

Submission to IP Australia's Review of the Patent System

Exemptions to Patent Infringement

**Intellectual Property Research Institute of Australia
(IPRIA)**

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IPRIA was established in 2002 as part of the Federal Government's Innovation Statement, *Backing Australia's Ability*. IPRIA's research focuses on ways to improve the protection, management and exploitation of intellectual property by business, research institutions and other users of the IP system, and on supporting high quality policy development by government in areas relating to intellectual property. It seeks to use the outcomes of its research to create and contribute to public debate on key issues relating to intellectual property. Part of IPRIA's mission is to provide objective contributions to law reform efforts.

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Exemptions to Patent Infringement

Proposed Change

A person may, without infringing a patent, do any act *on* a patented invention which is solely for the purpose of:

- determining how the invention works
- seeking an improvement to the invention
- testing the validity of a patent
- determining the scope of the patent claims
- determining whether an act or product infringes a patent or
- obtaining the information required for regulatory approval under Australian law or the law of any other country that regulates the manufacture, construction, use or sale of the patented invention.

The statutory exemption will not apply where the invention is used in, but is not the subject of, an experiment.

1. Do you agree in principle with IP Australia's proposal?

There are two dimensions to this issue: (a) a general research exemption; and (b) a research tools exemption. IP Australia's proposal argues in favour of (a), but is opposed to (b).

We agree that (i) a general research exemption is justified on economic grounds; and (ii) the current system is uncertain and warrants a statutory change to provide certainty to industry and research organizations. However, we believe that (iii) in principle a statutory exemption **SHOULD ALSO** apply for research tools where the invention is used in research *provided this research use is not the primary and dominant market for the invention*. However, determining whether a market is the dominant market may be hard to operationalise and the provision of a research tool exemption would be inconsistent with other jurisdictions. It is therefore unclear whether our proposal to provide a limited research tool exemption has merit. We discuss the pros and cons of our proposal below.

We start from the basic premise that to maximise the welfare of citizens of a country, an economic system should optimize the incentive to invest in innovation while maximizing the diffusion of knowledge and ideas throughout society. This is a delicate balancing act which requires understanding the costs and benefits of knowledge creation versus knowledge diffusion.

Where there are a lot of knowledge spillovers, society is probably best served by the use of research grants to fund knowledge creation, rather than the use of patents. This is the reason why research grants are used to support basic science, since it typically has wide and varied potential applications (and therefore the spillovers are potentially large). Where knowledge spillovers are limited, patents provide an important means of stimulating investment in knowledge creation. However, even when patents are desirable, there are some circumstances in which exemptions from patent law may be desirable. In

principle, this occurs when the research exemption does not create any adverse implications for the *ex ante* incentive to invest.

Under what conditions would the existence of a statutory research exemption cause *no* damage to the incentive to invest? After all, the whole point of the patent system is to enable inventors to appropriate returns from their initial investment and it could be argued that any exemption would necessarily affect returns (since it allows others to do any act on the invention without paying license fees). We argue that this is not the case. Rather, we argue that as long as the domain where the research exemption applies is *not the dominant end-market for the invention*, the existence of the exemption may not weaken investment incentives.

The issue, therefore, hinges on the degree of demand specialisation for the invention. We argue that if the end-market is highly specialised (e.g. if the only potential end users of the invention are in the research community), then a research exemption may be harmful. However, if the potential market is much larger than the research environment, then the existence of a statutory research exemption will do little damage to investment incentives (i.e. the invention will still be created).

The key to designing such a policy involves a clear and precise definition of the “dominant market”. Although acknowledging that such a concept is difficult to define, we believe that there is sufficient experience in the domains of regulation and competition policy to suggest that a workable definition could be constructed.

A more detailed exposition of our argument is as follows:

- Without public sector intervention, the economy will under invest in invention and innovation. A public grant scheme can supplement the incentive to invent and innovate without affecting the course of knowledge diffusion. However, raising the revenue for grants via taxation leads to distortions in economic behaviour and imposes administrative costs on society. In addition, peak or top-down grant bodies are unlikely to correctly identify all future innovations and we cannot therefore expect them to be comprehensive. The same caveats apply to incentives based on a scheme of prizes. Accordingly, there is a limit to how pervasive a grant and prize scheme can or should be.
- The patent system, which uses the democracy of the market to supplement and fill the gaps left by grant and prize schemes, constitutes the third tier of public innovation policy.
- However, patents, by virtue of their monopoly nature, artificially limit the natural diffusion of knowledge and ideas and as such impose costs upon society. Society loses when valuable knowledge is left unused because it is priced above the additional cost (zero) of its use. Put another way, if using knowledge does not deprive anyone else from the benefits of that knowledge, then this use should be encouraged. Patents, and other forms of legally sanctioned monopoly, are therefore *only appropriate* where it can be demonstrated that the gains from stimulating

knowledge in a specific area dominate the losses from restricting the use of that knowledge.

- The challenge for public policy is to codify these economic principles in a manner that is clear and unambiguous. It is especially important to codify which specific areas should be patentable. Any confusion and uncertainty in the boundaries around permissible behaviour will lead to economic loss.
- It is generally presumed that upstream, basic scientific research and the development of theoretical principles have large and far-reaching knowledge spillovers and thus should not be acceptable patentable subject matter. As the well-spring of knowledge, they embody ideas that are too important to be under monopoly control. End or consumer products, on the other hand, are at the end of the knowledge-creation spectrum and their control by a monopolist would not inconvenience too many parties, especially since there are likely to be substitutes available.
- At first glance therefore, it appears that excluding discoveries and fundamental research from patentable subject matter should be enough to attenuate the losses from a monopoly-based system. That is that the research exemption should be seen as a substitute to the exclusion of discoveries from patentable subject matter.
- However, there are three complications to this narrative which argue for a research exemption over and above the exclusion of theory and fundamental research from patentable subject matter:
 - a. Patenting on research ideas is moving upstream. We do not know the extent to which patenting is moving further upstream in Australia but there is increasing anecdotal evidence that this is occurring in the US. Patenting background research information increases the transaction costs associated with subsequent or related research and opens the possibility for hold-up. A research exemption in this case will actually embellish the interest of the patentee since any commercially viable follow-on invention will require licensing from him or her. As such there are no grounds for not suspending patent rights in research use *per se*.
 - b. Research is often cumulative. An invention which is new, but not clearly a theoretical break though in the scientific sense, is not necessarily the end of a research line but may constitute the beginning of a major research trajectory. As such, there are clear societal gains from encouraging cumulative research provided it does not cut across the interests of the patentee. Similar to the situation above, a research exemption in this case will actually embellish the interest of the patentee since any commercially viable follow-on invention will require licensing from him or her.
 - c. In many fields there is not a clear dichotomy between fundamental and end-use inventions.¹ Many end products are used as research tools and

¹ Dreyfuss argues that the nature of much innovation has changed, and many inventions in the field of technology now: ‘...have immediate, commercial applications as diagnostics or treatments and thus they qualify for patent protection. At the same time, they are of crucial importance to researchers, and as such,

permitting patent rights on these end products can hamper research (by furnishing the monopolist with the right to hold up research and demand a price premium).

If research use of the knowledge embedded in the end product leads to significant subsequent spillovers, then there are grounds for arguing that patent rights in these cases should be suspended. If the research community is not the dominant market for the end product, then suspending patent rights will not have a major impact on the incentive to create the end product.

If however, the research community is the dominant market for the end products, the research tool exemption may not be justified.

- While, in principle, there is an argument (as detailed above) for exempting the use of research tools from the patent system, this would be contrary to principles of harmonisation and the desire to reduce uncertainty. Overseas jurisdictions do not include research tools in their general research exemption. So (b) is consistent in spirit with other jurisdictions. Not including (b) may be invalid under TRIPS; that is, exempting the use of a research tool not in the “primary and dominant market of the invention” may be counter to Article 30 – ‘members may provide limited exceptions ... provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent’. Current (legal) understandings of the patent system do not restrict normal exploitation to a particular market. The uncertainty over the validity of such an exception is in addition to the risks a researcher would take in using a research tool (in that the researcher may not know what the “primary market” of an invention is and it may take significant litigation for there to be an accepted definition of the term in the context of patented inventions).
- Currently, there is considerable confusion over the current status of researchers’ freedom to operate in Australia. An Intellectual Property Research Institute of Australia (IPRIA) survey of public sector scientists in 2007 revealed that 23 per cent of all respondents believed that not-for-profit sector researchers do not need permission to use patented research tools and techniques when that use is purely for research purposes and a further 34 per cent were unsure. In relation to for-profit sector research, 10 per cent said permission is not required and 29 per cent were unsure. A copy of the summary statistics from this report is attached in Appendix 1. Introducing a statutory research exemption will not only make Australian policy consistent with sound economic principles, but will make the legal situation clearer and less ambiguous than the existing state of affairs.

While in many fields of research the lack of either a wide or a clear research exemption is not impacting directly on work, there are fears that the impact will grow in the future. In particular, there is a justified concern that the need to use

they have enormous power ... They cannot be invented around: for instance, any scientist who wants to study the genetics of breast cancer needs to utilize the BRCA 1 test.’ Dreyfuss (2004).

patented technology as a basic research tool will create a chilling effect on the growth of scientific knowledge.

- The counter argument to research exemptions is that it is desirable for researchers to license patented inputs since this enhances the incentive for the patentee researcher to conduct their research. In Appendix 2 we review the arguments for and against this view (this is extracted from Dent et al. 2006, which was a report on research exemptions written by IPRIA staff and commissioned by the OECD). However, we believe that on balance, it is more efficient for society to grant statutory research exemptions than to require researchers to license research inputs.

2. Do you think that IP Australia's formulations are the best solutions?

Overall we believe that IP Australia's proposed formulation for (a) the general exemption is clear and precise. However, the wording of (b) the research tool exemption has been the subject of misinterpretation by several people we have spoken to. The issue is that some readers understood (b) to exclude experiments *per se*. We therefore recommend that (b) is expressed to replace 'an experiment' with 'research':

The statutory exemption will not apply where the invention is used in, but is not the subject of, research.

Two issues about (a) the general research exemption still need to be considered: that of harmonisation of Australia's laws with those of overseas jurisdictions and of the degree of certainty that will attach to any amendment.

In terms of harmonisation – as the IP Australia Consultation Report states, and the ACIP report details,² there is no uniformity, with respect to the research use exemption, across the major economies of the world. There may, nonetheless, be value in following the lead of the Community Patent Convention (CPC) as this is indicative of a number of exemptions across Europe.³ The provision in the Convention reads 'The rights conferred ... shall not extend to acts done for experimental purposes relating to the subject matter of the patent'.⁴ This differs from the IP Australia's proposed change in two ways: the limitation of "relating to" instead of "on" and object being the "subject matter of the patent" rather than the "patented invention". IP Australia's Consultation Paper does not explain why the proposed change has the formulation that it does – though it could simply be that the expression is clearer. Without sound argument to the contrary, the policy preference for harmonisation may be sufficient to argue the European (and ACIP) formulation is preferable.⁵

With respect to the degree of uncertainty, as was stated above, any confusion and uncertainty in the boundaries around permissible behaviour will lead to economic loss. It

² ACIP (2005), pp. 38-44.

³ IPRIA's accompanying submission relating to IP Australia's Consultation Report, "Getting the Balance Right", contains a more detailed consideration of the policy benefits of harmonisation.

⁴ This formulation forms the basis of the research use exemption recommended by ACIP.

⁵ IPRIA has done no independent research that examines the preferred formulation of a research use exemption.

is, however, impossible to have absolute certainty with respect to both the scope of a patent and whether an activity infringes a granted patent.⁶ While parties to the patent system have to accept that there is a degree of risk associated with their participation in the system, there are, nonetheless, sound reasons to reduce the degree of uncertainty in the system.⁷ With respect to the research use exemption – there may be a slight advantage to using the formulation adopted in the CPC as the case law that has been established in countries, such as the UK, may be helpful for courts in Australia; however, the plain English of the proposed change also has advantages over other possible formulations of an exemption.

References

- Advisory Council on Intellectual Property (2005). *Patents and Experimental Use*, Report.
- Dent, C. (2008), ‘An Exploration of the Principles, Precepts and Purposes that Provide Structure to the Patent System’ *Intellectual Property Quarterly* 456-477.
- Dent, C., Jensen, P.H., Waller, S. and Webster, E. (2006). *Research Use of Patented Knowledge: A Review*, STI Working Paper 2006/2, Directorate for Science, Technology and Industry, Organisation for Economic Cooperation and Development (OECD), Paris.
- Dreyfuss, R. (2004), “Protecting the public domain of science: Has the time for an experimental use defense arrived?”, *Arizona Law Review* 457-72.

⁶ It is possible to have the former by legislating that a patent granted is not challengeable in court but that would be counter to principles of accountability and, to maintain patents as effective incentives, it would require much greater investment in the patent examination procedure. It is not possible to be certain that, in circumstances where there is reasonable doubt, a given activity does, or does not, infringe a granted patent. Such certainty requires a court to rule on the legal extent of the claims of the patent and on whether the other activity infringes those claims.

⁷ For a discussion of the principle of risk assessment in the patent system, see Dent (2008).

Appendix 1: Summary Data – Freedom to Operate Survey 2007

FINDINGS FROM THE SURVEY

This Appendix provides an overview of the results from a survey of public sector researchers in the physical, agricultural and health sciences across the Go8 universities and major research institutes in Australia. The survey was conducted during February to April 2007 by the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne. In total, 2959 useable surveys were returned (an overall response rate of 31 per cent).

Survey results have been classified according to four broad research fields: medicine, science, engineering and architecture. The medicine category includes researchers in the various fields of medicine, health sciences, nursing, veterinary science, speech therapy, dentistry and human movement studies. Science covers researchers in science, maths, information technology, information systems, psychology, agricultural science, microbiology, land and food resources, chemistry, zoology and biology. Engineering includes researchers in the various fields of engineering. Meanwhile the architecture category includes researchers in the architecture, design and the built environment disciplines. The breakdown of survey respondents by discipline is as follows: medicine (39.5 per cent); science (43.5 per cent); engineering (14.7 per cent) and architecture (2.3 per cent).

Understanding Existing Patent Law (Tables 1–6)

The survey included six questions about existing patent law relating to the sector in which researchers work, the intent of research, and patent ownership. From Table 1 it can be seen that 42.4 per cent of all respondents believed that *not-for-profit* sector researchers need permission to use patented research tools and techniques when that use is purely for research purposes. Meanwhile 22.7 per cent of respondents thought that such permission is not required and 34 per cent were unsure. In relation to *for-profit* sector research, a substantially higher proportion of respondents believed that permission is required to use patented research tools and techniques for research purposes—at 59.7 per cent of respondents; meanwhile just 9.7 per cent said permission is not required and 29.3 per cent were unsure (see Table 2).

The need for permission to use patented research tools and techniques for commercial purposes was generally thought necessary by a much higher proportion of respondents than was the case if patented material is being used for purely research purposes. Just over 68 per cent of all respondents believed that *not-for-profit* sector researchers need permission to use patented research tools and techniques when that use is commercial. Meanwhile, almost 74 per cent thought *for-profit* sector researchers need permission to use patented material for uses which have commercial intent (Table 3 and Table 4).

There was greater uncertainty amongst respondents as to whether permission is necessary to use patented material if the owner of a patented tool or technique is a public organisation (Table 5). Almost 45 per cent of respondents were unsure if *not-for-profit*

sector researchers need permission to use publicly owned patents, while 38 per cent were unsure whether *for-profit* sector researchers need permission in such cases (Table 6).

Patent and Licensing Behaviour (Tables 7-8)

In response to a question about the use of patents, only 13.4 per cent of respondents indicated that they had sought permission to use others' patented technology over the previous year (Table 7). Of those who did seek permission to use others' patented technology, some 75 per cent were granted permission on at least one occasion (that is, 10.0 percentage points of the 13.4 per cent requesting permission (Table 8).

Effects on Research (Table 9)

Respondents were asked about the effects of patents and other matters on their research. They were presented with a number of statements and asked to rate their accuracy on a scale of 1 to 7. Table 9 presents the averages of these ratings. In general it would seem that respondents' choices of research projects are not significantly affected by other researchers' patents, with this effect given an average rating of just 2.3. Meanwhile respondents indicated greater difficulty getting information about other researchers' methods or getting data and research tools from other researchers (mean ratings of 4.9 and 4.7). The situation in regard to negotiating with the owners of patented technology was slightly more mixed (with an average response of 3.9). Finally, patent owner restrictions on the timing of research publication were the second greatest concern (a rating of 4.5).

The Culture of the Workplace (Table 10)

Table 10 presents results in the same format as Table 9, that is, as averages of ratings, on a scale of 1 to 7, in relation to a range of statements. Overall there would appear to be a reasonable degree of freedom, encouragement and openness within the workplaces of respondents to the survey. The survey revealed that, on average, academics: do not feel pressure from their management to patent; feel free to disclose and publish their findings; perceive other scientists in their field as open rather than secretive; value publishing in peer-reviewed journals more than patenting; and feel encouraged to present findings at conferences and share information on research.

SUMMARY TABLES

Table 1: Not-for-profit sector researchers need permission to use patented research tools & techniques if that use is purely for research

| <i>Research Field</i> | <i>True (%)</i> | <i>False (%)</i> | <i>Unsure (%)</i> | <i>Missing (%)</i> | Total (%) |
|-----------------------|-----------------|------------------|-------------------|--------------------|------------------|
| Medicine | 46.5 | 22.1 | 30.3 | 1.2 | 100 |
| Science | 38.2 | 24.1 | 36.9 | 0.9 | 100 |
| Engineering | 44.9 | 21.7 | 32.5 | 0.9 | 100 |
| Architecture | 33.8 | 14.7 | 51.5 | 0.0 | 100 |
| Total | 42.4 | 22.7 | 34.0 | 1.0 | 100 |

Table 2: For-profit sector researchers need permission to use patented research tools & techniques if that use is purely for research

| <i>Research Field</i> | <i>True (%)</i> | <i>False (%)</i> | <i>Unsure (%)</i> | <i>Missing (%)</i> | Total (%) |
|-----------------------|-----------------|------------------|-------------------|--------------------|------------------|
| Medicine | 62.8 | 8.7 | 27.0 | 1.5 | 100 |
| Science | 57.4 | 10.0 | 31.4 | 1.2 | 100 |
| Engineering | 59.0 | 12.4 | 27.4 | 1.2 | 100 |
| Architecture | 55.9 | 1.5 | 41.2 | 1.5 | 100 |
| Total | 59.7 | 9.7 | 29.3 | 1.3 | 100 |

Table 3: Not-for-profit sector researchers need permission to use patented research tools & techniques if that use has commercial intent

| <i>Research Field</i> | <i>True (%)</i> | <i>False (%)</i> | <i>Unsure (%)</i> | <i>Missing (%)</i> | Total (%) |
|-----------------------|-----------------|------------------|-------------------|--------------------|------------------|
| Medicine | 68.6 | 3.3 | 26.9 | 1.3 | 100 |
| Science | 68.3 | 3.0 | 27.6 | 1.2 | 100 |
| Engineering | 67.3 | 6.7 | 24.2 | 1.8 | 100 |
| Architecture | 60.3 | 1.5 | 36.8 | 1.5 | 100 |
| Total | 68.1 | 3.6 | 27.0 | 1.4 | 100 |

Table 4: For-profit sector researchers need permission to use patented research tools & techniques if that use has commercial intent

| <i>Research Field</i> | <i>True (%)</i> | <i>False (%)</i> | <i>Unsure (%)</i> | <i>Missing (%)</i> | Total (%) |
|-----------------------|-----------------|------------------|-------------------|--------------------|------------------|
| Medicine | 73.5 | 1.7 | 23.4 | 1.4 | 100 |
| Science | 74.2 | 2.0 | 22.8 | 1.1 | 100 |
| Engineering | 74.2 | 4.6 | 19.8 | 1.4 | 100 |
| Architecture | 66.2 | 0.0 | 32.4 | 1.5 | 100 |
| Total | 73.7 | 2.2 | 22.8 | 1.3 | 100 |

Table 5: Not-for-profit sector researchers need permission to use patented research tools & techniques if the owner of the patent is a public organisation

| <i>Research Field</i> | <i>True (%)</i> | <i>False (%)</i> | <i>Unsure (%)</i> | <i>Missing (%)</i> | Total (%) |
|-----------------------|-----------------|------------------|-------------------|--------------------|------------------|
| Medicine | 42.3 | 13.5 | 42.7 | 1.5 | 100 |
| Science | 37.5 | 12.7 | 48.5 | 1.3 | 100 |
| Engineering | 43.3 | 17.1 | 37.8 | 1.8 | 100 |
| Architecture | 36.8 | 14.7 | 47.1 | 1.5 | 100 |
| Total | 40.2 | 13.7 | 44.6 | 1.5 | 100 |

Table 6: For-profit sector researchers need permission to use patented research tools & techniques if the owner of the patent is a public organisation

| <i>Research Field</i> | <i>True (%)</i> | <i>False (%)</i> | <i>Unsure (%)</i> | <i>Missing (%)</i> | Total (%) |
|-----------------------|-----------------|------------------|-------------------|--------------------|------------------|
| Medicine | 55.8 | 5.1 | 37.7 | 1.5 | 100 |
| Science | 54.4 | 4.8 | 39.4 | 1.4 | 100 |
| Engineering | 59.9 | 6.9 | 31.8 | 1.4 | 100 |
| Architecture | 48.5 | 5.9 | 44.1 | 1.5 | 100 |
| Total | 55.6 | 5.2 | 37.7 | 1.4 | 100 |

Table 7: No. of times permission sought to use someone else's patented technology over past year

| <i>Research Field</i> | <i>None</i> | <i>1–2</i> | <i>3 or more</i> | <i>DK / NA</i> | Total |
|-----------------------|-------------|-------------|------------------|----------------|--------------|
| Medicine | 82.4 | 13.6 | 2.5 | 1.5 | 100 |
| Science | 87.2 | 10.4 | 1.2 | 1.2 | 100 |
| Engineering | 87.6 | 9.2 | 2.3 | 0.9 | 100 |
| Architecture | 86.8 | 13.2 | 0.0 | 0.0 | 100 |
| Total | 85.3 | 11.6 | 1.8 | 1.3 | 100 |

Table 8: No. of times permission to use someone else's patented technology granted over past year

| <i>Research Field</i> | <i>None</i> | <i>1–2</i> | <i>3 or more</i> | <i>DK / NA</i> | Total |
|-----------------------|-------------|------------|------------------|----------------|--------------|
| Medicine | 6.0 | 9.8 | 2.4 | 81.9 | 100 |
| Science | 5.0 | 7.6 | 1.1 | 86.3 | 100 |
| Engineering | 5.4 | 6.7 | 2.1 | 85.8 | 100 |
| Architecture | 10.5 | 7.5 | 0.0 | 82.1 | 100 |
| Total | 5.6 | 8.3 | 1.7 | 84.4 | 100 |

Table 9: Effects of patents and other matters on research (Means of responses on a scale of 1 to 7)

| <i>Effects on research</i> | <i>Med.</i> | <i>Sci.</i> | <i>Eng.</i> | <i>Arch.</i> | Total |
|---|-------------|-------------|-------------|--------------|--------------|
| Effect of other researchers' patents on which research projects you choose: no effect=1, major effect =7 | 2.3 | 2.2 | 2.6 | 1.6 | 2.3 |
| Difficulty getting information on other researchers methods: 1=obstacle, 7=no difficulty | 4.8 | 5.1 | 4.7 | 4.4 | 4.9 |
| Difficulty getting materials (data & research tools) from other researchers: 1=obstacle, 7=no difficulty | 4.6 | 4.9 | 4.6 | 4.1 | 4.7 |
| Difficulty negotiating with owners of patented technology: 1=difficult, 7=easy | 3.9 | 3.9 | 3.9 | 3.5 | 3.9 |
| Patent-owner restrictions on the timing of your research publications: 1 = restrictions, 7= no restrictions | 4.4 | 4.8 | 4.4 | 3.9 | 4.5 |

Table 10: The way research is conducted in researchers' department or laboratory (Means of responses on a scale of 1 to 7)

| <i>Way research conducted</i> | <i>Med.</i> | <i>Sci.</i> | <i>Eng.</i> | <i>Arch.</i> | Total |
|---|-------------|-------------|-------------|--------------|--------------|
| Pressure from senior management to patent significant inventions: under pressure=1, no pressure =7 | 4.4 | 4.6 | 4.7 | 5.6 | 4.6 |
| Freedom to disclose significant inventions before patenting: 1=never disclose, 7=free to publish & present | 4.7 | 5.0 | 4.7 | 5.4 | 4.8 |
| Secrecy of scientists working in your field: 1=secretive, 7= very open | 4.8 | 5.1 | 5.0 | 5.0 | 5.0 |
| Importance of publishing in peer reviewed journal cf. patenting : 1=publishing more important, 7=patenting more important | 2.3 | 2.2 | 2.4 | 1.8 | 2.3 |
| Whether encouraged to present findings at conferences: 1 = not encouraged, 7= encouraged | 6.0 | 6.1 | 5.5 | 5.9 | 6.0 |
| Whether encouraged to share information on your research: 1 = not encouraged, 7= willingly share | 5.7 | 5.8 | 5.6 | 5.6 | 5.7 |

Appendix 2: Arguments for and against license-based research

Arguments for license-based research

Patents do not necessarily prohibit research on the invention or idea. They can merely add to the costs of doing research, since the researcher must pay commercial (i.e. monopoly) prices in order to use the product or process. They are not permitted simply to reproduce the product or process themselves at marginal cost. Added to these commercial costs are the costs of negotiating a license which will include both labour time and lapsed time, and may, in the limiting case, be infinite.

Opponents of research exemptions argue that an efficient allocation of resources – which provides the appropriate level of investment incentives for all research – requires researchers to pay the full costs of any inputs they use. If they use knowledge created by another researcher, they should pay for both the fixed costs of discovery as well as the on-going marginal costs. Researchers who need to pay patent license fees for their inputs therefore need to attract higher levels of funding: a point which is often overlooked by governments who are advocating that universities more aggressively pursue licensing revenues. This has the effect of supporting incentives for the upstream researcher as well as concentrating research funds on projects which are judged to have the best potential. Hence, licensing without exemptions provides an efficient way to balance the incentives to invest with the appropriate level of spillovers.

Arguments against license-based research

However, the proponents of exemptions believe that these arguments are simplistic for a variety of reasons. First, since much research is cumulative in nature, there may be multiple licensing arrangements that need to be negotiated separately before any actual research can take place. These will probably involve significant transaction costs. These payments are deadweight losses from societies point of view and do not augment the incentive to invest for either party. As Scherer stated: ‘Developing new products that enhance human health and welfare should not be like walking through a minefield, with risk of severe consequences should a loosely-related patent claim be infringed’.⁸

Negotiating your way through a minefield of contracts (or cross-licensing arrangements) can also lead to well-known contractual problems such as hold-up. As a consequence, research will only be conducted up until the point where the transaction costs imposed are less than the total expected value of the research itself. This is of particular relevance with regard to an upstream, enabling invention which has little (or no) commercial value yet provides the potential for considerable commercial opportunities downstream. In this case, it is likely that important upstream research projects will not be undertaken at all.

Secondly, the license-based research argument assumes researchers know *ex ante* which projects will be the most successful *ex post*. However, most research, by its very nature is

⁸ Scherer (2002), 1364.

subject to fundamental uncertainty. Fundamental uncertainty occurs when we cannot use information from past events to form statistical probabilities over the outcomes of future events, since each event is so distinctive and novel. This concept plays an important role in understanding scientific progress since many important scientific breakthroughs have occurred purely by chance. Since we cannot know *ex ante* which scientific pathways will bear fruit, the greater the user and transactions costs associated with each pathway, the greater is the possibility that some important (but not as yet known as being important) research will not be undertaken. Interviews of researchers by Walsh, Arora and Cohen (the Walsh study)⁹ find some evidence of patent owners “blocking” research pathways and there are other precedents for such behaviour in Merges and Nelson.¹⁰

References

- Merges, R.P. and Nelson, R.R. (1990), ‘On the Complex Economics of Patent Scope’, 90 *Columbia Law Review* 839.
- Scherer, F.M. (2002), ‘The economics of human gene patents’, 77 *Academic Medicine* 1348
- Walsh, J.P., Arora, A. and Cohen, W.M. (2003), ‘Effects of research tool patents and licensing on biomedical innovation’, in Cohen, W. M. and Merrill, S. A. (eds) *Patents in the Knowledge-Based Economy*, National Academies Press: Washington DC.

⁹ However, note that the Walsh et al. (2003) interviews were conducted before the *Madey v Duke* decision was handed down.

¹⁰ Merges and Nelson (1990).