Fordham Law Review

Volume 77 | Issue 5 Article 7

2009

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Cover Page Footnote

Acting Professor of Law, U.C. Davis School of Law. I would like to thank Professors Brett Frischmann, Jay Kesan, and Katherine Strandburg for organizing this Symposium and for graciously inviting me to contribute. I am grateful to all of the Symposium participants for their thoughtful insights and valuable comments on earlier drafts of this essay. I wish to extend special thanks to Keith Aoki and Bhaven Sampat for their critical commentary and encouragement.

INTERFACE: THE PUSH AND PULL OF PATENTS

*Peter Lee**

INTRODUCTION

The title of this Symposium, *When Worlds Collide: Intellectual Property at the Interface Between Systems of Knowledge Creation*, captures an essential feature of university patenting. University patents mediate the intersection of two worlds—academics and industry—that differ substantially in structure, motivation, and purpose. Notwithstanding their constitutional and cultural differences, academics and industry play vital roles in technological development, and patents play a vital role in facilitating exchange between them. Greater engagement between academics and industry, however, may have certain deleterious consequences. As several of the Symposium contributions reveal, university patenting raises deep concerns over the increasing commercialization of academic science. This essay first explores these concerns and then identifies a subtle but powerful countervailing dynamic. Highlighting the concept of "interface," this essay emphasizes that patents facilitate bidirectional normative exchange between universities and industry. While university patenting may accelerate the commercialization of academic science, it also creates opportunities for academic institutions to project their unique normative commitments into the marketplace.

This essay explores these issues through the lens of three Symposium pieces dealing with university research and commercial science. Part I presents a brief overview of these contributions. Drawing from economic theory, empirical methods, and norms analysis, Professors Brett Frischmann, Jay Kesan, and Katherine Strandburg artfully explore the structural, institutional, and communal implications of commercial encroachments into academic research. While varied in their perspectives, these contributions articulate related concerns over the potential for profit motives and financial considerations to compromise the traditional structure and objectives of university research.

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Part II extends and complements these observations by focusing on patents as bidirectional "interfaces." While commercial interests exert a "pull" on universities, patents also provide a vehicle by which universities may proactively "push" their institutional norms and policy objectives into the private sector and wider society. This essay builds on insights from each Symposium contribution to reveal that universities are using patents to advance nonmarket interests in the context of technology transfer.

Part III addresses deeper normative questions raised by the push and pull of patents. For example, is it truly problematic for universities to orient themselves toward "applied" rather than "basic" research?[1] What is the proper role of universities in advancing social and distributive ends through technology transfer practices? Without providing conclusive answers, I simply suggest that any response is likely to be multifaceted and must take into account the unique backgrounds and missions of particular universities.

I. THE INCREASING COMMERCIALIZATION OF UNIVERSITY RESEARCH

In *The Pull of Patents*, Professor Frischmann explores an underappreciated structural (perhaps infrastructural) implication of increased university patenting.[2] Such patenting has attracted a wide range of academic commentary—much of it critical.[3] In the most immediate sense, university patents may inhibit access to foundational research resources, thus impeding scientific and technological progress.[4] More fundamentally, such patenting may accelerate the erosion of highly productive academic norms that have traditionally emphasized freely sharing research results.[5] Toward the most fundamental end of the

1. As I argue later, the distinction between basic and applied research can be quite blurry, particularly in "Pasteur's Quadrant." DONALD E. STOKES, PASTEUR'S QUADRANT: BASIC SCIENCE AND TECHNOLOGICAL INNOVATION (1997); Francis Narin et al., *The Increasing Linkage Between U.S. Technology and Public Science*, 26 RES. POL'Y 317, 317 (1997); Richard R. Nelson, *The Market Economy, and the Scientific Commons*, 33 RES. POL'Y 455, 457 (2004); *see also infra* note 46 and accompanying text.

2. Brett M. Frischmann, *The Pull of Patents*, 77 FORDHAM L. REV. 2143 (2009).

3. *See, e.g.*, David Blumenthal et al., *Participation of Life-Science Faculty in Research Relationships with Industry*, 335 NEW ENG. J. MED. 1734, 1738 (1996) (addressing decreases in academic productivity); Risa L. Lieberwitz, *The Marketing of Higher Education: The Price of the University's Soul*, 89 CORNELL L. REV. 763, 793–98 (2004) (reviewing DEREK BOK, UNIVERSITIES IN THE MARKETPLACE: THE COMMERCIALIZATION OF HIGHER EDUCATION (2003)) (addressing weakening of academic freedom); Eyal Press & Jennifer Washburn, *The Kept University*, ATLANTIC MONTHLY, Mar. 2000, at 39 (addressing changes in university research agendas). *See generally* BOK, *supra*; JENNIFER WASHBURN, UNIVERSITY, INC.: THE CORPORATE CORRUPTION OF AMERICAN HIGHER EDUCATION (2005).

4. *See generally* Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698 (1998) (observing that a proliferation of exclusive rights may lead to wasteful underutilization of protected resources).

5. *See* Rebecca S. Eisenberg, *Proprietary Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177, 225 (1987) (describing academic norms discouraging exclusive rights in research discoveries). *See generally* ROBERT K. MERTON, THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS 273–75 (1973)

spectrum, Professor Frischmann explores how patenting may alter the internal structure and resource allocation of universities themselves. Drawing from earlier work on commons and infrastructure,[6] Professor Frischmann argues that the demand-side pull of patents may lead universities to favor research pathways that generate appropriable (i.e., patentable) results. This may fundamentally skew university infrastructure toward applied, readily commercialized research at the expense of basic research that generates greater long-term spillovers.[7]

Professor Kesan provides some empirical corroboration for Professor Frischmann's concerns. In *Transferring Innovation*, Professor Kesan first presents a history of university technology transfer policy as well as an overview of current controversies arising from increased university-industry relations.[8] He then engages in the difficult work of quantifying the performance of university technology transfer offices. Analyzing survey data from the Association of University Technology Managers, he concludes that revenue maximization constitutes the overriding focus of most university technology transfer activities. Accordingly, universities are likely to underutilize alternative mechanisms of technology transfer—such as forming start-up companies—that may not generate direct revenues. Professor Kesan's findings are sobering, and he concludes with a prescriptive call for universities to adopt technology transfer strategies that maximize knowledge dissemination rather than profits.

In *User Innovator Community Norms: At the Boundary Between Academic and Industry Research*, Professor Strandburg explores strategies for maintaining access to research tools[9]—technological inputs to scientific experimentation—in areas where basic and applied research overlap.[10] She extends earlier work on user innovation[11] to consider the powerful role that nonmarket incentives and sharing norms play in generating and disseminating research tools. She introduces several distinctions that vastly clarify current policy debates. First, she distinguishes between "dual-purpose" research tools, which are both basic research aids as well as direct subjects of commercial exploitation, and "garden variety" research tools, which only facilitate basic research.[12] While commercial exploitation and

(describing traditional scientific norms of universalism, communism, disinterestedness, and organized skepticism).

6. Brett M. Frischmann, *An Economic Theory of Infrastructure and Commons Management*, 89 MINN. L. REV. 917, 956 (2005).

7. *See* Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257 (2007).

8. Jay P. Kesan, *Transferring Innovation*, 77 FORDHAM L. REV. 2169 (2009).

9. "Research tool" is a term that resists simple and consistent definition. *See* Katherine J. Strandburg, *User Innovator Community Norms: At the Boundary Between Academic and Industry Research*, 77 FORDHAM L. REV. 2237, 2248 (2009).

10. *Id.* (noting, for example, that genetic assays, chemicals, and imaging techniques may have both research and commercial uses).

11. *See generally* Katherine J. Strandburg, *Users as Innovators: Implications for Patent Doctrine*, 79 U. COLO. L. REV. 467 (2008).

12. Strandburg, *supra* note 9, at 2266, 2271–74.

patenting will likely lead to disclosure of the former, private firms have incentives to practice the latter in secret. Second, she distinguishes between "do-it-yourself" research tools and tools comprising tangible materials. Whereas publication may be adequate for disseminating "do-it-yourself" research tools, sharing tangible materials generally entails much greater effort and expense. Finally, she distinguishes between academic and industrial scientists, who often differ substantially in their sharing costs and preferences. Among other policy recommendations, Professor Strandburg proposes codifying a research use exception to ensure sharing of "do-it-yourself" research tools.[13] She also proposes lowering sharing costs through utilizing centralized deposits, differential licensing of dual-purpose research tools for academic and commercial use, and standardized material transfer agreements.[14]

A common concern running through these contributions is that commercial interests are increasingly influencing university research and patenting.[15] Professor Kesan finds that most offices of technology transfer are oriented toward maximizing licensing income, even at the expense of other modes of technology transfer that may better promote commercialization of university inventions. Professor Frischmann cautions that increasing academic patenting, fueled by profit motives, may fundamentally alter university infrastructure and research agendas. Professor Strandburg recognizes that certain parties have strong incentives to patent research tools, and she provides creative solutions for maintaining the availability of such tools for academic research.

As several of the contributions recognize, however, there are mitigating forces at work. For example, while private industry significantly pulls university research toward commercial ends, the most significant funder of university research—the federal government—has traditionally focused on basic rather than applied research.[16] Thus, the National Institutes of Health, which provides about $30 billion per year for biomedical research, largely funds fundamental biological investigations rather than research with immediate commercial application.[17] Additionally, Professor Kesan's observation that patent licensing by universities rarely generates significant revenues would seem to challenge the notion that profit motives unduly influence research agendas.[18] However, today's state of affairs need not persist tomorrow. In a world of declining public support for university

13. *Id.* at 2266–67.

14. *Id.* at 2268.

15. For a related criticism, see Mark A. Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611 (2008).

16. *See* Frischmann, *supra* note 2, at 2146; Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663, 1726 (1996).

17. NAT'L INSTS. OF HEALTH, REPORT TO CONGRESS ON AFFORDABILITY OF INVENTIONS AND PRODUCTS 3 (2004).

18. Kesan, *supra* note 8, at 2181–84, 2188–89; *see* Jerry G. Thursby & Marie C. Thursby, *University Licensing and the Bayh-Dole Act*, 301 SCIENCE 1052, 1052 (2003).

research and increased university-industry partnerships,[19] Professor Frischmann's concerns over the pull of patents assume heightened urgency. Furthermore, as Professor Strandburg observes, fundamental research and commercial application increasingly overlap in several technical fields,[20] suggesting that interactions between university scientists and private firms have become the norm. Given these developments, the pull of patents and commercial interests on universities will in all likelihood increase.

II. THE PUSH OF PATENTS

The notion of "interface," however, suggests that university-industry relations represent a two-way street. While patents, and the profits they enable, clearly influence universities, patents also provide a vehicle for universities to project their unique norms and objectives into the marketplace.

The role of patents in pushing academic norms into the commercial sphere is evident in an area that all three Symposium contributions address: patenting of biomedical research tools. As noted, university and industry patents on research tools—technological inputs to scientific experimentation—may potentially inhibit basic research.[21] While a de facto experimental use exception prevents many patentees from suing academic researchers for infringement,[22] universities are taking matters into their own hands to prevent patent-enabled research holdup. In some cases, universities are choosing to forgo patenting what Professor Strandburg characterizes as "garden variety" research tools, which only serve as research aids and are not subjects of commercial exploitation.[23] As one example, universities are conscientiously choosing not to patent DNA sequences that only serve as markers.[24] Thus in a "negative" fashion, universities are advancing the norm of open science[25] by refraining from patenting certain foundational research tools and thereby ensuring their wide availability in the public domain.

Even when universities decide to patent a resource, they are pushing their commitment to robust scientific research through their licensing policies. First, universities are vastly enhancing the availability of research technologies through nonexclusive licensing. As Professor Kesan describes, Stanford University and the University of California, San

19. *See, e.g.*, Kesan, *supra* note 8, at 2190 (describing the U.C. Berkeley partnership with Novartis).

20. Strandburg, *supra* note 9, at 2251.

21. *See generally* Heller & Eisenberg, *supra* note 4.

22. *See* Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, LAW & CONTEMP. PROBS., Winter/Spring 2003, at 289, 296; Strandburg, *supra* note 9, at 2256; *see also* John P. Walsh et al., *Effects of Research Tool Patents and Licensing on Biomedical Innovation*, *in* PATENTS IN THE KNOWLEDGE-BASED ECONOMY 285, 324–28 (Wesley M. Cohen & Stephen A. Merrill eds., 2003).

23. Strandburg, *supra* note 9. at 2266–67.

24. Lori Pressman et al., *The Licensing of DNA Patents by US Academic Institutions: An Empirical Survey*, 24 NATURE BIOTECH. 31, 33–34 (2006).

25. *See* Rai & Eisenberg, *supra* note 22, at 289.

Francisco, nonexclusively licensed the Cohen-Boyer patents covering recombinant DNA technology, thus facilitating widespread adoption of this basic research tool.[26] As this example illustrates, nonexclusive licensing is particularly appropriate for "upstream," infrastructural resources that facilitate myriad "downstream" applications.[27] Furthermore, as in the case of recombinant DNA technology, the decision by Stanford and UCSF to grant *royalty-free* nonexclusive licenses for academic research facilitated even higher adoption rates.[28] This method of use-based price discrimination—charging higher fees for commercial rather than academic use—conceptually parallels the de facto and statutory experimental use exceptions that Professor Strandburg advocates.[29]

Second, even within the context of exclusive licenses, universities are advancing the norm of open science. In exclusive (and nonexclusive) licenses, universities are ensuring that patented university inventions remain widely available for noncommercial research purposes. For example, as Professors Frischmann and Strandburg note, a consortium led by Stanford University recently recommended that universities differentiate between licensing patented research tools for *use* as opposed to *sale*.[30] In this manner, academic researchers may continue to *use* dual-purpose research tools in their laboratories, but only an exclusive licensee may *sell* them as commercial products. Furthermore, it is becoming quite common for university offices of technology transfer to reserve research rights for themselves and other nonprofit institutions for inventions licensed to the private sector.[31] Thus, even when a private firm has exclusively licensed a university patent, it may not sue unlicensed scientists who infringe that patent in the course of conducting noncommercial research. These contractual mechanisms provide a legal backbone to the "ignore patents" norm already prevalent among university researchers and establish a limited, "private law" experimental use exception.

In addition to advancing the norm of open science, universities are also using patents to push other nonmarket objectives. For example, universities are leveraging their patents on essential medicines to enhance the availability of these technologies to underserved communities. This development has been most visible in the context of university patents on

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26. Kesan, *supra* note 8, at 2173–74.

27. *Id.* at 2196–97; *see also* Frischmann, *supra* note 6.

28. *See* Kesan, *supra* note 8, at 2202–03.

29. Strandburg, *supra* note 9.

30. Frischmann, *supra* note 2, at 2166; Strandburg, *supra* note 9, at 2267; *see also* ASS'N OF AM. MED. COLLS. ET AL., IN THE PUBLIC INTEREST: NINE POINTS TO CONSIDER IN LICENSING UNIVERSITY TECHNOLOGY 3 (2007), *available at* http://news-service.stanford.edu/news/2007/march7/ gifs/whitepaper.pdf.

31. *See* Pressman et al., *supra* note 24, at 35; *see, e.g.*, Board of Trs. of the Stanford Leland Junior Univ., Exclusive Agreement 2 (n.d), *available at* http://otl.stanford.edu/industry/resources/exclusive.pdf.; Harvard University Office of Technology Development, Licensing Harvard Patent Rights: A Guideline to the Essentials of Harvard's License Agreements, http://www.techtransfer.harvard.edu/resources/guidelines/license/ (last visited Feb. 21, 2009).

AIDS medicines.[32] One well-documented case involves Yale University, which patented stavudine, a medicine used in antiretroviral combination therapy. Yale had exclusively licensed the patent to Bristol-Myers Squibb (BMS), which manufactured the medicine. With the urging of Médecins Sans Frontières, Yale and BMS entered into an agreement whereby they would permit the sale of generics in South Africa; additionally, BMS agreed to lower substantially the price for stavudine throughout sub-Saharan Africa for governments and nonprofit organizations, thus enhancing access to this essential resource.[33] Another example where universities are leveraging patents to promote public health arises in the context of the Public Intellectual Property Resource for Agriculture (PIPRA).[34] PIPRA is a consortium of over forty universities and research institutions that aggregates agricultural biotechnology patents and facilitates their exploitation in the developing world.[35] Such measures prevent patent holdup and reflect universities' commitment to use patents to advance public health, particularly in low-income countries.[36]

While Professor Kesan's observation that universities unduly privilege revenue maximization over commercialization is worrisome, some universities are structuring their licensing practices to actively promote commercialization. For example, universities are increasingly utilizing "diligence milestones" that require licensees to demonstrate tangible progress toward commercializing university-generated inventions.[37] These efforts preempt the threat that nonpracticing entities (sometimes referred to as patent trolls)[38] will license university intellectual property with no plans to actually produce commercial goods and services.

These considerations shed new light on the role of patents as interfaces between universities and industry. Professor Frischmann reminds us that universities are increasingly functioning as market actors.[39] This may clearly cause concern, but it also raises unique opportunities. While commercial interests and profit motives certainly exert a pull on universities, academic institutions may also utilize patents to push their unique norms into the marketplace. Universities, which control valuable intellectual property, maintain a significant degree of leverage vis-à-vis private industry, and they can utilize this leverage to drive particular policy

32. *See generally* Amy Kapczynski et al., *Addressing Global Health Inequities: An Open Licensing Approach for University Innovations*, 20 BERKELEY TECH. L.J. 1031 (2005).

33. *Id.* at 1034–37.

34. *See generally* Richard C. Atkinson et al., *Intellectual Property Rights: Public Sector Collaboration for Agricultural IP Management*, 301 SCIENCE 174 (2003).

35. *See* Keith Aoki, *"Free Seeds, Not Free Beer": Participatory Plant Breeding, Open Source Seeds, and Acknowledging User Innovation in Agriculture*, 77 FORDHAM L. REV. 2275 (2009).

36. *See generally* Anupam Chander & Madhavi Sunder, *Is Nozick Kicking Rawls's Ass? Intellectual Property and Social Justice*, 40 U.C. DAVIS L. REV. 563 (2007).

37. Pressman et al., *supra* note 24, at 38.

38. *See* eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 396 (2006) (Kennedy, J., concurring).

39. Frischmann, *supra* note 2, at 2147.

objectives. For example, a commercial firm may have to accept a noncommercial research exception as a condition of exclusively licensing valuable university technology. Furthermore, as Professor Strandburg suggests, university researchers may engage in a "tit-for-tat or market transactions with industry scientists seeking access to their research material innovations."[40] As Professor Frischmann observes, "[u]niversities remain in the driver's seat and may decide which road to take and at what speed."[41] While we consider the ways that commercial interests, via patents, may alter the internal structure and resource allocation of universities, it is also useful to consider how universities are using patents to help generate and distribute infrastructural resources throughout society at large.

III. NORMATIVE DIMENSIONS OF THE PUSH AND PULL OF PATENTS

We arrive, then, at another interface, or perhaps more accurately, a historical inflection point. While distinguishing historical epochs is always fraught with difficulty, one might plausibly contend that we are on the cusp of a new era in technology transfer policy. Drawing from Professor Kesan's timeline, during the "pre-Bayh-Dole" era, universities as a general matter did not aggressively pursue intellectual property rights. (There are, of course, exceptions; as Professor Kesan notes, the Wisconsin Alumni Research Foundation has had a long history of managing intellectual property since the 1940s.)[42] The passage of the Bayh-Dole Act in 1980[43] ushered in a second era characterized by vastly increased university licensing as well as concomitant rises in technology transfer offices, licensing revenues, and, most controversially, commercial influences on universities.[44] I would suggest that we may be on the verge of a third epoch, which I would characterize as "qualified Bayh-Dole." Universities still retain the right to patent taxpayer-funded inventions, but they do not exercise that right indiscriminately. In some cases, universities forbear patenting upstream research tools so as to enhance their widespread

40. Strandburg, *supra* note 9, at 2268.

41. Frischmann, *supra* note 2, at 2165.

42. Kesan, *supra* note 8, at 2171. *See generally* Charles Weiner, *Patenting and Academic Research: Historical Case Studies*, 12 SCI. TECH. & HUM. VALUES 50 (1987).

43. Bayh-Dole Act, Pub. L. No. 96-517, § 6(a), 94 Stat. 3018 (1980) (codified as amended at 35 U.S.C. §§ 200–211 (2000)).

44. As several scholars have noted, passage of the Bayh-Dole Act was not the only catalytic event that spurred greater university patenting. In 1980, the U.S. Supreme Court expansively construed patentable subject matter so as to include many products of the nascent biotechnology industry. Diamond v. Chakrabarty, 447 U.S. 303, 318 (1980). In addition, advances in molecular biology revealed a relatively clear path from "basic" discoveries to commercial products, thus enhancing opportunities for university patenting. Rebecca S. Eisenberg, *Patents and Data-Sharing in Public Science*, 15 INDUS. & CORP. CHANGE 1013, 1014 (2006). Indeed, David Mowery shows an increase in university patenting prior to the 1980 passage of Bayh-Dole. *See* David C. Mowery, *The Bayh-Dole Act and High-Technology Entrepreneurship in U.S. Universities: Chicken, Egg, or Something Else?*, *in* UNIVERSITY ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER: PROCESS, DESIGN, AND INTELLECTUAL PROPERTY 39, 44–48 (Gary D. Libecap ed., 2005).

availability. In other cases, universities are conscientiously crafting licenses, reserving research rights, and aggregating intellectual property to advance open science, public health, and commercialization objectives.

These developments raise a host of deeper normative questions concerning university technology transfer. First, what are the normative implications of the pull of patents? As Professor Rochelle Cooper Dreyfuss inquired in her comments on Professor Frischmann's piece, is it such a bad development for universities to configure themselves to produce outputs that are appropriable via market mechanisms?[45] This question is particularly relevant to research in "Pasteur's Quadrant," where basic inquiry and commercial applications frequently overlap.[46] Basic knowledge in fields such as metallurgy, chemical and electrical engineering, and computer science have often arisen from attempts to solve real-world problems.[47] In such fields, it is conceivable (though far from certain) that marshalling university research to generate applied technologies may also substantially advance "basic" science.

Second, what are the normative implications of the push of patents? These developments raise the question of whether and to what extent universities should promote particular policy objectives—such as maintaining a research commons or advancing distributive aims—in their technology transfer practices. This question is ultimately a component of a broader inquiry into the proper role of universities in society. Obviously, such a question is beyond the scope of this essay, and I attempt no comprehensive response. I simply hope to add to the discussion by suggesting a few points for consideration.

The three Symposium contributions considered here are bound by a number of themes, and a relatively subtle one is the theme of distinctions. As Professor Frischmann notes, the dynamics of industry pull may vary based on the particular research area implicated; computer science, biotechnology, and materials science may feel the pull of patents quite differently.[48] Furthermore, as Professor Strandburg aptly demonstrates, the appropriate policy response to access constraints on patented research tools may vary depending on the nature of the tool and the community seeking to share it.[49] Furthermore, distinctions between academic and commercial uses and attendant price discrimination are key to enabling optimal access to such resources. Professor Kesan analyzes aggregate data on university technology transfer, but he emphasizes that the "role, structure, and

45. Rochelle Cooper Dreyfuss, Pauline Newman Professor of Law, New York Univ. Sch. of Law, Remarks at Fordham Law Review Symposium: When Worlds Collide: Intellectual Property Laws at the Interface Between Systems of Knowledge Creation (Oct. 31, 2008); *see* Adam Jaffe et al., *Academic Science and Entrepreneurship: Dual Engines of Growth?*, 63 J. ECON. BEHAV. & ORG. 573, 573 (2007).

46. *See* STOKES, *supra* note 1 (noting that while biomedical research seeks to advance basic science, it is intrinsically aimed at facilitating practical applications).

47. *See* Nelson, *supra* note 1, at 459.

48. Frischmann, *supra* note 2, at 2145.

49. Strandburg, *supra* note 9, at 2271–74.

business model of university TTOs can vary significantly depending on the university and the academic discipline involved in the technology transfer activity that is taking place."[50] Indeed, individual universities approach technology transfer very differently. For example, the University of California and Columbia University have been particularly aggressive in seeking and asserting patent protection.[51] By contrast, owing to its unique institutional culture, Johns Hopkins University—a major recipient of research funds—has been reluctant to assert intellectual property rights on its discoveries.[52]

Drawing on this last observation, I join Professor Frischmann and others in emphasizing that determining a university's "proper" approach to technology transfer is a highly contextual inquiry.[53] Universities are far from homogenous; they arise from a wide range of histories, serve a large group of constituencies, and embody a broad set of aspirations. These factors can meaningfully inform a particular university's approach to the push and pull of patents. At the grossest level, the distinction between private and public universities may be salient. Relative to public universities, boards of trustees of private institutions may have greater flexibility to determine an intellectual property strategy unconstrained by obligations to taxpayers and state stakeholders. Additionally, elite private institutions that pride themselves on pursuing knowledge "for its own sake" may be particularly resistant to embracing an applied orientation.

At the other end of the spectrum, public universities arguably bear a more immediate obligation to the public that they serve. This sense of public obligation may cut both ways with respect to asserting proprietary rights on university discoveries. On the one hand, the "public" nature of these institutions may weigh toward ensuring that discoveries are freely available to all. On the other hand, university leadership may view licensing revenue as a legitimate means to offset taxpayer support and tuition increases.[54] Additionally, some universities may view closer collaborations with private firms as intrinsically related to their traditional mission to disseminate knowledge.[55] At the far end of the spectrum, many

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50. Kesan, *supra* note 8, at 2179.

51. *See* Eolas Techs. Inc. v. Microsoft Corp., 399 F.3d 1325 (Fed. Cir. 2005); Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559 (Fed. Cir. 1997); Bernard Wysocki, Jr., *College Try: Columbia's Pursuit of Patent Riches Angers Companies*, WALL ST. J., Dec. 21, 2004, at A1.

52. Gregory K. Sobolski et al., *Technology Licensing: Lessons from the US Experience*, 294 JAMA 3137, 3138 (2005).

53. *See* Fumio Kodama & Lewis M. Branscomb, *University Research as an Engine for Growth: How Realistic Is the Vision?*, *in* INDUSTRIALIZING KNOWLEDGE 3, 14 (Lewis M. Branscomb et al. eds., 1999); Frischmann, *supra* note 2, at 2165 ("I envision robust competition among universities operating on different models and pursuing different strategies, missions, and ideologies.").

54. Lemley, *supra* note 15, at 619–20.

55. Timothy L. Faley & Michael Sharer, *Technology Transfer and Innovation: Reexamining and Broadening the Perspective of the Transfer of Discoveries Resulting from Government-Sponsored Research*, 3 COMP. TECH. TRANSFER & SOC'Y 109, 114 (2005).

public universities are land-grant colleges.[56] Although the history and character of these institutions vary considerably,[57] their origins suggest a pragmatic orientation well-suited for serving "the industrial classes."

Of course, the past need not dictate the present or the future. It may be the case that, notwithstanding their histories, most modern universities operate quite similarly: they are teaching and research institutions that aim to serve the public interest but also strive to raise revenue through exploiting their intellectual property. Furthermore the "privatization" of public universities is a well-recognized phenomenon, such that the public-private distinction may soon have little analytical value. That being said, in the contemporary debate over the role of patents in technology transfer, some consideration of the unique backgrounds and aims of universities may be useful.[58]

CONCLUSION

The contributions to this Symposium demonstrate that commercial pressures can exert a powerful pull on universities, with significant implications for university infrastructure, income, and access to research resources. However, patents are interfaces that facilitate bidirectional exchange. Drawing on the insights of three Symposium contributions, I suggest that universities should recognize the powerful role that patents and technology transfer can play in pushing their institutional values into the marketplace. Universities, in a very real sense, are in the "driver's seat" and can marshal their assets to advance open science, public health, and commercialization of new technologies. Such decisions, moreover, should arise from a careful examination of a university's unique character, values, and constituencies. The colliding worlds examined at this Symposium refer not simply to monolithic "university" and "commercial" cultures, but to a multiplicity of worlds within these sectors that may strive toward a multiplicity of ends.

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56. *See* Morrill Act of 1862, ch. 130, § 4, 12 Stat. 504 (codified at 7 U.S.C. § 304 (2006)) (providing land grants to states for colleges "where the leading object shall be . . . to teach such branches of learning as are related to agriculture and the mechanic arts . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life"); Steven Brint, *Creating the Future: 'New Directions' in American Research Universities*, 43 MINERVA 23, 29 (2005).

57. *See generally* Vernon Carstensen, *A Century of the Land-Grant Colleges*, 33 J. HIGHER EDUC. 30 (1962) (providing a history of land-grant colleges).

58. This normative inquiry necessarily implicates an institutional one. While university leadership may espouse one intellectual policy, offices of technology transfer often practice another. Given Professor Jay Kesan's findings that offices of technology transfer focus primarily on maximizing revenues, university leadership should consider changing their incentive structures and performance metrics to ensure that these offices act consistently with centralized policy.