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Are Universities Patent Trolls?

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Abstract

Hold-up is a primary component of patent litigation and patent licensing today. Universities are engaged in an unprecedented surge in patenting. At the confluence of these seemingly unrelated developments is a growing frustration on the part of industry with the role of universities as patent owners. Time and again, when I talk to people in a variety of industries, their view is that universities are the new patent trolls. In this article, I argue that universities should take a broader view of their role in technology transfer. University technology transfer ought to have as its goal maximizing the social impact of technology, not merely maximizing the university's licensing revenue. Sometimes those goals will coincide with the university's short-term financial interests. Sometimes universities will maximize the impact of an invention on society by granting exclusive licenses for substantial revenue to a company that will take the invention and commercialize it. Sometimes, but not always. At other times a non-exclusive license, particularly on a basic enabling technology, will ultimately maximize the invention's impact on society by allowing a large number of people to commercialize in different areas, to try out different things and see if they work, and the like. University policies might be made more nuanced than simply a choice between exclusive and non-exclusive licenses. For example, they might grant fieldspecific exclusivity, or exclusivity only for a limited term, or exclusivity only for commercial sales while exempting research, and they might condition continued exclusivity on achievement of certain dissemination goals. Particularly in the software context, there are many circumstances in which the social impact of technology transfer is maximized either by the university not patenting at all or by granting licenses to those patents on a royalty-free basis to all comers. Finally, I think we can learn something about the raging debate over who is a patent troll and what to do about trolls by looking at university patents. Universities are non-practicing entities. They share some characteristics with trolls, at least if the term is broadly defined, but they are not trolls. Asking what distinguishes universities from trolls can actually help us figure out what concerns us about trolls. What we ought to do is abandon the search for a group of individual companies to define as bad actors. In my view, troll is as troll does. Universities will sometimes be bad actors. So will non-manufacturing patent owners. So will manufacturing patent owners. Instead of singling out bad actors, we should focus on the bad acts and the laws that make them possible.

KEYWORDS: university patents, patent hold-up, troll problem, Eolas Technologies, Inc. v. Microsoft Corp., Bayh-Dole, patent troll

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In this article, I argue that universities should take a broader view of their role in technology transfer. University technology transfer ought to have as its goal maximizing the social impact of technology, not merely maximizing the university's licensing revenue. Sometimes those goals will coincide with the university's short-term financial interests. Sometimes universities will maximize the impact of an invention on society by granting exclusive licenses for substantial revenue to a company that will

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* © 2008 Mark A. Lemley, William H. Neukom Professor of Law, Stanford Law School; of counsel, Keker & Van Nest LLP. I am particularly grateful to a large number of people who read this and gave me comments, even though simply asking the question is anathema to many of them. In particular, thanks are due to David Adelman, Ann Arvin, Robert Barr, Linda Chao, Maggie Chon, Michael Cleare, Peter Detkin, Rochelle Dreyfuss, Brett Frischmann, Carl Gulbrandsen, Rose Hagan, Joel Kirschbaum, Kathy Ku, Gary Loeb, Mike Mireles, Lita Nelsen, Alan Paau, Arti Rai, David Simon, and Janna Tom, and to participants in conferences at Washington University School of Law and the Licensing Executives Society/Association of University Technology Managers joint meeting for comments on this topic. Not only don't they necessarily agree with what I've said, in many cases I'm sure they don't. This is an edited transcript of a speech, and reads like it.

take the invention and commercialize it. Sometimes, but not always. At other times a non-exclusive license, particularly on a basic enabling technology, will ultimately maximize the invention's impact on society by allowing a large number of people to commercialize in different areas, to try out different things and see if they work, and the like. University policies might be made more nuanced than simply a choice between exclusive and non-exclusive licenses. For example, they might grant field-specific exclusivity, or exclusivity only for a limited term, or exclusivity only for commercial sales while exempting research, and they might condition continued exclusivity on achievement of certain dissemination goals. Particularly in the software context, there are many circumstances in which the social impact of technology transfer is maximized either by the university not patenting at all or by granting licenses to those patents on a royalty-free basis to all comers.

Finally, I think we can learn something about the raging debate over who is a patent troll and what to do about trolls by looking at university patents. Universities are non-practicing entities. They share some characteristics with trolls, at least if the term is broadly defined, but they are not trolls. Asking what distinguishes universities from trolls can actually help us figure out what concerns us about trolls. What we ought to do is abandon the search for a group of individual companies to define as bad actors. In my view, troll is as troll does. Universities will sometimes be bad actors. So will non-manufacturing patent owners. So will manufacturing patent owners. Instead of singling out bad actors, we should focus on the bad acts and the laws that make them possible.

I. COMPLAINTS ABOUT UNIVERSITY PATENTS

The confluence of two significant developments in modern patent practice leads me to write a paper with such a provocative title.[1]

[1] So I don't give anyone a coronary, the general answer to the question in my title is no.

A. The Rise of Patent Hold-up

The first development is the rise of hold-up as a primary component of patent litigation and patent licensing. You can call this the troll problem if you like.[2] I prefer to think of it as the hold-up problem. But whatever we call the problem, it seems quite clear that more and more patent litigation is being filed, and significant money is being made, by non-manufacturing entities—entities that don't themselves actually make the product and in many cases don't actually engage in developing the technology very far at all. Many of these entities also engage in tactics that allow them to lay low and then take a mature industry by surprise once participants in the industry have made irreversible investments.[3] The hold-up or troll problem is particularly significant in component-driven industries, notably information technology ("IT"), where the problem is compounded by the fact that a product developer such as Intel that must aggregate thousands of different inventions into its semiconductor chip is vulnerable to hold-up by any one of the thousands of inventors. Patent owners in those component industries can capture far more than the intrinsic value of their invention, because under long-standing patent law[4] patent owners have had the right not just to sue and get paid the percentage of the value contributed by their invention but to enjoin the sale of Intel's entire chip until it can design a new chip that avoids infringing that patent, something that might take years and require investing billions of dollars in a new fab.[5] These factors have combined to produce *the* growth industry of the new millennium: patent hold-up. Hundreds of companies

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[2] The term "patent troll" was coined in the late 1990s by Peter Detkin, then assistant general counsel at Intel, to refer to patent owners who hide under bridges they did not build to pop out and demand money from surprised passers-by. I'll talk about some definitions of "patent troll" at the end of this Article.

[3] For discussions of this problem, see, for example, Mark A. Lemley, *Ten Things to Do About Patent Holdup of Standards (and One Not To)*, 48 B.C. L. REV. 149, 149 (2007) [hereinafter Lemley, *Ten Things*]; Mark R. Patterson, *Inventions, Industry Standards, and Intellectual Property*, 17 BERKELEY TECH. L.J. 1043, 1048–51 (2002).

[4] *See* 35 U.S.C. §§ 281, 283–84 (2007).

[5] On this problem and how it leads to settlements well in excess of the intrinsic value of the patent, see Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 2163, 2172–73 (2007); Carl Shapiro, *A Model of Patent Bargaining With Holdup* (2006) (working paper, on file with author).

are engaging in efforts to capture not just the value of what they contributed to an invention, but also a disproportionate share of somebody else's product.

B. The Rise of University Patenting

The second development in the last three decades is the massive surge in university patenting.[6] Universities obtained sixteen times as many patents in 2004 as in 1980,[7] and universities had 100 times as many technology transfer offices.[8] In significant measure this is a result of the Bayh-Dole Act,[9] which not only permits but encourages university patenting of federally-funded inventions. But it is also a reflection of the growth in importance of patents more generally. Those university patents don't sit dormant; universities license them to companies for over $1 billion a year in revenue.[10] Patents are now a significant contributor to some university bottom lines. And importantly, more and more university patents are patents on the very earliest stages of technology. It is universities, perhaps not surprisingly given their role in basic research, who are patenting the basic building blocks in new technologies. We see this with particular force in

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[6] For a discussion of the growth of university patenting and its potential risks, see DAVID C. MOWERY ET AL., IVORY TOWER AND INDUSTRIAL INNOVATION: UNIVERSITY-INDUSTRY TECHNOLOGY TRANSFER BEFORE AND AFTER THE BAYH-DOLE ACT 4 (2004); John R. Allison et al., *University Software Ownership: Trends, Determinants, Issues* (2005) (working paper, on file with author); Katherine J. Strandburg, *Curiosity-Driven Research and University Technology Transfer*, *in* UNIVERSITY ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER: PROCESS, DESIGN, AND INTELLECTUAL PROPERTY 93 (Gary D. Libecap ed., 2005).

[7] Before 1980, universities worldwide obtained about 250 U.S. patents a year. In 2003, they obtained 3,933 patents, an almost sixteen-fold increase. *See* Bernard Wysocki Jr., *College Try: Columbia's Pursuit of Patent Riches Angers Companies*, WALL ST. J., Dec. 21, 2004, at A1.

[8] Lorelai Ritchie de Larena, *The Price of Progress: Are Universities Adding to the Cost?*, 43 HOUS. L. REV. 1373, 1412 (2007) ("There were only 25 active technology-transfer offices in the United States at the time the Bayh-Dole Act was passed. By the twenty-fifth anniversary of the Act, there were 3300.") (internal citations omitted).

[9] 35 U.S.C. §§ 200–12 (2000).

[10] *See* Jerry G. Thursby & Marie C. Thursby, *University Licensing and the Bayh-Dole Act*, 301 SCI. 1052, 1052 (2003); *The Big Ten: Universities That Made the Most Licensing Dollars Last Year*, IP L. & BUS., Jan. 5, 2005, at 14 (estimating $1 billion in 2004); Wysocki, *supra* note 7, at A1, A12 (estimating $1.3 billion per year).

nanotechnology, an area I have studied in detail.[11] Universities, which account for 1% of patents on average across all fields, account for 12% of all patents in nanotechnology, and more than two-thirds of what I identify as the basic building block patents in nanotechnology.[12] The other area in which university patents are significant is biotechnology, where they represent about 18% of all patents.[13] As a result, universities have met a much bigger role in patenting than they ever have before.

C. Are Universities Engaged in Hold-up?

At the confluence of these developments is a growing frustration on the part of industry with the role of universities as patent owners. Time and again, when I talk to people in a variety of industries, their view is that universities are the new patent trolls. One even referred publicly to universities as "crack addicts" driven by "small-minded tech transfer offices" addicted to patent royalties.[14]

Why such a vehement reaction? One important reason is that universities are non-manufacturing entities. They don't sell products. I don't think that necessarily means they're bad actors. But it does mean that their incentives in dealing with the patent system align in many ways with those of private-sector patent licensing shops. One of the assumptions corporations in patent-intensive industries (such as IT or increasingly biotechnology) make about patenting is symmetry: that if a competitor sues you for infringement you can sue them back. That symmetry deters much patent litigation in the industries in which it operates.[15] But

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[11] Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601 (2005) [hereinafter Lemley, *Nanotechnology*].

[12] *Id.* at 616, 616 tbl.2.

[13] *See* David E. Adelman & Kathryn L. DeAngelis, *Patent Metrics: The Mismeasure of Innovation in the Biotech Patent Debate*, 85 TEX. L. REV. 1677, 1687 & n.44 (2007) (noting that in 1994 university and government patenting "accounted for twenty percent [of biotechnology patents] and has remained at that level ever since").

[14] Chuck Fish, Comments at the Fordham Annual Conference on International Intellectual Property Law & Policy (Apr. 22, 2006).

[15] *See, e.g.*, John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 474 (2004) (finding that semiconductor patents are litigated only 1/3 as often as other patents, and offering the symmetry of relationships as an explanation). To be sure, other factors, such as industry concentration and large patent portfolios, may play a significant role in

that symmetry doesn't often exist for non-manufacturing entities. Universities aren't going to trade their patents away in exchange for a cross-license, because they don't need a license to other people's patent rights.[16] Instead, they want money. And to an IT general counsel who deals with dozens of threats of suit every year, any patent owner in that position looks an awful lot like a patent troll. In short, there's definitely a sense among industry representatives that universities are greedy when it comes to licensing patents.[17]

Compounding the perception of greed is that university patent licensing offices have strong institutional incentives to grant exclusive rather than non-exclusive licenses, for various reasons. First, exclusive licensing royalty rates are almost always higher than non-exclusive rates. That's not surprising, since the licensee is getting more from an exclusive license than from a non-exclusive license. From the perspective of a technology transfer office focused on this quarter's bottom line, that higher royalty rate is hard to turn down. Second, the companies with which they are negotiating often want exclusivity.[18] They are especially likely to get it if the company in question is a faculty-organized startup.[19] Finally, exclusive licensees often pay the cost of patent prosecution, a relatively small savings but an immediate one that

causing disputes in this industry to be resolved without litigation. *See* Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 63–64 (2005).

[16] Theoretically, universities could be sued for infringement, but they aren't—there is only one reported decision involving an infringement suit against a university between 1983 and 2004. *See* Tao Huang, *The Experimental Purpose Doctrine and Biomedical Research*, 11 MICH. TELECOMM. & TECH. L. REV. 97, 111–12 & tbl.1 (2004). There may be other cases that settle before decision, however. For reasons universities aren't sued, see Elizabeth A. Rowe, *The Experimental Use Exception to Patent Infringement: Do Universities Deserve Special Treatment?*, 57 HASTINGS L.J. 921, 942–44 (2006).

[17] A surprising dissenting view suggests that universities are overly cautious in licensing intellectual property. *See* Kristen Osenga, *Rembrandts in the Research Lab: Why Universities Should Take a Lesson from Big Business to Increase Innovation*, 59 ME. L. REV. 407, 408–11 (2007). I don't believe that either the data (which show an enormous increase in both patenting and licensing by universities) or the experiences of those I've talked to support this characterization.

[18] *See, e.g.*, William J. Holstein, *Putting Bright Ideas to Work Off Campus*, N.Y. TIMES, Nov. 5, 2006, § 3, at 11 ("Companies, on the other hand, want exclusive licenses.") (quoting William R. Brody, president of Johns Hopkins University).

[19] de Larena, *supra* note 8, at 1415 (referring to "tacit favoritism" of such companies).

impacts the technology transfer office's bottom line. The result is that the overwhelming majority of university patent licenses are exclusive. The Association of University Technology Managers ("AUTM") reports that more than 60% of its members' 2005 licenses were exclusive.[20] In the nanotech licenses I studied (just a few dozen, admittedly), between 95 and 100% of the university licenses granted were exclusive.[21] One example from the biotechnology field of an exclusive license to an enabling technology is the Wisconsin Alumni Research Foundation's ("WARF") field-exclusive license to Geron of all stem cell patents, granted shortly before those stem cell patents became extraordinarily valuable because the Bush administration obstructed the development of new stem cell lines.[22]

In fact, however, this higher royalty rate may or may not translate into a higher revenue stream for the university. Whether it does, depends on the nature of the technology being licensed. For certain basic building blocks—what I call "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.[23] And exclusive licenses can block any

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[20] AUTM U.S. Licensing Survey, FY 2005, http://www.autm.net/events/File/US_LS_05Final(1).pdf.

[21] Lemley, *Nanotechnology*, *supra* note 11, at 627 (citing ETC GROUP, NANOTECH'S "SECOND NATURE" PATENTS: IMPLICATIONS FOR THE GLOBAL SOUTH 14 (June 2005), http://www.etcgroup.org/documents/Com8788SpecialPNanoMar-Jun05ENG.pdf (last visited Jan. 2, 2008)). *See also* Allison et al., *supra* note 6, § 5 (discussing exclusive licenses of software patents by universities).

[22] *See, e.g.*, Amy Rachel Davis, *Patented Embryonic Stem Cells: The Quintessential "Essential Facility"?*, 94 GEO. L.J. 205, 210 n.21 (2005); Ryan Fujikawa, *Federal Funding of Human Embryonic Stem Cell Research: An Institutional Examination*, 78 S. CAL. L. REV. 1075, 1075–60 (2005). Those patents are now under reexamination at the Patent and Trademark Office ("PTO"), however, and WARF has significantly eased its licensing restrictions, particularly for academic research. For a discussion, see Antonio Regalado & David P. Hamilton, *How a University's Patents May Limit Stem-Cell Research*, WALL ST. J., July 18, 2006, at B1.

[23] I have made this argument in detail elsewhere, see for example Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989 (1997), and I won't repeat it here.

development of a technology if the licensee doesn't deliver.[24] Even if in the long run non-exclusive licensing of many technologies actually increases university revenue, in the short run a university tech-transfer office seeking to maximize the amount of money that the office generates will tend to grant exclusive licenses. Exclusive licenses aren't necessarily bad—a point I discuss below—but they raise concerns about the effective diffusion of new technologies.

A final reason for industry concern about university patenting is that universities are increasingly enforcing their patents. Recent years have seen high-profile cases litigated to judgment by the University of California, the University of Rochester, Harvard, MIT, Columbia, Stanford, and suits filed by many other universities. One notable example is *Eolas Technologies, Inc. v. Microsoft Corp.*,[25] in which the University of California licensed a software patent to a company that really does look like a patent troll, however you want to define that term, and then shared with that company a jury award of $520.6 million against Microsoft.[26]

Universities, recognizing patent licensing and litigation as an important revenue source in the modern environment, have been active in politics, largely in alignment with the life sciences industries (from which most university patent revenue comes), in opposing most of the effective pieces of draft patent reform legislation. Universities helped argue for eliminating from the 2005 patent reform bill any restrictions on both injunctive relief

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[24] Rochelle Dreyfuss relates the story of Johns Hopkins' ill-fated exclusive license to Baxter for a patent that Baxter didn't use. *See* Rochelle Dreyfuss, *Unique Works/Unique Challenges at the Intellectual Property/Competition Law Interface* 5 (N.Y.U. Sch. of Law Ctr. for Law & Econ. Research Paper Series, Working Paper No. 05-12, 2005), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=763688. The exclusivity of the license prevented CellPro, which independently developed a commercial use for the invention, from licensing it from the university. *See id.*

[25] 399 F.3d 1325 (Fed. Cir. 2005).

[26] *Id.* at 1332. A more recent high-profile case involved the Harvard-MIT patent successfully enforced against Eli Lilly for $65 million. *See* Brian Kladko, *Ariad, research institutes win patent-infringement case against Eli Lilly*, BOSTON BUS. J., May 4, 2006, *available at* http://boston.bizjournals.com/boston/stories/2006/05/01/daily48.html. For documenting of other cases, see Allison et al., *supra* note 6, § 5; Rowe, *supra* note 16, at 936–37.

and continuation applications. The patent reform bill[27] also faced attacks from some universities seeking to eliminate the move to first inventor to file, which doesn't benefit them because they tend to file later than commercial entities, and eliminate the creation of prior user rights, which also don't benefit them since they aren't generally using the inventions. These university preferences should not be surprising, at least if we view the university as a profit-maximizing entity rather than one concerned with the social good. Like other non-manufacturing entities, after all, universities are first and foremost intellectual property ("IP") owners, not IP licensees.

The result is a felt sense among a lot of people that universities are not good actors in the patent system. Given the difficulty anyone has had in defining a patent troll, it is easy to move from that conclusion to the idea that universities are trolls too. I think it is worth questioning that leap. There is something going on here, but I'm not sure that it is reasonable to equate university patents with private troll behavior. The common refrain in complaints about patent trolls is that they are not contributing anything to society, but rather obtaining and asserting patents covering technology independently developed by defendants. The question remaining to be answered is whether the same is true of university patents. In other words, it's worth asking whether society needs or wants university patents at all.

II. DO WE NEED UNIVERSITY PATENTS?

From the perspective of the university, one justification for university patents may be to fund universities. More money is better than less money, and the billion dollars each year in licensing is a substantial new revenue source for universities, most of which goes to research, and some of which goes to education. If you think research and education are under-funded in our society today, as I tend to believe, generating that additional revenue

[27] The "Coalition Draft" of the Patent Reform Act, H.R. 2795, 109th Cong. (2005) (as modified by Congressman Lamar Smith of Texas on Sept. 1, 2005) was the specific target of these attacks, but they are just as relevant to the legislative debate in the 110th Congress.

sounds useful in a way that paying for-profit licensing shops doesn't. But the additional revenue is not costless: it is money that comes out of industry pockets, and at least some of it would otherwise have gone to industry research and development, or to selling better products, or to providing products more cheaply. So, it is worth thinking about the costs of patents as a pure wealth-transfer mechanism. Most economists would agree that if our goal is to adequately fund higher education, patent litigation is an inefficient way of doing so.[28] Further, some argue that a culture of patenting imposes costs on the university or on academic research more generally.[29] University scientists focused on patenting may delay or even forego publication in favor of IP protection.[30] And there is substantial literature on how the shift to university patenting has actually moved universities away from basic research and towards more applied research in ways that are arguably bad for society in the long run.[31] The risk is not so much that individual professors will change their research habits as that the departments that grow will be ones that generate money, and that the new faculty hiring slots will go to those who engage in revenue-generating applied research. Of course, government and private foundation grants can come with conditions attached, and

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[28] A general tax is a cheaper method of wealth transfer than specific assessments. *See, e.g.*, ALAN J. AUERBACH & LAWRENCE J. KOTLIKOFF, DYNAMIC FISCAL POLICY 55–87 (1987).

[29] *See generally* JENNIFER WASHBURN, UNIVERSITY, INC.: THE CORPORATE CORRUPTION OF HIGHER EDUCATION (2005).

[30] *See generally* MOWERY ET AL., *supra* note 6, at 9–34; Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177 (1987). Margo Bagley has documented this problem, and in the hopes of eliminating it, proposed giving university inventors more time to file patent applications after publishing articles. Margo A. Bagley, *Academic Discourse and Proprietary Rights: Putting Patents in Their Proper Place*, 47 B.C. L. REV. 217, 217 (2006).

[31] Pierre Azoulay et al., *The Impact of Academic Patenting on the Rate, Quality, and Direction of (Public) Research*, (NBER Working Paper No. 11917, 2006), *available at* http://www.nber.org/papers/w11917; Brett M. Frischmann, *Commercializing University Research Systems in Economic Perspective: A View From the Demand Side*, *in* 16 UNIVERSITY ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER: PROCESS, DESIGN, AND INTELLECTUAL PROPERTY, *supra* note 6, at 155, 176–78; Eisenberg, *supra* note 30, at 177; MOWERY ET AL., *supra* note 6, at 9–34; Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, 66 LAW & CONTEMP. PROBS. 289 (2003); *see generally* Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NW. U. L. REV. 77 (1999).

can also direct research to particular ends, so in practice they aren't perfect funding mechanisms either.

Why else might society need university patents? The classic justification for patents—creating incentives to innovate—arguably isn't nearly as important in the university context as in the private sector. I think it unlikely that university scientists would not do research or invent in the absence of patent protection. There are plenty of other incentives for university scientists to engage in research, including curiosity, academic prestige, and tenure and promotion. Further, university inventors are generally funded by grants or departmental revenue, must assign their rights to the university,[32] and don't necessarily see any tangible benefit from university patenting of their inventions. Now, this doesn't necessarily mean that patents have no additional effect. It may be that patents generate some revenue which is refunded to the researcher's department and supports further research, and even that the prospect of that additional funding motivates some research. But the contribution of patents to university incentives to innovate seems smaller than in profit-driven companies.

The final reason we might want university patents—and the argument that actually prevailed in the congressional debates over Bayh-Dole—is the commercialization argument. Unlike the classic incentive story, commercialization theory argues that it is not so much the act of invention, but instead the act of turning that invention into a marketable product that requires investment and therefore the exclusion of competition.[33] According to this theory, university inventions will languish and not be commercialized unless we give someone (initially the university, but presumably eventually a private company to which the right is licensed or transferred) control over the invention, and therefore incentive to invest in developing and marketing it. This argument seems

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[32] *See generally* CORYNNE MCSHERRY, WHO OWNS ACADEMIC WORK?: BATTLING FOR CONTROL OF INTELLECTUAL PROPERTY 144–89 (2001).

[33] *See generally* John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439 (2004); F. Scott Kieff, *Facilitating Scientific Research: Intellectual Property Rights and the Norms of Science—A Response to Rai and Eisenberg*, 95 NW. U. L. REV. 691 (2001); Edmund Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977); Michael Abramowicz, *The Danger of Underdeveloped Patent Prospects*, 92 CORNELL L. REV. 1065 (2007).

particularly strong with respect to university inventions, since we can reasonably expect those inventions involve more basic research, and therefore to be made at an earlier stage, than private inventions.

There is some debate as to whether the commercialization theory is actually true of university inventions. Mowery, Nelson, Sampat, and Ziedonis suggest that Bayh-Dole was based on concerns that were misstated, or at least overstated.[34] They argue that there was a good deal of technology transfer without university patents in the decades before Bayh-Dole, and that even today there is plenty of university technology transfer that occurs in the absence of patents.[35] By contrast, the prevailing wisdom seems to be that university patents increase commercialization, and therefore that Bayh-Dole has been a success.[36] Certainly they increase commercialization *deals* between universities and companies,[37] though it is hard to know the extent to which that simply reflects the fact that once a patent issues, the company in question needs a license in order to commercialize the technology.

My own view is that the validity of commercialization theory depends a great deal on the industry in question and the particular

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[34] MOWERY ET AL., *supra* note 6, at 85–97. *See also* Michael S. Mireles, Jr., *States as Innovation System Laboratories: California, Patents, and Stem Cell Technology*, 28 CARDOZO L. REV. 1133, 1136 (2006) (describing Bayh-Dole as "one of the most controversial pieces of intellectual property law related legislation").

[35] *Id.* at 99–148. Inferential empirical evidence for this is provided by Daniel Elfenbein, who shows that the majority of technologies developed at Harvard are licensed before the grant of patent rights, and often without a patent application. Daniel W. Elfenbein, *Publications, Patents, and the Market for University Inventions*, 63 J. ECON. BEHAV. & ORG. 688, tbls. 1, 6, 8 (2007), *available at* http://ssrn.com/abstract=739227; *see also* Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663 (1996) (discussing ways in which patents do and do not promote commercialization of university research). One of the leading objections to university patenting comes from Strandburg, *supra* note 6.

[36] *See, e.g.*, WENDY H. SCHACHT, CONGRESSIONAL RESEARCH SERVICE REPORT: THE BAYH-DOLE ACT: SELECTED ISSUES IN PATENT POLICY AND THE COMMERCIALIZATION OF TECHNOLOGY (2006), *available at* http://www.ncseonline.org/NLE/CRSreports/07Jan/RL32076.pdf (last visited Nov. 10, 2007); Chester G. Moore, *Killing the Bayh-Dole Act's Golden Goose*, 8 TUL. J. TECH. & INTELL. PROP. 151, 155–57 (2006). For an analysis of both the benefits and costs, see Thomas J. Siepmann, *The Global Exportation of the U.S. Bayh-Dole Act*, 30 U. DAYTON L. REV. 236, 229–38 (2004).

[37] *See* Elfenbein, *supra* note 35, at 690.

nature of the technology. In the pharmaceutical and biotechnology industries, where coming up with an invention is only the first step down a very long road of regulatory process that can take hundreds of millions of dollars and several years, the commercialization argument makes some sense. The university generally isn't going to seek regulatory approval, and arguably we need to give somebody exclusive rights to induce them to make the regulatory investments that the university itself isn't going to make. We give the right to the university, but we do so expecting that they will transfer or exclusively license that right to a private company that will recoup the hundreds of millions of dollars they spend in clinical trials, product development, and marketing.[38] Other industries might also have a long post-invention development cycle and therefore be good candidates for commercialization theory. That might be true of basic building block technologies like nanotechnology, where we expect a very long road between the development of the invention and the ultimate commercialization,[39] though it is likely too early to say for sure how nanotech will develop. In these industries, Bayh-Dole is probably a good thing.

On the other hand, I'm doubtful that central control is necessary to produce commercialization in the majority of other industries.[40] Bear in mind that the commercialization story is at base anti-market: it assumes, contrary to centuries of economic

[38] Interestingly, though, even industry players in the pharmaceutical industry sometimes lament university reliance on exclusive licensing. *See* Siepmann, *supra* note 35, at 236–37 (quoting Joshua Kalkstein, corporate counsel for Pfizer).

[39] Lemley, *Nanotechnology*, *supra* note 11, at 628–29.

[40] Empirical evidence supports the conclusion that patenting reduces rather than increases technology diffusion overall. Murray and Stern find that patenting is associated with reduced citation to an academic publication associated with the patent. Fiona Murray & Scott Stern, *Do Formal Intellectual Property Rights Hinder the Free Flow of Scientific Knowledge? An Empirical Test of the Anti-Commons Hypothesis* (Nat'l Bureau of Econ. Research, Working Paper No. W11465, 2005), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=755701. Were commercialization theory true, it should be the opposite. And Rosell and Agrawal find that university inventions are diffusing less widely over time, not more widely. Carlos Rosell & Ajay Agrawal, *University Patenting: Estimating the Diminishing Breadth of Knowledge Diffusion and Consumption* (Oct. 2006) (working paper), *available at* http://www.nber.org/papers/w12640. Again, were commercialization theory true, it should be the opposite.

learning, that ordinary profit motives will not produce efficient allocation of resources and that we need to vest exclusive control of a technology or market in one actor in order to get that efficient allocation.[41] Even if we think that's true in the pharmaceutical or biotechnology industries because of the regulatory barriers to entry in those markets, we should not conclude exclusivity is always or even generally required to encourage a company to bring a product to market.[42] In the IT industries, and even in industries like medical devices, there is no reason to believe that exclusive rights are necessary to encourage commercialization of the technology. It is true even in those industries that when an inventor has gotten to the point where she can patent something, there may still be development and marketing work to be done. But we get plenty of both in a competitive marketplace because the companies who engage in product development and marketing can reap enough of the benefits of that investment to make it worthwhile. And indeed we have seen an enormous number of technologies commercialized out of universities throughout the 20th Century without need of university patents. Think of the computer, the world wide web, search engines, relational databases, and any number of software programs.[43]

The need for university patents, in short, depends critically on the technology at issue. I think much of the industry frustration with the role of university patents stems from the failure of some university technology transfer offices to recognize and adapt to these technology differences. As noted above, technology transfer offices have strong incentives to maximize revenue from patent licensing. To achieve this, they have adopted the life sciences

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[41] *See* Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 147 (2004) [hereinafter Lemley, *Ex Ante*].

[42] More and more property rights scholars seem to forget the benefits of a market economy. I have heard academics suggest, for instance, that we may not get efficient entry of Indian restaurants into particular neighborhoods unless we grant some sort of regional exclusivity. Maybe that's right, but I doubt it. The market has worked pretty well in the past, and we should be reluctant to forego its benefits unless we're quite sure that the alternative will be better.

[43] For a detailed discussion of one example, Apache, see Jay P. Kesan & Rajiv C. Shah, *Shaping Code*, 18 HARV. J. L. & TECH. 319, 394–96 (2005). "The Apache Software Foundation provides support for the Apache community of open-source software projects." http://www.apache.org (last visited Jan. 12, 2008).

model, where exclusive rights and patents seem to make sense because of the regulatory delays, as their general approach to patent licensing. But they are increasingly using it in software and other information technologies.[44] The result is frustration on the part of industry counterparts in industries like computers or telecommunications that are more interested in freedom to operate than in exclusive rights over a new technology. It may also be frustration on the part of tech transfer offices; less than 1% of all university patent licenses generate over $1 million in revenue.[45] And efforts to commercialize the rest is what leads to a lot of the more worrisome patent licenses in cases like *Eolas*.[46]

III. LESSONS FROM THE UNIVERSITY PATENT EXPERIENCE

A. Towards an Enlightened University Patent Policy

Universities should take a broader view of their role in technology transfer. University technology transfer ought to have as its goal maximizing the social impact of technology, not merely maximizing the university's licensing revenue.[47] A university is more than just a private for-profit entity. It is a public-regarding institution that should be advancing the development and spread of knowledge and the beneficial use of that knowledge.[48] Sometimes those goals will coincide with the university's short-term financial interests. Sometimes universities will maximize the impact of an invention on society by granting exclusive licenses for substantial revenue to a company that will take the invention and

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[44] *See* Allison et al., *supra* note 6, § 1 (documenting the growth in university software patenting).

[45] *See* Jerry G. Thursby & Marie C. Thursby, *University Licensing and the Bayh-Dole Act*, 301 SCI. 1052, 1052 (2003) (0.56%).

[46] Eolas Techs., Inc. v. Microsoft Corp., 457 F.3d 1279 (Fed. Cir. 2005).

[47] For a similar view, see Robert E. Litan et al., Commercializing University Inventions: A Better Way (Apr. 2007) (working paper, Nat'l Bureau of Econ. Research), *available at* http://www.kauffman.org/pdf/NBER_0407.pdf. Osenga, by contrast, suggests that universities should act *more* like private businesses in licensing their patents, paying more attention to the short-run bottom line. Osenga, *supra* note 17, at 2. Again, I disagree.

[48] Certainly that is the role universities claim for themselves in their mission statements.

commercialize it. Sometimes, but not always. At other times a non-exclusive license, particularly on a basic enabling technology, will ultimately maximize the invention's impact on society by allowing a large number of people to commercialize in different areas, to try out different things and see if they work, and the like.[49] Universities can still earn revenue from nonexclusive licenses, and for enabling technologies they might even maximize their revenue in the long term by granting nonexclusive rather than exclusive licenses.[50]

University policies might be made more nuanced than simply a choice between exclusive and nonexclusive licenses. For example, they might grant field-specific exclusivity, or exclusivity only for a limited term, or exclusivity only for commercial sales while exempting research,[51] and they might condition continued exclusivity on achievement of certain dissemination goals.[52] Finally, particularly in the software context, there are many circumstances in which the social impact of technology transfer is maximized either by the university not patenting at all or by granting licenses to those patents on a royalty-free basis to all

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[49] *See* Lemley, *Nanotechnology*, *supra* note 11, at 627–45; Ted Sabety, *Nanotechnology Innovation and the Patent Thicket: Which IP Policies Promote Growth?*, 15 ALB. L.J. SCI. & TECH. 477, 510–12 (2005).

[50] The key university patents on enabling technologies in biotechnology, issued to Cohen and Boyer for the creation of chimeric organisms and to Axel for methods of inserting genes into a cell, were licensed nonexclusively because of then-existing NIH requirements. *See* Wysocki, *supra* note 7, at A1. They made enormous sums of money for Stanford, the University of California, and Columbia, arguably *because*, not in spite of, the nonexclusivity of the licenses. *See* Sally Smith Hughes, *Making Dollars Out of DNA: The First Major Patent in Biotechnology and the Commercialization of Molecular Biology, 1974-1980*, 92 ISIS 541, 569–70 & n.77 (2001); Wysocki, *supra* note 7, at A1. Amy Kapczynski has argued that open licensing may be profitable for universities more generally, not just with enabling technologies. *See* Amy Kapczynski et al., *Addressing Global Health Inequities: An Open Licensing Approach for University Innovations*, 20 BERKELEY TECH. L.J. 1031, 1088–89 (2005). I am less persuaded by this broader argument.

[51] For examples of such approaches, including Stanford's and WARF's, see Ritchie de Larena, *supra* note 8, at 1420.

[52] Stanford University has a relatively enlightened university technology transfer policy that uses all of these intermediate mechanisms. Conversations with Linda Chao, Senior Licensing Associate, Stanford Office of Technology Licensing, Stanford, Cal. (May 2006). Stanford's official policy is available at http://otl.stanford.edu/inventors/resources/otlandinvent.html.

comers.[53] Open source software development is one example, but hardly the only one.[54]

If we are to achieve the goal of maximizing the social benefit of a university invention to society, universities must first recognize their proper role in society and how that role affects patent policies. An important first step in that education process is to end the isolation of university technology transfer or licensing offices from the rest of the university.[55] If universities treat licensing offices as revenue generation devices, evaluated on how much money they bring in each quarter, the result will be university patent policies that are not always or even often consonant with the ultimate public interest.[56] The problem is even worse if universities outsource their technology transfer functions altogether to private licensing shops.[57] If a university thinks of its role in society as a whole, if it treats patent licensing as one aspect of a broader technology transfer policy, it can and should develop

[53] For a general argument along these lines, see generally Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 MINN. L. REV. 917 (2005). *See, e.g.*, Stanford Office of Technology Licensing Policies, http://otl.stanford.edu/inventors/policies.html#research ("Inventors may place their inventions in the public domain if they believe that would be in the best interest of technology transfer."). And some have argued for open licensing of university pharmaceutical inventions in the developing world. *See, e.g.*, Kapczynski *supra* note 50, at 1031. By contrast, Arti Rai documents the difficulties scientists have had persuading universities to build an open source model for collaborative biotechnology research. *See* Arti K. Rai, *"Open and Collaborative" Biomedical Research: Theory and Evidence*, 29, 35–36 (2005) (working paper), *available at* http://pascal.case.unibz.it/retrieve/2436/rai.pdf.

[54] For a useful step in this regard, see generally Leonard Lynn & Hal Salzman, *Collaborative Advantage*, ISSUES IN SCI. & TECH., Summer 2006, at 74, *available at* http://www.kauffman.org/pdf/collaborative_advantage_12_05.pdf (setting out principles agreed to by corporations and several major universities for making software inventions freely available).

[55] For a discussion of the various ways in which university technology transfer offices are organized today, see Ritchie de Larena, *supra* note 8, at 1413.

[56] *See id.* at 1416–17 ("One point that most technology-transfer managers agree upon is that it is not wise to judge a university's technology-transfer office solely on licensing income.").

[57] For example, the University of Colorado has outsourced much of its patent licensing to Competitive Technologies Inc.

more enlightened policies. A number of universities have taken significant steps in this regard,[58] but more remains to be done.

B. Legal Constraints on Unenlightened Universities

If universities don't develop such policies voluntarily, society may have other mechanisms to ensure that university patents don't impede innovation. Federal funding agencies can play a role. The National Institutes of Health ("NIH") has, at various times in the past, imposed mandates requiring universities to grant certain types of licenses to their work.[59] The Bayh-Dole Act permits the government to exercise "march-in rights," requiring that particular patents be licensed on non-exclusive terms,[60] though those rights have not been used, and may prove difficult to use.[61] Some have even suggested that publicly funded research should be subject to compulsory license.[62] Alternatively, as universities become more and more vulnerable to patent infringement suits themselves,[63] private sector patent owners may be able to create some of the symmetry that drives cross-licenses in industries like semiconductors by obtaining patents that universities infringe and threatening to assert them against any university who sues them for patent infringement.[64] These measures might turn out to be necessary, but I'd like to see us try first to solve the problem not by imposing a solution, but by encouraging universities to take the first step in recognizing their social responsibility associated with their patents.

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[58] For discussion, see Geertrui Van Overwalle, *Reconciling Patent Policies with the University Mission*, 13 ETHICAL PERSPECTIVES 231, 237–38 (2006) (offering suggested policies).

[59] *See* Wysocki, *supra* note 7, at A1 (noting that the NIH required Professor Axel at Columbia University to license his fundamental patents on methods of inserting genes into cells nonexclusively and at a reasonable royalty).

[60] 35 U.S.C. § 209 (2000).

[61] *See* Mireles, *supra* note 34, at 1138 (making this argument).

[62] *See, e.g.*, Ron A. Bouchard, *Balancing Public and Private Interests in the Commercialization of Publicly Funded Medical Research: Is There a Role for Compulsory Government Royalty Fees?*, 13 B.U. J. SCI. & TECH. L. 120, 125–26 (2007).

[63] *See, e.g.*, Madey v. Duke Univ., 307 F.3d 1351 (Fed. Cir. 2002).

[64] There may be practical reasons why this last option is unlikely, however. *See* Rowe, *supra* note 16, at 940–44.

C. Broader Lessons: Who Is a Patent Troll?

Finally, I think we can learn something about the raging debate over who's a patent troll and what to do about trolls by looking at university patents. Universities are non-practicing entities. They share some characteristics with trolls, at least if the term is broadly defined,[65] but they are not trolls. Asking what distinguishes universities from trolls can actually help us figure out what concerns us about trolls. One of the differences between universities and private licensing shops is that universities are, by and large, not engaged in hiding the ball, waiting until people have developed an industry and then popping up and demanding a disproportionate share of royalties based on irreversible investments.[66] There are occasional examples of that,[67] and they should be condemned, but it's not the ordinary case with a university license. Instead, most university licenses have a major technology transfer component. A nonexclusive patent license is effectively nothing more than forbearance from suit in exchange for money.[68] By contrast, most university licenses give the licensee not just the right to avoid a lawsuit, but also provide valuable know-how. Indeed, many also involve continued work by the inventor, particularly if the license is to a start-up and is exclusive. That sort of technology transfer is something we want to encourage for reasons Rob Merges has explained: granting IP rights allows companies not to be constrained by a particular definition of the firm and forced do all of our innovation in house. It allows us to have markets for technology.[69] Markets for technology contribute more to society than markets for litigation

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[65] *Cf.* James F. McDonough III, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189, 199 (2006) ("under Detkin's definition, the U.S. government and government-funded research universities become trolls . . .").

[66] On this problem, see Lemley, *Ten Things*, *supra* note 3; Lemley & Shapiro, *supra* note 5.

[67] For a discussion of a submarine patent strategy employed by Columbia University, see Ritchie de Larena, *supra* note 8, at 1417–18.

[68] *See, e.g.*, Intell. Prop. Dev., Inc. v. TCI Cablevision, 248 F.3d 1333, 1345 (Fed. Cir. 2001) (describing a nonexclusive license as nothing more than a "covenant not to sue").

[69] *See* Robert P. Merges, *A Transactional View of Property Rights*, 20 BERKELEY TECH. L.J. 1477, 1513–19 (2005).

rights.[70] University patent owners aren't trolls in my view when they contribute previously unknown technology to society, rather than just imposing costs on others by obtaining and asserting legal rights over inventions independently developed by others.[71]

In the abstract, I think we could successfully define patent trolls by distinguishing cases in which non-manufacturing entities license only the right not to be sued from cases in which the patent owner actually engages in technology transfer. But that's only in the abstract. Were a court ever to announce such a definition, it would immediately be gamed. All true trolls would start passing on some mandatory know-how along with their patent licenses in order to avoid being categorized as trolls.

What we ought to do instead is abandon the search for a group of individual companies to define as trolls. We don't need to focus on identifying bad actors. In my view, troll is as troll does. Universities will sometimes be bad actors. Nonmanufacturing patent owners will sometimes be bad actors. Manufacturing patent owners will sometimes be bad actors. Instead of singling out bad actors, we should focus on the bad *acts* and the laws that make them possible. We will solve the troll problem not by hunting down and eliminating trolls, but by hunting down and eliminating the many legal rules that facilitate the capture by patent owners of a disproportionate share of an irreversible investment. And that process is well underway. We should encourage reform of current continuation practice, which allows patent owners to hide the true nature of their invention until late in the process and facilitates their later claiming to have invented something they did not.[72] We

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[70] *See generally* ASHISH ARORA ET AL., MARKETS FOR TECHNOLOGY (2001) (noting the contributions of technology markets).

[71] Indeed, Jerry and Marie Thursby argue that the continued role of the inventor in technology transfer is critical to the success of university licenses. Jerry G. Thursby & Marie C. Thursby, *Are Faculty Critical? Their Role in University-Industry Licensing* (Nat'l Bureau of Econ. Research, Working Paper No. W9991, 2003), *available at* http://ssrn.com/abstract=450892.

[72] *See, e.g.*, Mark A. Lemley & Kimberly A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63, 71–84 (2004). The PTO issued regulations that would limit applicants to three continuations (plus an unlimited number of divisionals) as a matter of right, a rule that would make a very modest step towards solving the problem. United States Patent & Trademark Office, Changes to Practice for Continued Examination Filings, Patent Applications Containing Patently Indistinct Claims, and

should focus on reform of the willfulness doctrine, under which a patent owner can get treble damages from an independent inventor merely by telling them about the patent and which has the perverse effect of causing people to try to avoid learning of patents.[73] We should focus on reform of royalty calculation rules that give a disproportionate award of damages to patent owners in component industries because they don't adequately take account of the contributions of other aspects of the invention.[74] And we should take the opportunity presented by the Supreme Court's *eBay* decision[75] to craft intelligent standards for deciding when to grant injunctive relief. If we change the rules that make patent hold-up such an attractive revenue generator, we won't have to worry about the question of whether or not universities—or anyone else—are patent trolls. We will have eliminated the problem of opportunistic behavior that interferes with innovation, something we want to stop regardless of what we call it.

Examination of Claims in Patent Applications; Final Rule, 72 Fed. Reg. 46716 (Aug. 21, 2007). At this writing it is far from clear that even these watered-down rules will go into effect, however; they are currently enjoined. Tafas v. Dudas, 511 F. Supp. 2d 652 (E.D. Va. 2007).

[73] *See, e.g.*, Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law's Willfulness Game*, 18 BERKELEY TECH. L.J. 1085 (2003) (identifying this problem and proposing changes to deal with it). The Patent Reform Act, H.R. 2795, 109th Cong. (2005), pending at this writing, would make it much more difficult to plead willfulness. And the Federal Circuit took a significant step towards reducing the problem in *In re Seagate Technology*, 497 F.3d 1360 (Fed. Cir. 2007) (en banc).

[74] *See* Lemley & Shapiro, *supra* note 5; Mark A. Lemley, *Distinguishing Lost Profits From Reasonable Royalties* (2008) (working paper).

[75] eBay, Inc. v. MercExchange LLC, 547 U.S. 946 (2006).