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Rembrandts in the Research Lab: Why Universities Should Take a Lesson from Big Business to Increase Innovation

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I. INTRODUCTION

Universities are typically considered to have two complementary goals: providing education and performing research.[1] While the determination of which objective deserves primacy has long been debated and is not within the scope of this paper, it is indisputable that productive research serves to further a university's goal of education, both directly by adding to the body of knowledge to be dispensed to the students and indirectly by increasing the university's prestige, thereby attracting lucrative grants, quality students, and competitive faculty members to the university.[2] It is, at the very least, safe to say that research is the heart of the academic system.

Standing between a university and its goal of research are two basic, but substantial, obstacles: lack of funding and lack of access. Although lack of funding is fairly self-explanatory, a few statistics provide data on how important funding is to the research arm of the academy. Research is a generally expensive pursuit, with primary expenditures including equipment, materials, and labor costs. In 2002, an estimated thirty-six billion dollars was spent on research activities at academic institutions in the United States.[3] The federal government has long been the primary source of academic research funding, with the National Institutes of Health (NIH), the National Science Foundation (NSF), and the Department of Defense (DOD) providing a vast majority of the funds.[4] Although the government continues to allocate resources for university research, there are increasing numbers of universities, scientists, and projects seeking

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1. Am. Ass'n of Univ. Professors, *1915 Declaration of Principles of Academic Freedom and Academic Tenure*, *in* POLICY DOCUMENTS & REPORTS 295 (9th ed. 2001).

2. *See* Madey v. Duke Univ., 307 F.3d 1351, 1362 (Fed. Cir. 2002) (noting that research universities engage in research projects that "unmistakably further the institution's legitimate business objectives, including educating and enlightening students and faculty" and that these projects "increase the status of the institution and lure lucrative research grants, students and faculty"). Of course, some argue that the pursuit of research excellence may have a detrimental effect on the educative arm of the university. *See, e.g.*, Daniel Alpert & Robert F. Rich, *The Information Revolution: Implications for Higher Education Policy*, 2001 U. ILL. J.L. TECH. & POL'Y 291, 296 (2001).

3. National Science Board, Science and Engineering Indicators 2004, at 5-8 (2004), *available at* http://www.nsf.gov/statistics/seind04/pdf/c05.pdf.

4. Association of University Technology Managers, AUTM U.S. Licensing Survey: FY 2004, at 14 (2005) [hereinafter *AUTM Survey*] (stating that approximately sixty-seven percent of research expenditures were paid by federal funds in 2004); National Science Board, *supra* note 3, at 5-15, 5-17.

a piece of a finite level of funding, and of course, there is always the concern that other, non-research priorities may require a change in the government's distribution of funds. Because of the high, and often fixed, costs of conducting research, funding is a prerequisite to research. Decreased funding necessarily decreases the amount of research. The natural extension of this relationship is a reasonably settled principle—decreased funding results in decreased innovation.

While certainly less settled, as a matter of principle, the problems related to lack of access are perceived to cause no less of an obstacle to university research and the inevitable result of decreased innovation. Many scholars argue that the ability to engage in scientific research is hampered by the increased presence of patents issued on scientific building blocks and research tools rendering these resources unavailable or expensive and making research stemming from their use impossible.[5] Some scholars claim these patents exacerbate the "tragedy of the anticommons."[6] Other scholars assert the process that surrounds the acquisition of patents impedes access to the open dialogue and early accessibility of information that has been a traditional hallmark of the academy.[7] Yet others, in a criticism tangentially related to access, argue that university patenting alters the incentives for researchers, who will pursue potentially lucrative industry-supported research over "curiosity-driven research."[8] This "curiosity-driven" research is assumed to more likely include foundational or theoretical research.[9] Finally, the second obstacle, lack of access, may be exacerbated by the first, lack of funding. Patented inventions, if made available at all, may be licensed at supra-competitive prices,[10] requiring funding for licensing to be a line-item cost for a research budget, alongside the costs associated with equipment, materials, and labor. The argument follows that the access obstacle leads to a decrease in innovation as surely as does the funding obstacle. Innovation suffers when the scientists are not able to do research because the required technology is unavailable or expensive. The scientists are not as productive in their research because they are unable to build on the promptly-disclosed research of others and they are focused on commercial inventions that attract corporate funding rather than pure research.

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5. *E.g.*, John M. Golden, *Biotechnology, Technology Policy, and Patentability: Natural Products and Invention in the American System*, 50 EMORY L. J. 101, 177-178 (2001) ("[A]s patents are used to stake out more territory for future research and development, there may be a decrease in the areas open for productive research unimpeded by existing patents."); Barry Hoffmaster, *Between the Sacred and the Profane: Bodies, Property, and Patents in the* Moore *Case*, 7 INTELL. PROP. J. 115, 134 (1992) ("The possibility of obtaining patents has already begun to cast a shroud of secrecy around science and has decreased the extent to which research materials and results are freely shared among scientists.").

6. Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698, 701 (1998). See discussion of the research anticommons, *infra*, at notes 32, 37, 38 and accompanying text.

7. *E.g.*, Margo A. Bagley, *Academic Discourse and Proprietary Rights: Putting Patents in Their Proper Place*, 47 B.C. L. REV. 217, 219 (2006); Rebecca S. Eisenberg, *Academic Freedom and Academic Values in Sponsored Research*, 66 TEX. L. REV. 1363, 1373-84 (1988); Arti Kaur Rai, *Regulating Scientific Research: Intellectual Property Rights and the Norms of Science*, 94 NW. U. L. REV. 77, 79 (1999).

8. Katherine J. Strandburg, *Curiosity-Driven Research and University Technology Transfer*, 16 ADVANCES IN THE STUDY OF ENTREPRENEURSHIP, INNOVATION, AND ECON. GROWTH 97 (2005), *available at* http://ssrn.com/abstract=889207.

9. *Id.*

10. Michael H. Davis, *Patent Politics*, 56 S.C. L. REV. 337, 341 (2004).

No study has yet definitively tied a decrease in research and innovation to the availability of patents to and exploitation of patents by universities. Even the first premise, that university patents cause a decrease in funds available for research and a decrease in access to essential resources for research, is tenuous at best.[11] I contend that the answer is not to eliminate university patents or diminish rights available to universities in their intellectual property,[12] but rather to encourage universities to view and exploit their intellectual property assets like a savvy business enterprise would. In fact, the obstacles related to lack of funding and lack of access may actually be mitigated by university patenting, if universities start obtaining and using their patents strategically. It should follow that by removing obstacles to university research, the level of activity and thus innovation should actually increase. While big business did not initially embrace patenting and, in fact, shared many of the same barriers that universities express with respect to entering the intellectual property arena, studies have regularly shown that both patenting by businesses and innovation are rising.[13]

To be fair, the business world has not always been so patent savvy; the volume of intellectual property acquisition and exploitation in the business world today exponentially eclipses that of the past. Although other reasons may have contributed to their reluctance to journey into the patent arena, big business certainly experienced some level of unwillingness or disinterest in jumping full force into patenting, citing lack of money, lack of knowledge, lack of infrastructure, and concern about upsetting the research and development culture of the firm.[14] Some companies in the business world waited until they were on the defensive end of an intellectual property lawsuit to embrace a patent strategy of their own.[15] Others witnessed intellectual property being used beneficially (or perhaps witnessed second-hand the liabilities that come from not having patents) and proactively adopted an intellectual property strategy.[16] Fortunately, in most sectors of business, patents are viewed favorably, and a business contemplating jumping into the intellectual property arena need not look far for guidance. For example, in one recent book aimed at the business executive audience, Kevin Rivette and David Kline, authors of *Rembrandts in the Attic*, explain the importance of intellectual property in today's world and impart guidance for developing an intellectual property strategy to maximize profits and promote innovation in the firm, basically providing business with a primer of how and why to

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11. There are some studies that suggest a relationship between an anticommons effect and university licensing activity. *See* Michael S. Mireles, Jr., *States as Innovation System Laboratories: California, Parents and Stem Cell Technology*, 28 CARDOZO L. REV. 1133, 1166-68 (2006).

12. Although the term "intellectual property" encompasses at least patents, trademarks, and copyrights, I am using this term to specifically connote patents in this Article. The ability of a university to increase its revenue stream through careful management and exploitation of its trademarks and copyrights, while interesting, is beyond the scope of this paper.

13. *E.g.*, John R. Allison & Mark A. Lemley, *The Growing Complexity of the United States Patent System*, 82 B.U. L. REV. 77, 78 (2002) (noting an increase in the amount of patenting and the amount of innovation).

14. KEVIN G. RIVETTE & DAVID KLEIN, REMBRANDTS IN THE ATTIC: UNLOCKING THE HIDDEN VALUE OF PATENTS 37-42 (2000).

15. *Id.* at 45-46.

16. *Id.*

accept intellectual property as the new currency.[17] The experience of big business in the patent world has been positive—research, innovation, and revenue attributable to intellectual property are all on the upswing.[18]

It would seem that university patenting would produce similar positive results for research and innovation (and in a domino fashion, perhaps, for revenue) following the general trend seen by business. While universities are relative newcomers to the patent world, one benefit is that they do not need to reinvent the wheel. Although there are certainly issues that are unique to universities, the barriers to entering and participating in the intellectual property arena are very similar: lack of money, lack of knowledge, lack of infrastructure, and concern about upsetting the culture of academic research. In fact, even the concerns that are unique to universities are, at bottom, variations on the same barriers that businesses face. For example, the wide variety of subject matter being researched at universities may be unique to academia, but at its essence, the barrier is in providing an infrastructure equipped to handle such diversity. Similarly, academic freedom adds a certain twist to the research and development culture, but there exist similar cultural barriers in industry, as evidenced by the open source movement. Thus, a university can and should look to and adapt the guidance and experience of big business to organize and implement an intellectual property management scheme, hopefully to achieve similar positive results.

In this Article, I argue that patents, if obtained and exploited strategically, can have a beneficial effect on university research. I will describe the barriers to university participation in the patent arena—that is, lack of money, lack of knowledge, lack of infrastructure, and cultural concerns—and explain, with reference to business, how and why universities need to overcome these barriers. By breaking down these barriers and ably exploiting their intellectual property, I argue that the obstacles to university research will be lessened, resulting in increased research and innovation. I further provide a primer to provide university administrators, technology transfer offices, and researchers with the information necessary to understand at least the "whys" of obtaining patents and an initial "how" for exploiting and maximizing the use of these patents. With reference to the patent management strategies provided by the authors of *Rembrandts in the Attic*, I argue that these can be adapted to address the barriers to the university patenting, as well as show how a coherent patent strategy can set up the university to overcome the obstacles of lack of access and lack of funding.

In particular, I will address the knowledge barrier faced by universities seeking to obtain and exploit their intellectual property rights. With this knowledge, the university can begin to overcome the other barriers, such as lack of money and cultural concerns. To further this goal, I propose implementing an infrastructure to facilitate the ability of universities to put into practice the suggestions inspired by *Rembrandts in the Attic*, as adapted for universities. This infrastructure includes an entity that will act as both an aggregator and analyst and will work in conjunction with a modified version of university technology transfer offices, addressing both the knowledge and infrastructure barriers. The modifications proposed for technology transfer offices are directed, in alternate part, towards removing the cultural barrier between researchers

17. *See generally*, RIVETTE & KLEIN, *supra* note 14.

18. *See id.* at 4-13.

and patenting. The final barrier, lack of money, is intimately tied to the lack of funding obstacle. In theory, an appropriate patent management strategy will lead to increased revenue streams and potential lines of funding, which will alleviate both of these concerns. Finally, the infrastructure suggested includes provisions to address the access obstacle (and concurrently the cultural barrier), which also should be mitigated by the impartation of knowledge and the increased potential for funding.

In Part II of this Article, I discuss the problems of university patenting in more detail. In particular, I review the literature directed to the obstacles related to lack of funding and lack of access, paying special attention to the role of patenting by the universities. In Part III, I determine what businesses know that universities do not, based on the principles and strategies from *Rembrandts in the Attic*. In Part IV, I adopt and apply these principles and strategies to the university setting and propose an infrastructure for implementing these ideas. I explain how this proposal breaks down the barriers to entering the patent arena, overcomes or at least lessens the obstacles of lack of access and lack of funding, and ultimately leads to increased research and innovation. I conclude that universities should adopt a mindset more akin to big business when considering their intellectual property resources, thereby alleviating the access and funding obstacles, resulting in greater research and innovation.

II. UNIVERSITY PATENTING—WHAT'S THE PROBLEM?

When considering university patenting, three sequential questions come to mind. First, can a university own patents? Second, should a university own patents? And third, what should a university do with its patents? Although the first question has been answered in the affirmative by Congress in enacting the Bayh-Dole Act,[19] the remaining two questions remain the topic of extensive debate.

A. Universities as Patent Owners

For much of recent history, and due to the peculiar involvement of the government in funding most university research, it was unclear whether universities could even own patents. Although the federal government had been allocating money to scientific research prior, in the 1940s the government recognized that research conducted by academic institutions may represent the greatest opportunity for scientific advancement and, as a result, began to provide funding in the form of grants in 1946.[20] That year, the Office of Naval Research and the NIH were created, followed shortly by the NSF, with the purpose of overseeing the allocation and use of federal funds for scientific research.[21] Each of these agencies, as well as others instituted later, had different standards for ownership in inventions created with the provided funds. Worse still, some patent policy was determined not on an agency level, or even research institution

19. The Universities and Small Business Patent Procedures (Bayh-Dole) Act, Pub. L. No. 96-517, 94 Stat. 3015 (codified as amended at 35 U.S.C. §§ 200-212 (2007)) [hereinafter Bayh-Dole Act].

20. Kenneth S. Dueker, *Biobusiness on Campus: Commercialization of University-Developed Biomedical Technologies*, 52 FOOD & DRUG L.J. 453, 459-60 (1997).

21. *Id.* at 460.

level, but on an ad hoc basis depending on the particular invention in question.[22] The result was unclear ownership of inventions supported in full or part by government grant monies. In some cases, where the federal government took title to the invention, the patents were rarely, if ever, licensed, in part due to the bureaucratic red tape involved.[23] In fact, studies indicate that only about four percent of patents issued for inventions funded by NASA, the DOD, and the NIH were ever used.[24] The bottom line was that the very scientific research the government was trying to promote via federal funding was instead then simply shelved, unused.

To address this problem, Congress, in 1980, passed the Bayh-Dole Act, having the stated purpose of promoting the utilization of federally-funded inventions.[25] Specifically, the Act aims:

> to promote the utilization of inventions . . . ; to encourage maximum participation of small business firms in federally supported research and development efforts; to promote collaboration between commercial concerns and nonprofit organizations, including universities; [and] to ensure that inventions made by nonprofit organizations and small business firms are used in a manner to promote free competition and enterprise without unduly encumbering future research and discovery . . . .[26]

To accomplish these objectives and prevent inventions based on federally-funded research from laying fallow and unused, the Act permits the inventing university to take title in the resulting invention.[27] The relevant requirements of the Act are rather simple: the university must disclose the invention to the federal government within a reasonable time; inform the government of its intent to patent the subject invention; retain title of the invention; share licensing proceeds with the inventors; and use the remaining licensing income to support further research or education.[28] With the patent in the hands of the university, it is hoped the invention will be used and licensed, more so than it would have been if the government had title.[29] To protect the government's interest, the Act also contains a provision granting a paid-up license to the federal government, such that neither the federal government nor its contractors can be liable for infringing an invention created using federal research funds.[30]

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22. Gary Pulsinelli, *Share and Share Alike: Increasing Access to Government-Funded Inventions Under the Bayh-Dole Act*, 7 MINN. J.L. SCI. & TECH. 393, 399 (2006).

23. Dueker, *supra* note 20, at 460.

24. Pulsinelli, *supra* note 22, at 397. This low number, however, may be the result of selection bias in the government-sponsored patents surveyed. *See* Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government Sponsored Research*, 82 VA. L. REV. 1663, 1679-80 (1996).

25. 35 U.S.C. § 200 (2007).

26. *Id.*

27. 35 U.S.C. § 202(a).

28. *Id.* § 202(c).

29. Other articles have investigated the efficacy of the Bayh-Dole Act in reaching its objectives. *See, e.g.*, Pulsinelli, *supra* note 22; Eisenberg, *supra* note 24. However, this topic is beyond the scope of this article.

30. 35 U.S.C. § 202(c)(4).

B. Criticisms of Bayh-Dole and the Problems of University Ownership

The Act answers the question "Can a university own patents?" However, going forward, the question remains "Should a university own patents?" The answer to this question should also be an unqualified "Yes." As previously noted, some commentators claim that university patenting creates, at least in part, the obstacles of funding and access that hamper academic research.[31] Professor Mark Lemley explains, "While in theory patents spur innovation, they can also interfere with it. Broad patents granted to initial inventors can lock up or retard improvements needed to take a new field from interesting lab results to commercial viability."[32] Many of these initial, broad inventions are believed to result from the type of basic science and foundational research performed in the academy. Opponents of university patenting argue thus that research and innovation is hampered because patents can be used as blocking mechanisms, patents can create an anticommons effect, and patents can cause a chilling of the disclosure that is a tradition of the academy, all of which are perceived to inhibit access to research and increase the amount of funding required to do research.

Patents, unlike most other forms of property rights, do not grant the holder any affirmative rights; rather, a patent simply permits the owner to exclude others from making, using, selling, or offering for sale the patented invention.[33] Because a patentee cannot technically grant a license to practice the invention, a patent license instead provides a promise from the patentee not to sue the licensee upon using the invention.[34] This unusual bundle of rights granted by a patent can give rise to a situation where a later invention, which is patentable, cannot be practiced due to another, earlier issued patent.[35] The earlier patent is a "blocking" patent, and its holder basically has exclusionary rights over not just the invention described in that patent, but also any other patent that requires that invention to be practiced.[36]

For a very simplistic example, consider inventor A, who obtains a patent on a bucket. Inventor B invents a bucket with a handle. B's invention is (for the purposes of this example, at least) patentable, because it is a new and non-obvious improvement on the prior art. However, to use B's invention, A's bucket is required; the patent on A is a blocking patent. B could choose to license the use of A's invention, or as is common in these situations, A and B could cross-license their patents to each other. However, A could potentially thwart B by refusing to license or cross-license its bucket patent. If there are other bucket patents out there, B might be able to negotiate with those patent owners, but if A's invention is, instead of a bucket, an essential research input or research tool for which there are no substitutes, this may not be an option.

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31. One additional criticism is the idea of "double paying." This complaint asserts that the public has funded the research through payment of taxes, but then also has to pay for the research again in the form of supra-competitive prices on the patented products that result. *See* Eisenberg, *supra* note 24. Regardless of the validity of this argument and its relevance generally to university patenting schemes, it is not related to the obstacles of access and funding, and thus is outside the scope of this paper.

32. Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 609, 618-19 (2005).

33. Pulsinelli, *supra* note 22, at 412-13.

34. *Id.* at 413.

35. *Id.* at 414.

36. *Id.*

It is this ability to potentially block future innovation that fuels the first concern about university patenting. The foundational research performed by universities means that many inventions discovered may be necessary inputs or tools for further research. Before the Bayh-Dole Act, these inventions either became part of the public domain or were the property of the unlikely-to-litigate United States government, so the patents on these inventions did not pose a threat to future research. However, now that these patents on building block technologies are instead being held by private parties—universities, research institutions, and an increasing number of companies—commentators fear that one party may be able to block any or all future endeavors in a particular area of research through failure or refusal to license its patents.

A related criticism is the idea that these patent rights will lead to a tragedy of the anticommons. Professors Michael Heller and Rebecca Eisenberg define the problem this way:

> [A] resource is prone to underuse in a "tragedy of the anticommons" when multiple owners each have a right to exclude others from a scarce resource and no one has an effective privilege of use. In theory, in a world of costless transactions, people could always avoid commons or anticommons tragedies by trading their rights. In practice, however, avoiding tragedy requires overcoming transaction costs, strategic behaviors, and cognitive biases of participants, with success more likely within close-knit communities than among hostile strangers. Once an anticommons emerges, collecting rights into usable private property is often brutal and slow.[37]

Proponents of the "tragedy of the anticommons" theory note that, although patents have been traditionally granted for downstream products, there is an increasing tendency for researchers, particularly in the biomedical area, to patent upstream inventions, such as research tools and inputs to basic research.[38] The argument is that patenting upstream technology will cause patent thickets that hinder future development and research.[39] In particular, Heller and Eisenberg point to license stacking as leading to these problems because permission to use multiple upstream products and inputs will be necessary to conduct research.[40]

For a simple hypothetical, consider a complicated research process that requires, among other things, two patented inputs and includes at least one patented step. Each of these three patents is owned by a separate party, and no single party has sufficient rights to perform the research process. The research process itself is not patented, and yet, to perform the process, a scientist will need to negotiate licenses with three parties, each with its own interests in mind. Although the inputs may only represent a small portion of the research process, the patentees of the inputs may require an industry-

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37. Heller & Eisenberg, *supra* note 6, at 698.

38. Christopher M. Holman, *Biotechnology's Prescription for Patent Reform*, 5 J. MARSHALL REV. INTELL. PROP. L. 318, 330 (2006).

39. *Id.*

40. Heller & Eisenberg, *supra* note 6, at 672. By way of example, many researchers conduct research leading to patents on segments of a gene sequence, which may prevent another researcher from collecting the pieces necessary to invent a screening method that needs to access multiple segments. *See id.* Stacking also creates issues with respect to funding because even if the above researcher can obtain licenses to access each of the necessary gene segments, the aggregation of licensing fees may make the project financially untenable. *See id.*

standard royalty which is greater than the value of the input to the process.[41] Thus, research becomes costly, both in terms of license fees that must be paid (and which may not reflect the value of the patented invention to the process) as well as the indirect costs of having to find and negotiate with multiple patent holders.

Two additional criticisms, though less direct, blame patents for decreased research. First, at least one commentator contends that the process requirements of university patenting stifle the early disclosure and dialogue that have long been part of the university culture.[42] Presentations and publications were previously the measure of productivity and prestige for academics.[43] However, because disclosure of an invention via presentation or publication can destroy the novelty required to obtain a patent, university scientists are now being counseled to keep their research private until a patent application can be prepared.[44] Because new inventions are not disclosed quickly, follow-on research is purportedly hindered.

Second, some commentators assert that university patenting commercializes academia.[45] That is, professors are not conducting research for the sake of intellectual inquiry, but rather choose their projects based on commercial potential or investor guidance.[46] In addition to altering research paths away from basic science and towards applied science and commercial innovation, critics also contend that the increasing commercialization of university research labs is harming the university's attention to its other goal—education. "[M]odern [science and engineering] departments function more like miniature research corporations that happen to do some undergraduate teaching on the side."[47] Because it is assumed that only universities will perform foundational research, critics argue that the fact scientists are steering away from this type of research will cause a dearth of innovation in basic research.[48]

Without question, the bulk of the scholarship promotes the above argument that university patenting leads to lack of access, which in turn leads to decreased research and innovation. However, there is some limited support in the literature for university patenting.[49] Professor F. Scott Kieff takes on the anti-patent literature directly, arguing that "patents are essential" for the advancement of research and innovation.[50] Kieff contends, contrary to much of the literature, that patents may not be to blame for lack

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41. For a thorough and detailed discussion of this phenomenon, see, e.g., Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, Stanford Law and Economics Olin Working Paper No. 324 (2006), *available at* http://ssrn.com/abstract=923468 (last visited Feb. 16, 2007).

42. Bagley, *supra* note 7, at 220-21.

43. *Id.* at 239-40.

44. *Id.* at 242-44.

45. Strandburg, *supra* note 8.

46. *See id.*

47. Sarah J. Bannister, Note, *Low Wages, Long Hours, Bad Working Conditions: Science and Engineering Graduate Students Should Be Considered Employees Under the National Labor Relations Act*, 74 GEO. WASH. L. REV. 123, 135 (2005) (citing JENNIFER WASHBURN, UNIVERSITY, INC.: THE CORPORATE CORRUPTION OF HIGHER EDUCATION 73-102 (2005); Risa L. Lieberwitz, *The Corporatization of the University: Distance Learning at the Cost of Academic Freedom?*, 12 B.U. PUB. INT. L.J. 73,100-13 (2002)).

48. *See, e.g.*, Strandburg, *supra* note 8.

49. 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).

50. *Id.* at 692.

of access because scientists have generally regarded their work as some form of intellectual property anyway and "have demonstrated countless ingenious methods for staking out, defending, and even pirating this form of intellectual property."[51] Kieff goes on to note that, rather than blocking access, the exclusionary power granted by the patent is "paradoxically essential" to promoting utilization of the technology.[52] In addition to improving utilization, Kieff also argues that patent protection may also encourage research by providing a less-established scientist with necessary funding, whereas funds may otherwise only be available to more-established scientists.[53] Finally, Kieff argues that basic research, "like any process, can be viewed as one that requires inputs and generates outputs, and experience shows that patents on inputs generally do not prevent the production of outputs."[54]

Although the literature in support of university patenting may be scarce, there are other indicators that this endeavor produces apparently positive results. For example, other industrial nations have begun implementing national legislation similar to the Bayh-Dole Act.[55] For example, in 1998 Japan enacted a national "Industrial Revitalization Law" to allow university recipients of government funds to own the resulting intellectual property.[56] The Japanese law includes a provision for compulsory licensing if the universities are not working the invention and requires Japanese universities to license intellectual property rights free of charge "if the government believes it is in the public interest to do so."[57] Similarly, Australia has a Bayh-Dole model of ownership for inventions resulting from government funding.[58] Some European countries have enacted legislation emulating many of the Bayh-Dole hallmarks.[59] Despite evidence of little success for these foreign technology transfer provisions,[60] the significance is in these countries' belief that the provisions work in the United States and the appropriation of the idea for their own laws.

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51. *Id.* at 694 (citing RICHARD HOFSTADTER & WALTER P. METZGER, THE DEVELOPMENT OF ACADEMIC FREEDOM IN THE UNITED STATES 365 (1955)).

52. *Id.* at 699.

53. *Id.* at 703.

54. *Id.* at 703-04 (citing Ellen Schrecker, *Academic Freedom: The Historical View*, in REGULATING THE INTELLECTUALS: PERSPECTIVES ON ACADEMIC FREEDOMS IN THE 1980S 1 (Craig Kaplan & Ellen Schrecker eds., 1983)).

55. DAVID C. MOWERY ET AL., IVORY TOWER AND INDUSTRIAL INNOVATION: UNIVERSITY-INDUSTRY TECHNOLOGY TRANSFER BEFORE AND AFTER THE BAYH-DOLE ACT IN THE UNITED STATES 95 (Martin Kenney & Bruce Kogut, eds., 2004) (citing a recent report from the Organization for Economic Cooperation and Development (OECD) showing "a general trend across OECD countries to emulate the Bayh-Dole patent legislation . . . .").

56. *See, e.g.*, Lorelei Ritchie de Larena, *The Price of Progress: Are Universities Adding to the Cost?*, 44 HOUS. L. REV. (forthcoming Spring 2007), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=917367 (all page references for this article refer to the version at this web address); *The Brains Business*, ECONOMIST, Sept. 8, 2005, *available at* http://www.economist.com/displaystory.cfm?story_id=4339960.

57. Ritchie de Larena, *supra* note 56, at 68 (citation omitted).

58. *Id.* at 69.

59. *Id.* Despite any cultural differences, I contend that European technology transfer offices would likely experience more positive results if they expended effort to craft and execute a strategic patent management strategy.

60. *Id.*

Neither Kieff nor the many critics of university patenting offer anything more than theoretical support for their respective positions. However, there is some reason to believe that the parade of horribles attributed to university patenting is unwarranted. In fact, a survey of current research, albeit preliminary, provides at least mixed support for the necessity of university patenting.[61] Similar studies have been done to assess the effect of patenting on innovation outside of academia, but no study convincingly ties the presence of patenting to a decrease in research and innovation. To the contrary, studies have shown that the increased number of patents have in fact led to increased innovation. "[E]ven when employed for competitive purposes, patents appear to have also had the effect (perhaps ironically) of fostering innovation in new areas of research."[62] Similarly, a study undertaken to determine whether the increase in patents was a result of patent-friendly courts or an actual increase in innovation came out decidedly in favor of innovation.[63] Other scholars have tied the patent policy reforms of the 1980s, which made obtaining and enforcing patents easier, to a positive effect on technology commercialization.[64] Business is embracing patents and the result seems to be increased innovation. Given that patenting has been part of the academic landscape for some twenty-five years and part of the business landscape for much longer, and given that there has been no discernible slowdown in research and innovation in this country, it is a fair assumption that the effects of patenting at the university level are, if not beneficial, at least neutral.

Thus, I argue that universities should own patents, leaving only the question of "What should a university do with its patents?" How this question is answered is the key to both allaying the above criticisms of university patenting, as well as, I believe, overcoming the prevailing obstacles to university research—funding and access. Unfortunately, this is a difficult question to address and among the barriers universities face as they enter the intellectual property arena. While the question of how a university should use its patents is likely a multi-level determination, the body that is likely to figure prominently in at least the implementation, if not the decision-making process, is the technology transfer office.

C. University Technology Transfer Offices

Not unlike the increase in popularity of patent attorneys and intellectual property counsel tied to the increased interest in intellectual property in the business world, the technology transfer office of the university has seen its popularity rise from overlooked (or even non-existent) to somewhat of a "big man on campus." Although the point for which Professor Rochelle Dreyfuss makes the following observation is negative, there is no denying the truth of the substance of the remark: "Universities have also begun to regard their technology transfer offices as the academic equivalent of their football teams: even if the offices aren't winning, there is cachet in fielding them. And the technology transfer offices want to win, just like the football teams do."[65]

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61. MOWERY, *supra* note 55, at 95.
62. RIVETTE & KLEIN, *supra* note 14, at 45.
63. *Id.* at 49.
64. *Id.* at 26.
65. Rochelle Dreyfuss, *Protecting the Public Domain of Science: Has the Time for an Experimental*

Unfortunately, most technology transfer offices are not equipped or designed to win, in no small part because the characteristics of a well-functioning technology transfer office have not been well defined. Further, many universities have not considered how to fully integrate the technology transfer office with the university and the business world outside to achieve maximum benefit from the university's inventions and the protection efforts made by the technology transfer office. Any discussion of improving the intellectual property management strategy of a university must begin with the technology transfer office.

One of the first requirements for a university to enter the patent arena is to establish a technology transfer office, an activity that has been on the increase. In 1980, prior to the enactment of the Bayh-Dole Act, there were only twenty-five technology transfer offices active at United States universities.[66] By 2005, that number had jumped to some 3,300 technology transfer offices active at universities, research institutions, and hospitals around the country.[67] Over a similar time span, 1988-2003, patents assigned to universities rose from 800 patents to 3,200.[68] The amount of money spent by universities on patent-acquisition increased from thirty-seven million dollars in 1991 to 221 million dollars in 2004.[69] It is clear that it is not simply the researchers on campus that have been busy and productive—the technology transfer offices have been hard at work as well.

The United States Patent and Trademark Office, in conjunction with the NSF, prepared a report summarizing patents obtained by universities from 1969 to 2003, as well as information about research expenditures in 2002.[70] In 2003, 3,259 utility patents were assigned to universities or colleges, out of a total of 169,024 utility patents granted overall.[71] In that year, the leading universities, based on patents obtained, were the University of California (439 patents), the California Institute of Technology (139), Massachusetts Institute of Technology (127), and the University of Texas (96).[72] Not surprisingly, each of these universities has an active and visible technology transfer office presence.[73]

The second requirement is that the technology transfer office be arranged and equipped to adequately handle the necessary tasks to acquire and exploit intellectual property. This metric is a bit harder to measure, since there are numerous ways to

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Use Defense Arrived?, 46 ARIZ. L. REV. 457, 464 (2004).

66. Ritchie de Larena, *supra* note 56, at 43.

67. Karen Pollarito, *When Science Has a Potential Payoff*, THE SCIENTIST, Jan. 17, 2005, *available at* http://www.the-scientist.com/article/display/15195.

68. NATIONAL SCIENCE BOARD, SCIENCE & ENGINEERING INDICATORS 2006, http://www.nsf.gov/statistics/seind06/c5/c5h.htm (last visited Feb. 16, 2007).

69. *AUTM* survey, *supra* note 4, at 20.

70. U.S. PATENT AND TRADEMARK OFFICE, U.S. COLLEGES AND UNIVERSITIES-UTILITY PATENT GRANTS, CALENDAR YEARS 1969-2003, http://www.uspto.gov/go/taf/univ/univ_toc.htm (last visited Feb. 16, 2007).

71. *Id.*

72. *Id.*

73. *See* University of California Technology Transfer System, http://www.ucop.edu/ott/; Caltech Office of Technology Transfer, http://www.ott.caltech.edu; MIT's Technology Licensing Office, http://web.mit.edu/tlo/www/about/our_mission.html; University of Texas System Intellectual Property, http://www.utsystem.edu/OGC/intellectualproperty/index.htm.

establish a technology transfer office. For example, the technology transfer office of each of the institutions listed in the previous paragraph is arranged and equipped uniquely.[74] Typically, in the university setting, technology transfer offices will fall into four general modes: (i) a "centralized" model, where a single office provides patent acquisition services for all research and technology areas for the whole university; (ii) a "decentralized" model, where the separate divisions of the technology transfer office are associated with different research and technology areas (for example, there may be one office or unit for the physics department, another for the engineering school, and so on); (iii) the "foundation" model, where an independent nonprofit organization is created expressly to manage intellectual property acquisition and/or licensing; and (iv) the "contractor" model, where a university outsources its acquisition and licensing activities to another entity, such as a law firm.[75] A technology transfer office may also utilize two or more of these modes in combination.

At the least-involved end of the spectrum, the technology transfer office serves merely as a conduit between the researcher and an outside entity charged with obtaining and exploiting intellectual property on behalf of the university (following the contractor model).[76] For example, the technology transfer office may gather invention disclosures from scientists on campus and forward them to an outside law firm hired by the university. At the other end of the spectrum, the technology transfer office may also pursue acquisition and exploitation of inventions from within; this could be done either on a centralized or decentralized basis.[77] For example, a well-staffed technology transfer office may be able to gather invention disclosures, apply for and prosecute patents, and actively seek to license or otherwise exploit the resulting intellectual property assets. Most technology transfer offices will fall somewhere in between the two extremes.

In addition to acquiring and exploiting intellectual property in a traditional manner, universities have also begun to address the research-funding question creatively by implementing industrial affiliate programs.[78] In these affiliations, for example, an industry partner will pay an annual fee in the ten thousand to fifty thousand dollar range in exchange for having first rights in the intellectual property generated in a certain sector or sectors of the university's research developments. Harvard, a leader in this type of partnership arrangement, announced in November 2005 its intent to seek more commercial partnerships for research and licensing, and plans to spend ten million dollars on an "accelerator fund" to bridge the gap between early stage research funded by private agencies and advanced research paid for by

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74. For example, the Intellectual Property division of the General Counsel's office for the University of Texas system staff includes two attorneys, one legal assistant, and one support person. *See* http://www.utsystem.edu/OGC/intellectualProperty/index.htm (last visited Feb. 16, 2007). In contrast, MIT's website boasts twenty-nine employees, including four technology licensing officers/directors (one designated an attorney), five additional technology licensing officers, four associate technology licensing officers, two technology licensing associates (one designated an attorney), four financial operations staff, four office operations staff, two persons for patent administration, two legal assistants and two administrative assistants. *See* http://web.mit.edu/tlo/www/about/our_staff.html (last visited Feb. 16, 2007).

75. Ritchie de Larena, *supra* note 56, at 44.

76. *Id.*

77. *Id.*

78. *Id.* at 45.

venture capitalists.[79] Technology transfer offices stand to play an integral liaison role in these relationships as well.

Unfortunately, the reality is that technology transfer offices are often not arranged or equipped to fulfill these varying roles in the patent acquisition and exploitation arenas. From the exponential increase in amount of university inventions being considered for patenting, to the wide array of potential subject areas of invention at large universities, to the difficulty in determining industry partners or potential licensees without being part of the industry, to convincing administrators and scientists that the academic culture now includes patents and that priorities and resources should be allocated appropriately, the technology transfer offices of today and the future have many difficult tasks. These tasks are made more difficult by the fact that most universities do not yet view themselves as commercial players in the intellectual property arena, and even some of the more forward-thinking institutions are not sure how to do it well. Universities, and in particular the technology transfer offices, need to look no further than the business world to gain all of the information and insight needed to play the game well.

III. WHAT DO BUSINESSES KNOW THAT UNIVERSITIES DON'T?

Businesses did not spring into the intellectual property arena fully formed and ready to acquire and exploit patent assets. Rather, the adoption and implementation of patent management strategies required a number of small steps, forward and backward, before becoming generally accepted and adopted by most firms. Although slow to embrace at first, businesses now fully accept that "[t]he old industrial era has been supplanted by a new knowledge-based economy in which ideas and innovation rather than land or natural resources have become the principal wellsprings of economic growth and competitive business advantage."[80] The simplest expression of this notion is quite clear: "[I]deas really *are* where the money is."[81] This is the first point that universities need to embrace in order to learn from the experience of business in intellectual property. Oddly, universities, which have always been in the business of ideas and innovation, seem more hesitant to adopt these maxims than did the business world.

Businesses exhibit a number of different motivations driving the adoption of intellectual property management schemes, motivations that may not have influenced the academy—yet. Overcoming the initial reluctance to engage in patent acquisition and exploitation was not always easy; some companies, including Microsoft and Dell, did not become patent owners until they found themselves on the defensive ends of patent litigation suits.[82] Other companies entered the patent game after witnessing the success (and their relative lack in comparison) of their competitors who had embraced intellectual property.[83] Regardless of what spurred their entry into the patent arena, more and more companies are becoming more and more active in their acquisition of

79. Stephen Heuser, *Harvard Woos Firms to Fund Research*, BOSTON GLOBE, Nov. 9, 2005 at 1.
80. RIVETTE & KLEIN, *supra* note 14, at 1-2.
81. *Id.* at 50.
82. *Id.* at 45-46.
83. *Id.*

intellectual property. For example, some large companies, such as Sun and Oracle, have boosted the size of their patent portfolios by more than 500 percent in just a few years.[84]

In addition to exhibiting a growing interest in obtaining patents, businesses are making increased efforts to exploit their acquired intellectual property assets. Patent licensing revenues rose some 700 percent, from $15 billion in 1990 to $100 billion in 1998.[85] These revenues can be used in a number of ways: to boost company earnings and shareholder returns, to improve the return on research and development investments, or to seed additional research and innovation. Beyond simple revenue generation, firms may also utilize their intellectual property assets to generate non-monetary benefits. For example, value associated with patents can be used to raise corporate valuations, enhance equity, and serve as a type of currency for mergers and acquisitions.[86] Patents may further be used as an offensive business tool, encouraging competitors to not engage in certain behaviors, or as a defensive business tool, providing the business with an asset to offer for cross-license if accused of violating another's intellectual property rights. Finally, patents often serve a signaling function, supplying information about the technological and legal competence of a business.[87] Depending on the technology involved, innovation level, and breadth of the patent, a business can use a patent for any, or all, of these purposes, all of which provide visible benefits to the business.

On the flipside, a mismanaged patent portfolio can produce devastating results for the company. Failure to have a coherent patent management strategy can lead to breakdowns in both the acquisition and exploitation of a business's intellectual property assets. These breakdowns can include: failure to obtain critical patents or patents that may lead to lucrative situations; failure to identify potential relationships with partners and licensees; failure to realize the defensive value of a patent portfolio when challenged by another company on intellectual property issues; and failure to follow through on patent-related aspects of business, such as product development, branding, and market expenditures.[88] Although businesses seem to have embraced intellectual property, there are, of course, still problems. In contrast to universities, where the primary problem appears to be the lack of an intellectual property management strategy, or worse, the failure to acknowledge the importance of pursuing intellectual property assets, businesses more often stumble in their execution of already-established strategic plans. In a 1998 survey of companies, 90 percent of companies agreed that patents can be important, but 71 percent admitted to wasting research and development resources through patent mismanagement.[89] Similarly, while 84 percent of these companies have a patent policy in place, only 42 percent conduct regular IP audits to ensure that their patent policy is achieving its goals.[90]

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84. *Id.* at 4.
85. *Id.* at 5.
86. *Id.* at 29.
87. Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 627-28 (2002).
88. RIVETTE & KLEIN, *supra* note 14, at 99, 101.
89. *Id.* at 102.
90. *Id.*

To play successfully in the intellectual property arena, the first step for any business is to develop a coherent patent strategy. For most businesses, this strategy will be aimed at three primary objectives: 1) strengthening its proprietary market advantages, 2) improving financial performance, and 3) enhancing competitiveness.[91] To strengthen its proprietary market advantages, a business will want to maintain the technology edge of its products or services, focus on boosting the outputs of its research and development efforts, exercise effective branding of its products, and anticipate and move early with respect to market and technology shifts.[92] Improving financial performance will require the business to audit and examine its patent assets for new revenue sources, reduce its costs, and bolster its corporate financing and valuation efforts.[93] Finally, to enhance competitiveness, the business will want to analyze and outflank its competitors, identify and exploit new market opportunities, and reduce competitive risks.[94]

These goals should not be surprising—every firm wants to make more money and outdo its competitors. *Rembrandts* asserts successful achievement of these goals can be obtained through the intelligent use of patent assets.[95] In particular, the book provides an assessment system to be applied to a business's intellectual property—the "Grow-Fix-Sell" triage to assist with patent exploitation.[96] A business cannot exploit its intellectual property until it knows what assets it holds and where those assets can be used.[97] To make these assessments, the business must first audit its intellectual property assets, assign the patents to a responsible business unit, and create a grid map in which business units are grouped with respect to growth and potential.[98] Once the intellectual property assets are identified and assigned to a responsible unit, each asset is analyzed to determine if it should be grown, fixed or sold.[99] An asset that should be grown is one that has potential to develop into new product lines or expand into new markets.[100] An asset slated for fixing may be in an area of slow growth or cluttered or eroding markets; the business may need to assess whether there are ways the asset can still be used beneficially.[101] Finally, an asset that cannot be used for growing or fixing should be sold to get the most economic or strategic value from the asset that offers no additional value to the business.[102]

In addition to assessing the business's existing assets for potential exploitation, the business must have a strategy for patent acquisition. When determining what technologies to pursue patent protection for, a firm must identify the business's core technology advantage and seek patents to reinforce the product's differentiating features and

91. *Id.* at 64-65.
92. *Id.* at 64.
93. *Id.* at 65.
94. *Id.*
95. *Id.* at 68.
96. *Id.* at 66-68.
97. *Id.*
98. *Id.* at 67.
99. *Id.*
100. *Id.* at 70.
101. *Id.* at 77.
102. *Id.* at 81.

control the choke points in the manufacturing and distributing lines.[103] This may involve patenting key methods for building, marketing, and selling the product, beyond seeking protection for the product itself.[104] In identifying what to protect, the business should conduct a preliminary assessment to identify exactly what its core technology advantage is, that is, the business must identify the nature of its product or products and how it fits within the business's strategic goals.[105] Next, the business must determine the feasibility of exploiting the technology, which may require analyzing the costs involved, the technology required to manufacture and distribute, and the time it will take to get a viable product to market.[106] With these steps in place, the business should be able to appropriately identify technology for patenting, as well as have a strategy for managing the patents it has obtained.

However, simply designing a patent management strategy is not sufficient—the business needs to implement and execute the strategy as well.[107] As noted above, it is more often at this step that businesses fail.[108] The first issue with respect to execution is to ensure that management is structured to reflect the importance of intellectual property.[109] This will often require a change in leadership structure; at a minimum the intellectual property decision-making cannot be the sole province of the in-house patent counsel.[110] Instead, *Rembrandts* recommends a multi-level structure to implement the intellectual property strategy, ranging from business units to high-level executives.[111] The business units, with front-line experience, are responsible for reporting patent creation and usage.[112] However, the responsibility for overseeing the execution of the intellectual property strategy must rise above the business units and be centralized to the business.[113] Finally, ultimate leadership decisions must be made at an upper level, such as senior vice president.[114] Part of the purpose for this delegation of duties is to allocate responsibility to the parties best able to accomplish the task.[115] In other words, the business units will be most knowledgeable about the product's core and differentiating features as well as the choke points for manufacturing and distribution.[116] Alternatively, a higher-level officer will understand a product's fit within the entire business line and will also have the power to implement the decisions.[117]

This interplay between the various levels in the patent management structure would be incomplete without mention of the inventors. In fact, the perceived divide

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103. *Id.* at 106-07.
104. *Id.* at 107.
105. *Id.* at 113.
106. *Id.* at 116.
107. *Id.* at 116-18.
108. *Id.* at 102.
109. *Id.* at 85.
110. *Id.*
111. *Id.* at 85-92.
112. *Id.* at 89.
113. *Id.*
114. *Id.*
115. *Id.*
116. *Id.*
117. *Id.*

between the research side and the management side of business is perhaps one of the reasons for the hesitancy of business to adopt intellectual property as a commodity. As authors Julie L. Davis and Suzanne S. Harrison note:

> In many companies, the research and development or 'R&D' function, has been literally a 'black box.' Inventors—whether engineers, scientists, or web designers—have received special treatment—often keeping odd hours and receiving incentives for their ideas. . . . It has been up to the business folks on the other side of the wall—or even in a different building altogether—to shape and refine that idea into a saleable product or service that can generate revenue.[118]

Any effective patent management strategy will need to bridge this gap between science and business.

Businesses are embracing these strategies and techniques, and they are benefiting from the strategic acquisition and exploitation of their intellectual property. A number of simple, but important thoughts should be clear from this brief synopsis of *Rembrandts*. First, patents are critical. Second, patents need to be acquired on a relatively generous, although strategic, basis. That is, a business should acquire patents on more than just its invented technology, but also the technology associated with the manufacturing and distribution and any other choke point in the process. Third, patents can be used by businesses in a variety of different manners; the business needs to consider ways to use their patents creatively. Fourth, businesses that acquire patents cannot just rest on their laurels, but instead need to regularly and actively review their patent portfolios looking for opportunities to grow, fix, or sell. Fifth, the structure of the parties responsible for executing the business's intellectual property management strategy is important to ensure success.

Although universities suffer from some unique problems in that they are not simply businesses, these essential points can be applied and adapted to not just address the peculiarities of academia, but also to overcome the barriers that universities typically cite as reasons against implementing patent management strategies and to alleviate the obstacles that hamper university research.

IV. HOW CAN UNIVERSITIES BE MORE LIKE BUSINESSES?

Universities, like businesses, are experiencing a period where intellectual property is becoming an increasingly critical commodity. It is not only in the business world that intellectual property assets are the new cash, and similar to businesses, the indirect benefits for a university of acquiring and exploiting intellectual property assets are many. The problem is that universities most often do not view their intellectual property management activities as an integral part of their "business." They have not set up a coherent patent management strategy. They may not have even set up a technology transfer office, although this is becoming rarer. However, of the universities that have set up technology transfer offices, most were not created with the execution of a patent management strategy in mind. In this section, I will review the problems with universities in moving in this direction, as well as analyze a proposal

118. JULIE L. DAVIS & SUZANNE S. HARRISON, EDISON IN THE BOARDROOM: HOW LEADING COMPANIES REALIZE VALUE FROM THEIR INTELLECTUAL ASSETS 1 (2001).

that has been raised to address some of the problems. I then provide the university with a primer for creating an intellectual property management strategy and a proposed structure to help it effectively implement the designed strategy.

A. The Problems with Universities

In order to function like a business, the university will need to have an overall intellectual property management strategy, at least a basic understanding of the hows and whys of exploiting its intellectual property, and the infrastructure to implement these plans. Unfortunately, universities are lacking to some extent each of these three facets.

One problem with establishing a patent management strategy at the university level may be the academy's historical aversion or disinterest in the patent system. However, even if a university surmounts this hurdle and enters the patent arena, it likely faces one or more of the following, additional difficulties. First, the breadth of research at universities prohibits the ability to base a strategic plan along a set of product lines. For example, in the business arena, a car manufacturer will be seeking patents on automobile technology, plus the manufacturing and distribution technologies to bring the automobile technology to the public. Even research that results in technology outside of conventional automobile technology is likely to be driven by or relate to the core research; one such technology might be a database designed as a knowledge-management system for tracking best-practices on the assembly line. While a knowledge-management database is not likely to be considered conventional automobile technology, it was driven by the underlying goal of developing automobile technology. A strategic plan can be built around these technologies, because they derive from foreseeable sources.

A university, on the other hand, has research occurring in multiple areas, on multiple levels, which may be wholly unrelated to other research in other areas. The biomedical engineering department may be inventing new materials for creating implants that generate fewer rejection reactions from a patient's body, while the medical school may be inventing new surgical procedures and the tools to perform them, and the physics department may be developing new methods and apparatuses for smashing atoms to generate energy. The inventions and directions of research are not coherent, and (again, largely unlike businesses) the directions may change from year to year. This breadth of invention may create a great difficulty for a patent management team to decide where to focus limited energies and efforts—it is hard to create a strategy for patent acquisition when it is unknown from where the next invention may be coming.

Second, universities, who are hampered perhaps by their late entry into this arena, are unaware of the hows and whys of exploiting their patents. Many institutions now understand that at least one common exploitation technique is licensing, but the mechanics of doing so escape them. Intellectual property licensing in academia has been skyrocketing; one study estimates licensing at some $611 million in 1997 (an 89 percent increase over 1993).[119] Despite these encouraging statistics, it is fair to say that

119. RIVETTE & KLEIN, *supra* note 14, at 12-13 (but still acknowledging that there is conflict between academic freedom and the desire to profit).

universities are not making their best efforts at licensing their assets. In general, universities are passive in their licensing attempts, limiting their efforts to cold calling, listing available technology on the Internet, or attempting to foster industry contacts by hiring technology transfer office staff having business backgrounds.[120] Cold calling and technology listings are not generally successful modalities because there are information deficiencies—technology transfer offices may not know who to pursue as potential licensees and companies seeking licenses may not think of universities as the place to look to license technology. Moreover, as noted previously, the breadth of inventions and research areas at the university make it nearly impossible for the technology transfer office to be knowledgeable in each, a prerequisite to understanding the pool of potential licensees. Further, university technology transfer offices have been accused of over-charging potential licensees to the point of deterring deals, perhaps because of a lack of understanding of the market in which the licensing occurs or the strategic plan of the university with respect to this technology.[121] On the flip-side, university technology transfer offices have also been charged with pipelining exclusive deals to favored licensees, such as faculty start-up businesses, for little or no consideration, agreements that entice faculty members to work and remain at the institution, but may not be the most lucrative use of the asset.[122]

Another issue hampering licensing by the university is its desire to "have its cake and eat it too." That is, institutions are writing into their license agreements terms which they would object to if they were on the other end of the deal.[123] One National Institute of Health study

> concluded that "universities have sought just about every kind of clause in research tool licenses to which they themselves have objected, including publication restrictions, rights in or the option to license future discoveries, and prohibition on transfer to other institutions or scientists." This phenomenon has been characterized as the "Paradox of the Patent Community" whereby universities, as major-technology users, appear to have an interest in broad-use rights, but as major patent-owners they fight instead for stronger patent protections.[124]

One final impediment to university exploitation of their patent assets are the reports that very few universities are profiting from their technology transfer enterprises.[125] Patent royalties appear insignificant when compared to total university revenue, constituting somewhere between 0.5 and 2 percent of revenue at the high end.[126] Not surprisingly, the biggest success stories seem to be in the pharmaceutical world, where the risks and payouts are the biggest for all players. One such example

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120. Ritchie de Larena, *supra* note 56, at 45.

121. *Id.* at 48 (citing Pollarito, *supra* note 67, at 6).

122. *Id.*

123. *Id.* at 52.

124. Ritchie de Larena, *supra* note 56, at 52 (quoting NIH Report on Working Group on Research Tools (1998), *available at* http://www.nih.gov/news/researchtools).

125. Heuser, *supra* note 79, at 2.

126. Amy Kapczynski et al., *Addressing Global Health Inequities: An Open Licensing Approach for University Innovations*, 20 BERKELEY TECH. L.J. 1031, 1088 (2005) (citing Yochai Benkler, *Commons-Based Strategies and the Problems of Patents*, 305 SCIENCE 1110 (2004)).

is the patented HIV drug Emtriva, developed in part by Emory University.[127] Another is the Cohen-Boyer patent on recombinant DNA technology licensed successfully by Stanford University.[128]

However, putting aside the superstars of university licensing, the low revenue percentage associated with licensing may be quite misleading—revenue for universities comes from a number of different sources, from tuition to gifts to athletic ticket sales to licensing of branded products. It is not surprising, given the nature of the patents as well as the ineptitude that many technology transfer offices exhibit with respect to licensing, that the licensing income stream is not substantial. Furthermore, universities are not viewing these figures with the proper attitude; these figures represent nearly pure profit. The research has been done and was going to be done anyway, and the costs of obtaining intellectual property protection are a minor expenditure compared to the costs of research. Thus, if the technology can be licensed at all, it should represent a win-win situation for the university.

Therefore, an important part of the university's patent management strategy must include a more robust and active approach to licensing, as well as making efforts to use intellectual property assets in alternative ways. To do this, the intellectual property management team must be aware of potential licensees, understand current business and technology trends, and recognize, to the extent possible, how the current university research fits into the big picture. This leads to the third problem, which is that a university often lacks adequate infrastructure to exploit its intellectual property assets in the same way a business does. Technology transfer offices, the department typically held at least partially responsible for acquiring and exploiting patents, vary greatly in their staffing. Some universities staff their technology transfer offices with attorneys, others with business majors or administrators. Regardless of whether the office is staffed with lawyers or business people, given the breadth of inventions coming out of the university's research labs, it is unlikely that the staff will be sufficiently knowledgeable about the best avenues for licensing in many cases. Further, the technology transfer office is not often a high-level department in the university, so decision-making will often need to go above. Without a strategic plan, the knowledge to exploit the assets, and the infrastructure to do so, it is unlikely that the assets acquired by the university are going to reach their full potential and are much more likely to cause the problems attributed to them, as discussed previously.

This observation that universities are not effectively utilizing their intellectual property is not new. Professor Lorelei Ritchie de Larena, for one, has noted this problem (and other problems that plague university patenting) and proposes a unified national technology transfer center to make identifying potential licensing relationships more convenient.[129] This center would be organized by technology departments, using the Patent Office technology center taxonomy for example.[130] The center would

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127. Bagley, *supra* note 7, at n.47.

128. Ted Sabety, *Nanotechnology Innovation and the Patent Thicket: Which IP Policies Promote Growth?*, 15 ALB. L.J. SCI. & TECH. 477, 485 (2005).

129. Ritchie de Larena, *supra* note 56, at 74. Ritchie de Larena also views underreporting of patented inventions prepared with federal funding to be a significant problem, to which her proposal is also addressed.

130. *Id.* at 74.

provide a primary, centralized repository of university patents for businesses seeking to license technology.[131] Income received from the licensing would be split; the revenue from the license to a commercial licensee would be used first to pay for the costs associated with patenting the technology.[132] Second, a small fee may be charged to cover the operating costs of the center.[133] Of the remaining revenue, the inventors would share a substantial portion.[134] Some small percentage would go to the institution to which the inventor belongs and a nominal amount would go to the university to cover the technology transfer office overhead costs.[135] Finally, the remaining amount (approximately one-third of the revenue) would be returned to the university for use in further research.[136] Ritchie de Larena's proposal envisions that the center would work directly with researchers to obtain protection for new inventions.[137] The center would also have a Board of Advisors, consisting of university, government, legal, and industry experts, to make suggestions for commercializing the inventions.[138] The center would also maintain a public Internet database of all university patents and their licensing status.[139]

Although Ritchie de Larena's proposal is very appealing, it is not specifically directed towards overcoming three barriers to successful exploitation of patents by the university. First, it does not suggest an intellectual property management strategy. Second, it does not provide the university with the hows and whys of patent acquisition and exploitation. Third, it does not provide the vital infrastructure necessary to create an effective technology transfer office, even though it does provide a structure to assist with developing relationships between businesses and universities for licensing purposes. To address these particular concerns, I propose both a primer and a structure that adapt and promote the strategies and behaviors set forth in *Rembrandts*, leading to effective acquisition and exploitation of inventions, and in turn, reduced obstacles to research.

B. A Patent Acquisition and Exploitation Primer for Universities

There are three main points a university will need to address to establish and implement a successful intellectual property management strategy which, as will be explained below, should promote research and innovation by alleviating the funding and access obstacles. First, a university needs to embrace patenting and seek patents generously. Second, a university needs to create a patent management strategy that reflects the objectives of the institution. Third, a university needs to implement an infrastructure that permits the execution of the established strategy, a topic covered in Part C below.

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131. *Id.*
132. *Id.* at 75.
133. *Id.*
134. *Id.*
135. *Id.* at 76.
136. *Id.*
137. *Id.* at 77-78.
138. *Id.* at 78.
139. *Id.*

1. Embrace Patenting

A university needs to allocate resources to enable the institution to embrace and generously seek patents, and further to educate its scientists about the patenting process (with the hopes of encouraging the acceptance of patenting on the research side of the academy). At the next level, the university's technology transfer office will need to analyze inventions to determine how they fit within the university's overall patenting scheme to generously, but intelligently, seek patent protection. The concern about allocating resources is understandable; with dwindling state budgets and wildly expanding college tuition costs, universities are particularly sensitive about spending money on an endeavor that is not directly related to education or research. One way to manage this is to try to make the technology transfer office somewhat self-funding, that is, revenue from licensing may support the operations of the technology transfer office, including the costs of acquiring patents, overhead, and personnel. (This also provides a side benefit of incentivizing the technology transfer office to actively, not passively, license the university's patent assets in order to generate sufficient funds for its support.)

To further encourage the university's embracing of patenting, the technology transfer office will need to address the current divide between the scientists and the business side of intellectual property. On a pragmatic level, researchers need to understand the importance of submitting their research to the technology transfer office at an early stage; they also need to be aware of how their presentation and publication activities may affect the patentability of inventions. On a socio-cultural level, the issues may be addressed head-on, with the eventual hopes of convincing researchers to embrace patenting, by creating a team atmosphere between the technology transfer office and the researchers and by educating the researchers about the benefits of patents.

The task of analyzing inventions to fit within the university's patent management strategy, and to generously but strategically seek patent protection, is much more difficult. As discussed previously, in a business, most of the inventions will either be the core technology of the company or will be related to or driven by this core technology. For this reason, the intellectual property department of a business will be able to readily identify how a new invention fits within the general strategy and scheme for the company. In the university setting this is not the case because inventions can come from a myriad of technology areas and there is no general sense of staying within a singular type of inventions. Moreover, the trajectory of research, even within a discrete department in the university, may change over time, depending on the faculty makeup, the outside funding available, and the popular trends of research. Thus, part of the intellectual property strategy for a university technology transfer office is to not just embrace patenting, but to create some sort of strategy for determining which inventions to acquire patent rights for and on which patents to actively pursue licensees.

2. Patent Management Strategy

Next, the university needs to create a patent management strategy that reflects its objectives. In business, the primary objectives are most often to 1) strengthen proprietary market advantage; 2) improve financial performance; and 3) enhance

competitiveness.[140] Translating these objectives to the university setting does not require much alteration. In fact, university administrators are unlikely to complain about achieving any or all of these objectives. To be precise, however, a university's objectives must include university specific issues. Improving financial performance can take on many faces at the university. Financial performance can be boosted directly by funneling revenue into the school in the form of licensing fees, or similarly, by attracting more students and their tuition dollars. Indirectly, financial performance can be improved by decreasing the outlays required by the university, such as by attracting grants to fund research (so the university then does not need to fund as many projects). In a related vein, the university also wants to enhance competitiveness, which in the currency of universities includes prestige, which again lures more and better students, faculty, and funding. The first objective, strengthening a proprietary market advantage, does not have a precise analog with respect to the university. One way to think about this may be as strengthening the university's research advantages. This can include increasing grant and licensing revenue, permitting and promoting a wide variety of research, and attracting top talent in both the faculty and student ranks.

The question then becomes how the university can exploit its intellectual property assets to achieve these defined objectives. The grow-fix-sell triage proposed by *Rembrandts* can be easily adapted for use in a university setting.[141] At the outset, the university must audit (both initially and at regular intervals) its patent portfolio and determine what inventions and what technology sectors are suited for seeking potential licensees. This is difficult, to be sure, since the inventions will be from diverse sectors of technology with little rhyme or reason and no single product line to tie advances to. It will also be difficult because university technology transfer offices are unlikely to have sufficient skill or knowledge in each and every area in which inventions are being submitted. If this hurdle can be surmounted, using the proposal below for altering the makeup of the technology transfer office, the technology transfer office can then apply the grow-fix-sell triage system, again with some modifications.

In the business setting, patents tagged for growth have been identified as being primed for development into new product lines or expansion into new markets.[142] These activities do not have a direct correlation in the university setting for two reasons. First, universities are frequently developing new inventions or product lines in a vast array of scientific areas, and so developing a new product line or expanding into new markets is not a terribly useful metric. Second, one of the major complaints against university patenting is the notion that it brings a level of commercialization that interferes with academic freedom.[143] To then target research to specifically develop a new product line would exacerbate this problem. At least initially in the university setting, the real growth should be increasing patent acquisition and encouraging relationships with potential licensees. The university should also focus on using its intellectual property assets to grow its academic capital and further its goals of education and research. However, as the sophistication level of the technology transfer

140. RIVETTE & KLEIN, *supra* note 14, at 64-65.

141. *Id.* at 124-36.

142. *Id.* at 68-77.

143. *See supra* text accompanying notes 45-48.

office increases, it can endeavor to focus more like a business and seek new product lines or markets for its inventions. The sticking point is that the technology transfer office will unlikely be in the position to have the requisite information. The structure proposed below addresses this issue.

In the business setting, patents are identified in the fix category if they fall within areas of slowing growth or in cluttered or eroding markets.[144] The business will need to see if the intended use for this patent can be "fixed"—can the patent somehow be relevant in the slower market? Because universities will likely be only in the licensing market (as opposed to making or manufacturing a product themselves), the fix category is not so relevant. However, to give this category relevance in the university setting, the fix category can be composed of patents for which licensing efforts have been made, but failed, and where these patents are viewed as having future licensing or other potential. Rather than simply releasing the invention to the public domain or otherwise failing to exploit the patent, the technology transfer office faced with this situation needs to think outside the box in search of other uses or applications for the technology, at least until the future licensing opportunities become a reality.

In the business setting, the sell patents are fairly self-explanatory. These are the patents that are no longer useful and have no perceivable value going forward.[145] The point is then simply to get the most economic or strategic value from the sale of the dying business.[146] Universities do not often (and in fact are usually bound not to) sell their intellectual property assets and must rely on licensing.[147] However, the identification of these patents in the sell category may indicate which patents need to be pruned from the active licensing set or which patents need not be maintained (as a maintenance fee is required at regular intervals to keep a patent in force). The difference between the fix patents, which have no licensees, and sell patents, which also have no licensees, is that the fix patents have some perceivable future value at the time of assessment. Looking at these sell patents, there is no ascertainable future use, no outside-the-box functions that render keeping the patent relevant. These patents should be sold or no longer maintained by the university.

In summary, in the grow mode, the technology transfer office needs to be concerned with connecting what is being done in the university with what is being done in industry. In fix mode, the technology transfer office needs to be concerned with the immediate issue of determining whether each particular patent asset has visible or imaginable value. If not, then the technology is demoted to the sell category. The biggest problem is that most, if not all, university technology transfer offices are not equipped to understand and analyze the trends of business and technology.[148] The next section provides a proposal to improve the technology transfer office's capability to handle these tasks.

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144. *Id.* at 77.

145. *Id.* at 81.

146. *Id.* at 133-36.

147. In particular, the Bayh-Dole Act only authorizes, and in fact encourages, licensing. 35 U.S.C. §§ 200, 202, 204 (2007). *See also*, Rebecca S. Eisenberg & Arti K. Rai, *Harnessing and Sharing the Benefits of State-Sponsored Research: Intellectual Property Rights and Data Sharing in California's Stem Cell Initiative,* 21 BERKELEY TECH. L.J. 1187, 1197 (2006).

148. *See* discussion *supra* Part II.C.

C. A Proposed Infrastructure and Structure

Ultimately, the key to implementing and executing the previously described patent management strategy is equipping the technology transfer office with the tools it needs to succeed. Part of this solution must come from within the office itself; it must be appropriately staffed to perform the required functions. However, because of the unique situation of the university and its diverse range of inventions, it is not feasible (or perhaps not even possible) for the technology transfer office to be responsible for all of the required knowledge. For example, to identify potential licensees or to determine whether a patent has an imaginable future value, a technology transfer office will need to be knowledgeable about the trends for research and commercialization in the field of an invention; however, with the myriad variety of inventions springing from university research, a technology transfer office simply cannot reasonably be charged with detailed knowledge of each sector. Thus, I suggest changes in the structure of the technology transfer office and further propose a new structure, outside the university, to facilitate the technology transfer office in implementing the above detailed patent management strategy.

Currently, most technology transfer offices are staffed by a few attorneys or possibly a few business people.[149] A few technology transfer offices are lucky enough to have some scientific expertise on staff.[150] The most fortunate offices may have a few of each of these types of employees. No matter what the combination of employees, it is nearly impossible for the technology transfer office to have sufficient understanding in each of the various research areas in which patents are being obtained to perform the necessary analytic tasks. Although the proposed structure described below—the University Patent Resource Center (UPRC)—goes a long way to solving this problem, the composition of the technology transfer office staff must be a primary consideration. I propose three main policies for staffing a technology transfer office to ensure that it is capable of performing the tasks described above: 1) each office must include at least one patent attorney on staff; 2) each office must include some significant portion of the staff that has scientific knowledge; and 3) each office must have at least one business person on staff.

First, there must be at least a patent attorney on the staff of the technology transfer office. Depending on the volume of inventions generated by the university and the number of attorneys employed by the technology transfer office, the lawyer can draft and prosecute patent applications at the Patent Office or can supervise the same activities performed by external law firms or law student interns (or some combination of the three). The attorney should also be responsible for at least reviewing, if not drafting, the patent licensing agreements. Finally, but certainly not least, the attorney must oversee the education of scientists at the university about important patent-related issues, such as submitting inventions disclosures, maintaining and corroborating

149. Of course, any smoothly functioning administrative office will have a sufficient number of support staff, such as secretaries or paralegals. I in no way diminish the importance of these types of employees by their omission; rather, I am trying to make a point with respect to the "professional" staffing of technology transfer offices.

150. *See supra* note 74.

research notebooks, and avoiding patent-barring activities related to presentations and publications.

Second, the technology transfer office must include a significant number of staff members with scientific knowledge. For this aspect, I propose using graduate students in a variety of specializations to serve semester or year-long terms as assistants to the technology transfer office, rather than as teaching assistants for that time period.[151] These graduate students will be better able to understand the science presented in the inventions and have some idea, based on their own knowledge and available reports on industry trends, how each invention might be utilized in industry and how the invention fits within the university's growing patent portfolio. The reason that graduate students are proposed to fill this task is manifold. First, these students are likely to be up to date in their knowledge of the cutting edge directions in their field. Second, by virtue of being scientists, the graduate assistants will have an ability to understand scientific inventions not immediately within their research areas, at least at a basic level. Third, these students, working as graduate assistants, can provide valuable work for reasonable compensation. Further, because the graduate students' salaries will be low, the technology transfer office will be able to employ a larger number of these students, thereby representing a greater number of technology areas present within the university. Finally, the exposure that the graduate assistants have to the technology transfer process early in their careers may indoctrinate them into the *new* academic mindset, where patenting is done as a matter of course, thereby changing the culture and relationships between science and patents.

Third, there needs to be at least one business person on staff at the technology transfer office. This person needs to understand typical industry analyses and reports, serve as a liaison and negotiator between the university and industry (and possibly between the technology transfer office and the university administration), and assist in developing strategic plans for intellectual property acquisition and exploitation. Moreover, this person, along with the attorneys and graduate assistants, will need to think outside the box with respect to the patents designated for growth or fixing. Because the business person will not need to be intimately familiar with the details of the science, this person will have a better view of the overall picture and can provide an industry level insight that may not be available from the scientists or attorneys.

Populating the university technology transfer office with persons having the skills necessary to enable the office to perform tasks indicated in the patent management strategy proposed above goes a long way toward fixing many of the barriers associated with entering the patent arena; nevertheless, a knowledge deficit that will hamper the ability of the technology transfer office to succeed remains. For this reason, I suggest supplementing the redesigned technology transfer offices with an entity, or structure, that is independent of the university but works in conjunction with it. The entity will provide a number of advantages for the university, including creating and fostering

151. Some universities have implemented some aspects of this model. See, for example, the University of Virginia Patent Foundation's graduate student internship program. More information is available at http://www.uvapf.org/index.cfm/fuseaction/viewpage/page_id/106?CFID=1302319&CFTOKEN=17624305& (last visited Feb. 16, 2007).

relationships between industry and business and providing information to the university in the form of analysis of industry, research, and patenting trends.[152]

The UPRC will be charged with first creating and maintaining a database of all university patents. The database will be available online, for a fee, to universities and industry. However, the UPRC will not simply function as a database administrator or aggregator. The UPRC will also provide reports and analyses to universities based on data available to, or gathered by, the UPRC, such as information about patenting trends or development directions in academia or industry. Different types of organizations will have different access rights to the database, as well as to the value-added information, such as the trend reports.

Rather than viewing the system as a simple database, a more apt analogy might be a high-level nanny-matching system. In a database model, a nanny-matching system may simply allow users to access a list of nannies looking for work or possibly search the list based on desired criteria. However, a high-level nanny-matching system would provide additional functions beyond just a database. For example, the high-level nanny-matching system may provide additional information, such as the results of background checks, as well as additional related services, such as paying employment taxes on the family's behalf. The system can also provide additional information, education, and services for the nanny, such as providing first aid training. Furthermore, the high-level nanny-matching system may take advantage of the data contained in its database to provide additional data. For example, the system can provide information to aspiring nannies in the form of trends for hiring—e.g., perhaps the trend in the Northeast United States is toward hiring nannies, while the Midwest market for nannies is cooling off, or maybe the trend is toward hiring nannies that have college degrees or speak multiple languages. The monetary exchange for this system may permit nannies, as the resource-poor party, to insert their data into the database for free or for a nominal cost. The seeking family, as the resource-rich party, will be charged either a flat fee to search the database of willing nannies and/or may be charged a royalty-type amount, such as a finder's fee in the amount of two times the nanny's weekly salary, upon hiring the nanny. Another feature is that different users may have different access to the database. Members of the general public may have limited capabilities to search the database, for example, limited to seeing a truncated listing of families seeking nannies and aspiring nannies. Nannies that have paid a nominal fee may have greater access to view information about families seeking nannies. Similarly, families seeking nannies that have paid a fee may be able to get full details on each of the potential employees as well as access to the additional services described.

I propose that the UPRC be a university patent database having similar value-added, multi-user-level characteristics to the high-level nanny-matching system described above. For a nominal fee, the university would be encouraged (or required)

152. Although this entity shares some resemblance to Ritchie de Larena's proposal, detailed above, the value of this proposal is that it does not merely suggest an aggregator or matchmaker between industry and academia, but instead provides the valuable information that technology transfer offices do not have ready access to. Ritchie de Larena's proposal also addresses the underreporting of patenting by universities under the Bayh-Dole Act—a worthy goal, but one not relevant to this paper.

to list its patents with the UPRC and in return would be permitted to access the database to search for other university research in similar areas. This capability will provide the technology transfer office with the ability to do simple patent searching to assist with making decisions about filing patent applications on new inventions. In fact, depending on how sophisticated the UPRC becomes, it may even offer the service of patent searching to universities for an additional fee. Also, with respect to the university, the UPRC will provide reports and analyses about trends in patenting by universities, as well as trends in industry and research. This information will help the technology transfer office have sufficient knowledge to identify potential partners or licensees in industry, as well as data to assist with performing the grow-fix-sell triage as modified above. For industry, the database of university patents would also be available for a cost. Access to the database will permit a business to, in one location, be able to identify universities holding patents available for licensing. Other future directions for the UPRC may include creating citation networks to identify important patents and tracking royalty rates and other industry metrics.

Between the reorganization of the technology transfer office and the creation of the UPRC, the university technology transfer office should be sufficiently equipped to perform the required tasks to effectively execute a patent management strategy. If the office can get to this stage, where it is regularly, efficiently, and effectively exploiting its patent assets, the result should be decreased obstacles to research, the ultimate goal of this proposal.

D. How Does this Proposal Address the Concerns?

The two obstacles to university research are lack of funding and lack of access. At its best, revenue from patent licensing will generate funding, alleviating the funding obstacle, which can then be used to bring about improved access, alleviating the access obstacle. However, university patents cause concerns in their own right—the fear that patenting of foundational research will prohibit innovation and that academic freedom is lost in the growing commercialization of university research. My proposal for equipping the university technology transfer office with the appropriate staffing and the data necessary to implement and execute a patent management strategy addresses these obstacles and other concerns on a number of levels. On a superficial level, any strategic plan for intellectual property revenue is going to increase the probability of receiving a revenue stream because efforts to license become active, rather than passive. The key to licensing—finding the right partner—will be aided by the revamped technology transfer office staff, as well as by the data and analysis provided by the UPRC. As noted above, any increase in licensing revenue will decrease the university's lack of funding, because the cost of licensing is minimal.

With respect to access, the UPRC will provide vital information about who has rights in various technologies and materials required by the university to forward its research agenda. By lowering the transaction costs of identifying parties holding relevant intellectual property rights, the university will be able to seek licenses, where necessary, to permit its research to go forward. Ideally, instead of cash licenses, universities will cross-license their research to each other. The UPRC also provides the university with data to engage in discussions with members of industry that would enhance the collaborative partnership and encourage innovation.

V. CONCLUSION

Although the prevailing wisdom is that university patenting is bad, I argue that if done correctly, it can actually be a boon to university research. The main obstacles to research are lack of funding and lack of access. Instead of eschewing patents on institutional research, the university must patent strategically, like a business, and then exploit those patents. In doing so, the university should be able to generate revenue, which alleviates both the funding and the access problems. Further, by building a portfolio of patents, the university can mitigate the access problems associated with patents held by others via cross-licensing opportunities.

Universities are not strategically pursuing or exploiting their patent rights. In fact, many universities do not even have an intellectual property management strategy. The first step in creating a plan is to determine what to patent. Next, the university needs to determine how to best exploit their assets. By adopting the grow-fix-sell triage of businesses to meet the peculiar needs of universities, I believe that universities can in fact function like businesses.

University technology transfer offices, however, are not equipped to behave like a business at this point. I argue that two changes can improve the situation. First, the technology transfer office needs to be appropriately staffed, which requires the employment of at least an attorney and a business person. I further argue that the use of graduate students as scientific assistants in the technology transfer office provides benefits to the office, in terms of science-knowledgeable employees, as well as to the graduate assistant, in terms of being exposed to the patent system and its benefits at an early stage in his career. Second, an entity, the UPRC, needs to be established to serve as a university patent database and, more importantly, a provider of data reports and analyses. This information will help the technology transfer office to make an informed decision, based on knowledge of the trends and directions of industry and research—information that businesses, by virtue of being "in business," have readily available.