

PRIME MINISTER'S SCIENCE, ENGINEERING AND INNOVATION COUNCIL

SECOND MEETING, 4 December 1998

AGENDA ITEM 2

THE NEXUS BETWEEN SCIENCE AND ITS APPLICATIONS

WORKING GROUP TERMS OF REFERENCE

- **To develop a strategy to build a stronger cadre of people skilled in both science and technology and management**
- **To consider how to inculcate entrepreneurial culture in school and post-school education**

This working group arose from consideration at the December 1997 meeting of the former Prime Minister's Science and Engineering Council of a report, *Science, Engineering and Technology for Employment*. That report argued strongly, on a number of grounds, about the vital importance of strengths in science, technology and innovation to economic growth and industry competitiveness.

In forming this working group, the Council have asked us to focus on the human resource dimensions of entrepreneurship, and technology management and commercialisation. We have looked at the factors that will create an environment in which such people will be well educated, encouraged, and restrictive impediments removed. To address these issues we consider managing the interaction between science and technology, business and government.

Australia has many opportunities to capitalise on the strength of its science and technology, and the ambition and enthusiasm of its innovators. We believe that these opportunities can be realised, and the recommendations of this report, if adopted, will contribute greatly to this. However, we must be aware that, at the moment, these opportunities are being lost. In fact, if urgent action is not taken with the current situation continuing for much longer we will reach a state of crisis with damaging consequences for the Australian economy.

We wish to make some general comments before addressing these issues in detail.

This paper was prepared by an independent working group for the PMSEIC and the views so expressed are those of the Working Group and not necessarily those of the Commonwealth.

First, we believe there would be enormous value to Australia's future in explicit and continuing Government recognition, at the highest level, of the importance of science and technology and the commercialisation of these two areas. It needs to be stressed at government level that there is a clear link between economic prospects and successful science and technology policy and implementation.

Second, we believe that it is only through a change in the approach to education and provision of information and establishing a strategic focus to government programs and legislation that Australians can be empowered to achieve success in commercialising scientific and technological innovations.

Finally, we need to recognise that we operate in an era of globalisation and an intensively competitive business environment. There are other nations and regions which are seizing the opportunity. Scotland, Wales, and Finland are three examples where people are transforming their economies through technology and a focus on tomorrow's industries. Australia has everything it needs to do the same. In the future it will not be good enough for Australia to be world competitive. Because of our small domestic market and percentage of world GDP, we must be at the leading edge or ahead of world's best. We can achieve this if Government acknowledges the opportunities and shows leadership and direction through both words and actions.

1. EDUCATION IN SCIENCE, TECHNOLOGY AND ENTREPRENEURIAL SKILLS

Science and technology education

Although Australia has a history of strong performance in science by school students, we have real concerns that this performance has been falling off markedly and indications are that it will continue to do so. We are also concerned that technology education has not achieved a satisfactory level in schools. There has been a general decline in university enrolments in the physical sciences, maths and engineering as a percentage of total enrolments from 1991-1997. In a recent international comparison Australia ranked virtually at the bottom on degrees in physical and engineering sciences, and science as a whole, as a percentage of overall university degrees¹.

Figures from the New South Wales Higher School Certificate show that in the period from 1991 to 1997 total university candidature increased by 11 percent but the number of students taking science subjects fell by 21 percent, with particularly dramatic falls at the advanced end of the scale - a 50 percent decline in the number of students taking Physics or Chemistry or 4-unit Mathematics and a 28 percent decline in the number of students taking 4-unit Science².

Student interest in science and technology is falling away due to a number of factors.

One major factor is that there is an alarming decline in the number of teachers adequately trained in either science or technology. The TIMSS report (1997)³ revealed that 52 percent of maths and science teachers in Australia would prefer to change to another job. Many of these teachers

¹ Business/Higher Education Round Table Issue 2: June 1998

² The Fate of Australian Science - The Future of Australian Universities - Address to the National Press Club: 1998

³ Third International Mathematics and Science Study: 1997

lacked appropriate qualifications to teach science and technology subjects. Training maths and science teachers is relatively expensive. Higher levels of the Higher Education Contribution Scheme levy for science students may be sending the wrong signals to prospective students, some of whom may be considering a career in science and technology. Furthermore, graduates in science and technology subjects have many more financially attractive options available than doing an extra year of study to become teachers. This situation is likely to become worse if it is not addressed quickly.

Another factor which has been identified by ASTEC, the Australian Academy of Technological Science and Engineering (AATSE) and other groups is a lack of appropriate teaching materials and class room equipment, especially in the area of technology education. To some extent this is because such a huge percentage of the education budget is spent on salaries with little left for training and resources.

The present deficiencies within the schools in terms of their capacity to address the outcomes of the new science and technology curricula can be addressed only through agreement between the Commonwealth and the States to inject both capital and recurrent funds.

The capital needs include identified special purpose space and equipment. The recurrent needs are in-service training and the assignment of special teachers in each school to assist in the development of the confidence and competence of their peers.

The Australian Academy of Science, CSIRO and the Australian Academy of Technological Sciences and Engineering have developed programs which seek to address this issue.

- The CSIRO “CREST” Program has a focus on creating greater links with industry and supporting training in both practical and entrepreneurial aspects of science and technology. CREST has been introduced on a pilot basis in schools around Australia.
- The Australian Academy of Science has developed the “Primary Investigations” program. This is a science and environment program for primary schools providing resource materials for both teachers and students.
- The Australian Academy of Technological Sciences and Engineering (AATSE) has proposed a program to develop resource materials for teaching technology.

Such programs should receive encouragement and support by government. There is also scope to introduce programs which explain the social and economic value of innovation.

Recommendations

- 1. The Government ensure a career in science or technology teaching is an adequately attractive option for young people both during university training and later during their teaching career by ensuring that teachers of science and technology are appropriately rewarded and provided with opportunities for continuing training and development.**
- 2. The Minister for Education, Training and Youth Affairs, through contribution to the capital costs of classroom space and equipment, complement the contributions of State**

Education Ministers in provision of staff time and materials to achieve effective science and technology education in primary schools.

Developing an 'entrepreneurial culture' in schools.

To develop an entrepreneurial culture in Australia we need to introduce children and young people to the concepts of entrepreneurship from an early age. Establishing an entrepreneurial culture in education cannot be achieved through curriculum alone. What is needed is an education system that provides students with meaningful experiences that reinforce the curriculum and mirror 'best practice' outside the education system.

An example of how this might be achieved has been demonstrated by a pilot project being undertaken in Victorian schools. This project provides schools with access and support to undertake improvement based on proven principles and practices derived from "Quality Management" experience in industry. The first year of the project has focussed on the leadership and management systems and processes of the school. This focus has sought to encourage schools to see themselves as an interconnected system living within other systems. For example, school teachers can spend up to one year working in industry, with industry largely meeting the costs of this.

By incorporating an entrepreneurial approach in teaching, the concepts and processes of entrepreneurship have been effectively demonstrated to the students who have been encouraged to put these into practice.

The office of AusIndustry within the Department of Industry, Science and Resources (DISR) has developed the Innovation Culture Program to carry out work over three years to heighten understanding of the importance that innovation and enterprising behaviour have to individual prosperity and business success. The specific goal of this program is to build a more enterprising culture. This is achieved by giving school students a better opportunity to understand the world of business, including small business. The program stimulates interaction between business enterprises, schools and the overall community.

Another example is the National Centre for Public Awareness of Science in collaboration with the Australia and New Zealand Association for the Advancement of Science. Together they have undertaken a program which creates linkages between young people and, scientists and the community including industry to encourage the pursuit of non-traditional science careers.

There are also other excellent examples of programs which address the issue of enterprise education and interaction between schools, industry and the community.

The appropriate role for the Commonwealth government in this area is to encourage the wider application of the 'best practice' programs which already exist. Programs working successfully in one area should be actively promoted nation-wide.

Recommendation

- 3. The Minister for Education, Training and Youth Affairs and the Minister for Industry, Science and Resources, in conjunction with their State and Territory counterparts, encourage and provide increased support for the uptake of programs, such as the Quality Management program implemented in Victoria and the Innovation Culture Program, which encourage development of an entrepreneurial culture and enterprise education in schools.**

Commercialisation of Innovation and Business Skills for Scientists and Engineers

Commercialisation of innovation in Australia can be improved both by educating scientists and technologists in gaining an understanding of the language and skills of business; and by educating entrepreneurs and business professionals in the commercialisation of scientific and technological innovations.

High skill occupations such as management, professionals and para-professionals are likely to experience strong employment growth over the next 10 years and there will be more opportunities for science graduates with business knowledge. This emphasises the need for advanced training of students preparing to enter business at a management level.

Graduates with a business and science background are in demand to help develop the “investment readiness” of the scientific community. Business and technology-literate scientists who can also operate comfortably with financiers are needed as successful commercialisation must consider the whole infrastructure framework for science. Mobility between research organisations and private sector businesses should be encouraged.

There are some excellent examples of tertiary level courses in Australia which seek to address these issues. The University of New South Wales will be introducing a scheme in 1999 modelled on a Stanford Business School scheme. In this program MBA students work with science and technology research students to identify and explore possibilities for commercialisation of their scientific or technological research. This program has proved highly successful in starting up new businesses in the USA.

Other excellent examples of courses which address the need for people skilled in both science and management include Swinburne University Entrepreneurship Program, The Australian Technology Park *New Business Creation* course, and the Deakin University science and technology courses which have placed increasing emphasis on developing strong links between different courses and industry. Macquarie University also provides a technology management course which aims at teaching technology students the fundamentals of business and management practice. This course will be expanded to include science students in 1999. Such courses help to provide alternative career pathways for science and technology graduates.

Some other universities and post-school education facilities are also beginning to address issues of entrepreneurship education. However, although these programs have been highly successful, we have a concern that there will not be enough places to meet the growing demand of students or the demand for graduates from industry.

The Australian Stock Exchange Enterprise Market (ASX EM) has also suggested provision of a program for business managers and interested scientists/technologists in research organisations such as the CSIRO. This would be an awareness/education program teaching methods of preparing a private business for capital raising in a public market.

ASX EM would provide a cost-recovery plus “success-fee” arrangement for capital-raising for research agency-originated projects. ASX’s enterprise market would benefit by ensuring that research agency technologies coming to this public market were properly prepared and would not waste the time and effort of investor subscribers.

We feel it is important that mechanisms are in place to ensure students, educators and industry will be adequately serviced by our higher education system to meet both current and future needs of students and industry in the development of people trained in both science and technology, and entrepreneurial and business skills.

Recommendations

- 4. The Government recognises and supports the high value of interactive training of scientists, technologists and business professionals in the commercialisation of science and technology.**
- 5. The Federation of Australian Scientific and Technological Societies should promote to their member organisations the idea that accreditation of professional qualifications should require inclusion of elements in innovation, commercialisation of research outcomes, and associated business skills in accredited courses.**

Media and community attention and demonstrating best practice

The working group has identified a need for a multimedia package targeted towards young people. The purpose of this package would be to provide young Australians with confidence and enthusiasm for entrepreneurial application of science and technology.

Such a package would provide examples of Australians who have been successful in commercialising Australian scientific and technological breakthroughs. It should also explain the process of such developments and provide young people with the skills necessary to explore such career options further.

The Sydney Olympics in 2000 offers an opportunity for promotion of examples of Australian science and technology which has been successfully commercialised in Australia.

There already exist programs in Australia which aim to educate children and provide good examples of science and technology breakthroughs which have been made by Australians. It would be a very positive move if these programs could be expanded to include aspects of the commercialisation phase of research and development.

Two excellent examples have been developed by the ABC. They include the *Ingenious* CD-ROM and *The Lab*. *Ingenious* is aimed at 8-14 year olds and is based upon five recent Australian science problems. *The Lab* is the ABC’s Internet science-gateway. It is targeted at young adults (15-35), and works closely with ABC TV and Radio.

Another example is the Questacon innovations exhibition which has recently been developed and is currently touring both Australia and internationally.

An additional benefit of demonstrating commercialisation successes would be that best practice examples of successful Australian innovations would be internationally available, further adding to Australia's credibility as a world class location for commercial development of high-technology products and services.

The working group concludes that although work is being done which promotes science and technology to young people, little has been done to show them how the benefits from the discoveries can be developed to create business opportunities in Australia. By adding this new dimension to awareness raising mechanisms such as these, young people will be given an understanding of entrepreneurial opportunities of science and technology commercialisation.

To ensure maximum benefit from such programs, teachers should be trained and actively encouraged in the use of these packages.

Recommendation

- 6. The Government, utilising a multimedia approach, promote the opportunities from science and technology commercialisation as valuable and exciting careers.**

2. GOVERNMENT PROGRAMS TO ENCOURAGE INNOVATION

Focusing on emerging growth businesses

It is businesses which are growing strongly which are most frequently commercialisers of scientific and technological innovations. These high growth businesses are found predominantly amongst the Small to Medium Enterprises (SMEs). The SMEs are recognised as having generated more than half the employment growth in Australia in recent years.

However, in 1995 The Yellow Pages Australia Small Business Index found only around 10 percent of small businesses were seeking significant growth, with more than half seeking only moderate growth. This critical finding is broadly consistent with reports of similar surveys in other countries, and highlights the relatively small group of SMEs which constitute the cohort with real growth potential. It is businesses which are seeking growth which will lead the way in contributing to economic, employment and export growth for Australia's future.

The working group would therefore encourage the Government to identify and create a focus on *Emerging Growth Businesses* (EGBs) instead to the more generic SMEs when designing and assessing programs to support science, technology and industrial innovation.

This is not a plea for 'picking winners' but rather for picking winning characteristics which public policy should seek to encourage in firms which are selected through the play of market forces. It is therefore a matter of Government decision making on incentives for industry to be more strategic in its approach on regulation, and on influencing the environment in which

industry operates. Government must keep in mind that any decisions on different sized businesses may have different effects and, wherever possible, shape decisions to allow opportunities for emerging growth businesses.

Recommendation

7. Government policies and programs recognise and address the needs of emerging growth businesses as a group within SMEs.

Support for research and development

Government support for business R&D is intended to increase the level of research and development conducted by industry above and beyond that which would occur in the absence of government intervention. There is a significant body of theoretical and empirical work which supports the role of government intervention in this area, based on the “spillover” benefits which this additional R&D generates for the national economic well-being. Much of this work also indicates that government support tends to encourage greater levels of additional R&D among smaller, as opposed to larger, firms. This indicates a legitimate policy basis for discrimination in support measures towards smaller firms.

The 125% R&D Tax Concession currently provides a direct benefit to established companies with taxable income, and an indirect benefit to start-up and/or pre-profit companies through the carrying forward of ‘enhanced’ tax losses.

A similar scheme is already operating in Canada. As in the Australian scheme, ‘scientific research and experimental development’ (SRED) is defined in the tax regulations, and certain types of activities are specifically excluded.

The basic differences between the current Australian system and the Canadian tax incentive scheme are that:

- In Canada a *tax credit* is provided (rather than a premium tax deduction) of 20% of qualified SRED expenditure (net of government grants, contract payments and equivalent non-government assistance); and
- The tax credit is *increased to 35%* for ‘Canadian controlled private companies’ (essentially SMEs) in respect of the first C\$2 million qualified expenditure per annum.⁴

A further key feature of the Canadian scheme is that:

- small claimants receive a *cash* (taxable) payment to the value of the tax credit generated by their eligible R&D expenditure.

The direct cash payment of the concessional tax credit to small and non profitable Canadian companies provides a valuable targeted incentive to those companies in a start up or developing phase (SMEs), which is not available *via* a general tax deduction scheme. Under the Canadian

⁴ This enhanced tax credit starts to phase out where the taxable income of a small corporation exceeds C\$200,000 and reverts to the 20% tax credit rate where the taxable income exceeds C\$400,000.

scheme, large and profitable companies (non-SMEs) do not receive a tax credit payment, but receive instead the relevant direct tax credit benefit.

The Canadian scheme supports approximately 11,000 applicants per year compared to around 4,000 in Australia. The number of applicants in Australia has shown a decline in the past year. The difference in these numbers is largely due to the increased number of SMEs participating in the Canadian scheme. The Canadian system targets those businesses most likely to create growth for the economy far more successfully than the Australian system. The more stringent compliance regime in Canada also ensures that the increased levels of R&D being undertaken are definitely genuine.

Studies carried out by AusIndustry suggest that compliance costs related to claiming the tax concession are high for all firms, but are relatively higher for smaller businesses. This is due to the fact that these businesses would not have access to the accounting and recording systems available within larger organisations as part of normal business arrangements. Therefore, the relative benefit to companies is likely to be more significant for larger claimants than for small.

Under the Australian tax concession scheme, about 80% of R&D claims are made by SME-type firms, and the corresponding expenditure is only about 20% of the total R&D expenditure claimed.

It would be possible therefore to target Australian SMEs (of which emerging growth businesses are a subset). They could be provided with an enhanced R&D tax concession rate under defined conditions (eg company size and/or claim size). Under the current Tax Concession Scheme arrangements this would have a minimum impact on cost to revenue but a significant incentive impact on those SME-type firms which are widely recognised as being in greatest need of assistance/encouragement in the innovation process generally and in R&D in particular.

For best effect the suggested targeted 'SME' incentive would need to be provided *via* a cash (tax credit) payment. Tax credit payments could be made 'automatically' on application with minimum extra administrative resource requirement, on an agreed self assessment/risk management basis as is done under the current Tax Concession Program.

Recommendation

- 8 The Minister for Industry, Science and Resources and the Treasurer consider introducing changes to the R&D Tax Concession Scheme to remove inherent bias in the program and provide SMEs with greater incentives to pursue additional research and development.**

Government programs for enterprise development

Federal Government funding for the Enterprise Development Program (EDP) ended on 30 June 1998. The EDP, including its predecessor NIES (the National Industry Extension Service) program, had been funded for ten years. The program was managed and delivered through a series of bilateral arrangements with the States and Territories. The cessation of funding meant the ending of these bilateral agreements, and as a consequence, the coordination arrangements which allowed for joint development and piloting of management improvement products, and cross government referrals. This has led to the duplication of program activities between governments.

Innovation Ready is a new element of the Government's *R&D Start* program, announced recently by the previous Minister for Industry Science and Tourism. This program employs some of the strategies and processes of the Enterprise Development Program, but will be delivered through a private sector network of delivery agencies. The short term objectives of the program are to develop competencies that allow firms to be more competitive and effective, and improve profit and growth. The long term objective of the program is to improve R&D capability within the firms. While the focus of *Innovation Ready* is narrower than that of the former Enterprise Development Program, it is clear that the new and old programs will have many similarities. Given this, and the tendency for all state governments to implement new assistance programs which focus on innovation, there is a clear potential danger for the Commonwealth and state governments to recreate the past problems of duplication and lack of coordination of support for small, technology based firms.

The State and Commonwealth programs have different terms and conditions, and vary from State to State but typically provide up to \$5,000 subsidy on a 50% basis for the preparation of business plans and other improvement techniques for SMEs.

The Government has also announced two new programs as part of its industry policy statement.

A new *Venture Awareness* program will establish investment benchmarks on Australian institutional investment in venture capital in Australia and overseas and also assist Australian investment funds to evaluate venture capital investments in Australia better.

A new *Investment Ready* program will strengthen information available to emerging early-stage companies about the requirements of potential investors and enhance small firms' abilities to meet those requirements. Funding of up to \$5 million a year over four years will be provided from existing portfolio resources.

A gap in current Government mechanisms for provision of venture capital has been identified at the 'proof of concept' stage of R&D. Without such a mechanism industry will not consider many R&D proposals. Venture capital for this stage of R&D currently falls between an Australian Research Council Large Grant or SPIRT Grant and an *R&D Start* grant. This is for 'proof of concept' type experiments, without which industry will consider few R&D proposals. At a recent DISR Commercialisation Forum, this problem was identified repeatedly as a major difficulty for commercialisation of high technology.

Government programs such as the Innovation Investment Fund which provide assistance to businesses wishing to commercialise high technology innovations also need to recognise and take into account the different needs of the different sectors of high technology businesses. For instance, bioscience and the IT based businesses will require different kinds of venture capital at different stages in the development and commercialisation of products.

Recommendation

9 The Minister for Industry, Science and Resources in conjunction with equivalent State and Territory counterparts pursue improvements to the programs for enterprise development to ensure that:

- **Support for those programs which encourage emerging growth businesses is maintained;**
- **These programs are coordinated and complementary, rather than leading to competition, duplication or gaps in services between the Commonwealth and the States; and**
- **The focus of these programs is upon achieving quality management of emerging growth businesses.**

3. VENTURE-SEED CAPITAL FOR EMERGING GROWTH BUSINESSES

Venture Capital and Capital Gains Tax

a. Venture Capital Support Programs

Venture capital is critical to the development of emerging growth businesses. There is a strong view in the countries with which we compete globally that the taxation of capital gains discourages innovation, risk taking and capital investment.

The Government has initiatives such as the IIF and Pooled Development Fund (PDF) which are designed to encourage more investment in early stage innovative companies and other programs. The previously mentioned Investment Readiness and related State programs also seek to address this issue.

The Government has recognised through unexpected difficulties encountered in the implementation of the first IIF round that there is a need to increase Australian investment in venture capital especially by superannuation funds.

Recommendation

10 The Minister for Industry, Science and Resources pursue improvements to programs which provide access to venture capital to ensure that:

- **The range of programs in place provides recipients with incentive and support at all scales of activity, from initial start-up through business development to commercialisation; and**
- **That these programs be well promoted to the business community, particularly to new starters and SMEs. They must also be flexible enough to allow rapid take up by business. Without this they will not be effective in addressing the problems of raising venture capital.**

b. Capital Gains Tax

At the PMSEIC meeting of 29 May 1998 the software working group made recommendations for changes in the taxation regime. It stated that these issues extend well beyond the software industry but are crucial to it.

It saw an urgent need for changes in taxation policies and in the treatment of investment capital to encourage and reward risk taking in the Australian software industry.

Our working group agrees with the findings of the software group. Although we support government programs which aid emerging growth businesses in raising venture capital, we maintain that the high rate of capital gains tax is still preventing many businesses from raising the capital they require to commercialise their research and development.

It is important to understand just why the rate of capital gains tax should be seen to be so important in the context of venture capital investment in SMEs. Most of these investments will be in small, rapidly growing technology-based companies which will frequently be cash-flow negative for several years and which **normally will not pay any dividends** because of the need to retain earnings to fuel growth. The investor will routinely be required to keep this, often very risky, investment in the firm for between three to ten years and it will be highly illiquid throughout this period.

The only way in which an investor can realise any return from such investments is through exiting the investment via a trade sale or some form of public float. He or she will then be liable to pay capital gains tax on this benefit without any access to the advantages of franking credits or any other form of tax relief. It is at this point that the comparative rate of CGT in Australia versus that in other countries becomes one of the critical determinants in whether foreigners invest in venture capital in Australia at all. Many foreigners simply refuse to consider investing in Australian venture capital because our rate of CGT is internationally uncompetitive.

Countries such as the USA, Israel and Singapore have all reduced, modified or eliminated CGT on gains from venture capital in recognition of the need to encourage this form of investment.

The Australian rate of capital gains tax on individuals and companies is one of the highest in the world. Many of our trading competitors impose no long-term capital gains tax at all.

Reduction in capital gains tax has the potential to attract local and overseas funds to new Australian business start ups – particularly to the high-technology industries – where investments tend to involve high risk but potentially have large pay-offs.

There are two related areas which could also be considered in the context of capital gains tax. The first is the tax treatment of investments in small firms which achieve exits through mergers with other firms, based on a swap of shares, which can trigger a tax liability in Australia. The second is the tax treatment of share options which are a common incentive in the USA but which can also attract uncompetitive tax treatment in Australia.

In the USA, a major source of funding for venture capital is sourced from tax exempt pension funds. These funds would like to invest in Australian entrepreneurial companies but are discouraged from doing so because of the application of Australian CGT provisions. Under the current taxation arrangements international venture capitalists who do decide to invest in

Australian companies are encouraged to buy promising high growth companies outright, rather than simply providing venture capital. The Government's proposed modifications to dividend imputation will only exacerbate this trend.

Reductions in the level of capital gains tax for long term investment in venture capital need not result in a loss in taxation revenue. The capital gains that would give rise to that taxation revenue are not now being generated and will not be generated without the injection of equity funding.

Moreover, funds that are available on a global basis for venture capital investment are not being directed to Australia as they might be with a land capital gains level (say corporate tax level).

The two changes recommended by the software working group were:

- rewarding patient capital by reducing or eliminating capital gains tax for venture investments held for a significant period (say 5 or 7 years); and
- removing impediments to off-shore venture capital coming into Australia;
 - ⇒ the problem is that tax-exempt US and UK funds become taxable in Australia; rather than investing directly, such funds generally invest through intermediate bodies; such entities are taxed as limited partnerships in Australia, and US and UK funds therefore prefer to channel their off-shore investments to other countries which offer reciprocity of tax treatment.

Our recommendations are in agreement with those of the software working group.

Recommendations

11 Providing capital gains tax relief necessary to ensure an adequate supply of venture capital for emerging growth businesses. Recommendations to improve the availability of venture capital include:

- **Reducing the Capital Gains Tax rate to the level of the corporate tax rate; and/or**
- **Having the rate of Capital Gains Tax decrease in proportion to the length of time an asset is held.**
- **Changing the tax treatment of share swap based mergers and share options to be in line with those of the USA.**

12 Removing Capital Gains Tax from US-based pension funds wishing to invest in Australia, thereby making Australia competitive with the many other countries in this regard.

NASDAQ in Australia

NASDAQ has indicated an interest in a branch operation in Australia, which would provide support for innovation in the Asia-Pacific region.

The National Association of Securities Dealers, Inc.(NASD), which operates subject to Securities and Exchange Commission oversight, is the largest self-regulatory organisation in the United States. Every broker/dealer in the nation that conducts a securities business with the

public is required by law to be a member of the NASD. Through its subsidiaries, The NASDAQ Stock Market, Inc., and NASD Regulation, Inc., the NASD develops rules and regulations, conducts regulatory reviews of members' business activities, and designs and operates marketplace services and facilities.

The NASDAQ Stock Market is the largest electronic, screen-based market in the world with the capacity to handle share volume in excess of one billion shares a day and is known for its innovative, leading-edge growth companies. Many of these companies are high-tech. NASDAQ has two tiers: the NASDAQ National Market, with NASDAQ's larger companies whose securities are the most actively traded, and The NASDAQ Small Cap Market, with emerging growth companies.

In July 1997 NASDAQ had a market value of \$US1,847 million. By July 1998 this had increased to \$US2,191 million. This reflects a high growth rate over the last ten years. Some successful companies listed on NASDAQ include Microsoft, Yahoo, Netscape, Northwest Airlines Corp, Micron Electronics Inc, and LM Ericsson Telephone Co, to name a few.

The Australian Stock Exchange has held discussions with NASDAQ representatives and more are proposed. We understand that they are exploring, among other things, possible strategic alliances.

Recommendation

- 13 The Government take an active and supportive interest in NASDAQ either by its setting up in Australia, or by encouraging some similar arrangement such as a strategic alliance between the Australian Stock Exchange and NASDAQ for the listing of innovative, leading-edge companies.**

4. CONCLUSION

The working group has identified three different groups of people who need government support to increase their effectiveness in commercialising science and technology in Australia. The impact of the suggested changes will take effect over different time periods. However, if Australia is to increase its success, both now and in the future, we must take action now.

We need to help those who wish to commercialise science and technology over the next ten to twenty years. We must provide them and their teachers with resources, encouragement and the entrepreneurial environment which will allow them to develop skills and confidence in science, technology and entrepreneurship.

We need to motivate those people who are capable of making scientific breakthroughs and assist them in their ability to commercialise these. We must provide incentives for research and development which is targeted at commercialisation success and effective well coordinated business support.

We need to help those people in emerging growth businesses who are ready to commercialise their discoveries today. We must remove restrictive taxes and legal impediments and encourage avenues for raising venture capital for all businesses, including emerging growth businesses. This will provide them with the opportunity of developing and commercialising their discoveries in Australia rather than having to sell their ideas overseas.