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Abstract	Academic research is increasingly being commercialised. This commercialisation trend has different dimensions, among which the massive increase of patenting and licensing activities by universities, the significant growth of industry funding of academic research via so-called contract research, and the creation of ever more 'spin-out' companies. All this is strongly encouraged by governments throughout the Western world. The commercialisation trend has far-reaching consequences for access to the fruits of academic research and so the question arises whether the current policies are indeed promoting innovation or whether they are instead a symptom of a pro-commercialisation culture which is blind to adverse effects. This paper discusses the justifications that are given for the current policies and raises the question to what extent they threaten important academic values. Next, the question will be addressed as to why policymakers seem to ignore the adverse effects of the commercialisation of academic research. Finally, a number of proposals for improving university policies will be made.

Enclosing the Academic Commons – Increasing Knowledge Transfer or Eroding Academic Values?*

Sigrid Sterckx

Universities must maintain and encourage freedom of enquiry, discourse, teaching, research and publication, and they must protect all members of the academic staff and student body against external and internal influences that might restrict the exercise of these freedoms.[1]

Abstract Academic research is increasingly being commercialised. This commercialisation trend has different dimensions, among which the massive increase of patenting and licensing activities by universities, the significant growth of industry funding of academic research via so-called contract research, and the creation of ever more 'spin-out' companies. All this is strongly encouraged by governments throughout the Western world. The commercialisation trend has far-reaching consequences for access to the fruits of academic research and so the question arises whether the current policies are indeed promoting innovation or whether they are instead a symptom of a pro-commercialisation culture which is blind to adverse effects.

This paper discusses the justifications that are given for the current policies and raises the question to what extent they threaten important academic values. Next, the

*This text served as the basis for a talk given in Gent on March 6th, 2008, at the symposium that led to this book.

[1] *Statement on Academic Freedom*, May 26th, 2005, signed by the Presidents of the following (and more) universities: Columbia, Oxford, Yale, Harvard, Princeton (available at http://www.columbia.edu/cu/president/ommunications%20files/globalcolloquium.htm).

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question will be addressed as to why policymakers seem to ignore the adverse effects of the commercialisation of academic research. Finally, a number of proposals for improving university policies will be made.

1 The Massive Rise of Academic Patenting and Licensing in the US and Europe

For most of the twentieth century, US universities were clearly hesitant about getting involved with patenting and licensing of research results produced by their faculty. Especially in relation to medical patents, opposition was widespread. According to Mowery et al., in their impressive book *Ivory tower and industrial innovation*:

> In part, this ambivalence reflected concerns that any appearance of profiteering at public expense would be politically embarrassing.[2]
>
> Well into the 1960s … [m]any institutions continued to avoid direct involvement in patent administration, and others maintained a hands-off attitude towards patents altogether. Columbia [University's] policy left patenting to the inventor and patent administration to the Research Corporation, stating that "it is not deemed within the sphere of the University's scholarly objectives" to hold patents, and Harvard, Yale, and Johns Hopkins adopted similar positions. All of these universities … discouraged or prohibited medical patents. Other universities allowed patents on biomedical inventions only if it was clear that patenting would be in the public interest (Mowery et al. 2004, pp. 42–43).

However, this attitude has changed. Since the early 1980s in the US and the 1990s in Europe, academic patenting and licensing activities have massively increased, particularly in biomedical fields and some fields of engineering. Between 1980 and 2004, the number of US patents obtained by universities increased almost 16-fold. The strategies universities use to defend and extend their patents are sometimes very aggressive, which leads to growing irritation on the part of industry.[3] In fiscal year (FY) 2004, circa 154 US universities collected more than $1 billion in net patent licensing income, signed 3,928 new licences, and obtained over 3,800 U.S. patents.[4] In 2006, 4,963 new licences were signed, 3,255 U.S. patents were issued and 553 spin-off companies were set up.[5] The number of technology transfer offices (TTOs) in the US has also mushroomed: in 1980 there were only 25 active TTOs; in 2005 there were 3,300 (Pollarito 2005). Indeed: "Technology transfer has become a multi-billion dollar industry unto itself".[6]

[2] Mowery et al. (2004), p. 4. For a detailed discussion of the evolution of the patent policies and practices of US universities from 1925 to 1980, see Mowery et al. (2004), Chap. 3. Those universities who did get involved with patenting and licensing did so indirectly, i.e. they 'outsourced' these activities to a third party. Concerns about direct involvement with patenting were one of the reasons why the Research Corporation was established in the US in 1912. See Mowery et al. (2004), Chapter 4.

[3] See e.g. Wysocki (2004). See also Bagley (2006). See also Thursby and Thursby (2005).

[4] Bagley (2006), p. 217, referring to the summary of the *2004 Licensing Survey* by the Association of University Technology Managers (available at www.autm.net).

[5] *2006 Licensing Survey US*. See Association of University Technology Managers (www.autm.net).

[6] Ritchie de Larena (2007), Part V, opening paragraph.

Recently, figures for Europe became available which show the same trend of a very fast increase in the number of academic patents and licences.[7] *ProTon Europe*, an organisation similar to the American *Association of University Technology Managers*, provides an overview of 'knowledge transfer' in Europe, based on information obtained from 392 'Knowledge Transfer Organisations' across 17 European countries. In FY 2005, according to this source, 2,310 patent applications were filed,[8] 731 licences were executed, € 94 million was obtained in licensing income and 434 spin-off companies were created. These figures may be less impressive than the US figures for 2005 – the already mentioned 4,932 licences, the creation of 628 spin-off companies and the $1.3 billion in licensing income – but the trend is clear and the numbers are rising quickly.[9] For FY 2006, *ProTon Europe* reports the granting of 687 patents, the execution of 3,174 licences and the creation of 473 spin-offs.[10]

Two other trends are also apparent, which will briefly be commented on in the next two sections: the increasing number of 'upstream' patents and the preponderance of exclusive – as opposed to non-exclusive – licences.

2 The Increasing Number of 'Upstream' Patents

An increasing number of patents, including academic patents and university spin-off patents, are being applied for and obtained for the results of 'upstream' research – sometimes referred to as patenting of 'research tools'[11] or 'inputs to science' – particularly in biomedical fields as well as nanotechnology (Lemley 2005).

The patenting of research tools by universities seems an almost inevitable result of the pressure on universities to patent. The basic or early stage research for which universities receive funding is often such as leads to the discovery of techniques useful in later stage research, i.e. research which universities are not generally funded to carry out. Whilst manufacturing industries are more interested in patenting end products and hence may choose to keep research tools secret, this option may not be available to universities if they have neither the funds for nor the interest in carrying out the later stage research which leads to those end products. The shortage

[7] See the 2005 Annual Survey Report by *ProTon Europe*, a European network of 'Knowledge Transfer Offices' and companies affiliated to universities and other public research organisations, available at http://www.protoneurope.org/news/2007/Articles/2005AnnualSurveyReport.

[8] No information is given on the number of patents *granted*.

[9] As shown by *ProTon Europe*'s comparison with FY2004.

[10] See the 2006 Annual Survey Report by *ProTon Europe.*

[11] 'Research tool' is used in this paper since it is the term most widely used in this context. It is, however, somewhat misleading since it brings to mind the image of the machines and equipment used in the lab by researchers. It has long been the case that universities buy lab equipment from commercial suppliers when it is available, whether or not the suppliers have patented it. Our particular concern in this paper is with research *methods* which could be performed without specialized equipment and with patented apparatus and materials which are only available, if at all, under conditions universities find hard to meet, e.g. inflated cost or demanding licensing terms.

of funding to perform later stage research and hence the drive to patent 'upstream' research results applies similarly to university spin-offs.

Such patents pose particular problems (Heller and Eisenberg 1998; See also Eisenberg 2001; See also Rai 1999). A proliferation of intellectual property rights on results of 'upstream' research – i.e. early in the pipeline – may stifle 'downstream' research and development, as the greater the number of people whose agreement has to be obtained in order to allow a project to proceed, the higher the risk that bargaining will fail or that transaction costs will become too high. This will be even more likely if the property rights belong to actors in both the public and the private sector, with different institutional agendas. Just as *too few* property rights can lead to *overuse* of resources in a 'tragedy of the commons', *too many* property rights can cause *underuse* of resources in a 'tragedy of the anticommons' if too many owners can block each other. Hence, future research can be stalled as a result of the:

> [C]omplex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream … innovation. (Heller and Eisenberg 1998, p. 698)

More concretely, proliferation of 'upstream' patents leads to royalty stacking and a reduced number of 'players' in the research field, both of which hinder or limit the arrival of new products onto the market.

The problem of 'royalty stacking' (or 'licence stacking') is clearly explained by Heller & Eisenberg:

> [A]n RTLA (reach-through license agreement) gives the owner of a patented invention, used in upstream stages of research, rights in subsequent downstream discoveries. Such rights may take the form of a royalty on sales that result from use of the upstream research tool, an exclusive or nonexclusive license on future discoveries, or an option to acquire such a license. … RTLAs may lead to an anticommons as upstream owners stack overlapping and inconsistent claims on potential downstream products. In effect, the use of RTLAs gives each upstream patent owner a a continuing right to be present at the bargaining table as a research project moves downstream toward product development (Heller and Eisenberg 1998).

Thus the result of such 'stacking' can be that the product reaches the market but only after extended delays due to licence negotiations or at a price which is affordable to few of the possible users, or even that the product does not reach the market at all.

In addition, 'upstream patenting' reduces the number of players in the research field. More specifically, unlike traditional patents to commercial end products, which are rarely infringed by university researchers, 'research tool' patents cover almost by definition the type of research carried out by academics. While academics may fondly believe that their research cannot infringe patents, unlicensed use of patented research tools by university researchers in the US and most of Europe would almost certainly constitute patent infringement (see infra Sect. 4). Accordingly, research tool patents act not only to exclude commercial research players but also academic ones. Clearly, the less a field of research is explored, the fewer the products that can be expected to emerge from it.

3 The High Proportion of Exclusive Licences

Our focus should not only be on patenting *per se*, for the way universities design their *licensing* policies can also have a significant impact on the 'social return' of publicly funded research. Thus, for example, more than a quarter of licences issued by universities and research institutes are reported to include clauses allowing the industry partner to *delete* information from publications, while almost half allow the industry partner to insist on *delaying* publication (Thursby et al. 2003).

Research by Stanford Law Professor Mark Lemley has shown that the vast majority of licences granted under university patents are exclusive (see Lemley 2007). This tendency to grant exclusive licences has benefits and disadvantages for both the university in question and society at large. While university technology transfer offices tend to think that it is beneficial for them because it generates more income, this is not necessarily the case. The non-exclusive licensing of the Cohen-Boyer patent on recombinant DNA technology certainly proves this. As Lemley explains, it may depend on the nature of the technology:

> For certain basic building blocks – … "enabling technologies" – opening up licensing to many innovators who can develop different uses will generate substantial improvements, while giving an exclusive license to only one person will generate fewer improvements. And exclusive licenses can block any development of a technology if the licensee doesn't deliver. … Exclusive licenses aren't necessarily bad … but they raise concerns about the effective diffusion of new technologies (Lemley 2007, p. 6).

Exclusive licensing, moreover, raises the risk that scarce university financial resources are diverted into litigation. Where a patent for a technology critical for the development of a product in a new field is licensed exclusively, companies wishing to enter that field have little option but to ignore or seek to revoke the patent.

4 Negative Effects of These Trends

In addition to the *general* problem that academic patenting and licensing amount to double taxation,[12] the developments discussed above pose various *specific* problems which are the topic of this section.

A pro-IP culture may have negative effects on the *sharing of research results* among academics.[13] Margo Bagley, a Law Professor at Virginia University, summarises it neatly:

> [T]oday, academic researchers are being encouraged by technology transfer offices … and industry sponsors to delay publishing and presenting their work until after filing a

[12] Since taxpayers contribute to the funding of the initial research and then must pay a second time as the cost of royalty payments to universities is reflected in the prices of patented products and processes. See Ritchie de Larena (2007) as well as Washburn (2005) for numerous examples.

[13] See e.g. Blumenthal et al. (1997). See also Campbell et al. (2002). For a more general discussion, see Liebeskind (2001). See also Washburn (2005).

> patent application and sometimes even longer than that. … While not amenable to precise quantification, the stifling of discourse and the erosion in the norms of sharing and colloquy historically associated with the scholarly enterprise are costs that must be balanced against the technology transfer gains (Bagley 2006, pp. 2–3.).

> Encroachment on traditional sharing norms now often comes from university intellectual property policies codified in faculty hand-books and in the instructions of TTO [Technology Transfer Office] personnel to vet inventive work through the office before publishing or presenting it to avoid the loss of potential patent rights (Bagley 2006, p. 12; see also Grushcow 2004).

Current university policies on patenting and licensing may also affect the *direction of academic research*. Research funding as well as research efforts may be redirected from non-commercialisable to commercialisable areas – a shift which may imply a redirection from fundamental to applied research as well as from research in the arts and humanities to research in the 'hard' sciences.

Another risk of the increased pressure to commercialise is that *the manner in which research results are presented* may deviate from the disinterested Mertonian (Merton 1973) standard to a more selective 'patent-friendly' format. As Corinne McSherry quotes an interviewee from a technology transfer office:

> [Attorneys] prefer that you make every invention by accident … What the patent attorney's trying to do is establish that there's no mechanism, [that] you couldn't have foreseen this. Which is the exact opposite of the faculty inventor who's trying to establish that their understanding of the mechanism and predictability led to this discovery … That scares patent attorneys to death. People could say "Wait a minute, you mean anybody could have formed this hypothesis based on what Professor Joe Schmoe said in this paper and that all you did was test [that idea]? (McSherry 2001)

[AU1]

It also seems clear that the current emphasis on commercialization of academic work raises the *risk of further sidelining the importance of educating students*. As Geuna and Nesta observe[14]:

> If patent output is to be used in the academic evaluation process (as is already happening in a few countries and as is being promoted by some policy reviews), this will create incentives for researchers to reduce their time/commitment to some of their activities – and, given the current weighting scheme, teaching will be the activity likely to suffer the highest time reduction.

Another serious potentially negative effect is the *risk of universities being sued for patent infringement* in countries that don't have a sufficiently broad 'research exemption' in their patent law.[15] This has become all too clear in the US, with the decision in the case *Madey v. Duke*. The significance of this decision is clearly explained as follows by Adam Jaffe and Josh Lerner:

> Historically, universities and others engaged in academic research [in the US] have not typically been targets of patent infringement suits. This is partly because there is a doctrine in [US] patent law of an "experimental use exception," whereby otherwise infringing activity

[14] Geuna and Nesta (2003), p. 17. In this regard, Geuna and Nesta refer to the paper by Stephan (2001).

[15] National patent laws differ as to whether they include a research exemption or not, and how narrow or broad it is. See e.g. Cook (2006).

> cannot be prevented if it occurs "for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry." But it has never been clear that this narrow exception covers much of what universities do; the fact that they have rarely been sued in the past may have been due to a lack of concern or focus by patent holders as much as a belief that universities were truly exempt (Jaffe and Lerner 2004).

However, as they observe, this situation is changing:

> A recent CAFC [Court of Appeals for the Federal Circuit] decision has sent ripples of fear through the general counsel's offices at universities. In a case between Duke University and a former faculty member named John Madey, the experimental use exception was construed so narrowly that whatever fig leaf it may previously have provided university activities may have shriveled to the point of irrelevance (Jaffe and Lerner 2004).

The CAFC overruled an earlier decision by a District Court judge in favour of Duke University – which construed the 'research exemption' broadly as covering activities "solely for research, academic or experimental purposes".[16] In the view of the CAFC, this construction of the exemption was much broader than the traditional test, which limited the exemption to activities "for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry".[17] The CAFC concluded that:

> [R]egardless of whether a particular institution or entity is engaged in an endeavour for commercial gain, so long as the act is in furtherance of the alleged infringer's legitimate business and is not solely for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry, the act does not qualify for the very narrow and strictly limited experimental use defense.

In June 2003 the US Supreme Court refused to hear an appeal of the CAFC decision.

Under the CAFC's interpretation, most basic research will *not* be considered as exempted from patent infringement suits – an alarming state of affairs, for access to technologies and materials is vital for much basic research. Forcing academic researchers to seek licences may result in research being reduced, delayed or foregone.

5 Why Do Policy-Makers Seem to Ignore These Problematic Aspects of Academic Patenting and Licensing?

In spite of all the potential and real problems discussed in the previous section, policymakers at the level of both governments and universities strongly defend and encourage academic patenting and licensing as *the* way to promote 'knowledge

[16] *John M.J. Madey v. Duke University*, 307 F.3d 1351 (Fed. Cir. 2002).

[17] The traditional construction goes back to two famous nineteenth century decisions. In 1813 *Justice Story* ruled in *Whittemore v. Cutter* that: "[I]t could never have been the intention of the legislature to punish a man, who constructed … a machine merely for philosophical experiments, or for the purpose of ascertaining the sufficiency of the machine to produce its described effects". *Whittemore v. Cutter*, 29 F. Cas. 1120 (C.C.D. Mass. 1813). In 1850 it was decided that patent holders cannot sue for infringement: "[a person whose] use is for experiments for the sole purposes of gratifying a philosophical taste or curiosity or for instruction and amusement". *Gayler v. Wilder*, 51 U.S. (10 How.) 477, 497 (1850).

transfer' or 'technology transfer' from academia to industry. Might it be the case that these negative effects are the price we must pay for technology transfer which is vital to our economies? Several empirical studies – all based on responses obtained through interviews or surveys from senior managers in different industrial sectors – show that academic patenting and licensing are *not* the main channels for such transfer. Three such studies are briefly summarised here.

A first study which needs mentioning is Edwin Mansfield's survey, asking senior industry managers what proportion of their innovations either would not have been developed or would have been developed only significantly later in the absence of recent university research (Mansfield 1991). A second, similar example of pertinent empirical research is the so-called 'Yale Survey' (Levin et al. 1987). A third study is known as the 'Carnegie-Mellon Survey' (Cohen et al. 2002). This is even more important than the other two, as it is more recent, and because it also asked senior research managers from industry which were the most important channels via which corporations obtained access to the results of academic research to be applied in their innovations.

One of the main conclusions from each of these studies is that the importance of academic research for industrial innovation varies considerably between industries. In fact, only in biomedical fields – particularly pharmaceuticals and biotechnology – does university research appear to significantly and directly influence industrial innovation.

As noted earlier, the 'Carnegie-Mellon Survey' also asked industrial research managers to rate the importance of various information channels to industrial R&D. Interestingly, even according to managers from the pharmaceutical sector, the most important sources of information are not agreements with universities on patenting and licensing – even though these are regarded as very important – but research publications and conferences. Respondents from most other industries considered university patents and licences to be of very little importance to industrial R&D.

The question arises as to why these empirical findings are ignored by policymakers. Why is the pro-IP culture in academia growing stronger rather than being reoriented to take account of the abovementioned problems? A number of arguments are invoked to justify policies which encourage academic patenting and licensing:

First argument: strengthening the regional economy

In policy documents of international bodies, governments and universities, it is argued increasingly frequently that, through patenting and licensing, universities can promote the regional economy, e.g. by addressing technical problems faced by regional industries and by creating marketable products and jobs.

Admittedly, encouraging academics to generate things which are of value to the community can be a good thing, but universities can do this without getting entangled with patenting and licensing.

Second argument: more money for universities

Some say that, through their involvement in patenting and licensing, universities may generate revenue for themselves, revenue which is necessary in view of the

decline of government funding of universities (see Guena 2001). However, even though universities may well have a legitimate claim to more funding, patenting and licensing of academic research is not necessarily the best or the only way to achieve this – especially in view of the abovementioned disadvantages.[18]

The licensing revenues even of universities which have extensive experience with patenting and licensing are dominated by a very small number of outstandingly successful inventions (usually in the biomedical field). For most universities, patenting and licensing activities are clearly unprofitable (see e.g. Geuna and Nesta 2003). Yet, generating income seems to be the main reason why universities get involved with patenting and licensing. Research by Jensen and Thursby, surveying university licensing officers, found that 75% of respondents rated 'revenue' as 'extremely important', making it the most important objective of academic licensing offices in this survey (Jensen and Thursby 2001; see also Thursby et al. 2001).

Third argument: incentive to invent

A major aspect of the classic utilitarian justification of the patent system is that it provides an indispensible incentive to invent. It is sometimes claimed that this incentive effect may be real in an industry context but has very little relevance for academia, because academic researchers are paid to invent and hence don't need any additional encouragement. However, the argument *does* have some force:[19] even though academics are paid to do research, this does not necessarily imply that they make inventions. Generating *information* from research is not the same thing as generating *inventions*.

The pressure on the academic to publish new knowledge revealed by her research is not the same as pressure to consider the possible ways in which that knowledge might be utilized commercially. Since it is the *originality* of research that has traditionally been valued amongst academic scientists, there has moreover been little incentive for the academic to investigate the suitability of the new knowledge for such commercial end uses. With a pressure from the university to patent, there indeed comes a pressure on the academic to consider how to turn the new knowledge into a patentable invention.

Fourth argument: incentive to innovate

The most frequently invoked argument for universities' involvement with patenting and licensing is that this is a key enabling factor in the process of transforming research results into products or processes with market value, a process otherwise known as 'innovation'. Indeed, commercialising an invention may involve developing or improving technologies to manufacture the invention, performing additional scientific testing of the invention, performing pre- and post-marketing research and advertising the product or process, all of which require investment.

[18] This goal may better be obtained via a general tax. See Lemley (2007), note 27 and the reference given there.

[19] I am grateful to Julian Cockbain for making this point.

As noted by Abramowicz:

> Inventors sometimes might need to engage in inventive activity and seek patents well before commercialization is possible, lest they lose the patent race. … [C]ompetition among inventors [forces] patenting at an early stage, often so early that patentees will be quite unsure whether it will be worthwhile to ever [develop the invention].[20]

The question which concerns us here is whether the 'commercialization argument' is convincing in the case of *academic* inventions. Mowery, Nelson, Sampat and Ziedonis have analysed this issue in great detail (Mowery et al. 2004), in the context of their study of the effects of the US Bayh-Dole Act (1980), a law which was intended to promote the commercialization of federally funded inventions (including federally funded academic inventions).[21] One of the most significant findings of these researchers is that both before and after the entry into force of the Bayh-Dole Act, a lot of technology transfer took (and still takes) place *even in the absence of* academic patenting and licensing.

It is important to keep in mind that the overriding goal of the Bayh-Dole Act was and continues to be to produce the greatest *public* benefit. The objectives mentioned in the Preamble to the Act include: "to promote the utilization of inventions", "[for inventions to be] used in a manner to promote free competition and enterprise without unduly encumbering future research and discovery", to "promote commercialization and public availability of inventions" and to "protect the public against nonuse or unreasonable use of inventions". How the goals of the Bayh-Dole Act can be achieved – and whether patenting and licensing by the university is at all necessary – will often vary depending on the sector of technology and even the nature of the invention.

The popular view, which was also the key justification for adopting the Bayh-Dole Act, viz. that academic patenting and licensing are essential to achieve commercial development of academic knowledge, is in need of revision. For on the one hand, academic patenting and licensing turn out to be much less vital for commercialization of academic knowledge than is claimed by the dominant view, and on the other hand the pro-IP culture which has become so widespread in academia has several undesired effects and paradoxical consequences.

The 'prevailing wisdom' fails to see the real-world consequences of academic patenting and licensing. Although the empirical support for the pro-IP arguments discussed earlier turns out to be weak, these arguments continue to play a major role in policy-making, both at the level of universities and at the level of governments. What can be done to solve this problem? How can policy-making in this field be improved in the short term?[22]

[20] Abramowicz (2005) . Of course the problem of the delay between patent grant and commercialization is exacerbated by the increasing tendency of patent offices to grant 'embryonic' patents, i.e. the abovementioned patenting of 'upstream' research, especially by universities.

[21] *The Universities and Small Business Patent Procedures Act*, Public Law 96–517, 96th Congress, 94 Stat. 3015 (1980), enacted as 35 U.S.C. §200, et seq.

[22] 'Short term' solutions are understood here as opposed to solutions which would imply major modifications of patent laws, e.g. modifications of the novelty requirement for patentability, as proposed in Bagley (2006), or modifications of the requirement of susceptibility of industrial application. While such longer term solutions are necessary, the urgency of the matter is such that short term solutions should be investigated and put into place with minimum delay.

6 Some Comments on Potential Solutions

This final section of the paper makes some suggestions for reorienting academic patenting and licensing policies in order to curb the erosion of traditional academic norms and to bring the public interest back into focus.[23]

Some universities are already taking steps in this direction. Stanford University, for example, has a policy that contains at least two unusual features intended to facilitate technology transfer.[24] Firstly, despite the fact that the university claims ownership of all inventions made by faculty and staff, the inventors retain the right to place inventions into the public domain, i.e. to require no licence for their use, if this is deemed to be in the best interests of technology transfer. Secondly, Stanford University has an extremely simple procedure for material transfer agreements (MTAs), i.e. for the exchange of 'tangible research products'.[25] Where the recipient is in academia or a not-for-profit institution, no MTA is required. Where the recipient is in industry, three options are open to the donor: where the donor is certain that the material will be used for research purposes only, then again no MTA is required, and where the donor is uncertain he may either insist on an MTA where the recipient confirms use will be only for research purposes or he may refer the matter to the TTO for licensing.

Indeed, *standardising MTAs* in this way removes a barrier to academic cooperation and hence is one step towards reversing the current erosion of the key academic values of collaboration and openness.

Other suggestions which deserve further consideration can be split into three categories: a first which requires change in policy by universities; a second which necessitates change in national law; and a third which needs international agreement. Our focus here will be on the level of university policies.[26]

[23] This section has benefited greatly from my discussions with Julian Cockbain.

[24] Stanford University Office of Technology Licensing, *Our policy*, available at: http://otl.stanford.edu/inventors/policies.html.

[25] MTAs restrict the use of materials and data. An MTA is a contract between the donor and the recipient of a material which the donor is providing to the recipient. Frequently an MTA may forbid the recipient to analyse the material or to seek intellectual property rights in anything resulting from use of the material, and to publish results of experiments using the material. Some MTAs go so far as to provide that the intellectual property rights resulting from the recipient's use of the material shall belong to the donor. MTAs are becoming more and more widespread, and they are imposing increasingly complex and onerous terms. They typically forbid researchers receiving material to share that material with other institutions and may require pre-publication review of research results. As they are contractual agreements (e.g. between a university and company or between different universities), MTAs are not geographically or temporally limited. In this respect they differ from patents and can have even more far-reaching effects. See Streitz and Bennett (2003). See also Pool (2000).

[26] One suggestion requiring change in *national law* would be to make the research exemption to patent infringement explicitly cover *all* research by not-for-profit or public bodies, including universities, and hence shield them from litigation. Perhaps this should even extend to all areas of intellectual property, including in particular copyright. One example of a remedy necessitating agreement at an *international level* would be to adopt a one year grace period, similar to that already in US patent law. This would permit researchers to publish before patenting and hence would facilitate scientific openness. These and other proposals cannot be elaborated here.

The proposals listed below are aimed at improving university policies which relate to research collaborations and to the operation of the Technology Transfer Offices. To a large extent, with these proposals we aim to suggest that universities should instruct their TTOs to act for the benefit of the faculty rather than the reverse – in other words, the tail should not wag the dog.

First proposal: Universities must not enter into research or licensing agreements with industry that permit suppression or unreasonable delay of publication.

At first glance this would appear to be self-evident and it might surprise many readers that it is not a policy already in existence. However, as noted in Sect. 3, it is not. To give a simple example, one should consider the case of clinical trials carried out by academic medics, where it has been common practice for the sponsoring company to be in a position to delay, edit or suppress publication of less than favourable results.[27]

Second proposal: Require licences to be non-exclusive unless exclusivity can be convincingly justified, for example on the basis that development requires large and long term investment.

Since academic research is largely funded by the state, the use of IP rights to maximise the sale price of products stemming from this research represents a double payment by the public. This is avoided and the broad diffusion of the fruits of the research is encouraged by *non*-exclusive licensing, a strategy which nonetheless

[27] See *inter alia* Washburn (2005) and Smith, Richard (2006), for several examples. One of the particularly striking examples discussed by Washburn (pp. 19–20) relates to the long delay in publication of findings on the effectiveness of different thyroid medications. Betty Dong, a scientist working at the University of California at San Francisco (UCSF) discovered in 1990 that Synthroid, a drug which at that time was taken by eight million Americans every day, was no more effective than three cheaper drugs. The pharmaceutical company which sponsored her research – Boots Pharmaceutical, which later became Knoll Pharmaceutical Co. – spent several years vigorously trying to prevent the publication of these findings, arguing that Dong's research was flawed. Her research results were subjected to two investigations and only very minor problems were found. The conclusion from these investigations was that Boots/Knoll was harassing Dong because it did not want the public to learn these results. What Dong's employer UCSF did was at least as alarming. At first the university's lawyers agreed that Dong could submit her findings to the *Journal of the American medical Association* (JAMA), even though her research contract, which was approved by the university, required the company's approval for publication. JAMA's reviewers accepted the article and it was scheduled for publication on January 25, 1995, but a few weeks earlier Boots/Knoll threatened to sue UCSF. The university then urged Dong to withdraw her manuscript and she did. A while later a journalist from the *Wall Street Journal* learned of Dong's study and wrote an article on what had been happening. This lead to pressure from the Food and Drug Administration on Boots/Knoll and ultimately, 9 years after Dong completed the research, her results were published in the JAMA. As noted by Washburn: "[This] was a huge victory for Boots/Knoll, enabling the company to sustain Synthroid's dominant position in a $600-million market for drugs to control hypothyroidism. For the general public, it was another story. If an equally effective generic or brand-name preparation were substituted for Synthroid, Dong and her colleagues estimated that people suffering from hypothyroidism and other conditions would have saved $365 million annually." See Washburn (2005), p. 20 and the references given there.

provides the university with a financial incentive to promote such diffusion. However, we may accept that where extraordinary levels of investment are required to proceed from the research results to the marketplace, licence exclusivity may be necessary in order to allow the licensee to recoup that investment.

Third proposal: Require licensees to meet public interest goals, e.g. as regards sufficient and affordable dissemination of the invention.

One of the primary functions of a university is to provide services to the community. In as far as university *research* is concerned, one facet of this responsibility is surely to ensure that where research leads to products which meet a pressing need, those products are made accessible to the community. This is particularly relevant to essential drugs and other means for reducing disease burden, as well as for example to techniques for reducing pollution and increasing crop yields – more generally, this requirement relates to basic needs which are not met by existing products or which are met but at too high a cost.

Failure to meet these public interest goals could be sanctioned for example by loss of exclusivity, reduction of licence term, reduction in licence territory, etc.

Fourth proposal: As part of any licence agreement, require licensees to agree not to sue universities for IP infringement.

As discussed earlier, certain aspects of academic research in certain countries may not count as patent infringement, but other aspects do and in the US, e.g., the research exemption is currently almost meaningless. By their own collective actions, however, universities can claw back some freedom to carry out research without fear of incurring legal costs or damages or otherwise wasting scarce resources in litigation (including inter-university litigation).

The larger the number of universities that adopt such a policy of not suing other universities for IP infringement, the more effective it will be for all universities and the more beneficial it will be for scientific progress.

7 Conclusion

A long time has passed since the 1940 *Statement of Principles on Academic Freedom and Tenure* by the *American Association of University Professors*, which stressed i.a. that: [AU2]

> Institutions of higher education are conducted for the common good and not to further the interest of either the individual teacher or the institution as a whole. The common good depends upon the free search for truth and its free exposition.[28]

[28] American Association of University Professors, *1940 Statement of Principles on Academic Freedom and Tenure, With 1970 Interpretive Comments*, in Policy Documents & Reports, appendix 1 (9th ed. 2001), p. 3, quoted in Bagley (2006), p. 9.

Admittedly, academic patenting and licensing can generate significant social benefits, but these are not likely to be achieved by following the current approach of blindly promoting a pro-IP culture with hardly any attention being paid to negative effects and paradoxical consequences.

As Lemley puts it:

> University technology transfer ought to have as its goal maximizing the social impact of technology, not merely maximizing the university's licensing revenue. A university … is a public-regarding institution that should be advancing the development and spread of knowledge and the beneficial use of that knowledge (Lemley 2007, p. 14).

Unfortunately, this part of the story seems to have been somewhat lost along the way in the designing of academic patenting and licensing policies. However, better ways of doing these things are possible and urgently need to be implemented.

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Author Queries

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Queries	Details Required	Author's Response
AU1	Closing quote is missing in the sentence starting "Wait a minute ...." Please check.	
AU2	Please check the term "Stressed i.a. that" for correctness.	
AU3	Please provide page number in the reference "Pollarito (2005)", if appropriate.	