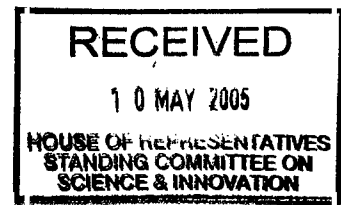
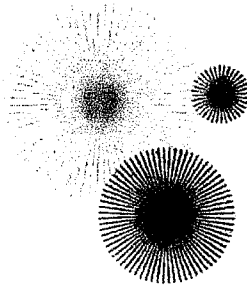


Australian
Innovation
Association



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May 6, 2005

Dr Anna Dacre
Secretary
Standing Committee on Science and Innovation
House of Representatives
Parliament House
Canberra ACT 2600

Dear Dr. Dacre,

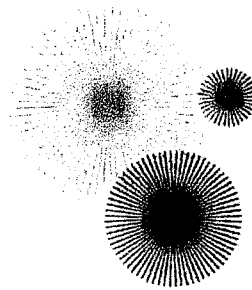
I attach a submission from the Australian Innovation Association to the inquiry into pathways to innovation.

As mentioned at the conclusion of the submission, we will, if the Committee desires, provide briefings on the experiences of two of our member companies, ResMed Limited and Vision Systems Limited.

Thank you for the opportunity to put our views forward.

Yours sincerely,

Jim Carlton



AUSTRALIAN INNOVATION ASSOCIATION

In July 2002 a group of researchers and investors launched a new body, the Australian Innovation Association (AIA), to represent the interests of R&D participants around the country.

The objectives of the AIA are to advance Australia's capacity for innovation and to promote a consistent and certain environment for R&D, thereby enhancing the country's international competitiveness in the years ahead.

RATIONALE FOR THE ESTABLISHMENT OF THE AIA

- R&D is crucial to Australia's future. AIA would seek to increase the profile of investment in R&D.
- AIA seeks to promote interaction and sharing of ideas on the key issues for successful R&D, while fostering best practice in R&D.
- AIA investigates the impact of Government policies on R&D investment.
- AIA seeks to promote the benefits of investing in R&D and of a consistent and certain long-term public policy on R&D.
- AIA seeks to facilitate cooperation between government and R&D participants to achieve R&D policy aims and to encourage the development and growth of R&D businesses in Australia.

OBJECTIVES OF THE AIA

The central objective of the Association is to advance Australia's capacity for innovation, thereby enhancing the country's international competitiveness. To achieve this goal, the Association will:

- Assist in the creation of a certain and consistent environment which is favourable to the development of the Australian research and development industry;

- Promote a bipartisan political agenda in which members may participate and be at the forefront of the development of long-term and consistent public policy for innovation;
- Promote greater public awareness of the benefits associated with increased research and development investment;
- Represent the interests of members in dealings with Government Ministers, departments and agencies, Members of Parliament and with any other persons or organisations deemed appropriate by the Committee; and
- Undertake any other activities the Committee determines to be in the interests of the Members.

AIA COMMITTEE

The Committee controls and manages the affairs of the Association and comprises:

Chairperson – The Hon Jim Carlton AO;

Deputy Chairperson – Dr Jim Fox, CEO, Vision Systems Limited;

Treasurer – Mr Allan Moss, Managing Director, Macquarie Bank Limited;

Secretary – Mr Chum Darvall, CEO, Deutsche Bank Australia & New Zealand

Dr Peter Farrell, CEO, ResMed Incorporated;

Ms Mary Foley, CEO, St Vincents and Mater Health Sydney.

Prof John Niland AC, former Vice Chancellor of the University of New South Wales and Chairman of Research Australia Limited;

AIA MEMBERSHIP

Membership is by invitation to serious players in the fields of investment and research. The membership includes those at the cutting edge of R&D and R&D technology commercialisation; investors who have a genuine interest, and proven track records, in R&D investment; and universities and non-profit organisations which may have commercialisation arms.

WHAT THE AIA HOPES TO ACHIEVE

- Accelerate industry based R&D
- Secure a bipartisan approach to R&D policy and consistency between various government departments
- Contribute to policy developments and debates on R&D
- Take a close look at what propels R&D and what needs to be done to reinvigorate the investment climate for R&D

- Investigate and achieve effectiveness of government support for, and targeting of, R&D promotion.

ACTION PLAN

The AIA has produced an analysis of the key factors for success in R & D worldwide and has gained the input of its members to determine the key success factors in the Australian environment.

During 2003, in collaboration with the Australian Institute for Commercialisation, we conducted a dialogue with those senior Federal public servants tasked with preparing the Government's update of its 2001 "Backing Australia's Ability" policy statement. In November 2003 we put a formal submission to the Government outlining what the AIA considers to be the basic requirements for successful commercialisation, and made recommendations designed to enhance Australia's ability to meet those requirements. Given the extensive consultations we had pursued throughout the year our submission was well received, and in general we were pleased with most aspects of the Government's new policy statement of May 2004.

Since then the Association has vigorously pursued an issue of great concern to many of our members, namely the treatment by the Australian Taxation Office of investors in R&D Syndicates. It is hoped that this long-standing matter will be finalised by the end of 2005.

AUSTRALIAN INNOVATION ASSOCIATION

SUBMISSION TO THE HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON SCIENCE & INNOVATION INQUIRY INTO PATHWAYS TO TECHNOLOGICAL INNOVATION

The Australian Innovation Association (AIA) is a body formed by a group of investors and researchers actively involved in the commercialisation of Australian scientific and technological inventions. The objectives of the AIA are to advance Australia's capacity for innovation and to promote a consistent and certain environment for R & D, thereby enhancing the country's international competitiveness in the years ahead. A description of the AIA, including the composition of its Committee of Management, is attached.

The views and proposals put forward in this submission are drawn from research and consultations carried out in partnership with Dr. Peter Jonson, Chairman of the Australian Institute for Commercialisation, during the Government's 2003 review of the "Backing Australia's Ability" policy package. We also drew heavily on the experience of our membership, which includes R&D based companies, investors, and university and institute researchers. We are grateful for the support and encouragement of officers in the various departments working on the review and also for input from the CSIRO. Nonetheless the AIA takes full responsibility for the content of the submission.

Introduction

Government support for basic science and innovation is high by world standards. It is generally agreed that Australia is not short of ideas generated by scientific and technological research, but that we have not so far been good at turning these ideas into profitable business enterprises. Business expenditure on research and development (BERD) is low by OECD standards. However BERD only measures inputs, and even if it were higher it would not necessarily indicate success in what we are looking for, that is, the profitable commercialisation of inventions.

In the view of the AIA, there are four basic underpinnings of successful commercialisation:

- A globally competitive market economy
- A carefully designed and targeted set of government support measures, consistent through long time frames and applied fairly, to offset the market disincentives to investment in R & D based enterprises, namely, high risk and slow pay-offs.
- A culture of scientific and technological enterprise, within which talented and entrepreneurial individuals are attracted to work in and direct globally oriented, R & D based companies, and there is close collaboration and understanding across the publicly funded research / industry divide.
- A supportive R & D focussed infrastructure, including a number of existing export directed technology businesses undertaking industry based R & D,

together with government supported institutions and processes to link research output to commercialisation outcomes.

Globally Competitive Market Economy

Without the substantial macroeconomic reforms at federal and state levels over the last twenty years, and without the development of a sound macroeconomic policy framework, we would not be even beginning to address the commercialisation issue with any sense of reality. In recent years the Australian economy has developed a capacity to grow at a fast rate without inducing inflation, and it has successfully weathered the Asian economic collapse and the more recent U. S. economic downturn.

Some sectors remain to be reformed, such as the construction industry and government delivery services, notably health, education and police, all of which are subject to serious restrictive work practices, as well as organisational and management weaknesses. The universities, too, have poor governance and management frameworks, and systems of assessment and reward that are not conducive to the encouragement of good performance.

We shall return to the question of schooling and university education and research when we look at the issue of culture, but for the most part Australia's overall economic performance, coupled with our investment in basic science and technology, is such that it provides a good platform for the successful commercialisation of science and technology. It is however a necessary, but not sufficient, condition.

Government Support Measures

It cannot automatically be assumed that government intervention in the market place specifically designed to support commercialisation is necessary. The case has to be argued, and it has to be said that the empirical evidence for it is not conclusive to the degree that public policy makers normally like to see. The factors causing this lack of clarity in the outcomes of analysis appear to be:

- The long time gaps between the idea and the commercial reality, often ten to twenty years. In the notable Radiata case, it took almost a decade to come to fruition, preceded by some thirty years of intense research activity in the relevant field.
- The high incidence of failure, quite normal in this field, but difficult for public policy makers to justify in terms of public expenditure.
- The absence of any single cause and effect linkage (no 'silver bullet'). Most successful countries have a wide range of policy instruments, no one or group of which can usually be linked consistently to multiple successes.
- The differing cultural influences between countries, as well as differing legal systems and economic policy frameworks.
- No clear agreed output metrics or international benchmarks that can be used to analyse performance.

It could be argued that because Australia's remarkable economic success over the last twenty years has been derived not from the commercial development of Australian ideas, but from the successful application of ideas available from various sources, it is not necessary for the purpose of economic

development to have a serious indigenous creative engine to help drive future growth. Hence, it could be argued, government efforts should be devoted not at intervention to promote the commercialisation of indigenous ideas, but at removing the remaining structural inefficiencies in the Australian economy and international trade barriers, and the lowering of transaction costs generally.

The AIA believes that it would be a brave public policy maker who accepted this argument, even though he or she would be well into retirement before being proved wrong. We believe that although the evidence is inconclusive, and the available mechanisms uncertain in their long-term efficiency, the indications are sufficiently strong to support a decision to actively promote the commercialisation of indigenous ideas, including those with elements of international collaboration.

In 2002 the AIA, in collaboration with the Australian Institute for Commercialisation, commissioned a survey of the critical factors for successful R & D in a number of overseas countries. Mr. Alex Erskine, principal of Erskinomics Consulting Pty Ltd, who conducted the survey, began with the scepticism of a good market economist as to the usefulness of government intervention in this area. After looking at the experience of six countries with successful R & D based industry, he was convinced that the long time frames before pay-off and the high risk of failure meant that carefully designed support measures, consistent over time, led to substantially better outcomes.

For years our outstandingly successful biomedical research scientists have been telling us that unless we have world class medical research institutes attached to our major teaching hospitals, then the quality of health care in Australia will gradually fall behind world best practice. There is considerable evidence that despite poor management systems in our major hospitals, the day-to-day interaction of our health practitioners with internationally connected and competitive researchers has been a major factor in achieving the high quality of health care we enjoy in Australia.

It is intuitively inconceivable that Australia's future economic growth would not be enhanced by the existence of an indigenous body of vibrant scientific and technological entrepreneurship working within and alongside Australia's primary, secondary and tertiary industries. Countries such as Finland, Sweden and Israel attest to this. In the view of AIA its desirability is incontestable. The difficulty is, how do you encourage it through public policy instruments? Before looking at specific support mechanisms, we need to look at the supremely important issue of culture.

Culture of Scientific and Technological Enterprise

"First, it is all about people - leadership, risk taking, celebration of success, support for the failures. People build businesses and people trade - not companies, not governments."

Dr James Fox, Managing Director, Vision Systems Limited, and Deputy Chair, AIA. The Warren Centre Innovation Lecture 2002.

At the heart of successful commercialisation of ideas is the person who has the vision, leadership skills and personal drive to see an opportunity and bring together all the elements needed to create a successful business around it. For our purposes here we must envision a business of sufficient size, usually implying global reach, to have some impact on the expansion of the Australian economy. Dr. Fox is one of those people, and Dr. Peter Farrell, CEO of ResMed Inc., also on AIA's Committee of Management, is another. Australia's problem is that there are far too few Foxes and

Farrells to make use of the extraordinary array of ideas that emerge in Australian science and technology.

It is not hard to see why we do not produce many such people. There are people with the potential entrepreneurial drive and skills we are talking about, but they are not working in this field. Most bright students will be encouraged by their parents, by social pressures, by the kudos attached to certain occupations or by the financial incentives to enter the higher paying professions, or the more remunerative areas of the finance industry. Normally those pursuing science or engineering degrees will have lesser expectations of financial reward, and will receive neither training nor encouragement to become R & D oriented entrepreneurs.

Returning to the roles of our schools and universities, mentioned earlier as having for the most part escaped the cascade of institutional and economic reforms of the last twenty years, we find a culture that is more likely to tolerate mediocrity than encourage high performance, let alone entrepreneurship. In the majority of schools the absence of effective performance measurement and individually tailored professional development for teachers has led to the retention of poor teachers, discouragement of good teachers, depression and uniformity in pay scales, lessened parent and public respect, and low professional morale. Without a culture within schools of respect and reward for the best teachers and a constant striving for the best outcomes, it is difficult to imbue students with a will to achieve. It is a tribute to the professionalism and dedication of individual teachers and principals that so many students do emerge with positive attitudes and a desire to excel, but it is not the norm.

The resistance to performance measurement applies not only to teachers, but also to students. The desire to see no student disadvantaged by comparison with others has led to an absence of competitive spirit, together with inadequate performance enhancing feedback to students and parents. To excel in sport is more highly regarded than to excel in scholarship. If Australia comes second or third in sport, it takes firm action. Not so in scholarship.

Successful reform of our school systems, particularly in the public school sector, will not of course produce science and technology entrepreneurs, but just as the economic reforms of the last twenty years have provided the necessary but not sufficient condition for the successful commercialisation of indigenous ideas, so too will a vibrant school system provide a base on which can be built a higher regard for science and technology, and the uses to which it can be put.

Our universities suffer from similar problems to the schools. The way universities are governed and managed, and the way academics are rewarded, hardly encourage teachers, researchers or students towards entrepreneurship. University councils, composed largely of representatives of particular interests and generally too large, struggle to perform the role of a board of a large enterprise. Those in top management roles often have had no training in the management of large scale operations, and have inherited management structures and systems singularly ill-suited to the unique cultural requirements of the complex institutions they are required to manage. And of course the centralised and unionised systems of rewards led one Vice-Chancellor to remark that "Every Vice-Chancellor has a professor worth twice what we pay and one worth half."

Little wonder then that in the areas of university research few universities have developed systems of encouragement for researchers to improve their connections with industry or to seek actively to convert their intellectual property into viable commercial assets.

The AIA argues that the creation of a culture of science and technology based entrepreneurship (call it STE culture for short) is even more important in this policy area than a raft of economic incentives, important though those are. We do not argue that all areas of human activity need to be

imbued with this culture. We do not argue that it should be at the expense of disinterested scholarship, for example in the humanities, mathematics or pure science. However if, to use the economists' term, 'at the margin', we can create a climate whereby a significant number of our best and brightest will regard it as worthwhile, whether financially, or in terms of social standing or mere personal satisfaction, to devote themselves to STE, then over time it will lead to a quantum leap in our national performance in the commercialisation of indigenous ideas.

The difficulty in achieving a STE culture is that it requires action across a broad front. A myriad of individual changes and reforms will be needed, some easy, some very difficult, some challenging vested interests. These include proper incentives to reward entrepreneurship within the public sector, freedom to allow secondment and rotation of staff between science and industry, and structures that nurture such activities. However provided the reform program is carefully designed and understood, coherent and interlocking, and pursued with quiet determination over a long period, then it will succeed.

We have two national examples of major culture shift to use as analogies. The first, affecting all of us, is the change over sixty years or so from a predominantly Anglo-Celtic culture to one of incredible diversity, richness and capacity. In retrospect this is a remarkable achievement.

The second example is our economic transformation over the last twenty years. Inward looking secondary and tertiary sectors have been changed into globally aware and globally competitive participants in the world economy. Organisation structures, management systems, work practices, attitudes to competition - all these have been changed dramatically, as have the mindsets of those responsible for managing and working in the enterprises in each sector. No single reform measure brought about this culture shift, and indeed most individual measures were opposed by vested interests. The advantage of each individual measure may have seemed small, but the sum total of them altered the course of lives and ensured our prosperity in a changing world.

Bringing about a STE culture, seen against these two examples, will be seen as less all encompassing, yet the outcome will be critical to success. The change in the nature of basic institutions required to assist the culture change will be difficult, affecting as it does some of the remaining unreformed sectors of our national life, in particular the schools and universities. Fortunately some of the measures needed to achieve a STE culture can be put in place without major systemic change, as we shall see later. Cultural change needs leadership from the top, involving continuing articulation of its desirability and benefits, and prominent recognition of instances of success. It needs the creation of a new breed of national heroes.

Supportive R & D Focussed Infrastructure

Success breeds success, hence the importance of an existing base of successful entrepreneurship that will actively pursue research based commercial opportunities and apply a global marketing perspective. It should be noted that Australia represents only about two percent of the world economy and is simply of an order of magnitude too small to support commercial returns on either public or private R & D that leads to domestic sales activity only. A culture to operate in major offshore markets is an essential pre-requisite for returns on public spending on science or on industry based R & D.

Without a vibrant industry based R & D sector, commercialisation falls back to the raw start-up model with a limited pool of experienced participants to draw on. A healthy industry sector that is based on commercially successful R & D provides the alternative model of a new business activity under an existing corporate umbrella which is lower risk than a start-up. Cochlear and to a lesser extent ResMed are examples of this. We would also emphasise that the route to market risks

outweigh the technology risks by a factor of 10 to 1, the biggest hurdle that a start-up (probably dominated by market inexperienced technologists) faces. A corporate umbrella at least provides an existing infrastructure from which to launch new business activity. In our view there is too much focus in policy development on raw start-ups as the principal mechanism of commercialisation.

Additionally, given the time that it takes the typical start-up to reach the survivor category, the question of what policy settings would enable the acceleration of businesses that are already through the start-up risks and who are profitable and exporting to grow even more quickly could also be constructively addressed.

In the remainder of this paper, we put forward the AIA's proposals for consideration by the Committee under two headings:

- Government support for commercialisation
- Creating a culture of science and technology entrepreneurship (STE culture)

Government Support for Commercialisation

Before commenting on specific measures of government support, it is worth making some general observations reflecting the views of AIA members.

- In designing support measures, the focus needs to be on the critical ingredients for the conversion of ideas into profitable businesses.
- Success is far more likely to be achieved by supporting an entrepreneur or an existing company looking for saleable ideas than by trying to turn an inventor into a businessperson.
- Given the long time frames for successful commercialisation, it is far too early to assess the worth of most of the government support measures under the "Backing Australia's Ability" framework.
- Consistency and continuity of support measures are far more important than their design. Chopping and changing programs can be extremely damaging to confidence in the overall package.
- The treatment of investors and researchers in R & D Syndicates by the ATO a decade or more after the original investment is a notorious example of administrative action undermining legislative intention, thereby destroying investor confidence.
- With regard to individual measures in BAA, those requiring detailed public service administration were the least well regarded by AIA members.
- Insufficient attention has been paid to agreeing suitable metrics and implementing them to measure the results arising from policy initiatives, which when coupled with the extended time frames needed to achieve results, makes it difficult to assess the worth of programs.

We now turn to comments on specific programs.

Tax Incentives

In the view of the AIA the present framework of tax concessions for R & D expenditure is not as effective as it could be as an incentive because of the limited commercial benefit arising from low R & D deduction and corporate tax rates. The 175 percent acceleration for incremental R & D does provide significant commercial benefits to participants, but only in the short term. However, to eliminate the present framework of concessions would offend against an even more important consideration, that of long-term consistency, so unless it can be rejigged and then maintained indefinitely, it would be best to leave it as it is. We need to learn from experience. The removal of the 150 percent tax deduction for R & D led to the relocation of significant multinational company R & D laboratories to Singapore and other more attractive locations from a tax incentive point of view. Whilst it was understandable that the Government preferred to support indigenous R & D, these facilities were an important training ground for young Australians in an internationally competitive environment.

There are three main problems with the present framework:

- A 125 percent deduction coupled with a 30 percent corporate tax rate provides only a few cents in the dollar benefit - not likely to change policy at board level.
- Providing a concession to moderately sized companies spending less than, say, three percent of revenue on R & D is putting money into places with no serious commitment to R & D. Very large companies do of course make substantial commitments to R & D with smaller percentages, so this comment does not apply to them.
- The 175 percent concession for improvement is merely a 'one year blip' incentive, of little use to serious R & D spenders in their long term planning.

An alternative way of spending the same amount of money as a tax concession in a way that will work as an incentive for serious players has been suggested by Dr. James Fox. "You can take the same pool of money and weight it so that if you spend more than eight percent (of revenue on R & D) you get a 200 percent deduction, if you spend more than five percent you get a 150 percent deduction if you spend more than three percent you get a 125 percent deduction and if you spend less than three percent you get nothing because actually that is just background." (From evidence to the 2002 Parliamentary Committee Inquiry). If in subsequent years you find you are spending too much in foregone revenue you can adjust the percentage deductions down slightly without destroying the long term planning of the target companies.

The Government did not adopt this suggestion in its 2004 Backing Australia's Ability package, but at least sensibly maintained the then existing framework.

R & D Syndicates

The R & D Syndicate program, introduced by the Labor Government in the late 80s and halted by the Coalition in 1996 is not part of BAA, but its treatment by the ATO has cast a deep shadow over the whole field of R & D investment. If consistency and continuity are the watchwords of sound government policy on commercialisation, then the ATO attack on syndicate investors and researchers is the antithesis, a case of administrative action running counter to legislated policy.

In brief, investors who entered the government sponsored R & D Syndicate program over a decade ago with the endorsement of the Industry Research and Development Board and after receipt of a ruling on each project by the ATO had every reason to believe that they had acted in accordance with government policy, and would not subsequently be subjected to punitive action by the ATO. However, beginning in 2000 they were issued with position papers and amended assessments claiming that the core technology valuations made at the outset of each project should have been zero or negative, and/or that the parties were not dealing at arms length. Unlike in most other areas

of tax administration, there is no limit on the period of time the ATO has to issue such papers and/or assessments. As a result investors were asked to pay back tax with a 12 percent compound interest surcharge, and a 50 percent penalty. These amended assessments were challenged in the AAT and the courts at great cost to the investors and researchers. The time spent by researchers in defending their actions, over ten or more years ago, is unproductive and a costly distraction to their current research effort and other activities. The sums at risk are enormous, causing grave concern to investors and researchers, as well as outrage at being accused of tax avoidance. The ATO actions are in the eyes of investors and researchers the equivalent of retrospective taxation. They are currently the subject of an inquiry by the Inspector General of Taxation. A more detailed exposition of this sorry episode can be made available to the Committee on request.

Management of Publicly Funded Intellectual Property

In consultation with the AIC and CSIRO we have examined the question of the proper management of intellectual property (IP). CSIRO has implemented an effective system, resulting in a complete inventory and classification of IP, together with provisions for its disposition. We proposed to the Government that institutions conducting publicly funded research, such as universities, Co-operative Research Centres, CSIRO, ANSTO, DSTO and AIMS, should encourage their governing bodies to deal systematically with all IP generated by their organisations, with a view to ensuring that commercially valuable inventions are identified, protected, and commercially exploited in some manner. (It is of course important to ensure that where businesses have provided funding to institutions that the business providing the funding has appropriate ownership, otherwise this form of funding could be substantially reduced.) Also, in line with the recommendations of the report to the Department of Education, Science and Training from the Intellectual Property Research Institute of Australia entitled "Analysis of the legal framework for patent ownership in publicly funded research institutes," March 2003, employees who create commercially valuable inventions should be appropriately rewarded. The AIA supports these proposals, noting also the equally important need to appropriately reward the commercialisation team.

Creating a Culture of Science and Technology Entrepreneurship (STE Culture)

The importance of bringing about a cultural change that will place higher value on science and technology entrepreneurship (STE) has been argued in an earlier section of this paper. In this section we put forward some of the measures that would assist in achieving this objective.

Schools

The time is ripe for a thoroughgoing reform of our school systems. Models do exist within both the public and private sectors for schools exhibiting the essential characteristics of sound education, namely

- A measure of local autonomy, with parent involvement in governance.
- Effective leadership by the principal, which includes responsibility for the professional development of the teaching staff.
- Multidimensional performance assessment of teachers, providing a sound basis for personal development.
- Comparative measurement of student attainment, providing feedback to students, teachers and parents as a guide to development.
- Flexible remuneration based on performance, including potential for higher incomes for teachers not wishing to enter administration.

We note with approval the Federal Minister's initiative in establishing a National Institute for Quality Teaching and School Leadership. We also understand that the Victorian Government is initiating significant change in its public school system, which could act as a model.

Universities

With regard to universities there is the need for fundamental reforms of the kind referred to in the opening sections of this paper, namely,

- Effective systems of governance.
- Structures of management tailored to the unique cultural requirements of universities.
- Adequate training in management of large scale organisations for Vice-Chancellors and other top management.
- Competition between institutions for students and staff.
- Price flexibility for course offerings.
- External and internal performance reviews of departments and faculties.
- Multifaceted individual performance review of staff linked to professional development and reward.
- Modification of a university's overall charter to include a 'third stream', namely, support for industry, i.e. in addition to teaching and research, as introduced in the U.K.
- Rationalisation of duplicated technology based course offerings to central sites to create larger scale, better funded, utilized and equipped facilities along with higher paid, performance-selected staff.
- Alterations to the teaching and research program timing (duration, contact hours) to more fully utilise major national infrastructure that sits largely unused for significant periods each year.

The Federal Minister's reform proposals are directed towards many of these objectives. There is also a responsibility resting with State Governments, which have legislative control over governance structures. The governance structures now implemented in the University of Tasmania are worth noting as a forward step. The successful implementation of these reforms will have a profound effect on the culture of our universities, improving not only the performance of faculties and departments with a commercial interface, but also the quality of scholarship in those areas not so related.

In addition to these broad scale reforms there are specific changes in universities that will have a direct impact on their contribution to the commercialisation of research. A great deal can be done without wholesale reform of the university system to encourage university researchers to improve their linkages with private sector R & D, and to look for opportunities for commercialisation.

Dr. Robert Frater, Vice-President for Innovation of AIA member company ResMed Limited, who worked in United States industry early in his academic career, and is a former Radiophysics Division head and Deputy CEO of CSIRO, has made this comment:

"The area that has been of concern to me for a long time is much more people and attitude oriented. We lack people on both sides of the Public Funded Research / Industry divide with serious understandings across the divide. I don't think this is addressed at all well in our existing programs, even within the CRC program. CRCs often seem to me to have the various groups involved "doing their own thing" in spite of the apparent connections.

"In the USA we see much better connectedness between universities and industry, in part because many people share their time between the two - academics spending their summer working for a company.

"My belief at this stage is that we must institute approaches here that vastly increase this type of interaction - with joint appointments, sabbatical arrangements, secondments etc. Approaches of this kind would give us a real chance of making a difference."

Such measures could include the following:

- University departments conducting research should be at the forefront of introducing flexibility into reward mechanisms that encourage industry linkages and potential for commercialisation. These could include performance related incentive programs, packages designed to accommodate the needs of researchers involved in collaborative ventures with business partners, allowing fee-earning consultancy arrangements up to certain limits and the introduction of equity based incentive plans.
- Employment contracts for university researchers should allow for them to spend periods away from their institutions to work with R & D companies here or abroad, or to engage in entrepreneurial activity on their own account, without losing status or financial reward on their return. Their secure return should not be dependent on the success of external ventures.
- Further mobility could be achieved by encouraging researchers to spend sabbatical periods in world class R & D companies. Also students in science, engineering and business faculties should be able to spend some final year time in SMEs on R & D projects. The front line US universities operate on a "ninth" basis, whereby the academic is employed for 9/12ths of the year, and is paid as such. The other 3/12ths is up for grabs, and the academic may do a deal with his/her own university, with another university, or for example with a technology transfer company.
- Engineering students should be required to spend at least one week of their course on commercialisation issues, involving a practical patent search and business plan. All researchers in general would benefit from early exposure to a course that outlines how to identify competing IP (through patent search), how to protect IP, how to assess market potential, and possible routes to market. The AIC has run such pilot courses at the University of Queensland and UNSW, with strong support and appreciation.
- Conditions could be attached to ARC grants in commercially potential areas to the effect that researchers hold the licence to exploit the IP arising from the research. Grants would also include an identified commercialisation component in the funding.

Underneath all of this is the basic need to increase the level and diversity of industry based R & D. Without targeting this, there is little for the public science community to interact with on the route-

to-market side of the fence, and a smaller pool of people who are being developed in the world of the commercial exploitation of technology no matter how active the "supply side" public sector becomes.

International Networks

Much has been written and discussed about the importance of clusters in innovation. Clusters are important at various levels of activity, such as regional development, urban concentrations of business activity, or co-located industrial development. Within the context of this paper, a cluster is essentially an international network, within which the high flyers of technological entrepreneurship interact with each other to produce results undreamed of in isolation. That is why it is so important to encourage our most able potential scientific and technological entrepreneurs, regardless of their background, to spend time working in the best international environments, be they universities or businesses.

There is an enormous cultural difference at the moment between the entrepreneurial atmosphere of a Harvard, MIT or Berkeley and even our best research universities in the technological areas. Similarly the experience of working in the very best U.S. R & D based companies provides an impetus not currently available here in Australia.

Young Australians who experience these environments and are exposed to the world's best practice develop not only the skills and motivation to succeed, but also invaluable networks that facilitate future success. It should therefore be a guiding principle for policy development to encourage this kind of international experience, communication and cooperation.

The Committee has expressed an interest in case studies of successful commercialisation. We suggest two of our member companies as outstanding examples, namely ResMed Limited and Vision Systems Limited. Should the Committee desire, we will arrange briefings on their respective histories.

6 May 2005