XX IASP WORLD CONFERENCE ON SCIENCE AND TECHNOLOGY PARKS
June 1-4, 2003 – Lisboa, Portugal

Managing and Commercialising Intellectual Property in Universities and Publicly Funded Research Organisations

Lillian Kassioras[1] and Lisa Di Marco[2]
DEPARTMENT OF INNOVATION, INDUSTRY AND REGIONAL DEVELOPMENT
55 Collins Street
MELBOURNE, VICTORIA 3000
AUSTRALIA
Tel.: + 61 3 9651 9000 • Fax: + 61 3 9651 9256
E-mail: lillian.kassioras@iird.vic.gov.au
Internet: http://www.innovation.vic.gov.au

Please Note: This paper is a concise summary of the detailed Victorian Government report. The complete paper is available at www.innovation.vic.gov.au

ABSTRACT

Innovation is the primary driver of economic development. Its importance is increasing as Australia moves from a resource-based economy to one focused on the management and application of new knowledge. The leading research conducted at Australian universities and research institutes is an important source of new knowledge and inventions to fuel the developing innovation economy.

IP management in publicly funded research organisations is critical to the development and growth of the innovation economy. This paper reviews a Victorian Government project to help strengthen the performance of universities and research institutes in identifying valuable intellectual property and protecting it appropriately to facilitate commercial exploitation.

[1] Acting Manager, Commercialisation; Science, Technology and Innovation
[2] Senior Associate, Technology Group, Blake Dawson Waldron Lawyers

INTRODUCTION

1. INNOVATION BASED COMPETITIVENESS

Recent studies into the competitive positions of nations have reinforced the view that the future of productivity growth in developed countries is determined by innovation based competitiveness – developed nations cannot compete with developing nations as a source of low cost inputs[3].

Only the capacity for world-class innovation can lead to sustainable GDP growth through innovation. Innovation is more than invention it is new products/services, new processes, new systems. Thus the key to productivity growth for developed nations is their ability to:

- Create high value products and services
- Offer unique products/features and processes
- Stay ahead of technology diffusion

The development and commercialisation of “new-to-world” technologies, products and services is a core requirement to provide these abilities. The commercialisation process is about the development of linkages that:

- facilitate the absorption of new technology
- encourage university/industry research collaboration
- stimulate venture capital availability.

The quality of these linkages is vital to innovation based growth strategies. These linkages join the common innovation infrastructure (government regulatory environment and investment in R&D) to industry.

International comparisons of Australia’s competitiveness place it in the “second tier” of innovative nations. Now that the process of market opening and deregulation is complete and the benefits reaped, a failure to shift to an innovation driven approach, will result in a continued decline in competitiveness and a corresponding decline in economic growth.

The importance of commercialisation to economic development has been acknowledged at both a Federal and State level.

1.1 The role of university and research institute IP management in the innovation economy

Innovation is the primary driver of economic development. Its importance is increasing as we move from a resource based economy to one focused on the management and application of new knowledge. The encouragement and support of the "innovation economy" is a core aspect of the Victorian Government's "Growing Victoria Together" framework, and aligns with the Australian Government's "Backing Australia's Ability" policy.

The leading research conducted at many Australian and Victorian universities and research institutes is an important source of new knowledge and inventions to fuel the developing innovation economy.

3 National Innovative Capacity Project 2002, joint research Michael E Porter, Jeffrey Furman, Scott Stern, The World Economic Forum Global Competitiveness Report 2001, 2002 Institute for Management Development World Competitiveness Yearbook, Dynamising National Innovation Systems [OECD 2002]

It is the process of "commercialisation" that moves these inventions from the laboratory to the marketplace, and this generally requires that there are appropriate intellectual property rights in place.

Intellectual property refers to the legally enforceable rights that can be used to prevent another person from using the knowledge or invention, thereby providing a competitive advantage or exclusivity in the marketplace. Without intellectual property rights, the invention is open to all to use, and commercialisation opportunities are restricted.

Accordingly, intellectual property and its management is a fundamental aspect of all "commercialisation" and, more broadly, the innovation economy.

The benefits of effective IP management

The effective management of IP and commercialisation can provide significant benefits to each of the research organisation, the individual or group responsible for the research, and the public. For the public, the main benefit is the contribution to economic growth and development arising from commercialisation and stimulation of the innovation economy.

For the research organisation, the significant and diverse benefits include:

- generation of additional income by licensing or assignment of IP;
- an effective IP strategy and policy may also assist organisations to recruit and retain high quality staff, by way of personal income incentives;
- development of links with industry that may provide additional deal flow and income for the future;
- publicity and reputation building;
- the exposure to the commercial world contributes to the education of students (and staff) and their attractiveness to employers; and
- protection from infringement risks, access to IP and freedom to operate.

The need for IP Management

The benefits of IP management do not come without a cost. There are a range of challenges and conflicts faced by universities and research institutes which make the task very difficult, and which mean that there needs to be a determined effort and strategy to overcome these issues.

Some of these challenges include:

- possible conflict between the primary mission of a university to educate and to conduct independent scientific research, and the exploitation of IP;
- there is a strong incentive for researchers to publish their research as early as possible to gain acknowledgment for their work and to enable the progress of research for the public good;
- significant resources are required to develop and implement adequate infrastructure to manage, assess and protect IP. Funding for these activities usually requires a diversion of funding from research activities;
- there is a significant time lag between investment in IP management and the generation of returns that will cover these costs;
- commercialisation of IP may risk diversion of academic staff time from mainstream activities, and/or risk of loss of staff to the business sector; and

- commercialisation involves **risk taking** which is contrary to the risk averse culture of publicly funded organisations.

Further, adequate IP management practices are or will soon be a condition for receipt of ARC and NHMRC grants, which are the main source of funding for universities and research institutes. In October 2001, the ARC and NHMRC, together with a number of other key national organisations, released the *National Principles of Intellectual Property Management for Publicly Funded Research* ("National Principles (Australia)").

1.2 Australian performance can improve

Australia's performance in terms of commercialisation of research arising from universities and research institutes allows significant room for improvement. A recent report of the Prime Minister's Science, Engineering and Innovation Council stated:

> *Limited data suggests that the commercialisation performance of Australia's universities, for example, is on a par with the American university average of licenses and spin-off companies; (1-2) per $100 million of research expenditure. It is a good base to spring from. But the best United States (US) practice is 5-20 times higher, with up to 27 spin-offs per $100 million of research expenditure in the best US universities.*[4]

There is limited data currently available in relation to the licensing income and number of spin offs from Australian universities and research institutes to properly assess Australia's performance in this area.

1.3 What is "IP Management"

Intellectual property refers to a range of legally enforceable rights that can be used to protect the outputs of intellectual endeavour, by preventing the copying or use of that output. The main types of intellectual property relevant to publicly funded research organisations are patents, confidential information and copyright. Other types of intellectual property rights that may be relevant are registered designs, plant breeders rights, and trade marks. [5]

Intellectual property management is used in this paper to refer to all activities and issues related to the handling or treatment of intellectual property throughout its full lifecycle from creation to exploitation. This includes identification, protection, licensing and assignment, monitoring and enforcement.

There is significant overlap between the concepts of "commercialisation" and "IP management", such that they are difficult to clearly separate. Commercialisation refers to the process of transferring technology from the laboratory to the marketplace. The term "IP Management" is often referred to as an aspect or component of commercialisation. However, it is not possible to or useful to separate out the two concepts. Commercialisation is not possible without IP, and the "management" of IP in IP management is for the purpose of effecting commercialisation. This in turn means that the whole process of commercialisation must be considered for effective IP management and vice versa.

[4] Prime Minister's Science, Engineering and Innovation Council (June 2001) *Commercialisation of Public Sector Research*, page 8 (available at: http://www.dest.gov.au/science/pmseic/documents/Commercialisation.doc).

[5] This paper has been written with the assumption that the audience will be familiar with the various types of intellectual property rights. An excellent source of further information is the *Biotechnology Intellectual Property Manual*, Biotechnology Australia, 2001, and the *IP Toolbox* published by IP Australia.

2. IP MANAGEMENT – KEY ISSUES TO CONSIDER

PART 1 – IP MANAGEMENT FUNDAMENTALS

2.1 IP Policy

An IP Policy is a document that sets out the position, obligations and rights of the organisation, staff and students in relation to IP management and ownership. The National Principles (Australia) require that all research institutions have policies approved by their governing body relating to the ownership, protection and exploitation of IP. It is essential that every research organisation have such a policy, so that there is clarity, transparency, fairness and consistency in the way in which IP is managed. It is also important that the IP policy is easily accessible and well promoted in the organisation.

What should an IP Policy cover?

Following is a list of issues that should be considered in developing an IP policy. This list of issues is drawn from a number of sources, in particular the National Principles (Australia) the AURIL Handbook of IP Management (UK), and the Business Higher Education Forum June 2001 Report (US).

The issues that should be considered in the content and management of an IP policy are:

(i) **Commitment of the organisation to commercialisation**. The policy should include a clear statement setting out the importance of IP management and commercialisation for the organisation. The policy should accordingly be one that is endorsed by the organisation's governing body, and be consistent across the organisation.

(ii) **Currency and review**. The policy should be updated and reviewed at reasonable intervals (say every 2 years). The policy itself should contain review mechanisms and timetables.

(iii) **Definition of IP**. The policy should clearly set out which types of intellectual property are covered by the policy.

As stated above, this paper does not address the issues of copyright in teaching materials, which is an issue that also needs to be considered in the IP policy, and is usually treated in a different way to inventions.

(iv) **Ownership of IP developed by staff, students, and visiting researchers**. The policy should clearly state who will own IP developed by employees, students and visiting researchers working at the organisation.

Where the rights claimed by the organisation extend beyond rights that would arise under common law, the organisation must ensure that it procures a written assignment from the person who would otherwise own the IP. For example, this would cover IP developed by a visiting researcher not employed by the organisation, students, and work done by staff outside the scope of their employment.

(v) **Notification of inventions** - The policy should contain specific procedures and requirements for notifying the organisation of the development of IP that may have commercial potential. This may be with reference to a specific "Invention Disclosure Form". Ideally, this should be supported by educational material in relation to what type of invention may have "commercial potential" and be patentable.

(vi) **Confidentiality and withholding of publication** – The policy should make it clear that both the organisation and the inventor must keep the invention confidential while being

assessed by the organisation. This may involve the withholding of a publication or limiting the amount of detail presented at a conference.

(vii) **Time limit for decision** – The policy should set out the period of time that the organisation may delay or suspend publication. This should not be more than 60 to 90 days, which is sufficient time for the organisation to seek patent advice and file a provisional patent if desired[6].

(viii) **Decision on exercise of IP – reversion of rights to researcher–** In the US, an organisation is required to elect within a limited time frame whether or not it wishes to take title to the invention. If the organisation does not elect to take title then the Federal agency that funded the invention may take title, or, upon approval by the Federal agency, the inventors may retain title. These standard US practices arise from provisions in the Federal *Bayh Dole* legislation, which[7]. Australian research organisations may wish to consider the inclusion of similar provisions in their IP policies.

(ix) **Sharing of benefits** – Where the organisation claims ownership of IP, it should put in place arrangements where a percentage of the revenue earned from the exploitation of the IP is shared with the inventors. This should also cover allocation of equity in start up or spin off companies, so that inventors are not disadvantaged where the organisation elects to take equity rather than a licence fee.

(x) **Laboratory notebooks** – All staff and students should be required to keep their laboratory notebooks in a form that is consistent with the requirements for patenting in the US. Refer to section 2.3(c) below for further information on good laboratory notebook keeping practices.

(xi) **Dispute resolution** – A mechanism for resolving disputes should be included in the policy.

(xii) **Contact details** – The policy should also include details of the person or office that can be contacted in relation to queries regarding IP matters and the policy.

2.2 Identification of IP

Procedures should be in place for the recognition and identification of IP that has potential commercial value so that it can be protected and managed for exploitation.

The task of identification varies significantly across different institutions. In smaller research institutes, there may be little need for formal procedures if the CEO is well aware of the type of research that is being conducted. In contrast, in larger organisations such as universities, the task of tracking and identifying potentially valuable IP is much more difficult because of the huge volume and variety of research that is undertaken and the greater level of independence and autonomy generally enjoyed by faculty.

2.3 Enforcement and Monitoring

Research organisations should also have in place appropriate mechanisms to monitor and take appropriate action to enforce their IP. This covers unauthorised use of the organisation's IP, as well as monitoring of licensee performance.

PART II - CULTURE AND GOVERNANCE ISSUES

The following four key IP management issues relate to cultural and governance issues particular to publicly funded research organisations. Largely, they arise from the fact that universities and research institutes receive substantial public funding and their primary mission is to educate and

[6] As recommended in the Business Higher Education Forum Report (June 2001) (US).
[7] See *Bayh Dole Act USC 35, s202(d)* (available at http://www4.law.cornell.edu/uscode/35/202.html).

to pursue scientific research. They were not established for profit and commercial purposes. Commercialisation is an important, but secondary role.

2.4 Rewards and incentives

The National Principles (Australia) raise the issue of rewards and incentives and provide that institutes should reward and encourage researcher participation in the commercialisation process.

In order to successfully manage intellectual property and commercialise it, it is imperative to involve the researchers in the process at a number of levels:

- they must be involved in helping to **identify** potentially valuable IP and disclosing inventions to the organisation;
- they may be required to **delay publication** of their work for a short or long period to allow for a patent to be filed, or follow a strategy that requires maintaining confidentiality;
- their **relationships with industry** are an important source of potential relationships for commercialisation[8];
- in the event that the invention is commercialised, they may be required to devote **significant time** to assist with further research, review patent specifications, and attend meetings and give presentations on the technology to potential licensees or venture capitalists;
- they may be involved in **further research** to develop the technology to proof of concept stage.

A recent survey of the views and attitudes of academics towards IP policy issues revealed that the majority of researchers regard the right to personal financial rewards as secondary in importance to the right to publish.[9]

A good source of information on other incentive options that can be considered is a recent report of the UK Government's Office of Science and Technology on Good Practice for Staff Incentives.[10]

2.5 IP ownership policies – 2 models

The vast majority of universities in both Australia and overseas have policies that provide that all IP developed by staff in the course of their employment is owned by the organisation. Adequate rewards and incentives can be provided to researchers via the allocation of a percentage of revenue earned from commercialisation.

There is an alternate model, namely where IP ownership is vested in academic staff. This is the model recently adopted by the University of Melbourne, and also practised by a number of universities overseas[11]. Another Victorian university is considering adopting a similar policy,

---

[8] A survey of industry licensing executives identified personal contacts between their R&D staff and university personnel as the most important source of university technologies. The report refers to an earlier study that reported that inventors are the primary source of licence leads, accounting for 56% of licences, with the marketing efforts of technology transfer staff accounting for only 19%. See Thursby J & Thursby M (2000) "Industry Perspective on Licensing University Technologies: Sources and Problems", *The Journal of the Association of University Technology Managers*, Volume XII (available at: http://www.autm.net/pubs/journal/00/perspectives.html)

[9] Ann L Monotti, "Allocating the Rights in Intellectual Property in Australian Universities: An Overview of Current Practices", *Federal Law Review*, Vol. 27, No. 3 (1999) (available at http://law.anu.edu.au/publications/flr/Vol27no3/monotti1.htm). The study is based on a survey of 372 academics at Monash University.

[10] UK Office of Science and Technology, (July 2000),*Good Practice for Public Sector Research Establishments on Staff Incentives and the Management of Conflicts of Interest* (available at: http://www.dti.gov.uk/ost/aboutost/psre.htm).

[11] A similar policy is applied by the University of Calgary in Canada. A 1998 study, referred to in the report of the National Innovation Summit ("NIS") Working Group on Managing Intellectual Property, of 62 US universities found that only 2 universities surveyed had policies vesting IP ownership in individual researchers. See NIS Working Group on Managing Intellectual Property (December 1999) *Framework Paper* , footnote 109 on page 43 (available at: http://www.isr.gov.au/industry/summit/scwg/IP/index.html).

and in the meantime is very open to assigning IP to researchers who are interested in pursuing commercialisation on their own.

The key rationale for a policy in which IP is granted to individuals is to provide an incentive to the individuals to pursue commercialisation, and the rewards that follow. It may also be used as a means to attract and keep top researchers.

The July 2000 ARC Report on Commercialisation of University Research[12] noted that the difficulty with granting ownership to individual researchers is that they are unlikely to have sufficient resources or skills to pursue commercialisation, and as a result their own research could be disadvantaged.

Where ownership of IP is granted to individuals, it is important that individuals have access to suitable support mechanisms. Otherwise organisations face the risk of losing potentially valuable and publicly funded IP through a lack of skills and resources on the part of the research owner.

Another significant difficulty with a policy that grants ownership to the inventors rather than the organisation is the issue of co-ownership or uncertainty of ownership, arising from the fact that most research discoveries involve multiple researchers. Co-ownership makes it difficult to negotiate licensing agreements, and to entice venture capital providers to support the establishment of spin off companies. In particular, in the event of disagreement between the co-owners, negotiations are paralysed, as neither co-owner will be able to proceed with licensing. Further, there is always a risk that another alleged inventor may "come out of the woodwork" claiming authorship.

A recent report of the Advisory Council on Science and Technology to the Canadian Government went so far as to say that for this reason "vesting IP ownership with university researchers is one of the single biggest factors accounting for lost commercialisation opportunities in Canada".[13]

Finally, any organisation taking on such a policy will need to consider on a case-by-case basis whether or not the source of funding for particular research prohibits the organisation from vesting the resulting IP with researchers. This will frequently be the case where private sector funding is involved, and also in some cases of public sector funding. In particular, it is noted that the standard form contracts introduced by the NHMRC for Research Grants and certain other grant schemes in 2002 provide, as a condition of funding, that all IP resulting from the funded research is to be vested in the recipient organisation, unless specified to the contrary[14]. However, as currently worded, this condition would not preclude the organisation from later assigning the IP to researchers if desired. It is also noted that the National Principles (Australia), which are applicable in respect of all ARC and NHMRC funding, leave this issue open and would allow a researcher owned IP policy to operate.

Allocation of commercialisation revenue

It is now fairly standard practice for IP policies at universities and research institutes to allocate a significant proportion of net revenue from commercialisation to the inventors, and to the department from which the invention came. The typical arrangement in Australia is to allocate one third to the inventors, one third to the department and one third to the organisation. This is in line with practices in the US. [15]

A number of universities, particularly in the UK, have adopted a "sliding scale" in which more generous arrangements apply for early income. For example, the University of Cambridge

[12] See pages 20 and 21. Australian Research Council (July 2000) *Research in the National Interest: Commercialising University Research in Australia*, (available at: http://www.arc.gov.au/publications/arc_pubs/00_03.pdf).
[13] Canadian Expert Panel on the Commercialisation of University Research (May 1999) *Public Investments in University Research: Reaping the Benefits* (available at: http://acst-ccst.gc.ca).
[14] A copy of the standard Research Grant Scheme contract and standard contracts for other grant schemes are available from the NHMRC website at: http://www.nhmrc.gov.au/research/general/condnew.htm.
[15] See NIS Working Group on Managing Intellectual Property (December 1999) footnote 112, page 43, which refers to a study that reported that the average percentage allocated to inventors was 40%.

allocates to the inventor 90% of the first £20,000, 70% of the next £40,000, 50% of the next £40,000, and 33.3% for net income above £100,000. This type of arrangement has the advantage of shortening the timeframe for receipt of rewards by individuals, which is desirable given the significant time lag between invention and commercialisation.

Promotional policies

Policies for promotion, and for awarding competitive ARC and NHMRC grants, which value researchers publication records, are at the root of the publish or perish problem. As researchers are assessed and rewarded by reference to their publication record, there is a strong incentive to publish as quickly as possible. Publication will mean a loss of IP protection unless a patent has been filed.

Flexibility and outside work

Another way in which researchers can be encouraged and given an incentive to involve themselves in commercialisation is via flexible and/or generous employment conditions to facilitate their movement between the organisation and industry.

For example, consulting to industry is an important and valuable means of developing networks and "commercial expertise". Most university outside work policies permit academic staff to engage in paid outside work one day per week without altering their salary.

However, time pressures and workloads remain a significant disincentive for most. In the US, it is common for staff to be allowed to earn funds above their salary for up to three months each year, normally through consultancy agreements with industry.[16]

Academics who are interested in pursuing commercialisation often have no option other than taking unpaid leave to pursue the venture.

2.6 Conflicts of Interest

The increasing focus on commercialisation activities and links between publicly funded research organisations and industry raises a plethora of conflict of interest issues. Essentially, the major concern is that the relationships between researchers and organisations on one hand and for-profit companies on the other hand, may lead to a lack of independence or a bias in the way in which research is conducted.

Australian research organisations appear to be somewhat more lax in their management of these issues than practices in the US. These conflicts need to be understood and appropriately managed.

There are three categories of conflicts to consider:

Personal conflict of interest – arises where a researcher has a personal financial or other interest that may compromise, or have the appearance of compromising, the researcher's professional judgement and ability to make unbiased decisions related to their work

Although this may arise in many forms, it will typically arise when the staff member has an interest in a company which has a commercial relationship with the employer, and the staff member is in a position to influence the outcome of research or other activities that will lead to financial gain or other advantage.

For example, such potential conflicts would arise where the staff member has an **equity interest** or holds an **executive position** in a **start up** or other company that has contracted with the organisation to conduct further research.

Institutional conflict of interest arises where the organisation itself, rather than an individual employee, has, or appears to have, a vested interest in the outcome of research

[16] See ARC report (July 2000) at page 31.

Again, where the organisation holds **equity** or a **voting position** within a **start up** or other company, such a potential conflict is likely to arise. There is a risk, or a perception of a risk in such circumstances that the organisation may, for example, grant favourable licensing terms for university owned technologies. Or, if the company contracts with the organisation to conduct further research, the organisation may be tempted to tilt their research agenda to help such a company.

Conflict of time and commitment and misuse of organisation resources

A conflict of commitment refers to anything that may interfere with an employee's full-time duties. For example, where a researcher is involved in a start up company, this may be to the detriment of their teaching and research obligations. This is usually dealt with by policies regarding the employee's time obligations to the university (eg the paid outside work policies referred to above).

Another issue is the potential misuse of organisation resources by employees engaged in activities as a consultant or for a company in which they have an interest.

Managing Conflicts of Interest

The approach taken to conflicts of interest in Australia is generally much more lax than in the US where Federal Regulations are in place.

In particular, whereas such practices are common in Australia, many organisations in the US have blanket policies that prohibit:

- undertaking any clinical trials or contract research work for companies in which equity is held by individuals or by the organisation; and
- the holding of executive positions by staff members in spin off companies.

Useful documents have been prepared in both the UK and US in relation to appropriate conflict of interest management procedures.[17] The July 2000 UK report of the Office of Science and Technology on best practice for management of conflicts of interest recommends that given the substantial benefits that can arise from collaborations and relationships with spin offs and with industry, rather than imposing prohibitions, organisations should manage such potential conflicts carefully through rigorous policies. Four main actions were recommended in this regard:

Disclosure obligations

Most organisations have policies that oblige staff to disclose all potential conflicts of interest. However, these disclosure obligations need to be supported by appropriate education and guidelines as to what type of activities and situations give rise to a potential conflict of interest.

The UK Office of Science and Technology recommends the following disclosure obligations:

Staff should make an annual declaration of any interests (shareholdings, directorships, consultancies, etc.) which they or members of their immediate family hold, to the extent that they are aware of them, and which a reasonable member of the public, knowing the facts of the situation, could reasonably conclude that these interests might be furthered as a result of their official position.

Staff should also declare any financial stakes or executive positions held in spin-out companies as and when they arise.

All information should be held in a register of staff interests maintained (by the institute).

[17] See: UK Office of Science and Technology, (July 2000),*Good Practice for Public Sector Research Establishments on Staff Incentives and the Management of Conflicts of Interest* (available at: http://www.dti.gov.uk/ost/aboutost/psre.htm); and Business Higher Education Forum (US) (June 2001) *Working Together, Creating Knowledge: They University-Industry Research Collaboration Initiative* (available at: http://www.acenet.edu/bookstore/pdf/working-together.pdf) at pages 35 to 42.

Note that US Federal regulations suggest that a reasonable threshold for disclosure is USD10,000 in annual income, or USD10,000 in equity holdings, or 5 percent ownership of a particular company.

Review mechanisms

A clear procedure should be established for reviewing and making decisions in relation to potential conflicts of interest. Ideally an appropriately qualified and independent committee should consider these.

Procedures for review should generally include the following mechanisms:

- **Agreement review -** Commercial contracts and grant agreements should be reviewed prior to entry for conflict issues arising from the interests of the staff involved (eg where staff members have an interest in the commercial party) or the organisation. Issues to consider include:
  - the financial value of the interest. Low value shareholdings are not significant;
  - the proportion of equity value of the company held. Modest holdings in large companies are not significant;
  - the likely impact of the proposed agreement on the value of the interest. For example, the results of clinical trials will have a significant impact; and
  - the extent to which the individual holding the interest, due to their position, has the scope to further their interests. For example, a junior team member's interest will be less significant than a senior team member's interest.
- **Start ups - review of equity and executive positions**– Procedures should be in place to consider conflict issues prior to any staff members or the organisation acquiring equity or an executive position in start up companies. This should be followed up by annual reviews.
- **Clinical trials –** Conflict of interest issues should be very carefully considered before involvement in any clinical trials, given the particular duty of care issues raised when dealing with human subjects. In addition, organisations should be aware that any financial interests held by researchers could adversely affect US FDA approval.[18]

Education

An effective conflict management mechanism must include a strategy to raise awareness and educate staff to assist them to identify potential conflict situations.

It is recommended that the conflict policy or a separate document include examples of conflict situations, and that this information be reinforced through compulsory induction programs and seminars.

Outside work policies

Each organisation should have a clear policy in relation to outside work and consultancies, which deals with the issues of use of university resources and time limitations.[19]

2.7 Education and Awareness

As stated above, many aspects of IP management rely on the involvement and contribution of the individual researchers. Their input is required to help with identification and review of potentially valuable IP, protection from non-disclosure, and liaising with industry and commercial partners.

[18] See Business Higher Education Forum (US) report (June 2001) at page 40.
[19] See NSW Audit Office (February 2000) *Performance Audit Report: Academics' Paid Outside Work* (available at: http://www.acag.org.au/nsw/reports/ACADEMICS.HTML).

The following should be considered:

- **Undergraduate science students**: Provision of basic education to all science students about IP management during their undergraduate degree.
- **Postgraduate science students:** Provision of more advanced program for postgraduate science students.
- **Research staff:** Training for all research staff in relation to IP management as part of their induction, and reinforced through regular seminars at least once a year.

As part of the Federal Government's Backing Australia's Ability policy, IP Australia has developed a number of services and programs to improve knowledge and awareness of IP management issues in the tertiary sector. These are an excellent resource for universities and research institutes to use. The Victorian Government has also developed an educational CD Rom that contains extensive and valuable material for use in delivering seminars or a course on IP management and entrepreneurship.[20] These are all general IP education tools. They need to be supplemented by specific material related to the policies and procedures and circumstances of the specific organisation.

2.8 Negotiating and dealing with industry

A number of issues arise when organisations are required to negotiate with industry to commercialise their IP. In general these issues arise from the fact that publicly funded research organisations are organisations whose primary concerns are to undertake research and to educate, rather than to make a profit.

Risk averse culture

There are two good explanations for the risk averse attitude taken by university negotiators. Firstly, the universities are publicly funded bodies dealing with public resources and subject to the scrutiny of the auditor general. It is in the public interest that universities ensure that there is probity and value for money in the handling of public funds and the assets created with them. However, there is a perception that universities are currently "erring on the side of caution".

A July 2000 report to the UK government recommended that an accountability framework for commercialising public sector research should be developed, that provides guidance on risk management and is supportive of commercialisation activities.[21]

Time frames, delays, inexperience and complexity

The delay in finalisation of deals often arises from the fact that many university offices are under resourced for commercialisation, that university personnel handling the matter are not necessarily responsible or accountable for commercialisation, or the time consuming decision making protocols in some universities.

Valuation

The National Innovation Summit report notes the "downside" of unrealistically high expectations of value as being an impediment to subsequent technology transfer and commercialisation.[22]

[20] A copy can be made available on request from the Science Technology and Innovation Division of the Department of Innovation, Industry and Regional Development.
[21] Note that the UK Government has recommended that such an accountability framework be developed. See HM Treasury Office of Science and Technology (UK) (July 2000) *The Government's Response to the Baker Report: "Creating Knowledge, Creating Wealth:" Realising the economic potential of Public Sector Research Establishments* (available at: http://www.hm-treasury.gov.uk/mediastore/otherfiles/Government%20response%20to%20the%20Baker%20Report.pdf) at paragraphs 14 to 16.
[22] NIS Working Group on Managing Intellectual Property (December 1999) at page 31.

Valuation of IP is a very difficult and largely speculative task. It requires a careful analysis of market conditions and contingencies, to come to a prediction of future earning potential. Access to independent valuations would be helpful.

Despite the difficulties in valuing IP, it is often possible to proceed with a deal and factor in the uncertainty by charging for the IP via a royalty stream, rather than an up front licence or assignment fee.

Need for value add/ preliminary due diligence

Before seeking to licence or commercialise IP, pertinent information should be gathered and an internal review should be conducted in relation to the IP position. The key issues that should be addressed include:

- What contracts affect the technology? How was the research funded? Are there any encumbrances over the IP?
- Is there any third party background IP involved?
- Perceived novelty and potential commercial applications and market. Significance of prior art?
- What disclosures or publications have been made?
- Who are the inventors/authors, and are they adequately covered by the organisation's IP policy or have they otherwise assigned IP? Are any students involved?

These sorts of issues can be addressed in Technology Disclosure Forms.

A lack of preliminary due diligence on these issues on the part of the organisation will inevitably lead to the incurring of excessive costs and time by external consultants, and a lack of trust in the judgement of the organisation.

Preference for spin-offs

This apparent preference for spin-offs and start-ups is contrary to the comments made in the November 1999 ARC report on university technology transfer[23] to the effect that universities had a tendency to licence out rather than support and develop spin offs because the licensing route gave more immediate returns (ie in the short term). The November 1999 ARC report suggested that development of Australian spin offs and start-ups is of greater benefit to Australia in that it helps to develop new Australian businesses rather than license out to internationally owned companies.

Although start-ups can lead to a higher multiplier on the university's investment in the long term, it needs to be recognised that this course of action will require more initial investment and generate greater risks in the short term. It will also require experienced management skills. Before spinning off a company, a full feasibility study and business assessment should be conducted.

Joint venture structures

Research organisations frequently engage in joint research activities via an unincorporated joint venture structure. For example, the majority of Co-operative Research Centres are unincorporated.

A major difficulty arising from these joint research arrangements is the fact that the IP is often jointly owned by the parties. This in turn means, in most cases, that each joint owner has negative control over the commercialisation of the IP, and it is necessary to get agreement from all joint owners on any arrangements proposed for commercialisation.

[23] ARC Report (November 1999).

Such fragmentation of ownership often produces inordinate delays and confusion when it comes to commercialisation.

It is therefore important that research organisations consider alternative arrangements to the standard joint venture arrangement when conducting joint research, so as to streamline arrangements for the commercialisation of IP. If the parties do not wish to enter into an incorporated structure, they could consider establishing governance arrangements where a sub-set of the joint venture Board is given decision making powers with respect to IP commercialisation matters.

IP management and commercialisation is one of many issues that need to be considered when selecting an appropriate joint venture research model. For example, incorporation raises the issue of the exposure of officers of the company to liability, and the costs associated with obtaining appropriate directors' liability insurance. These practical management issues must also be carefully considered in the selection of appropriate joint venture arrangements.

Tax issues

It is also important that tax issues are carefully considered when entering joint venture arrangements and establishing spin off and start up companies, which may have a significant impact on commercialisation feasibility.

PART III - IP MANAGEMENT INFRASTRUCTURE

2.9 IP management infrastructure

The effective management of IP to optimise commercialisation possibilities requires an appropriate support structure and resources.

Services and resources

The types of services and resources that should be available to enable commercialisation include:

- reviewing and assessing invention disclosures, and keeping abreast of research being undertaken;
- funding patent costs (usually limited to provisionals);
- managing and negotiating licensing and other commercialisation contracts;
- "value adding" to IP, by market research, business plan preparation, value assessment. This is often outsourced to services providers;
- marketing and networking to identify potential licensees and commercial partners;
- legal review of agreements;
- managing and reviewing policies and procedures for their implementation; and
- supporting and delivering education and awareness initiatives for staff and students.

A recent report in Canada has recommended that specific funding be allocated towards commercialisation activities, and that the quantum required to enable adequate management of commercialisation is 5% of the total research budget. This figure was calculated on the basis of providing two full time technology commercialisation specialists per 150 faculty members, in addition to extra funds for IP protection and other "value add" disbursements.[24] A June 2001 US report suggests that an appropriate level of funding is one full time equivalent person for every USD15 million to USD25 million of research expenditure.

Skills

[24] See Annexure 9 of the report of the Canadian Expert Panel on the Commercialisation of University Research (May 1999).

Staff need an in-depth understanding of the academic, financial and industrial sectors. They must possess an unusual combination of research, business, legal, interpersonal and communication skills. These people are in short supply and there is a high demand for them.[25]

2.10 Structure and role of the Tech Transfer Office

There are a number of different models for housing and structuring the commercialisation management or technology transfer activities at a university or research institute. Research organisations are diverse, and the most appropriate model will depend upon the particular cultural and historical circumstances.

The common models used are:

- for smaller organisations, management within the "research office" alongside management of research contracts and research grants. In research institutes this office or role is often called "business development";
- a separate administrative unit (or a position) within the organisation separated from the research office; or
- a separate incorporated entity, with a level of independence from the organisation (eg a board with external representation).

2.11 The funding challenge and critical mass

All research organisations, whether a large university, or a small research institute will have difficulties finding the resources to fully fund effective IP management. However, because of a lack of critical mass, this is a particularly difficult issue for the smaller research institutes.

Consideration should therefore be given, and opportunities explored for entering into collaborative arrangements whereby these IP management functions and resources are shared and managed jointly across a number of institutes.

The returns from IP management and commercialisation will involve significant time delays, and are in part speculative.

2.12 Access to seed/ pre seed capital

Another aspect of infrastructure or commercialisation support that is imperative for successful commercialisation is access to seed or pre seed risk capital. Information about the venture and seed capital market in Australia and sources of investment is contained in the Victorian Government's *Venture Capital Framework*.[26]

[25] See: ARC report (July 2000) at page 27; and Canadian Expert Panel on the Commercialisation of University Research (May 1999) at page 11

[26] *Growing Tomorrow's Big Australians – A Framework to encourage Investment in Victoria's Knowledge Businesses*, (available at: http://www.innovation.vic.gov.au/download/Venture_Capital_Framework.pdf)

CONCLUSION

IP management in publicly funded research organisations is critical to the development and growth of the innovation economy. The leading research conducted at many Australian and Victorian universities and research institutes is an important source of new knowledge and inventions to fuel the developing innovation economy.

The process of "commercialisation" moves these inventions from the laboratory to the marketplace, and this generally requires that there are appropriate intellectual property rights in place. Without intellectual property rights, the invention is open to all to use, and commercialisation opportunities are restricted.

Available data suggests that there is significant room for Australia’s performance to improve in terms of commercialisation of research arising from universities and research institutes.

By improving its strategic management and commercialisation of Intellectual Property arising from its universities and research institutes, Australia has the opportunity to capitalise on its excellent performance in research and development and help develop the high growth industries of the future.

GLOSSARY

ARC – The Australian Research Council, a Commonwealth government body within the Department of Education, Training and Youth Affairs, which is a significant provider of competitive research funding to Australian universities.

AURIL – The Association of University Research and Industry Links, a UK based association of university technology managers.

AUTM – The Association of University Technology Managers, a US based association.

Biotechnology IP Manual – A handbook on IP Management published by Biotechnology Australia in 2001.

CRC – Co-operative Research Centre. CRC's are collaborative research ventures involving at least one industry participant, and funded up to 50% under the Commonwealth Government's CRC program.

DIIRD – The Victorian Government Department of Innovation, Industry and Regional Development (formerly the Department of State and Regional Development).

IP – Intellectual Property.

IP Australia – The authority responsible for the registration of patents, trade marks and designs in Australia.

IP Toolbox – An IP management product marketed by IP Australia.

National Principles – The *National Principles of IP Management for Publicly Funded Research* published in August 1981 jointly by the ARC, the NHMRC, IP Australia, the Australian Tertiary Institutions Commercial Companies Association, the Australian Vice Chancellors' Committee, the Department of Education Training and Youth Affairs and the Department of Industry Science and Resources.

NHMRC – The National Health and Medical Research Council, a Commonwealth government body within the Department of Health, which is a significant provider of competitive research funding for medical research at Australian universities and research institutes.

PCT application – A patent application under the *Patent Co-Operation Treaty*, to which Australia and most industrialised nations are members. A PCT application is a mechanism that allows an applicant to file patent applications covering multiple jurisdictions through a central registry. The PCT application must be followed up with full national phase applications in the nominated jurisdictions.

STI – The Science Technology & Innovation division of DIIRD.

REFERENCES

Australian reports

ARC - Australian Research Council (November 1999) *University Research: Technology Transfer and Commercialisation Practices, Commissioned Report No. 60* (available at http://www.arc.gov.au/publications/arc_pubs/99_08.pdf)

ARC- Australian Research Council (July 2000) *Research in the National Interest: Commercialising University Research in Australia,* (available at: http://www.arc.gov.au/publications/arc_pubs/00_03.pdf)

AVCC - Australian Vice Chancellors' Committee (1995) *Ownership of Intellectual Property in Higher Educational Institutions – A Discussion Paper* (available at: http://www.avcc.edu.au/news/public%5Fstatements/publications/ooipiu.htm)

NIS - National Innovation Summit Working Group on Managing Intellectual Property (December 1999) *Framework Paper* (available at: http://www.isr.gov.au/industry/summit/scwg/IP/index.html)

PMSEIC - Prime Minister's Science, Engineering and Innovation Council (June 2001) *Commercialisation of Public Sector Research* (available at: http://www.dest.gov.au/science/pmseic/documents/Commercialisation.doc)

Ann L Monotti (1999), "Allocating the Rights in Intellectual Property in Australian Universities: An Overview of Current Practices", *Federal Law Review* Volume 27, No.3 (available at: http://law.anu.edu.au/publications/flr/Vol27no3/monotti1.htm)

Business/Higher Education Round Table (1996) *Partners in Intellectual Property*

DETYA - Department of Education Training and Youth Affairs (2000), *Higher Education report for the 2001 to 2003 triennium* (available at: http://www.detya.gov.au/highered/he_report/2001_2003/html/contents.htm)

Thorburn Lyndall (2000) "Government Policies to Encourage Creation of Spin-off Firm from Academic Institutions", paper presented at the APEC Symposium on IP Rights 28 February to 1 March (available at: http://www.advanceconsulting.com.au/reports/apecpaper.pdf)

Technology Commercialisation Program (2001) *Commercialise 2001 Workshop Series – Proceedings* (a record of the proceedings of the Commercialise 2001 workshops held in Marysville Victoria) (available at: http://www.innovation.vic.gov.au/programs/)

Department of Industry Science and Tourism (Cth) *Review of Greater Commercialisation and Self Funding in the Cooperative Research Centres Programme* (1998); http://www.crc.gov.au/Docs/pdf/MercerStocker.pdf

International reports

Business Higher Education Forum (US) (June 2001) *Working Together, Creating Knowledge: They University-Industry Research Collaboration Initiative* (available at: http://www.acenet.edu/bookstore/pdf/working-together.pdf)

HM Treasury Office of Science and Technology (UK) (July 2000) *The Government's Response to the Baker Report: "Creating Knowledge, Creating Wealth:" Realising the economic potential of Public Sector Research Establishments* (available at: http://www.hm-treasury.gov.uk/mediastore/otherfiles/Government%20response%20to%20the%20Baker%20Report.pdf)

HM Treasury (UK) (August 1999) *"Creating Knowledge Creating Wealth": Realising the Economic Potential of Public Sector Research Establishments: A Report by John Baker to the Minister for Science and the Financial Secretary to the Treasury* (available at: http://www.hm-treasury.gov.uk/docs/1999/baker.html)

Canadian Expert Panel on the Commercialization of University Research (May 1999) *Public Investments in University Research: Reaping the Benefits* (available at: http://acst-ccst.gc.ca)

Lawrence M Fisher (1998), "The Innovation Incubator: Technology Transfer at Stanford University", *Business Strategy*, Fourth Quarter 1998, p.1
OECD (2001) *STI Review No 26* Special Issue on Fostering High-tech Spin-offs: A public Strategy for Innovation

Thursby J & Thursby M (2000) "Industry Perspective on Licensing University Technologies: Sources and Problems", *The Journal of the Association of University Technology Managers*, Volume XII (available at: http://www.autm.net/pubs/journal/00/perspectives.html)

Good Practice Resources:

National Principles of IP Management for Publicly Funded Research The Australian Research Council, The Australian Tertiary Institutions Commercial Companies Association, The Australian Vice Chancellors' Committee, The Department of Education Training and Youth Affairs, The Department of Industry Science and Resources, IP Australia, and the National Health and Medical Research Council (August 2001) *National Principles of Intellectual Property Management for Publicly Funded Research*, (available at: http://www.arc.gov.au/publications/arc_pubs/01_01.pdf)

Handbook of IP Management Biotechnology Australia (2001), *Biotechnology Intellectual Property Manual*, (available at http://www.biotechnology.gov.au/primary%5Fproducers/ip%5Fmanagement/ip%5Ftraining%5Fmanual/biotechnologyipmanual.pdf)

AURIL - Association of University Research and Industry Links (UK) *Handbook of Intellectual Property Management* (available at: http://www.auril.org.uk/goodpractice.htm)

Conflicts and staff incentives UK Office of Science and Technology, (July 2000), *Good Practice for Public Sector Research Establishments on Staff Incentives and the Management of Conflicts of Interest* (available at: http://www.dti.gov.uk/ost/aboutost/psre.htm)

Paid outside work NSW Audit Office (February 2000) *Performance Audit Report: Academics' Paid Outside Work* (available at: http://www.acag.org.au/nsw/reports/ACADEMICS.HTML)

Stanford University

Fisher, Lawrence M., "The Innovation Incubator: Technology Transfer at Stanford University," *Strategy & Business*, Issue 13, Fourth Quarter 1998
OTL website: http://otl.stanford.edu
Stanford policies: http://www.stanford.edu/dept/DoR/
OTL Annual Report 1999-2000: http://otl.stanford.edu/about/resources/otlar00.pdf

MIT

Conflict of interest and IP policy: www.web.mit.edu/policies/
Guide to the Ownership, Distribution and Commercial Development of MIT Technology June 1999, (available at: http://web.mit.edu/tlo/www/guide.toc.html)
MIT: The Impact of Innovation, March 1997 report of BankBoston (available at http://web.mit.edu/newsoffice/founders/)

UBC
UILO website: http://www.uilo.ubc.ca
Report on UBC Spin-off Company Formation and Growth, 1997 (available at: http://www.uilo.ubc.ca/Technology%20Transfer%20&%20Commercialization/Spinoff%20Companies/spin.htm)
Policy #88: Patents and Licensing (available at: http://www.policy.ubc.ca/policy88.htm)
Policy #105: Acceptance, management and Sale of Technology Licensing Equity (available at: http://www.policy.ubc.ca/policy105.htm)
Policy#97: Conflict of Interest (available at: http://www.policy.ubc.ca/policy97.htm)
Intellectual Property Guide (available at: http://www.uilo.ubc.ca/General%20Information/Reports%20&%20Presentations/IPGUIDE.pdf)

Cambridge University
Technology Transfer Office website: http://www.admin.cam.ac.uk/offices/tto
Ethical Policy: http://www.admin.cam.ac.uk/offices/finance/ethical.html
University of Cambridge Entrepreneurship Centre (CEC) website, and *Entrepreneurship @ Cambridge* booklet: http://www.cec.cam.ac.uk/
Information and articles about "the Cambridge Phenomenon": http://bridge.anglia.ac.uk/~systimk/History/Phenomenon.Html; and http://www.tomw.net.au/nt/cp/html

Other useful Links and References
IP Australia: www.ipaustralia.gov.au
Knowledge Commercialisation Australasia: (formerly known as ATICCA): www.aticca.com
Victorian Technology Commercialisation Program: www.innovation.vic.gov.au/programs/
AURIL – Association of University Research and Industry Links (UK): www.auril.org.uk
AUTM – Association of University Technology Managers (US): www.autm.net