some uncontrolled and unstable proliferation, broadcast television and radio falls firmly within an explicit legal and regulatory framework which both permits educational access to it, and defines obligations for users of it. While academics who used broadcast audio-visual materials in their teaching may once have found themselves cast in the 'resistant' role of 'pirates', for the current system to work they need to recast themselves as intellectual property resource managers.

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Competitive research grants and industry collaboration: A challenge for universities in the 1990s

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Introduction

Many researchers within universities are undertaking collaborative research with industry for the first time in their careers. They are finding it difficult to come to terms with the pressures of working in a commercial environment. This article traces the reasons why universities and industry are collaborating more than ever before. It focuses on the competitive research grants schemes which have been established by government over the past decade, and especially on the research and development (R & D) corporations in the primary industries and energy sector. How well have universities and industry responded to the opportunities provided under these schemes? What are some of the problems? Have the various parties reached an understanding on issues such as the ownership and valuation of intellectual property, the right to publish and the importance of research milestones, etc? These and other issues are covered and some suggestions offered on what needs to be done in relation to both policy and attitudes in this area.

Responding to the challenge

Why are universities and industry collaborating in research more than ever before? A major reason is that government has made a concerted effort in recent years to encourage collaborative research between universities and industry. Initiatives such as the 150% tax incentive for research and development, the Generic Technology Grants Scheme, the establishment of R & D corporations in the primary industries and energy sector, the National Teaching Company scheme, the Cooperative Research Centres program, Australian Postgraduate Research Awards (Industry) and the Australian Research Council Collaborative Research Grants scheme have been developed to boost R & D expenditure. Most if not all of these schemes are administered and funded under the auspices of government departments or corporations (the 'funding agency'). They require formal links between researchers and commercial collaborators, including financial commitments by industry to the R & D, in cash or in kind. Government expects the results of the R & D to be exploited on normal commercial terms and to the benefit of the Australian economy.

On another front, the Government has also been taking steps to improve the intellectual property system. Various forms of protecting intellectual property have been recognised, including amendments to the Copyright Act in 1984 and the passage of the Plant Variety Rights Act in 1987. The Australian Technology Group (ATG) has also recently been established 'to provide the range of services required to translate Australian research and technology into products and services which can be delivered to the Australian and international markets on a totally commercial basis'[1].

How are universities responding? Some have been quicker than others to adapt to the new environment, where the term 'intellectual property' is now more fashionable than a decade ago. In those days, many believed that intellectual property with commercial significance was most likely to arise through serendipity, as a result of staff or students undertaking research primarily resourced by the university. Thus, the principal issues of concern were often whether to patent the discovery and how the inventor and the university might share in the proceeds from commercial exploitation. Issues such as the rights of funding agencies and other third parties to intellectual property were not commonly considered.

Initially, some universities responded to the new environment by establishing university companies to develop and manage links between the tertiary sector, industry and government. Such companies have had mixed success, with many relying on income from consulting activities to maintain a satisfactory cash flow, rather than on royalties from the exploitation of intellectual property. They are not well suited, however, to processing proposals and grants arising out of the industry-focussed competitive research grants schemes which have been introduced in recent years. Many of these schemes require a number of stages for each proposal. A preliminary proposal is usually around 2 - 3 pages in length, with sufficient information to enable a funding agency to decide whether to call for a full proposal. If a full proposal is submitted and is successful, further negotiations are often required to match the budget and research milestones, etc to the amount offered. Negotiations concerning a formal agreement between the funding agency and the university also take place at this point. Finally, many such agreements require the university and the commercial collaborator to enter into a further contract covering matters such as intellectual property.

A growing number of universities are now appointing legally trained research contracts officers, attached in many cases to their research grants offices, to assist with the negotiation of these matters and to draft and review research agreements. Many universities have also sought the assistance of the Australian Vice-Chancellors' Committee (AVCC). As a result of all of this activity, the level of awareness of the various issues relating to collaborative research with commercial potential has risen considerably within universities.

There are some universities, however, which are still reluctant to commit additional resources to the commercial aspects of research, either because they do not recognise the scope of work involved or are not convinced that income from commercially-oriented research ventures will justify the extra cost. Some fail to recognise that intellectual property matters often have less to do with generating significant income than with protecting the interests of parties to a contract where there may be a commercial return in the long term. Universities which neglect their contractual responsibilities may save money in the short term, but they expose themselves to the possibility of being sued for breach of contract if, for example, confidential information arising from a collaborative research project is disclosed without the prior approval of the funding agency.

Adjusting to change

The relationship between funding agencies requiring collaboration

between industry and universities (particularly in the rural sector) has been affected by three factors. First, the Government's objective is 'to make the system more "demand led" to meet the needs of all end-users, including industry, government and the general community'[2]. Second, whereas universities were strongly represented on many of the councils and committees, end-user representation is now much stronger. Third, research agreements drafted on behalf of the R & D corporations and others by the Australian Government Solicitor were modelled on the provisions of consultancy contracts and took little account of the unique nature of university-based research, where the dissemination of research results and a commitment to postgraduate research training are high priorities. These draft agreements ignored the fact that most of the R & D corporations would only provide funds at marginal cost levels, whereas consultancies are usually funded at full cost. Consequently, universities reacted strongly to these changes.

In addition, the R & D corporations in the Primary Industries and Energy portfolio and other research funding agencies increasingly refer to their allocations as 'investments in R & D' rather than research grants. For some, investments are more at the research end of the R & D spectrum; for others, the emphasis is more on development. This emphasis on investments rather than grants is because industry funds a high proportion of the R & D corporations' activities. In 1991/92, for example, government provided $89.7m and industry $77.07m to the corporations.

In this context, major changes in attitude have been necessary within universities and industry. Many academic researchers were accustomed to pursuing their own basic research objectives, with little or no direction from funding agencies. As long as the research aims were broadly in line with the overall objectives of the funding agency, their proposals of high quality and their track records strong, applicants could reasonably expect to be highly competitive when seeking external research funds. Now, many funding agencies ranging from the Australian Research Council (ARC) to the R & D corporations in the Primary Industries and Energy portfolio set priority areas or specific research objectives for some or all of their research outlays. Unfortunately, there are still many researchers who have failed to come to terms with this essential element of grantsmanship and continue to write grant proposals which ignore the priorities or objectives of the funding agency. For many, the non-priority area components of ARC and National Health and Medical Research Council (NHMRC) funding schemes are the only remaining opportunities for external funding. The highly competitive nature of these schemes, where only one in five applicants is successful, means that many have to reconsider their options. They can continue to compete for limited ARC and NHMRC funds; they can begin targeting their research proposals to the priorities of funding agencies; they can seek access to limited funds within their own institutions; or they can pursue low cost research objectives which do not require external or internal project funding.

Whilst universities' share of Commonwealth Competitive Grants (CCGs) over the five years from 1988-1992 has increased from 39% to 52%, industry's share has decreased from 23% to 3% and CSIRO's share has remained steady at 17-18%[3]. Some of these shifts can be attributed to the large increase in ARC and NHMRC funding over the period (to which the CSIRO and industry have limited access). However, many of the CCG schemes encourage or require industry collaboration, and universities may lose ground to the CSIRO and industry in the long term if they do not respond sufficiently to the imperatives of the new environment.

Competitive research grants

There are two principal differences between competitive research grants involving industry collaboration, and 'one-off' contracts with industry. First, nearly all competitive research grants are awarded at marginal, rather than full cost levels, and the policies of those funding agencies preclude any discussion about cash contributions to the research infrastructure of universities. Second, with competitive grants, there is often less time to give full consideration to issues at each step in the process, because of specific deadlines set by the funding agencies. For example, a 'one-off' negotiation is usually able to proceed at a pace determined by the parties to the agreement. Competitive schemes, however, usually attract a wide range of proposals, all with the same closing date. There is less time to consider each one individually before submission, and a similar situation arises when offers are received - usually all at once and with pressure from researchers for immediate action so that projects may commence. The existence of the funding agency's standard agreement should theoretically make the process quicker, but that assumes that the agreement is acceptable both to the university and where applicable, to the industry collaborator. In each case, the proposal and the offer must be examined carefully, to assess the relevance of the university's obligations under the agreement. For example, in some cases, the nature of the project might be such that there is little likelihood of publications being restricted, or intellectual property of commercial significance arising. In other cases, there may be issues of strategic importance. Yet the funding agency requires the standard agreement to apply in both situations.

There are other differences, too. For example, agreements under the Generic Technology Grants Scheme require all parties, including the university, the industry collaborator and the Industry Research and Development Board, to sign the initial agreement. They also require the university and the industry collaborator to enter into a separate, further agreement on intellectual property, which has to be approved by the Board. The Rural Industries Research and Development Corporation (RIRDC) does not require the industry collaborator to be a party to the initial agreement between the university and the Corporation, but requires evidence that the industry collaborator has made a written commitment to the university to provide the resources outlined in the proposal.

Following lengthy discussions between universities, the AVCC and competitive research funding agencies offering collaborative research with industry, each now has a better understanding of the other's perspective. However, there are still many issues where there are differences of opinion and the application of a standard agreement based on 'worst-case' scenarios is inappropriate. The view of many of these agencies is that research agreements should be explicit about the various issues which may arise during the course of a project, whereas universities have been accustomed to receiving grants from agencies such as the ARC and the NHMRC, where the conditions of award are less restrictive. Of course, ARC and NHMRC projects are usually pursuing more basic research objectives and do not need to be governed by such comprehensive conditions. Nevertheless, the distinct contrast between the two types of conditions is one of the reasons why universities have struggled to come to terms with the new environment.

In 1991, the AVCC released a paper entitled 'Guidelines relating to ownership of intellectual property in higher educational institutions'. It is worthwhile to identify some of the principal issues and to compare the AVCC's recommendations with the requirements of some of the competitive research funding agencies offering collaborative research with industry. On occasions, reference will also be made to the ARC's Conditions of Award for one line project grants, to illustrate the difference between commercially-oriented agreements and conditions covering basic research.

Ownership and valuation of intellectual property

Many standard agreements base ownership of intellectual property and the distribution of royalty income on the respective contributions of the parties. The contributions may include all direct and indirect financial inputs, the value of background intellectual property inputs and the skills of experts involved in a project. Professor Frank P Larkins, Deputy Vice-Chancellor (Research) at The University of Melbourne, argues[4] that the value of prior knowledge is sometimes not acknowledged and that too often industrial partners seek to negotiate only on a labour-related basis. He points out that if a university professor is approached to participate in a collaborative or contract research project, it is frequently because he or she is an international expert, with at least a 20 year investment from PhD studies to being a world leader in the discipline. Professor Larkins comments that when one consults a doctor or a lawyer, one expects to pay a high consultation fee to obtain the benefit of accumulated experience, but this same norm is not as readily accepted when research scientists or engineers are consulted.

Professor Larkins' view is not shared by many of the competitive funding agencies. They consider that universities unrealistically value background intellectual property. The funding agencies argue that the very fact that a professor is awarded a grant in a highly competitive funding round is recognition of that person's standing and skill in the discipline. In other words, the background intellectual property is recognised by success in the funding round. Their view is that background intellectual property should only have added value if it is in the form of existing patents, or is commercially significant and not yet in the public arena.

Most R & D corporations seek joint ownership of intellectual property, because in the short term at least, it appears equitable. Joint ownership gives all parties the right to decide how intellectual property should be developed and commercialised; it may be relatively simple to agree upon in the initial stages; and it enables the parties to decide how rights should be sub-licensed. In the longer term, however, there are disadvantages, particularly if there are multiple owners with different objectives, or in different locations. Too many chefs may spoil the broth!

Whilst some universities acknowledge joint ownership, others believe that intellectual property should be vested in the university, because the property is developed by its staff or students and the university is able to retain ownership rights over its commercial exploitation in the long term. In the short term, where ownership is vested in a university, a funding agency or an industry collaborator might be granted effective ownership for a defined period by means of a licence. The terms of the licence with regard to exclusive or non-exclusive rights, the duration, royalties, territory and industry, etc depend on the circumstances of each project. This is an issue that is not always well understood by industry collaborators, who criticise universities for wanting to retain ownership. If an industry collaborator is granted exclusive rights to intellectual property for a defined period in return for an agreed royalty to the university, effective ownership for that period is vested in the collaborator, not the university. This arrangement is also recognised for tax purposes. The advantage is that if the industry collaborator fails to perform, the university can seek an alternative means of exploiting the intellectual property which it has discovered. The university may also use the intellectual property for other research purposes not covered by the licence agreement.

Because the development of intellectual property with commercial potential is not one of the priucipal objectives of its basic project grants scheme, the ARC makes no comment on sharing intellectual property, other than to state that where there is an invention or process improvement arising from a project, the grantee or institution shall ensure that the industrial property is protected.

The AVCC recommends that:

(a) as a general principle, ownership of intellectual property should be vested in the university but when there are circumstances where this may not be so, such a position should be negotiated;

(b) in collaborative arrangements, ownership of intellectual property may need to be negotiated on a case by case basis. In such cases, however, it is vital that agreement on the ownership or use of the intellectual property be negotiated at the contract stage and not left to be considered if a useful invention arises in the project;

(c) if an external agency pays the full commercial rates for the research which has defined objectives and for any existing "know-how" and the research is conducted on a commercial basis, it is reasonable that the external agency would have exclusive rights to use any of the intellectual property pertinent to those objectives providing there is not a significant amount of pre-existing intellectual property; and

(d) the granting of a licence to commercialise the property to a company by a university be subject to a time limit for exploitation.

The AVCC is about to review its recommendations on intellectual property. It will be interesting to see if it revisits the question of whether there should be sole or joint ownership of intellectual property, especially in view of the R & D corporations' insistence on joint ownership.

Publications/confidentiality

It is important when considering the issues of publication and confidentiality to distinguish between:

- pre-existing information which has been provided in confidence to the researcher; and
- information arising out of a project which may have to remain confidential for a specified period for commercial or other purposes.

Research agreements and contracts rarely distinguish between the two. It is quite reasonable for pre-existing information to remain confidential, whether it be sensitive company data or descriptions of tribal rituals. In my view, however, universities should not be involved in research which forever limits the researcher's right to publish the results arising from research, unless the researcher is made fully aware of the implications of that restriction from the outset, and the full costs of the project, including infrastructure and possibly a profit premium, are charged to the funding agency. Postgraduate students should not be involved in these types of contracts.

When it comes to the training of postgraduate research students and collaboration with industry, there is a fine line between what is, and is not acceptable. There are many benefits to students and universities arising from collaborative projects with industry, but the rights of students to have their theses examined and to publish the results of their research must also be protected. When students are funded directly from a project's budget, the distinction between the educational purposes of the research activity and the project's objectives become blurred. This can not only affect the tax exempt status of any scholarship funded from the budget, but it can also bring the student into potential conflict with the provisions of collaborative research agreements. Some funding agencies have overcome these difficulties by offering awards under distinct scholarships schemes which are based upon educational objectives. In this way, the training objectives of universities and industry are met. Universities should protect the interests of postgraduate students by negotiating a clause in the research agreement to provide comfort against undue delays in the submission or examination of a thesis for reasons of confidentiality.

The AVCC recommends that:

(a) universities should not agree to sponsors having the right to indefinitely delay publication of research results, since the possibility of public dissemination of new knowledge is a necessary part of normal academic activity;

(b) where a researcher acknowledges that the outcome is likely to be commercially sensitive, and is willing to accept a limited restriction (12 months), universities consider the inclusion of a clause of the following kind:

the Principal Investigator is encouraged to publish the results of this research project and to encourage (where appropriate) their adoption in Australian industry throughout the life of the project, however no article or material containing or referring to the methodology used, results achieved or conclusions reached in carrying out the project is to be published, or disseminated in a way that may adversely affect the right of a Party to commercially exploit the Intellectual Property resulting from the Project without the prior approval, in writing, of both parties. This

provision is to apply for 12 months after the date of the request to publish; and

(c) where a candidate for a higher degree is involved in a project, all reasonable steps should be taken to protect intellectual property to ensure that patent protection is obtained while the thesis is in preparation and before submission. All steps should also be taken to avoid a delay in the submission of the thesis or the exclusion from the thesis of material which represents an essential or significant part of the student's work. At the request of the sponsor and with the concurrence of the student and the university, the thesis may be submitted to the examiners in confidence provided that approval for publication after a limited period is not unreasonably withheld.'

Very few funding agencies accept the AVCC's view that publication should only be restricted for a period of 12 months after a request to publish. For example, the RIRDC General Conditions state:

5(a) The Principal Investigator is encouraged to publish the results of this research project and to encourage their adoption in Australian industry throughout the life of the project, however no article or material containing or referring to the methodology used, results achieved or conclusions reached in carrying out the Project is to be published, or disseminated in a way that may adversely affect the rights of a Party to commercially exploit the Intellectual Property resulting from the Project without the prior approval, in writing, of both parties, such approval not to be unreasonably withheld. This provision is to apply for 18 months after completion of the Project or after receipt of a final report on the Project by the Corporation whichever is the later.'

The RIRDC and other corporations argue that an embargo for such a lengthy period is necessary and that universities should rely on the fact that publication shall not be unreasonably withheld. Nevertheless, under the RIRDC's clause, publication could potentially be withheld for a number of years and that is unacceptable in a university environment.

The ARC Conditions of Award for project grants merely state that the grantee or institution shall ensure that the industrial property in inventions or process improvements is protected. Nothing further is necessary for grants which are predominantly funding basic research projects.

Research milestones

The concept of research milestones was not common in research agreements with universities until they were introduced around four years ago by the R & D corporations in the Primary Industries and Energy portfolio. Milestones mean the stages at which specified parts of the project will be completed. Non-completion of the milestones by the due dates may result in the termination of the contract.

Initially, there was great resistance to milestones being incorporated in research agreements, because researchers argued that the nature of research made it difficult to predict progress. In practice, however, the establishment of milestones is in the hands of the researchers themselves and they should ensure that they are attainable. In fact, the AVCC recommends:

that research milestones should be formulated to reflect the work that is to be completed in the project under contract. They should not refer to specific outcomes which cannot be guaranteed and which would lead, in the case of failure, to the university being obliged to continue experiments indefinitely and without further financial support.

Agreements should also provide for the parties to mutually vary objectives and/or methodology, so that if the direction of the research changes, milestones can also be varied.

The RIRDC General Conditions are a good example of the power of a corporation to terminate an agreement by thirty days' notice in writing if a university does not achieve any milestone within thirty days of the date or expiry of the period specified for the achievement of that milestone. In practice, RIRDC and other corporations have baulked at invoking this clause immediately, possibly in recognition of the fact that researchers and universities are still coming to terms with the stricter conditions applying to research in a commercial environment. If there is reasonable communication between all parties, delays and other reasons for not completing milestones on time should be known well in advance of milestone dates. Many funding agencies complain that they only find out about delays when they follow up on late milestone reports. In these circumstances, researchers have only themselves to blame if the funding agencies take a firmer stance.

The ARC does not require formal milestones for its one line project grants, but it does require researchers to furnish progress and financial reports from time to time.

Termination

All research agreements provide for the termination of a contract. For example, a project may be terminated if a milestone has not been achieved, or a progress report submitted on time. In these cases, universities should ensure that the funding agency is required to give 30 days' notice to enable the breach of contract to be remedied before termination takes effect. There are some issues, however, where it is reasonable for termination to have immediate effect, such as material misrepresentation where false statements may have been made in the application.

Universities are particularly sensitive about termination clauses, because most research projects are labour-intensive, and termination of the agreement will usually lead to the termination of the staff employed on the project. Not only is that unfortunate in a personal sense, but it could expose the university to a substantial payout to staff who may be on long term contracts. Universities should protect themselves from exposure of that kind by inserting an appropriate clause in the offer of appointment to externally-funded research staff. For example, The University of Western Australia's clause is as follows:

You should note that your appointment is funded from a grant made for research purposes and that the University is unable to contribute funds from other sources towards the appointment. The continuation of the appointment to the date shown in the offer is conditional on the donor's maintaining funding for the full period. Whilst it is considered unlikely that funding would be withheld by the donor during the period of your appointment, if this were to happen the University would be obliged to provide you with a revised date for the termination of your appointment, and would not accept liability for payments of any kind relating to the remaining portion of the appointment period. In addition, your attention is drawn to Clause 6(1)(b) of the University of Western Australia Research Grant Salaried Staff Award which forms part of the Award mentioned above, which provides that where salary variations occur and available funds are insufficient to allow the continuation of the appointment to the original termination date, the term of the appointment will be shortened accordingly. In either case, you will be given at least two weeks' notice in writing of the revised date for the termination of your appointment, in accordance with the Clause 6(2) of the Research Grant Award mentioned earlier.

The AVCC recommends that:

(a) in any agreement, the terms and conditions of that agreement be written in such a manner as to recognise that staff must be employed in accordance with university conditions of appointment and that reasonable notice must be given to these staff in the event of termination of the contract by the sponsor; and

(b) universities seek the inclusion of termination provisions which recognise the rights of both parties.

Although universities have objected to the termination provisions of many of the collaborative funding agencies, they do not appear to have objected to the ARC's Conditions of Award. Nevertheless, an

ARC one line grant may be terminated by the Commonwealth by notice in writing 'at any time if in the opinion of the Secretary the approved project is not being carried out with competence and diligence or in accordance with the offer of grant'. There would be howls of protest if a similar clause were in an agreement between a university and a competitive research funding agency involved in collaboration with industry. The difference is that trust has been developed over many years between the ARC and its predecessor, the Australian Research Grants Committee (ARGC), and universities, whereas there is still a strong feeling of distrust within universities about how corporations and other funding agencies might react. It is easy to forget that termination rarely takes place without cost to all parties and consequently, it is only likely to be invoked as a last resort.

Ownership of equipment

Almost all the competitive research funding agencies offer grants at marginal, rather than full cost levels. The Meat Research Corporation is one of the few exceptions. It will provide a contribution to the infrastructure costs of a research project, based on 20% of all salaries (excluding salary on-costs) in the project budget. Many corporations recognise the importance of research infrastructure to a project, but only on a notional cost basis. In other words, corporations are willing for infrastructure to be included as part of the university's contribution towards a project for the purpose of calculating relative shares in the ownership of intellectual property, or the distribution of royalty income, but they are not willing to contribute cash towards those costs. It is an issue which universities find hard to accept.

Within this context, the issue of what happens at the end of a project to equipment purchased from project funds becomes significant. If the funding agency allows the equipment to remain with the university at the completion of a project, it is a real contribution towards the university's research infrastructure, assuming that the equipment can be put to good use. The Land and Water Resources Research and Development Corporation, for example, specifies that equipment costing less than $10,000 is vested in the university and that other equipment, designated as 'Corporation Equipment', is subject to negotiation between the parties at the completion of the contract.

The AVCC recommends that:

(a) all contracts should specify whether the sponsor intends to assign the ownership of equipment upon project completion to the university; and

(b) if the sponsor indicates that it expects the equipment to be returned to it, the university should ensure that the costs of maintaining the equipment during the course of the project and costs of returning the equipment to the sponsor are built in to the overall costing for the project.

The ARC's policy is that equipment purchased under a grant shall, in normal circumstances, be vested in the institution. However, where a grant is transferred to another institution, the ARC may require the equipment to be transferred.

In view of the very poor contribution to universities' research infrastructure costs by competitive funding agencies, equipment should be allowed to remain with a university at the end of a project, if it can be shown that the equipment will benefit the university. If there is no apparent benefit, then it may be reasonable for the equipment to be sold or transferred and for any proceeds to be returned to the funding agency.

Professional Indemnity

Many funding agencies, especially in 'one-off' negotiations, expect universities to sign 'hold harmless' agreements, which exempt the funding agency from any responsibility arising out of the project. Universities must ensure that they are only held responsible for actions which are under their own control. A more acceptable indemnity clause is as follows:

The grantee indemnifies and shall keep indemnified the funding agency, its officers, employees and agents from and against all actions, claims, demands, costs and expenses (including the costs of defending or settling any action, claim or demand) made, sustained, brought or prosecuted in any manner based upon, occasioned by or attributable to any injury to any person (including death) or loss of or damage to property which may arise from or be a consequence of any unlawful or negligent act or omission of the grantee, its officers, employees or agents in carrying out the research project.

Some funding agencies will not agree to limiting the extent of this indemnity to unlawful or negligent action only. For example, some require indemnity by the university for any actions that may bring a claim for damages, on the grounds that the funding agency has no control over any actions of the university, its officers, employees or agents during the course of a project.

The AVCC has recommended that:

(a) the matter of which party should bear the liability for work performed in relation to particular projects be addressed in all contracts; and

(b) universities should be encouraged to take out professional indemnity cover for all contracted outside work.

The issue of indemnity should not be underestimated by universities. Most research agreements also state that a university remains liable if any part of a project is sub-contracted. Universities are normally required to keep the funding agency indemnified against any damages and expenses incurred as a result of acts or omissions of a sub-contractor.

Other issues

There are many other issues which have arisen out of competitive research grants schemes involving industry collaboration which universities have not necessarily had to face up to in the past. For example, some funding agencies insist on clauses such as 'the Research Organisation shall ensure that . . . . . ', whereas universities would prefer comfort clauses such as 'the Research Organisation will use its best endeavours . . . . . ', or 'to the best of its knowledge . . . . . ', to cushion themselves from the responsibilities of contract performance. In a commercial environment, however, it is understandable that funding agencies are reluctant to accede to the universities' wishes. It is ironical, though, that funding agencies argue that universities must be prepared to perform in a commercial environment, when the agencies themselves are not willing to accept the commercial reality of funding projects at full cost levels.

There are other performance clauses which trouble universities. Some contracts state that progress and final reports should be provided 'to the satisfaction of the funding agency'. The AVCC recommends that reports should be in a format agreed with the funding agency, so that the funding agency is guaranteed a report of an acceptable size, nature and appropriate amount of detail which reflects the work that the university has agreed to undertake. Funding agencies argue that they are more concerned about the quality of the report, than whether it is in an agreed format. As payments are often tied to the acceptance of progress and final reports, the issue is an important one when research agreements are negotiated.

Other clauses relating to payments also present difficulties to universities. Whilst most funding agencies appear to have accepted the principle of payments in advance, subject to satisfactory progress, some withhold an excessive amount until after the project is complete. The Energy Research and Development Corporation, for example, states that the last milestone payment will be for at least 10% of the total grant and will not be paid until the final report has been assessed as satisfactory and the project objectives have been achieved. This is disproportionately high, because most payments should be tailored to forecasts of expenditure, or should be a series of equal instalments. It is far more reasonable to withhold payment of up to half of a final instalment, in line with the RIRDC General Conditions.

In relation to payments to protect intellectual property, most funding agencies expect universities to bear part, or all of the costs. The ARC states that the researcher or institution 'may at their own expense make application for a grant of Letters Patent in Australia and

other countries in respect of an invention'. RIRDC states that the costs of applying for the grant of patents or the registration of copyrights, designs or trade marks and any similar rights in respect of all such intellectual property shall be borne by the parties 'in the proportions in which they share the title to and ownership of the Intellectual Property'. The cost of registering and maintaining patents worldwide is an expensive proposition and many universities may baulk at the prospect, especially given the limited prospects of success. According to Mr R W Byrom, Legal Officer at The University of Queensland, for each successful product there are ten unsuccessful ones; 100 prototypes discarded; 1000 patents applied for; 10,000 inventions described; and 100,000 ideas floated[5]!

The cost of patenting can be quantified to a degree. Mr Crispin Marsh, patent attorney with F B Rice & Co in Sydney, has stated[6] that it costs around $1000 to file a provisional patent application in Australia; $1500 to file a complete specification; $1000 for examination before the (former) Australian Patent Office; and then there are annual renewal fees, which rise from about $180 for the third year to $700 for the sixteenth year. Overseas patent applications are generally more expensive, especially where foreign translations are required. The typical all-up cost of patenting in the United States, including renewals over the patent life, is around $10,000. In Japan, the cost is about $16,000 and in Europe (covering all twelve signatories to the European Patent Convention) about $50,000. As Mr Marsh points out, these are indicative costs only and in individual cases they may be substantially higher.

The capacity of universities to meet these costs is limited. One option is for universities to arrange for the initial costs to be recovered up front when licensing rights to other parties; another option is for the costs of protecting intellectual property to be a first charge against royalty income. But how many inventions produce sufficient income to offset these costs?

The future

In the long term, universities need to assess, on a case by case basis, the risks and benefits of operating under the restrictive conditions applying to competitive research grants schemes involving industry collaboration. Alternatively, universities might choose to give less emphasis to -*research of this nature. A pragmatic approach based on experience, subjective judgement, the size of the research project and the potential risk of non-compliance is required to find a sensible balance between accepting research grants of this nature with little consideration of the implications, and being too concerned with the legal technicalities of some of the conditions. In view of government policy to encourage greater interaction between universities and industry, universities are likely to find that access to external funds will become very limited in some disciplines if they choose not to accept grants from the commercially-based competitive research grants schemes. As research infrastructure funding to universities through Mechanism A is also currently linked to some competitive schemes with commercial objectives, it is even more difficult for universities to ignore the other benefits which flow through the system as a consequence of success in attracting these grants. The university sector is unlikely to extract many more compromises from funding agencies in relation to these issues. It is up to universities to develop the necessary policies and procedures to adapt to this new funding environment.

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Patents and university research in the United Kingdom

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Introduction

For many years there was little interaction between patents and university research: the patent system had little impact upon university research and university researchers little desire to patent their inventions. The mutual disregard of the law for university research, and university researchers for the law has over the last decade come to an end. It is the aim of this paper to examine the nature of this changing relationship by focusing upon the main points of interaction between patents and university research in the United Kingdom. These are: first, the attitude within universities towards the ownership and management of patents; second, the question of who has the right to patent inventions which are generated during university research; and third, the impact that the patenting of research will have upon university research itself.

Part I: University policy on patenting

Attitudes within universities in the United Kingdom towards the ownership and exploitation of inventions created within the university sector are in a state of flux. In order to understand the present approaches towards the patenting of research within universities and how these attitudes are changing, it is necessary to outline the changing environment within which universities operate.

The first important change that occurred over the last decade is that the UK government has pursued a policy of greater public sector accountability. One of the consequences of this was that during the 1980s there was a marked decline in the level of government funding of universities. As a result, universities have been forced to look to alternative sources for their income. In addition to expanding student numbers, universities have also sought to capitalise on the knowledge or, as it is now called, the information that they generate. That is, in order to make up for the short-falls in funding which have arisen, universities have begun to trade in the 'products' that they produce[1].

As a part of the drive towards increased public sector accountability there has also been an increase in the pressure for university research, as with most aspects of university life, to be rendered more 'useful'. One of the consequences of this is that in evaluating research, there has been a move away from criteria such as the novelty or originality of the research towards an examination of its commercial relevance or, as it was put recently, its 'direct application to real problems faced by society' (Cabinet Office 1992, p.33). In turn, traditional academic criteria such as dissemination of knowledge and freedom of research have been devalued as goals. Combined together with changes in the funding structure, the re-definition of the university as a public institution has led to an increase in demands for research to placed in a form so that it can best be exploited and traded: one of the most obvious ways this goal could be achieved was through the use of intellectual property protection.

The second major change that has occurred in recent years is in terms of the way inventions created within universities are exploited. In 1981, the British Technology Group (BTG) was set up to ensure the proper exploitation and management of intellectual property rights generated in puhlic sector research. To achieve this end, BTG was given the right of first refusal to the products of government funded research. The rationale behind the establishment of BTG was the belief that universities lacked the expertise to protect and exploit inventions. In addition, as basic research is often removed from immediate commercial application, it was felt that universities were unable to identify the (potentially) valuable intellectual property which they were generating (Cabinet Office 1992, p.7).

As a part of the general re-definition of the public sector that occurred in the last decade BTG was, in 1985, mandatorily disbanded. As BTG's right of first refusal was taken away from it, universities were given the chance to exploit their own intellectual property rights. Many, but not all, universities have taken up this offer. In order to ensure that their charitable status was not affected, many universities established holding companies to deal with and exploit any intellectual property rights that they owned. In addition, specialist positions were created within the university - the so-called 'Industrial Liaison Officers'- whose job it was to liaise between universities and holding companies, and to advise and educate university staff as to the nature of intellectual property rights (University Directors of Industrial Liaison 1989). Despite the fact that many universities have altered the way they exploit patents, the Office of Science and Technology said recently that only a small number of universities 'appear to have satisfactory mechanisms to exploit their own [intellectual property rights]' (Cabinet Office 1992, p.25).

The third factor which has influenced university attitudes towards patenting is the changes that have occurred within the nature of the research itself. During the post-war period, we have witnessed a remarkable change in the nature of science: most notably we have seen the growth of 'big science' and the scientific corporation. This has meant that science (at least in terms of its agenda and aims) has moved away from the university sector towards the industrial sphere. These moves away from the university have been partially reversed in recent years, however, by changes in the nature of research (or at least the research that is carried out in certain university departments). In particular, there has been an erosion of the distinction drawn between pure and applied research. One of the most important factors which has challenged this dichotomy is that university research has taken on a relevance that it hitherto lacked. This has been most noticeable in the fact that 'pure' research, especially that carried out in fields such as biotechnology, is no longer as far removed from direct commercial application as it once was (Eisenberg 1987).

The fourth and final change that has shaped university attitudes towards the management and ownership of patents is that the subject matter of patent law has expanded. Traditionally certain products or methods of creation, such as agriculture, pharmaceuticals and pure research, were excluded from the subject matter of patent law. Over the last twenty years, however, the subject matter which is said to fall outside the scope of protection has decreased[2]. One of the consequences of the expansion in the scope of patentable subject matter is that there has been an increase in the amount of university research which is *potentially* patentable.

While it is possible to identify changes in the environment within which university decisions about patenting are made, it is not as easy to identify any one clear response to these changes. The reason for this