



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON SCIENCE AND INNOVATION

Reference: Pathways to technological innovation

MONDAY, 23 MAY 2005

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON SCIENCE AND INNOVATION

Monday, 23 May 2005

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

Members in attendance: Mr Georgiou, Mr Jenkins, Miss Kelly, Mr Quick, Mr Tollner, Mrs Vale and Dr Washer

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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Committee met at 4.40 pm

CHAIR (Mr Georgiou)—Ladies and gentlemen, thank you for coming. 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. The inquiry arose from a request to the committee by Dr Brendan Nelson. We called for written submissions and over 70 have been received to date. This is our second public hearing. I call the representatives of the CRC Association. Would you like to make a statement about the capacity in which you appear today?

BULLER, Mr Christopher, Business Manager, Pest Animal Control Cooperative Research Centre

CAMPBELL, Dr Anne Judith, Executive Manager, Cooperative Research Centres Association Inc.

COOK, Dr Peter John, Chief Executive, Cooperative Research Centre for Greenhouse Gas Technologies

O'CLERY, Mr Peter Christopher, Managing Director, Sustainable Tourism Holdings Pty Ltd and Decipher Technologies Pty Ltd

CHAIR—Thank you. The committee does not require sworn evidence but I do remind you that these are proceedings of the House and deserve the same respect as proceedings of the House itself. It is customary to remind witnesses that giving of false or misleading evidence may be regarded as contempt of the parliament. I propose that we start with the CRC Association and then move on to the Rural Research and Development Corporation. Would the CRC Association like to make some introductory remarks?

Dr Campbell—The CRC Association is the peak body for the CRCs and all the currently operating ones are members. The program itself is a unique collaborative R&D program, which has been going since 1990. There have been 158 CRCs established and 69 are currently in operation. Each CRC has a range of participants drawn from universities, CSIRO and other research providers, government and, in particular, industry. The investment by industry in the program has grown since the program started in 1990 from about 12 per cent to about 25 per cent. CRCs are about bringing research users together with the researchers and these are long-term contractual relationships, so that is a particularly important component. In bringing these researchers and research users together, sets of skills and expertise are brought together that would not be available in just one institution. CRCs allow institutional boundaries to be crossed and also geographic boundaries. The research that is done in a CRC is multidisciplinary and team based. In this uptake and use of research, technology transfer is really important and the CRC program allows for technology transfer to be continuous, which is really important, from the early planning phase right through the project to the end, so that you do not have technology developed in isolation.

We see innovation as adding value to knowledge. We see commercialisation as diverse and heterogeneous. It is not just about producing widgets. In the wider sense, it is about the uptake and use of research. We see that there is no one pathway to successful uptake and use of research in commercialisation. Today we have examples from three different CRCs, in addition to the

number of examples we have provided in our submission. CRCs are all around Australia so, if you were having public hearings in other areas, you would find a rich source of material. Those are my initial remarks, and they will be exemplified by my colleagues.

CHAIR—Is there something common enough to be regarded as a classic CRC structure?

Dr Cook—There is, but it is changing. Until fairly recently the classic CRC structure would have been an unincorporated joint venture, which may or may not have had a commercial company associated with it. The government made it clear in the last round of CRC bids that it wanted to have all CRCs incorporated, so that will now be the new classic model. It was a classic model, unincorporated; now the required model is incorporated.

Dr Campbell—There are still two agreements. There is the agreement between the CRC and the Commonwealth. Then there is the centre agreement, which is the agreement between the CRC core participants as to how they will operate. The detail of the agreements will vary, but those two basic agreements underpin each CRC and the program.

Mr O'Clery—The CRC for Sustainable Tourism was incorporated from the beginning and that centre agreement that Anne Campbell referred to is by-law 1 of the CRC. It has the same broad operating rules but under a fully corporatised system.

CHAIR—Does the incorporation help or hinder or is it just something that the government decided?

Dr Cook—You would have to ask the government but I believe the view is—

Dr Campbell—Here is someone who is going through the process now.

Mr Buller—The change in the guidelines occurred in the last round, which forced all new CRCs to become incorporated. I think that went hand in glove with the way the program was repositioned in the R&D landscape. Previously, it was appropriate for some CRCs to be incorporated. The principles of the CRC programs—to bring together research providers and research users with some long-term seven-year certainty of funding—allowed the relationships to develop, the need for science and technology to be better assessed by research providers, and the type of research done and the way it was delivered to be done in such a way that the research users were sensitised to expect what was coming and more ready to adopt it. It depended which field you were in. If you were in the environmental and agricultural field, as I was, it really did not matter whether you were incorporated or unincorporated, but perhaps in some areas, such as where medical devices were being developed, it would have been much more useful to have been incorporated from the start.

Dr Cook—I will just mention an issue that we have in the incorporation/unincorporation area. We are actually an unincorporated joint venture, but we have a fully incorporated for-profit company that sits to one side and is called Innovative Carbon Technologies. That is the vehicle we use. A number of the institutions that we work with prefer to have an unincorporated structure. We have now discovered a problem that we are endeavouring to get resolved through Treasury. This really relates to the fact that we have discovered you can have a maximum of 20 organisations in an unincorporated joint venture. We feel this is an inhibition at the present time.

We have a number of companies knocking on our door wanting to join the CRC and there is a regulation, which I guess is part of the Companies Act, that says you cannot have more than 20 organisations in an unincorporated joint venture. We believe this is an inhibition on organisations wanting to come together. In the science and technology area, you need larger rather than smaller joint ventures, due to the nature of science becoming larger. We find that, for instance, you can have 100 dentists together in a joint venture, you can have X hundred doctors and you can have stacks of lawyers in joint ventures, but we have this really weird situation where you cannot have more than 20 organisations coming together for an R&D joint venture. We believe this needs to be fixed.

Mrs VALE—Is there any rationale behind the decision that you can divine?

Dr Cook—No. We do not see why lawyers, dentists and doctors should be allowed to have a great many people in their joint ventures when scientists cannot. We have brought this to Mr Nelson's attention and he is looking at it, but I suspect he might like some support from other parts of government to get this through Treasury or whoever is holding it up at the present time.

Mrs VALE—Thank you, Dr Cook.

CHAIR—Is there a typical formation process for a CRC?

Dr Campbell—Each one does vary depending very much on its participants.

CHAIR—Could we have some understanding of genesis and development?

Mr Buller—There is a bid process; we have just gone through the ninth round. The government issues the advice that groups can bid, and in our case a group of about 40 got together to develop a bid. If it is successful, the Commonwealth grant is made available to the new CRC company and the partners then provide both cash and in kind to support a research agenda. All CRCs that have just gone through a bidding round will be starting on 1 July or thereabouts and there will be a fair number of pieces in common in terms of their set-up process. They will all have to have independent members on their board and they will have to have a company constitution that follows particular ASIC guidelines.

Dr Cook—Quite often they grow out of a previous CRC as well. To use the example of the previous CRC that I ran, which was the Australian Petroleum Cooperative Research Centre, over a period of years it became evident to us that there was a great deal of interest in greenhouse gas technologies. So we evolved from a CRC looking at R&D for the petroleum industry and abroad to one that was highly focused on the issue of what technologies we can use to capture and store carbon dioxide for the long term. As part of the bidding process, we put in a bid for a totally new CRC which, rather than being a petroleum CRC, was a CRC for greenhouse gas technologies. So you can evolve and on that basis you are judged as a totally new CRC. The only advantage that you have is that you have got some of the infrastructure available there for developing the bid.

Dr Campbell—I think that is a considerable advantage compared with an entirely new CRC, because part of the bid process is bringing the participants together and getting a good understanding of what each wants.

CHAIR—So in this case there is an existing CRC. Who comes to the conclusion it is worth while establishing another CRC and who defines its mission?

Dr Cook—The mission of the CRC is defined by the board that you establish and the committee that comes together. They have a system that enables you to put out a very structured bid. It costs a lot of money to put together a bid—at least a quarter of a million dollars—to develop a bid for a CRC, so it really is quite an expensive business.

Dr Campbell—That comes down to the legal fees too.

Dr Cook—The legal fees are also very expensive. The whole thing is an expensive exercise but it then goes through a very rigorous process of review, using a variety of committees that have been put together by government. I think it is an appropriately rigorous process. There is a lot of money involved and I think that the process can withstand scrutiny. It is a very good process overall.

CHAIR—Is it worth while going through your specific CRCs and then coming back to questions? I just wanted to get some notion of whether or not there was a standard model.

Mr Buller—There probably is not a standard model but it may well be worth while running through some illustrations. We are talking about science and innovation and how it gets out to the business and public community. Some examples may well serve to show how CRCs vary but how they are all delivering. I will give as an example a CRC that I was involved in from 1991 to 1997, which was only one round of seven years. It was an interim funder of some research that had come out of universities and the CSIRO. At the time that CRC shut down, it did not have a significant portfolio of products. If we look at it now, there are new grains that are being marketed by a cooperative including the Australian Wheat Board, there is intellectual property in cellulose synthesis, and there are new technologies for plant molecular gene engineering, which were all brought together in the CRC. The industry partners in that partnership were the ones who acted as the magnet to draw the technologies out of the lab and into application. In seven years it was not possible to take them all to fruition but now we have companies which have taken up those technologies.

The CRC I am involved in now, like Peter Cook's, has just gone through the rebid process. We have gone from a partnership of seven that was highly scientifically focused to a partnership of 40 with a much greater market pull. As an example of a small product that has come out thus far, I will pass around a scent attractant that has come on the market recently. If you want to know what it smells like, you can take the lid off, as there is a small amount of retained scent inside. It is a lure for wild dogs and foxes. Wild dogs and foxes will take baits and they will cache them. They are smart and they will refuse to attend bait stations. This has increased the uptake of baits between three and sevenfold. It has come from our spin-off company. So we had a science-driven CRC in our previous existence but it spun off a company that went into the biotechnology and agricultural application niche and has found niche markets for things like this. So we have been progressively going more away from straight science return towards finding where industry needs products and applying our science to that. I can see that, with this much larger partnership, over the next seven years that will become a stronger feature of invasive animal control in Australia.

CHAIR—Can I take you back to your first 1991 CRC? How much money did you get from government?

Mr Buller—\$14 million.

CHAIR—Broadly, how much did you raise from your other contributors?

Mr Buller—About \$12 million in cash and about \$15 million in kind.

Dr Campbell—The leverage now is about three or four to one.

CHAIR—When you said that the work had not worked its way through, can you explain what happened and what was your evaluation of the success of the CRC at the point when it terminated?

Mr Buller—It did not put up a sufficiently clear argument that it should be re-funded after five years. In a competitive environment it was seen as having had a go at a set of objectives but not being competitive in the marketplace. At that stage when CRCs were first being set up it was a very competitive environment and there were probably many more stronger new bids than now. It was more the relationship between research providers in our field than the level of evolution of the products that we were running with at that time. It came back to the original partners having to take over the partly developed products and joining with the industry groups who had shown interest in the products and then taking them on to market.

Dr Cook—I will start by mentioning the previous petroleum CRC. We got external people in to do a review for us and we asked them what was the overall rate of return for every dollar put into our area of R&D. The answer was that it ranges from about five to one for our least useful piece of research to about 20 to one, so every dollar that was put in was producing \$20 in terms of the R&D. That was part of the rationale we used for going into the greenhouse gas technologies business because, surprisingly enough, the greenhouse gas area came back with the greatest returns. We asked why that was, because we do not put a price on a dollar of carbon dioxide. Much of that related to risk assessment and the risk that in the future there will be a price paid on carbon.

We were dealing with international companies who have to deal with countries where there is a price on carbon. That was one of the interesting results that came out of it. It was from that that we developed the new cooperative research centre. We have an interesting range of portfolios. We are concerned with the capture of carbon dioxide from major stationary sources such as power stations and that sort of thing. So in one way we are in the widget business: we are interested in developing a new type of sieve or a new type of solvent. We are getting our first patent at the present time, after just over a year of existence, and have others in the mill. If you could develop a system that would take carbon dioxide out of these major sources, that would be a very large prize. But that is not the only thing that we do, because we recognise the chances of success in an area where you have the United States and Japan putting in a massive amount of investment. So a very important part of our strategy is to take a portfolio approach. We are looking at a whole range of technologies and not trying to pick a winner at this stage. We are also making sure that we pick out the best partners to work with in the United States, Europe, Canada and so on. So we are putting people into those laboratories and we are having people

from their laboratories in our laboratories and so on, so we get a very strong interchange of ideas. That is certainly part of our strategy.

Know-how is also an important part of our commercialisation strategy. We are now called upon by overseas organisations and asked: 'How do we establish the risk associated with putting carbon dioxide into the ground?' or 'Can we determine there is no risk in this?' We have been acting as advisers on that sort of thing to organisations within the United States, so we have started to develop a portfolio of consulting activities and so on. The third thing we do is to provide a benefit to Australian industry and abroad. In many ways, that is the most important thing that we do. You can make some money from a widget, but quite often we can overdo looking for that sort of thing. I think these more broadly based things can be more important.

For instance, China is becoming a progressively more important customer for our LNG, our coal and so on. China is going to have to face the greenhouse gas issue as well, so what we have been doing just recently is looking at the options for storing carbon dioxide in the subsurface—geological storage, geosequestration—in China because, unless they can eventually develop this technology and apply it there, that probably will start inhibiting our sales of fossil fuels to these countries. Similarly, we are working with the Japanese and hope to develop some options for them too. But they are doing a lot of their own work, so I am not saying that we are doing all of it. These are the ways we can help a multibillion dollar industry. LNG brings many billions of dollars, and coal brings \$14 billion, a year to Australia. If we start losing a percentage of those sorts of incomes, that will have a massive impact in Australia. So we see ourselves as helping the risk strategy that Australia has to develop in areas like greenhouse gas.

Mr O'Clery—The CRC for Sustainable Tourism is now in its second term and has been going for eight years. It started out with five university partners and a couple of industry partners and over the first few years of its life it expanded to incorporate all state and territory tourist commissions, to include at least one university in each state, and in some states several universities—mainly universities that had some interface with the tourist commissions, or with which the tourist commissions would have liked to have had some interface. We found there was very little interaction happening. It built an enormous interaction, now with 16 universities across Australia, all the tourist commissions, most of the park agencies and a large number of big companies, including Tourism Australia. It has a network now that can pick up work that is being done in, say, south-western Western Australia and apply it in the Hunter Valley, and things that are happening in Tasmania can relate to some other work that is in the Northern Territory. What it has really done is establish a major network for the industry.

One of the particularly important things about it is that, while the tourism industry itself is an enormous foreign exchange earner, about 85 to 90 per cent of the operations within the industry are small to medium sized enterprises, and probably 80 per cent are close to being micro. So they are not ones that can put in a large investment. A lot of what the CRC has been doing has been to improve the information and opportunities for regional Australia to enhance its take from the tourism industry. Our research areas include IT, engineering, development of tools, working with agencies in relation to wildlife and regional tourism. On the commercialisation side, a lot of the work goes to aid the smaller enterprises. These are not necessarily things that you will be able to make big money from but what you can do is make the companies more sustainable, the destinations more sustainable and indeed the parks more sustainable, which are all an important part of the tourism industry. We do have a couple of spin-off companies; one is called Decipher

Technologies and that company was officially launched here in Parliament House on 11 February this year. It is providing information to the SMEs right across the tourism industry.

CHAIR—For instance?

Mr O’Clery—What it does is take something like 200 databases which can be accessed through one portal. A series of tools can be utilised for business planning or whatever—there is a series of information that you may normally require to upgrade your business plan or your marketing plan—and then it will alert you as new data comes in and replace the data that you originally accessed. It is quite a comprehensive program, using leading technology. It is a patented technology that has currently passed the international patent stage, so it is now going through the final phases in the US. That company is in full operation. Getting it through to that point was a challenging matter. AusIndustry helped significantly, first of all in joining with us and Amadeus and Ernst & Young in developing the prototype, which Jackie Kelly would remember. She launched it in, I think, this room. She gave a demonstration of the prototype. Subsequent to that, all of the state tourist commissions came on board and supported us in bringing it through the next phase, and now AusIndustry have come back in and helped us in getting it into the marketplace.

CHAIR—How much government money?

Mr O’Clery—Overall, we spent between \$6.5 and \$7 million, of which \$2 million would have come from AusIndustry and a fairly limited amount from the CRC itself. It mainly came through our partner organisations.

Mr QUICK—I have read through all these wonderful examples, which would be of use to people up in the Snowy Mountains who are worrying about feral animals and the like, people working in tourism who understand Decipher, carbon sinks and the like. But how do we collate all this exciting knowledge that has been gathered and commercialised and then filter it down to the ordinary, average punter who elects us every three years? If we come up with a recommendation that CRCs are the way to go in science and innovation and that we should treble or quadruple the millions of dollars given and expand it as the model for science and innovation, how can we filter that information down?

Dr Campbell—We have at the moment a national communication project, which we have run for two or three years, where we take the achievements of CRCs and put out media stories. This is based on the premise that, if you can excite people in the wider sphere, that is one way of getting the knowledge out. So we have focused on a media initiative in the first instance.

Mr QUICK—Once a year we have scientists meeting parliamentarians. The scientists bemoan the fact there are no decent science teachers in high schools, no-one is doing physics and chemistry and the whole world is coming to a grinding halt. That is the only time we see them in our busy life schedules. You people are operating all these wonderful things that are funded to the tune of tens of millions of dollars, but the results, to my mind, are not getting out.

CHAIR—They are very exciting.

Mr O'Clery—In the case of Decipher, our product is getting out to the operators across industry. Overall we have nearly half a million employees in the tourism industry and at least 100,000 companies. Our job at the moment is rolling it out through very complex arrangements with the state tourist commissions, individual sector organisations and regional organisations—and then there is the way in which the media then pick that up. We also get back the stories from companies and organisations that have used this tool as they put out their own story. It was great on budget night to hear of one company that had actually picked up and used Decipher describing what it had done to its bottom line. It ends up being reported in one of the newspapers in Orange and then others pick it up. We have to get those successes out. Nothing breeds success like getting out the stories of successful real life cases.

Dr Campbell—It is very much as Peter is describing, the CRC having responsibility for their own participants. The association can only do so much.

Mr QUICK—We have a fox problem in Tasmania and no-one in the fox task force has ever said there is this wonderful product called Feralgone. Is it operating in Tasmania?

Mr Buller—It is. It has only just hit the market, but the person from the CRC who has been working with the Tasmanian task force will be promoting this in the samplot areas.

Mr QUICK—You would only have to release that in state parliament and the message would soon be around. It would be so effective!

Dr Campbell—One of the achievements of CRCs is that it moves on, so you do not actually know it is a CRC technology. For example, a firm, Plantic Technologies, has picked up the biodegradable plastics technology and is making containers for chocolates. These containers came from the CRC for food manufacture and packing science. Now all you hear is the Plantic technology and you do not realise that it came from the CRC. We find that happens quite a lot.

Dr Cook—It is a very valid question you raise. I think most CRCs are pretty conscious of it and I am sure we could do better. We have a full-time communicator.

Mr QUICK—It is not a criticism. We read the submissions and see all these things happening and we do not hear all the great news. If we do not hear it, our punters are not going to hear about it, unless they are involved in the particular industries.

Mr Buller—I think that is the point. We each deal with some sectors of the economy and much of the work that we have been doing over the last year or so has been reported by the *Land* on probably on a monthly basis. The new dog and fox bait, the new feral pig bait, which is under development, and the cane toad work, which will be undertaken in the new CRC, are getting attention, but it is sectoral.

Dr WASHER—What has happened with the cane toads?

Mr Buller—Obviously if it was that easy, it would have been fixed a while ago. At the beginning of this year we were commissioned by the Beattie government to do a scan of investment that could make a difference to the cane toad problem. When you look at what is happening in the R&D landscape, you find that CSIRO are working on this very long term

biological control and traps being developed in Darwin and elsewhere. Between those two there is a huge amount of space. Through discussion with researchers it was decided the one thing you could do was to try and develop a new toxin. This is probably not something you would be able to spread from a plane, but it is something that you would be able to do to preserve sites and to build chemical fences to stop further invasions.

Fearing this over-claim of science, the Beattie government said they would invest in a two-phase process. There would be a discovery phase, where we would hit the opportunities very hard with the modern chemical and biological analysis techniques that are now available to us. If we managed to find some active ingredients that we think could be turned into a product, we would then go to a deployment phase where we would seek co-investment from industry. We have decided to take a strategic scientific approach to try and find a novel toxin that will preferentially target cane toads.

Mrs VALE—You mention the seven-year round for funding. Do you see any advantages or disadvantages in that length of time? Is that sufficient for the continued sustainability of the enterprise?

Mr Buller—I think anything less than seven years would stop you from funding the bluer sky work. You would be concentrating much more on the less risky work. Ten years is probably too long. It is my recollection that our skin turns over every seven years, so there is something about the seven-year cycle that seems to work. The competitive process every seven years does keep us on our toes.

Dr Campbell—It is very competitive and this last selection round was particularly vicious. They brought in a two-stage process, which was novel, and there were a lot of existing CRCs who were eligible to compete but, because it was such a stringent process, of the 25 competing, nine made it through. That was supplemented with another five entirely new ones.

Dr Cook—There is something remotely resembling envy in the CRC system when you talk to people overseas. Seven years is seen as a long time for funding and they are very envious of the fact that we can actually develop long-term programs, recognising that it does take a long time. I have just come back from the United States and they do not have seven-year funding. I think it is a very admirable feature of the CRC system. It helps us to lock in our industry participants. In our case each industry participant puts in \$250,000 a year. Even though we have large companies, to get \$250,000 a year out of industry is no mean feat.

Dr Campbell—They feel confident in doing that because of the long-term commitment from the government.

Dr Cook—They recognise that the government is putting in a long-term commitment, so it is a very good feature of the CRC system.

Dr Campbell—The core participants are very important, but there is also the opportunity for smaller companies to be associate participants. Each CRC will vary, depending on how it deals with its associate participants—these small and medium term enterprises.

Mr QUICK—Is there any disagreement about ownership of intellectual property with the involvement of overseas participants?

Dr Cook—At our CRC the companies have the opportunity to apply to the CRC, within the company, anywhere in the world. They do not have the right to on-sell that IP. They do not own the IP; we own the IP. That has worked very well in our case and we have had no problems. It is all held and they are shareholders in the company that we have holding the IP. They are usually a minority shareholder. It has not been a problem for us.

Mr QUICK—The cost for defensive and offensive patents?

Dr Cook—It depends on how you want to define that.

Mr QUICK—We heard in Sydney that when predators come you build a fence around the outer perimeter in order to protect the inner sanctum.

Dr Cook—That has not been a problem for us so far. We have gone for patents where it is the appropriate way to go. In some cases where we have seen it as a trade secret, we have gone that way as well. We have no one way of doing it. It has not been a problem so far, but we have a rigour about the way we do it. They all come in knowing exactly what the rules are on IP and they are happy to go along with those rules.

Dr Campbell—That is part of the CRC participants' agreement that you thrash out in detail at the beginning; that is very important.

Dr WASHER—Do you attract much overseas talent into this country with CRCs?

Dr Cook—Yes, we do. We are able to get a number of people from overseas. There is an interchange: we lose people, we gain people. I have not done the balance to see if we are gaining more than we lose, but people are very interested in joining CRCs from overseas. We do not realise what a great system we have here. It really gets an enormous amount of interest from overseas. They cannot believe how good it is. I have been and talked to the Canadians several times and they have finally put together something that really is a mini CRC. They said, 'It is nothing like as good as your CRC—it is about a tenth of the size—but it is the best we can do at the moment.' We have had people from Britain here, looking closely at our CRC and how we commercialise things, and, again, they were highly complimentary. I think it is a jewel in Australia's R&D crown.

Mr O'Clery—One of the particularly important things it has done is build capacities. Certainly for the industry that I have been associated with, the number of PhDs that have been going through the industry has been very significant and has done an enormous amount to broaden the view. What has also happened is that the research capabilities across our region have increased. In fact there is a cross-linkage with an APEC CRC type. They have tried to do something like it but their structures do not quite work. Nonetheless, it has meant there is an interface now between researchers within Australian CRCs and researchers throughout the APEC region. That again has given our people some additional opportunities, as well as some obvious benefits to our educational system, by bringing other people into Australia.

Dr Campbell—The PhDs trained in the operating environment of a CRC are much more workplace ready. I understand they get snapped up by the industry participants as they are not only technically trained but also have the other skills of time management, working within a team and other matters associated with IP.

Mr Buller—The CRC program gives us some unique opportunities. The new CRC that has just been successful has the US Department of Agriculture and the UK Central Science Laboratory as members. Through a series of workshops during the time we were working up the bid, it became clear that there were a number of areas of common interest where no one agency can make the necessary investment. We will be having PhD students working in the US Department of Agriculture and in the UK and we will have staff from those agencies working with us in Australia. That interchange is as important for setting up the future opportunities for young scientists to travel in both directions as it is to get the research opportunity underpinned at the moment.

Mr TOLLNER—Do you find there are areas where you cannot operate? For instance, do you find universities that are very cagey about the work they do or is it very open and everything is easily accessible?

Dr Cook—It is not very open and easily accessible necessarily. There is an element of competition when it comes to things that might be patentable. People are getting increasingly conscious of this. You have an underlying philosophy that scientists like to talk to scientists and they like to be fairly open about it; but there are limits to that these days. It is an unfortunate feature of becoming more commercially oriented, but we live with it. We still invite them to our meetings and we talk about things in a generic way, so everybody benefits.

Mr TOLLNER—You are pulling together all sorts of different organisations, from CSIRO to various universities all over the country, and they do get fairly cagey about their IP. Are you finding that easier as CRCs are more embedded into the psyche of Australians now, or more difficult?

Dr Cook—We are fairly rigorous these days in ensuring that we document background IP so that it is recognised. People are recognising that you are actually going to build on their IP and that you are attaching a value to that IP. There is a net benefit that is residually there in the future IP. That is certainly one way of doing it. At the end of the day you are also dealing with people, and some people are better than others at interaction.

Dr Campbell—That is one of the hidden things about a CRC. People say there is so much management cost in a CRC, but a CRC is about bringing together people from different cultures and different backgrounds. That is not easy and it takes time; they are managed relationships.

CHAIR—Are there any final comments that you would like to make to pick up issues that we should have picked up but have not, or are you happy? We will be coming back to you for some more information.

Dr Campbell—If you go to Brisbane or Melbourne, we can suggest some CRCs you might like to visit.

Mr QUICK—We would like to visit a couple.

Dr Campbell—They would be delighted to do that.

Dr Cook—I would like to ensure that the CRC is an essential part of the innovation process in Australia. Without the CRCs I do not know where we would be in this area. People claim we could do without them and spend the money elsewhere. But that just could not happen; we are an absolutely essential part of the innovation process.

Dr Campbell—We see too, with the Backing Australia's Ability time frame, that the money certainly has gone up on an annual basis but it is about to go back in 2011 to where it was at the beginning. So we would like to see not only that the CRC program has a permanent place in the R&D landscape but that the funding is maintained if not increased.

CHAIR—Thank you very much.

[5.29 pm]

NEWTON, Mr Alan Burton, Executive Manager, Rural Research and Development Corporation Chairs Committee

CHAIR—I welcome Mr Burton from the Rural Research and Development Chairs Committee. Is there anything you would like to add about the capacity in which you appear?

Mr Newton—I am the Executive Manager of the Rural Research and Development Chairs Committee, which is a cohesive organisation over the top of the R&D corporations to look after their joint interests and represent them in Canberra.

CHAIR—These hearings are privileged and we would like you to accord to them the same deference as you would a hearing in the House. To open up, would you like to make a brief statement?

Mr Newton—Thank you very much and thank you for the opportunity to meet with you and present this submission to your committee. I am representing the rural R&D corporations—there are 14 of them. Their characteristic is that they operate under government partnership arrangements sponsored by the Australian government—they are a co-investment model. We have 14 major industries, and each of those industries is very closely entwined with this arrangement. They fund it, and the dollars they put in are matched by the Commonwealth. They are set up under strategic management arrangements, so what they do is very much about scanning the future, looking at optimum ways to service their industry sectors and taking the nation forward. They are set up under Corporations Law; half of them are industry owned companies, and they mesh in with marketing and promotion functions as well as science and technology functions. But the 14 corporations are all there with one intent in mind: to maximise the global competitiveness of their industry sector, and to maximise the long-term sustainable production of those industries. So they are very commercially oriented, and distinguished from other models of R&D funding in that they are industry driven and market responsive. As I say, they are very closely directed by the industry sector. They have their dollars in there; it is an investment model. They do not conduct research in their own right. They fund research and their objective is to broker research in a way that will maximise return on investments.

My final point is that the corporations can straddle all aspects of the innovation system because of their particular flexibilities and arrangements. We have a pluralistic system in Australia where we are trying to balance the public and private sectors. The R&D corporations not only have a foot in both camps but they straddle the whole network so they can work very closely with their industries to make sure the priorities that they fund are well established. At the other end, they can make sure that there is a high level of adoption of the research undertaken so there are high levels of pay-offs, but they can also network right across the innovation system. They can invest in fundamental research and in strategic research, but they are more usually at the applied end. They can also work right through the value chain of their industry sectors to get all the players together and optimise the results that can come from research.

CHAIR—Can you select one project and take us quickly through the process? Who invests what, what is contracted out—just whatever is easiest for you or simple enough for us to grasp.

Mr Newton—A very good example, because it is so much in people's minds, is the Australian wine industry. The wine industry has been a player in the research and development corporation mode since its inception. It has not been a large contributor to research, but I think that is part of the success of the model that I can illustrate. This is an extraordinary story. When you look at the Australian wine industry, say in 1983-84, you find the level of exports from that industry—which was a very good reflection of the size of the industry and its economic moment in Australia as well as overseas—at that time was about \$3 million or \$4 million, and I emphasise the word 'million'. You have the situation now, 20 years on, where that industry's exports are worth over \$2.6 billion, and that is a reflection of the size of the industry.

The transformation of that industry, which had been around for 200 years at that stage, was to a very large degree underpinned by technological innovations—with a framework where the industry and the government were working together to put their dollars in, to very carefully scan the environment, to look at the maximum hits they could make to get pay-offs and take that industry forward. They also were able to fund through this the Australian Wine Research Institute at the Waite Research Institute in the University of Adelaide. They were able then to have a dedicated science capability for that industry, and we know the rest of the success story: the wine industry has captivated the world; it has changed the technologies; it has been at the forefront of the new world wine developments. It is now leading the new world producers in terms of market penetration and innovation in the industry, and it is changing the whole culture and the whole nature of wine—the way it is marketed, produced, sold and everything else.

A very simple example in recent times is what they call in the industry closures. That is a fancy word for saying you are replacing cork with something else that closes. This example is a good demonstration. There were not a lot of dollars that went into it, but the industry, through the R&D mechanism we are talking about—the Grape and Wine Research and Development Corporation—was able to fund the industry research and development of that closure mechanism.

Mrs VALE—Excuse me, do you mean the screw tops on the bottles of wine that are absolutely fantastic?

Mr Newton—That is right. If you look at that particular invention, it demonstrates fully what I am talking about with the R&D corporations. A particular problem that the industry had was able to be identified—something that was an obstacle to getting greater acceptability of wine, better marketing and better adoption of Australian wine around the world. One in 10 bottles of wine was tainted in one way or another, so this was a solution for that problem. It is something people have wrestled with for a long time and, as you know, they have tried all sorts of ways of getting around it. But in the end, the wine industry focused on it and developed a solution. And the classic thing you get with a model that is industry driven and industry owned is that the industry stays close to it and you get extremely high levels of adoption of the research finding. In the case of the wine industry, they were able to take this through and get the research done, but they had the industry working with them all along the way, to trial it and work with it.

One of the major companies funded a person to work full time in their organisation to look at the practical application of the technology and get it applied. But because of the way the industry research operates, every winemaker around the country, from the smallest to the largest, had access to the results of the work of that one person on the applicability. So those closures have been developed in a short time. You can see the rapid way it is extending throughout the industry, not only in Australia but around the world, because there is free and open access. The benefit to cost ratios from that particular investment were 187 to one. We achieved across the R&D corporations average rates of benefit to cost of six to seven to one; that particular one was 187 to one. So there have been high rates of adoption across the industry, tremendous commercial returns to the industry, satisfaction of the consumer, and more development of the wine industry throughout Australia. So that is an example of technology underpinning the progress of the wine industry.

Another simple example is what they call partial root zone drying. The wine industry is a very large user of water, and water is a very scarce commodity. So the wine industry over time has gone to drip irrigation to economise on the usage of water, and it is probably consuming something like 30 to 40 per cent of the water previously used. With partial root zone drying, it was worked out that the drip could be put on one side of the root system and water denied to the other side. So the vine is deluded into thinking that it is in drought and economises on its use of water. You will find that if a vine has a lot of water it deposits that water into leaves. When you deny it water, and it adapts to the harshness of the circumstances, it puts it into the fruit, so you get very good fruit. That is an example of another technology that has been applied through the industry to take the industry forward, to get not only a greater economy in the use of water but also better production of fruit. That system is being applied to other areas of horticulture. So they are a couple of snapshot examples.

The marketing system that has been taken across the world would be another. The co-investment model works by industry putting their dollars up, encouraged by a very favourable government arrangement where the government sets up the legislation, collects the levies for them and matches the dollars they spend. They work collaboratively with research partners not on the basis of supply push of funding research that might come to some good but on the basis of market oriented research—funding things that the market has said are high pay-off areas and driving them to commercial success. That is an example of the very good model.

Dr WASHER—I know about some of those things of course, they are good. I think these new closures, Stelvins, have been a hell of a jump forward and really make a big difference. An interesting thing is that, of course, it is not just that screw top, it is the management of the wine pouring and the wine ullage so it is quite sophisticated. The use of technology again has been tremendous and a compliment to you and your industry.

Mr QUICK—Failures? Would the sugar industry be an example of less innovation, less R&D and more reliance on the benevolence of the federal government of either persuasion?

Mr Newton—I think the sugar industry is probably an example of the great success of these arrangements. I have had quite a bit to do with the sugar industry over the years, and I was on the 1996 National Competition Policy review of sugar. There are two words, unfortunately, you are not able to mention on the sugar industry, and that is structural adjustment, and that has been unfortunate. But it has been a very good industry. In recent times this R&D corporation model

has been at the centre of the positive developments that have come out of the industry, because when the industry is in hardship, the Sugar Research and Development Corporation has been working with it on cultural change. They are having quite a bit of success. CSR has been a leader in this field. They mapped out the parameters they wanted to see their suppliers go forward with in the industry, and the sorts of gains they want their producers to make. Those producers have been able to come to the Sugar Research and Development Corporation which has acted positively to get the change in values and approaches within the industry. It has been a very positive force. So when an industry is down on its knees, this is a very important avenue to try to make them internationally competitive and accept the realities of change and to foster the development and change that is appropriate for the times.

Mr QUICK—How do we compare with New Zealand? There seems to be a perception that New Zealand lead the world in rural research and development, considering their size and the fact that they are producing the same sorts of things as us and we have 10 times the population. They are competing with South Africa and South America either side of them, yet everywhere you go in Europe, New Zealand is in your face be it dairy products, meat and the like, and it is always exceptional quality. They are up in the Asian markets as well. Do they have a similar structure to ours? Are they behind us or ahead of us?

Mr Newton—I would put them behind us. What they have over there is a crown research system. They rather fashioned it to an extent on the R&D corporation model because we had this in place some time before them. They went to I think six crown research institutes in their major spheres of economic activity. When you look at the councils that are driving those research institutes, they are essentially research provider type people. They are government people, and they are scientists; it is not an industry driven mechanism, and that is the strength that we have. But the New Zealanders are very innovative people. They have set their sails to be in tune with international competitive arrangements. They are the lowest protected major agricultural producers in the world, just below us. So they are very entrepreneurial, very marketing orientated, they are small, they are flexible and they are dominant in a couple of industries. They are superior producers in the world in dairy, for example, they lead the world and we lag behind them, but we are catching up. So, too, in horticulture where there are some industries in which they really excel and lead the world.

When you are talking about marketing, lamb is a good example. It is always a lesson to go overseas, and look in European supermarkets for Australian products, and you find New Zealand lamb right up front. It is hard to find the Australian product. But remember they also have also had a lot of benefits. They stayed as a major client of the United Kingdom when the United Kingdom moved away from Australian suppliers because they believed we did not need them as much as the New Zealanders. When they moved into the Common Market, they kept the New Zealanders. So the New Zealanders had an edge from a marketing point of view. But you will find that our system of R&D is competitive with them. Across the board, we might be struggling, because they have always been very good investors in research and they have some very good scientists; quite a few of them come to Australia, of course, but in terms of that pointy end of industry driven research, we would certainly have the edge on them.

CHAIR—Can I just take you back to sugar? What did the sugar research body actually do? You spoke about culture change and that is fine but what did they do in terms of innovation to assist?

Mr Newton—The Sugar Research and Development Corporation has done a lot of things. A very good example is a new system of wet blanket harvesting. Sugar producers for many years used to cut away all the cane and so on and clear it all off and burn it. What they discovered in recent times, through the auspices of the Sugar Research and Development Corporation is what they called a ‘wet blanket’ type harvesting. They stripped all the surplus vegetation matter off and left it on the ground. They did not burn it, and they found that the burning, which they used to kill rats as much anything else, had a detrimental environmental effect on the ground, and this wet blanket harvesting has led to significant productivity increases and a lot of environmental sustainability type benefits. So I could really get you loads and loads of examples of successes and that is one of them. The Sugar Research and Development Corporation funds right through the whole system including the milling of sugar and the poll content, which is the central aspect of the sugar. In the immediate time, when they are in difficulties, they have become a centre for cultural change. That is where CSR and others have decreed particular productivity gains they need to make and the best practice levels they want their producers to achieve. Talking to Russel Muchow, who is the Executive Director, he is a scientist, but he has told me that he has found it quite extraordinary that these people come to him almost for counselling on how they can change and how they can adjust. So what you have had is the identification of the movers and the shakers in the industry. The people that have a future in the industry and want to see a different industry have someone to talk to, and that corporation has been backing them up with research and focused advice and so on to help them through that transition process.

Mr QUICK—The wine industry is the shining example. Obviously they would not be getting any Commonwealth money; they would be big and ugly enough to look after themselves.

Mr Newton—The wine industry? Well, you have to remember that there are elements of the wine industry, and what we tap into is generally the growers’ side. So the wine companies might be large and international players, but the growers’ side of the industry is different and this drives most of the Rural Research and Development Corporation arrangements. At the point of sale of the product, a levy is collected and that is matched by the government. So, government dollars go into the system, but it is off the back of grower contributions. The corporates come in over the top with all the manner of things they do as international players. I gave that example of one of the major companies, where the industry was pushing the closure research and development, and they engaged a full-time operative to work out how it could be applied in practice. Then those gains were spread right across the industry as a free good.

Mr QUICK—So the issue of GMOs in the canola industry and the like?

Mr Newton—Well, that is a very good question and one of the major obstacles—and you refer to obstacles in your terms of reference—progressing the Australian agricultural and rural industries. It is quite clear that there are tremendous gains to be made by GMOs, but they need to be explained and sold to the public, and the public needs to get behind them. At the moment, we have some political impediments by way of the moratoria that are around the place and different regulatory mechanisms that are looking at this, so we are not going forward on GMOs. But let me tell you the one success story. The one success story is the Cotton Research and Development Corporation. There are only two marketable products that have been put on the market and developed in Australia; one is the Floragene development of a blue carnation which we will put aside, but the real success story is cotton.

The cotton industry was a very big user of pesticides, with a lot of stray drift complications in terms of neighbouring communities, health concerns and that sort of thing. So the cotton industry worked with Monsanto to develop what is called BT Cotton. That is their first-round Ingard cotton, first-round GM product. They developed that product in concert with Monsanto and, because of the close relationship they have in their industry, they achieved close to 100 per cent rates of adoption. So they developed this new technology, and all of a sudden all the cotton producers were able to use it. You do not get in other industries that sort of close networking. The introduction of that cotton led to something like a 75 per cent reduction in the level of pesticide use, which added a lot to the bottom line of the cotton producers in tough times but also took all those chemicals out of the environment and out of concern for the consumers.

If you take that story further, in 1985 the Australian cotton industry were using American varieties of cotton; we had to pay royalties and all the rest of it. They determined that they would develop premium varieties in Australia—they had Jim Peacock, head of the CSIRO Division of entomology at the time, on their board—and they worked very closely with CSIRO. It took them 10 years but they developed world premium cotton varieties. They not only developed them but linked them with that GMO development, the BT Cotton, and they went to an extra step in that and got even further economies. But they now have the world's best cotton and the world's highest regarded premium cotton varieties. The Europeans use it and the Americans use it, and they pay royalty streams. So there are significant royalties that come from those premium cotton varieties to the CSIRO and to the Cotton Research and Development Corporation.

Mr QUICK—But the ordinary average Australian does not understand or see that. They see Dilmah teas and all the wonderful things that are happening in Sri Lanka constantly on their TV, but we never see these happy, positive stories about the decrease in insecticides, which is a real environmental issue for a fair proportion of our population. We have had the whole issue of GMOs in Tasmania with the green movement and the like. It is detrimental in some regards, but there are lots of positives, especially our proximity to some of our Asian neighbours. So how do we convince people that you have done some positive things and we can use those advantages?

Mrs VALE—That is a fantastic question. Everybody loves a success story. I do not have any science background at all—one of the reasons I am on this committee is to learn—and I found it personally satisfying just to listen to your stories here tonight. Do you produce any material, further to Harry's question?

Mr Newton—I have some here.

Mrs VALE—There is a good book to be written here.

Mr Newton—We call it an e-zine; it is an e-line magazine, and we put out about four copies a year. That is meant to give captivating stories. But it is a tremendous challenge to communicate effectively.

Mrs VALE—Even one story every few months should be in a women's magazine or something.

Mr QUICK—Put all the 224 politicians on your email list.

Mr Newton—You are supposed to be on it.

CHAIR—No. I can tell you that because I delete all my own emails.

Mr Newton—I will make sure you get them. The rice industry is a simple example which is also in this fold. That is a pretty localised industry, and you get these high rates of adoption. There is a thing called clusters. If you really want to develop industries in regions, Michael Porter's concept of clusters. But the cotton industry is a fine example of clusters. Michael Porter says the Australian wine industry is the best example of cluster development around the world. That is where you get all the regional development.

Mrs VALE—And that is how you get your good, quick take-ups, too, is it not?

Mr Newton—Well, you certainly get solid take-ups. The whole idea of a cluster is that you develop not only an industry but you link in with technological capabilities, you link in with education and get an established platform in your domestic market and then you go global. That is the idea of a cluster. The Australian wine industry and the cotton industry are two examples. The rice industry is a good example of a cluster, being located in a localised area around Leeton and those sorts of places.

One of the marvellous bits of innovation in the cotton industry is that when you plant cotton, you have to submerge the plantation in water, it is paddy. The problem is that you are very captive to the leakiness of soils. If you have leaky soils, all your water drains away. So what the cotton industry did was develop an electromagnetic sensing system where they can focus this on the soil and they can identify whether it is going to retain moisture or not, so they can say 'Don't put your paddy there, put it over there.' That has led to a very significant reduction in water use and greater efficiency in the cotton industry. They also develop premium varieties and once you develop them you get 100 per cent rate of adoption, and that is what they did for this electromagnetic system for sensing and detecting of soils. But they also spawned a second industry because there are people out there going around installing this technology in the rice industry.

You talk about pathways to commercialisation. The first thing is, we have to find the system that will work for Australia and is appropriate to serve Australia's circumstances and picking up metrics that have worked overseas like start-up companies or patents and so on might not be applicable to Australia's circumstances where there are better ways of doing things. We go for adoption and utilisation of research, and often you will find that the commercialisation follows, rather than leads, the research. In two ways: for a start, the overall intent of what we are trying to do is drive the commercial success of our industries. So we do things like long-term investment in human resource capabilities; it might be a whole manner of things. We are all about keeping those people alive and in the marketplace long-term, their commercial future. So that is a commercial outcome. In the case of cotton, with premium varieties, the Australian industry went out in 1985 to develop premium varieties so they could get a market edge and so they would not pay royalties to the US. Now they are getting royalty streams. That followed rather than preceded the research.

Mrs VALE—What is our major overseas market for cotton?

Mr Newton—China has been. We have a mixture of clients including India, but it is a tough world at the moment because you have heavily subsidised cotton out of the US, which is making market circumstances very tough, and you have growing production and protection in China. So, the market is tough at the moment and we are being rather opportunistic and picking up markets where we can. China has been a big market for Australia, and India is, but they have a variety of markets.

Mrs VALE—Hopefully we might get some return on the royalties. On the understanding that there is a lot of money in flowers today, I am interested that you said you just shelved your blue carnations. It is absolutely fascinating.

Mr Newton—No, I said that Floragene was the company that developed it, but I do not think it has gone anywhere. We do maintain an interest in the flower industry and the nursery industry, so they have research and development involvement in this scheme developing new products, getting wildflowers out of Western Australia into export markets and getting patents where we can.

Mrs VALE—It sounds fascinating, given how much flowers actually contribute to the Dutch economy.

Mr Newton—Some of those that they have are Australian unfortunately.

CHAIR—Alan, thank you very much, that has been really useful. We might get back to you with some more questions, but thanks, that has been really illuminating.

Resolved (on motion by **Mr Quick**, seconded by **Dr Washer**):

That the committee authorise the publication of evidence given before it in these public hearings.

Committee adjourned at 6.01 pm