

RECTIFYING THE MISSING COSTS OF UNIVERSITY PATENT PRACTICES: ADDRESSING BAYH-DOLE CRITICISMS THROUGH FACULTY INVOLVEMENT[♦]

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INTRODUCTION

As an instrument of transferring technological discoveries from the university realm to the consuming public, the Patent and Trademark Law Amendment Act of 1980,¹ commonly called the Bayh-Dole Act (“Bayh-Dole”) after its primary legislative supporters, appears to have achieved tremendous success, measured by such rubrics as number of patents sought and issued and the

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¹ 35 U.S.C. §§ 200-212 (2006).

number of products successfully introduced to the market. Yet the central premise of Bayh-Dole—that making available to the public those products that arise out of scientific research achieves the greatest public benefit—overlooks other potential public interests. By creating a series of particular incentives, the Bayh-Dole Act may be stymieing certain kinds of basic research, blocking the flow of information in fields where open access is critical, and forcing non-commercial but important aspects of university patenting decisions out of the equation.

This Note explores how the structure of the Bayh-Dole Act may be causing these negative effects and suggests a way to correct them. Part II frames these problems as a reflection of a shift away from traditional university roles with respect to the progress of science, the purveyance of higher education, and social responsibility. Furthermore, it argues that the various Bayh-Dole criticisms considered can be understood as problems of benefits overlooked by university technology transfer offices (“TTOs”)—that is, by heavily favoring exclusive licensing agreements, TTOs often overlook the “missing” scientific, educational, and social costs of restricting access to an invention. Part III discusses from where a possible solution to these problems might come, and develops the suggestion that faculty involvement in the technology transfer decision-making process would restore the proper balance between the desire to maximize licensing revenue and traditional university values.² The final section, Part IV, comments on the details of faculty involvement in the patenting and licensing decision-making processes to best improve the Bayh-Dole system.

I. INTRODUCTION TO TECHNOLOGY TRANSFER AND THE BAYH-DOLE ACT

For all its promise of future returns and claims of incalculable value, scientific research comes with the same initial investment costs as any speculative venture. With the potential so high, it is no surprise that governments also get involved in the gamble of scientific progress. A newly discovered or developed technology, depending on the field, may be invaluable as a military tool, an

² This thesis was developed from suggestive comments by Jerry G. Thursby & Marie C. Thursby, *University Licensing and the Bayh-Dole Act*, 301 SCI. 1052, 1052 (2003) (finding evidence that “university licensing facilitates technology transfer with minimal effects on the research environment, but, . . . [f]urther study is needed, particularly as to whether faculty involvement in licensing complements or substitutes for open publication.”), and Mark Lemley, *Are Universities Patent Trolls?*, 18 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 611, 627 (2008) (“An important first step in [the process of having universities recognize the social impact of their patent policies] is to end the isolation of university technology transfer of licensing offices from the rest of the university.”).

environmental measurement technique, or a method of tracking the spread of infectious diseases; the possibilities are limited only by the bounds of science itself and the usefulness of these advancements to the state.

Notably, many scientific advancements are not directly useful to the state in its role as regulator, but are useful as being socially valuable. For example, what could a government do with a more efficient light bulb? It could install the new device in all its offices and incentivize its use elsewhere, but is that the maximum value that can be gained from such an invention?

The dominant theory for maximizing the value of government research funding, first articulated in the 1940s, is that the goal of its research funding should be “technology transfer.”³ Also called “commercialization,” technology transfer occurs when the research is transferred from the research institution to the market for public consumption in the form of useful ideas or products.⁴ The technology transfer theory does not, however, answer the question, “In whose hands will the vestiture of primary rights to inventions serve to transfer the inventive technology most quickly to the public for its use and benefit?”⁵

Prior to 1980, in the United States, there was no comprehensive or controlling federal policy for patenting inventions that arose out of federally-funded research;⁶ therefore there was no comprehensive policy on how the government would commercialize its research product. A growing general consensus, moreover, recognized that many patents built upon federally-funded research were not being effectively turned into marketable products and introduced into the stream of public commerce. One study in 1968 showed that inventions that were transferred from federal agencies to outside contractors were 10.7 times as likely as agency-held inventions to be used in publically available products or processes.⁷ In 1963, following a report by Science Advisor Jerome Weiser, President Kennedy issued a Policy Statement that attempted to bring agency practice into harmony.⁸ While some standardization occurred, the policy left the presumptive title to patents arising out of federally-funded research in the hands of

³ See VANNEVAR BUSH, OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT, SCIENCE – THE ENDLESS FRONTIER (1945), available at <http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm>.

⁴ *Id.*

⁵ Howard W. Bremer, *University Technology Transfer: Evolution and Revolution*, in COUNCIL ON GOV'T REL., 50TH ANNIVERSARY 1948-1998 - J. OF PAPERS 13, 22 (1998).

⁶ See *id.* at 17.

⁷ *Id.* (citing Harbridge House, Inc., *Government Patent Policy Study for the FCST Committee on Government Patent Policy*, Vol. II, Parts II and III (May 15, 1968)).

⁸ Memorandum for the Heads of Executive Departments and Agencies - Government Patent Policy, 28 Fed. Reg. 10, 943 (Oct. 12, 1963).

the agencies,⁹ giving them considerable leeway to decide how “title-oriented” they would be in practice.¹⁰

The problems continued until 1980, which is when Congress enacted the Bayh-Dole Act.¹¹ The most important provisions of the Bayh-Dole Act redirect responsibility for bringing inventions to the market from the funding agencies to the universities (and certain small businesses) that had been receiving much of the research funding, giving them the presumptive patent rights on inventions resulting from government-sponsored research as well as full rights to enter into licensing agreements with other entities.¹² The revenue generated by those licenses would likewise belong to the universities, with some amount required to go directly to the inventor.¹³

The purpose of Bayh-Dole is to provide an opportunity for both the university and the individual researcher by incentivizing (a) seeking funding opportunities from the federal government, (b) patenting the resultant inventions, and (c) licensing those inventions to private firms with the best chance of bringing in the most royalties.¹⁴ These in turn tend to be the firms with the capital and capacity to develop inventions into commercializable products and then sell them on the market. Bayh-Dole encourages universities to seek out those with the resources to bring these new products to market, and does so without requiring the outlay of any more capital than the initial research funding.¹⁵ While the government no longer gets the potential benefits of licensing revenue under the Act, the pre-Bayh Dole dynamics of agency technology transfer proved that this incentive was insufficient to motivate agency commercialization, in part because the agencies’ reluctance to grant exclusive licenses made companies reluctant to invest in and develop new products.¹⁶

The impact of Bayh-Dole on patent and licensing activity is well-studied, if not entirely conclusive: the number of patents

⁹ *Id.*

¹⁰ Bremer, *supra* note 5, at 19.

¹¹ For background and review of the structure of the law and related regulations, see COUNCIL ON GOVERNMENTAL RELATIONS, THE BAYH-DOLE ACT: A GUIDE TO THE LAW AND IMPLEMENTING REGULATIONS (1999), available at http://www.cogr.edu/docs/Bayh_Dole.pdf.

¹² 35 U.S.C. § 202(a) (2006).

¹³ *See id.* § 202(c) (7) (B).

¹⁴ *See, e.g.*, Michael S. Mireles, *States as Innovation System Laboratories: California, Patents, and Stem Cell Technology*, 28 CARDOZO L. REV. 1133, 1142 (2006) (discussing the broad technology transfer incentives provided by the Bayh-Dole Act).

¹⁵ Bremer, *supra* note 5, at 26 (“What is truly remarkable too is that [the benefits generated by Bayh-Dole] have been realized and the Bayh-Dole Act has been administered without the necessity for congress [sic] to appropriate any of the taxpayers’ money for its operation.”).

¹⁶ COUNCIL ON GOVERNMENTAL REGULATIONS, *supra* note 11, at 2.

sought by universities has risen dramatically, as have the number of licensing agreements.¹⁷ There is some controversy, however, as to what extent these increases are attributable to Bayh-Dole, and how much was a progression of increased university patent activity that pre-dated Bayh-Dole.¹⁸ A running verdict as to the overall effectiveness of the Bayh-Dole scheme, however, is not the subject of the present Note.

II. CRITICISMS OF BAYH-DOLE

A. *Framing Bayh-Dole Criticisms as Miscalculations of the Costs of Restrictive Licensing Practices*

Congress gave up government patent rights to new inventions based upon the theory that the public benefit is normally best served through the development and commercialization of the inventive idea. The purpose section of the Bayh-Dole legislation notes a policy and objective “to promote the commercialization and public availability of inventions made in the United States by United State industry and labor”¹⁹ Perhaps the most obvious contention with that policy is that, in some instances, there may be other public interest reasons for the government to have control of the development and public dissemination of a given patent. For example, a vital drug may need to be made available without waiting for market forces to allow its entrance, or at a price much lower than the market would provide. Before embarking on an examination of various criticisms of Bayh-Dole, it is worthwhile to recognize that the bulk of them are based on improper evaluations of the costs of restricting access to the products of scientific research.

The source of these problems is university TTOs, which are the primary evaluators of the costs and benefits of various patenting and licensing decisions, but which have “strong institutional

¹⁷ Compare, e.g., ASSOCIATION OF UNIVERSITY TECHNOLOGY MANAGERS, U.S. LICENSING ACTIVITY SURVEY: FY 2007—SURVEY SUMMARY, 32, available at http://www.autm.net/AM/Template.cfm?Section=FY_2007_Licensing_Activity_Survey&Template=/CM/ContentDisplay.cfm&ContentID=2805 (reporting 3,622 patents issued to 194 university technology transfer offices (“TTOs”) survey respondents in 2007), with Lorelai Ritchie de Larena, *The Price of Progress: Are Universities Adding to the Cost?*, 43 HOUS. L. REV. 1373, 1412 (2007) (noting that there were 25 active TTOs when Bayh-Dole was passed), and Bernard Wysocki Jr., *College Try: Columbia’s Pursuit of Patent Riches Angers Companies*, WALL ST. J., Dec. 21, 2004, at A1 (reporting that, before 1980, universities obtained about 250 patents per year).

¹⁸ See, e.g., David Mowery & Bhaven Sampat, *The Bayh-Dole Act of 1980 and University-Industry Technology Transfer: A Model for Other OECD Governments?*, 30 J. TECH. TRANSFER 115, 119 (2005).

¹⁹ 35 U.S.C. § 200 (2006).

incentives to grant exclusive rather than non-exclusive licenses.”²⁰ In an article addressing the growing perception that universities are unsavory players in patent markets, Professor Mark Lemley of Stanford Law School outlines how these incentives favor exclusive licensing agreements:

First, exclusive licensing royalty rates are almost always higher than non-exclusive rates. That’s not surprising, since the licensee is getting more from an exclusive license than from a non-exclusive license. From the perspective of a technology transfer office focused on this quarter’s bottom line, that higher royalty rate is hard to turn down. Second, the companies with which they are negotiating often want exclusivity. They are especially likely to get it if the company in question is a faculty-organized startup. Finally, exclusive licensees often pay the cost of patent prosecution, a relatively small savings but an immediate one that impacts the technology transfer office’s bottom line.²¹

The result is that TTOs favor exclusive licenses, with unexpected ratios of exclusive to non-exclusive licensing agreements for certain technologies,²² and an overall perception from “people in a variety of industries . . . that universities are the new patent trolls.”²³

Congress itself recognized the possibility that calculations of public benefit might sometimes weigh against normal commercialization practices:

It is the policy and objective of the Congress . . . 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* . . . [and] to ensure that the Government obtains sufficient rights in federally supported inventions to meet the needs of the Government *and protect the public against nonuse and unreasonable use of inventions*²⁴

Congress therefore built two mechanisms into the Bayh-Dole Act that act as trapdoors, essentially allowing a funding agency to retake the patent rights from the university if an agency recognizes that something more important than public dissemination

²⁰ Lemley, *supra* note 2, at 616.

²¹ *Id.* at 616-17 (citations omitted).

²² See, e.g., Mark A. Lemley, *Patenting Nanotechnology*, 58 STAN. L. REV. 601, 627 (2005) (finding 95-100% of nanotechnology licenses were exclusive), Arti K. Rai & Rebecca S. Eisenberg, *The Public Domain: Bayh-Dole Reform and the Progress of Biomedicine*, 66 LAW & CONTEMP. PROBS. 289, 301 (2003) (discussing misguided decisions to grant exclusive rather than non-exclusive licenses on embryonic stem cells).

²³ Lemley, *supra* note 2, at 615.

²⁴ 35 U.S.C. § 200 (2006) (emphasis added).

through commercialization is at stake.²⁵ The first of these trapdoors, so-called “march-in rights,” are available to the funding agency on a finding that action is necessary to, among other reasons, “alleviate health or safety needs.”²⁶ March-in rights give the agency the right to force a funding recipient to grant a certain license or, upon refusal, power to grant such license itself.²⁷ Additionally, Congress allowed funding agencies to modify the granting of patent rights in a funding agreement “in exceptional circumstances when it is determined by the agency that restriction or elimination of the right to retain title to any subject invention will better promote the policy and objective of [the Bayh-Dole Act].”²⁸

But public health and safety are not the only public benefits that may be missed by blindly maximizing revenues through exclusively licensing. In particular, a number of criticisms of Bayh-Dole focus on particular public benefits dependant on a degree of open access to scholarly research, benefits that are improperly smoothed over by the importance placed on simply commercializing the research. Accordingly, one can think of these benefits as costs that are incurred when access to research is restricted. These are the costs arising from (the profusion of) exclusive licenses, costs that are “missing” from the standard revenue-driven evaluation.

B. *Bayh-Dole Shifts the Research Focus Away from Basic Science*

One criticism of the effect of the Bayh-Dole Act is that it discourages research in non-applied sciences, which is research that will not likely lead to an idea that is patentable, license-able, and commercializeable.²⁹ The opportunity to make money off an invention drives the university and the individual researcher to divert resources to those fields that are more likely to result in an invention that a firm will want to license.³⁰ These incentives are much like those motivating a commercial entity. This diversion comes at the expense of “basic” and non-applied scientific research, which tends to be oriented towards the theoretical. A shift of focus away from these kinds of basic research is significant in that developments in theoretical sciences are more likely to result

²⁵ The funding agency also retains a non-exclusive, nontransferable license to practice the invention. *Id.* § 202(c)(4).

²⁶ *Id.* § 203(a)(2).

²⁷ *See id.* § 203(a).

²⁸ *Id.* § 202(a)(ii).

²⁹ *See, e.g.,* Mireles, *supra* note 14, at 1168; Henderson et al., *Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965-1988*, 80 REV. ECON. & STAT. 119, 122 (1998).

³⁰ Mireles, *supra* note 14, at 1168.

in a major expansion of an applied field or even spark a “paradigm shift” and “scientific revolution.”³¹ These events occur when discrepancies in scientific models force scholars to reconceptualize the fundamental aspects of an entire field and even to uncover entirely new ones.³²

Revolutionary discoveries are significant to the Bayh-Dole discussion for two reasons. First, the uncovering of new fields or new perspectives on older science, may spawn the creation of not just new, but more advanced applications, as “[a] scientists’ world is qualitatively transformed as well as quantitatively enriched by fundamental novelties of either fact or theory.”³³ As the next revolutionary science is by its nature unknown and requires investigating the breakdown in the current paradigmatic models,³⁴ evaluating the potential of any given basic research work is difficult at best. Regardless, the upside associated with revolutionary scientific discoveries gives research in basic science significant value. Diverting resources and attention away from the types of scholarship most likely to bring about such revolutionary research—which are the types less likely to directly result in the development of applications under the current scientific frameworks—may actually negatively impact, over the long term, the rate at which new applications are turned out as well as the relative value of those applications.

Second, diverting attention from study of the basic sciences may also be seen as a digression from the traditional university value of seeking knowledge for its own sake. This argument is taken up in Section D, *infra*.

C. Bayh-Dole Increases Transaction Costs for Scientific Research and Creates Barriers to Further Research

Perhaps the most consistent criticism of the effect of Bayh-Dole on university research practices is that the use of exclusive licensing raises the transaction costs of research, which affects both current research efforts and the possibility of future development on previously discovered ideas. Increased transaction costs is particularly troubling for so-called “upstream” discoveries, which are generally characterized as ideas or inventions that enable more advanced research; these can be theoretical models, as described above, or physical research tools. “Downstream” scientists use

³¹ See THOMAS S. KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* (3d ed. 1996) (1962).

³² See *id.* at 6.

³³ *Id.* at 7.

³⁴ *Id.* at 17.

these fundamental tools to develop their own ideas and come up with inventions well beyond the simple scope of the tools themselves—just as a carpenter with an improved hammer can build a better house, a pharmacist with access to a better centrifuge can analyze DNA more quickly and discover a new cancer treatment. The key word in that example, however, is access: If the research tools have been exclusively licensed out to a commercial firm and have become too expensive to obtain for further research purposes, that cancer treatment might take longer to find or might be missed altogether.

The problem of blocking access to upstream patents is that “they give a single entity monopoly control of basic research discoveries that enable subsequent investigation across a broad scientific territory.”³⁵ Patents on research tools also raise transaction costs for further research, as they “hinder subsequent research by permitting owners to charge a premium for the use of discoveries that might otherwise be more cheaply available in a competitive market or in the public domain.”³⁶ Numerous overlapping patent rights on component technologies such as research tools may also pose additional transaction costs, creating a “patent thicket.”³⁷ Patent thickets can “discourage investment in research or distort the paths that researchers take due to the difficulty of identifying and negotiating all of the underlying rights necessary to begin researching.”³⁸ They can also precipitate the economic situation known as the “tragedy of the anticommons,” which arises when component resources are held by diverse parties, and no single resource holder would rationally allow use of its component when any one of the other resource holders can hold out on the licensee for a higher fee.³⁹

Problems with access to component tools for future research are compounded by the deterioration of the experimental use exception in *Madey v. Duke University*.⁴⁰ In that case, the Federal Circuit held that the experimental use exception, which had protected faculty from infringement suits when their purpose in using the patented material was for experimental or teaching purposes, was not available when an entity, such as a university, was engaged

³⁵ Rai & Eisenberg, *supra* note 22, at 296.

³⁶ *Id.* at 295.

³⁷ See Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698, 698 (1998); Rai & Eisenberg, *supra* note 22, at 297; Mireles, *supra* note 14, at 1163.

³⁸ Robin Feldman & Kris Nelson, *Open Source, Open Access, and Open Transfer: Market Approaches to Research Bottlenecks*, 7 NW. J. TECH. & INTELL. PROP. 14, 15 (2008).

³⁹ See Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998).

⁴⁰ 307 F.3d 1351 (Fed. Cir. 2002).

in commercial activity related to a legitimate business objective.⁴¹ These include “educating and enlightening students and faculty, as well as increasing the status of the university, luring lucrative research grants, and attracting faculty and students. This definition effectively eliminates any research exception for universities.”⁴² Without the easy access to research tools that was previously available, the burdens imposed by patents on upstream technology and other research components become much more salient.

The heavy reliance on exclusive licensing may actually reduce the available licensing revenue for some technologies, in fact. Industries such as information technology (“IT”) and software have shown that companies may be willing to invest in product development and marketing even without having exclusive access to the component technologies.⁴³ Commercialization can be encouraged without closing the doors on other potential developers, allowing multiple non-exclusive licenses to take the place of a single exclusive one.⁴⁴ While this may be less true in industries that require considerable investment in product development or where the process of bringing a patented idea to market takes a long post-invention development period,⁴⁵ whether exclusive or non-exclusive licenses are the answer may be an industry-specific question.⁴⁶

D. *Framing Bayh-Dole Criticisms as Movement Away from Traditional University Roles and Values*

The incentives created by Bayh-Dole favoring the exclusive licensing of research have arguably had an overall negative effect of the traditional role of the university as a “public” institution. The current patent practices of technology transfer offices appear to betray traditional university values and responsibilities, such as independence, the service of the public interest,⁴⁷ and “the pursuit of knowledge, and the education of the next generation”⁴⁸ As one scholar has stated the problem:

[The] [u]niversity technology transfer office ought to have as its goal maximizing the social impact of technology, not merely

⁴¹ *Id.* at 1362.

⁴² Feldman & Nelson, *supra* note 38, at 19-20.

⁴³ Lemley, *supra* note 2, at 624 (citations omitted).

⁴⁴ *Id.*

⁴⁵ *Id.* at 623.

⁴⁶ *See id.*

⁴⁷ *See generally* DONALD KENNEDY, *ACADEMIC DUTY* (1999) (discussing the responsibility of universities to the society that sponsors them).

⁴⁸ James J. Duderstadt, *Commercialization of the Academy: Seeking a Balance Between the Marketplace and Public Interest*, MILLENNIUM PROJECT PAPERS, Apr. 6, 2002, at 8, available at http://milproj.dc.umich.edu/publications/academy_comercialization/index.html.

maximizing the university's licensing revenue. A university is more than just a private for-profit entity. It is a public-regarding institution that should be advancing the development and spread of knowledge and the beneficial use of that knowledge. Sometimes those goals will coincide with the university's short-term financial interests Sometimes, but not always.⁴⁹

Others have noted the impact Bayh-Dole has had on the way universities view themselves with respect to the furthering of scientific knowledge generally. Growing corporatization of the university model leads to priorities that are "plainly incompatible with the disinterested pursuit of truth and with the norms of science [of] . . . universalism, communalism, disinterestedness and organized skepticism."⁵⁰ The result is "an institutional conflict of interest for the university between its public interest goals and the private economic interests that it has now adopted."⁵¹

In many ways, the problems outlined in the preceding sections are also components of the larger problem of universities turning away from their traditional responsibilities. For example, the shift from basic to applied sciences reflects a larger issue of shifting research priorities away from pursuit of knowledge for its own sake. While this traditional principle does not necessarily consider the applied sciences to be less value in this way than theoretical study, it does place at least equal importance on advancements in theoretical fields. Furthermore, when a paradigm shift occurs, and advances in research do not simply bring about new inventions but alter fundamental understandings of the natural world, there is a stronger argument for value in the knowledge itself. Valuing intellectual inquiry for its own sake is not simply a traditional value:

Even committed utilitarians should accept [that intellectual inquiry for its own sake is important] once they remember how much works of sheer intellect and scholarship can contribute over the long run. After all, in the perspective of centuries, it is not generals and presidents, nor the experts who advised them, but social critics, philosophers, and the purest of scientists who have left the most enduring mark on our civilization.⁵²

By placing a premium on applied scientific research, however,

⁴⁹ Lemley, *supra* note 2, at 625.

⁵⁰ G.R. Evans & D.E. Packham, *Ethical Issues at the University-Industry Interface: A Way Forward?*, 9 SCI. & ENGINEERING ETHICS 3, 8 (2003) (citing the four "norms of science" from R.K. MERTON, SOCIAL THEORY AND SOCIAL STRUCTURE, 606 (1968)).

⁵¹ Risa L. Leiberwitz, *Education Law: The Corporatization of Academic Research: Whose Interests Are Served?*, 38 AKRON L. REV. 759, 762-63 (2005).

⁵² DEREK BOK, UNIVERSITIES AND THE FUTURE OF AMERICA 9 (1990).

Bayh-Dole shifts away from the traditional focus on the pursuit of knowledge towards the pursuit of patentable and license-able ideas.

Another impact on these values caused by Bayh-Dole is the conflicts of interests that result from the corporatization of university research. Universities had been traditionally defined as “institution[s] with a public interest mission” celebrating both external independence—from outside financial interests—as well as internal independence, expressed in the “central role of faculty rights of academic freedom to [have] the autonomy and independence to define and control their work.”⁵³ By getting involved with companies that are willing to buy the results of faculty work, the universities have exposed themselves to conflicts of interests for themselves as well as for the individual researchers who may be pressured to produce results for which buyers are looking.⁵⁴ These conflicts “threaten to undermine the credibility of the academic enterprise as a neutral arbiter of scientific information and further erode the credibility of scientific research by prohibiting the replication of research.”⁵⁵

Such conflicts also hinder the traditional openness and spirit of collaboration that accompanied scientific progress. These values are necessary to “support the quality and integrity of the research and to support a faculty culture that values openness in research—sharing research methods and results in the public domain.”⁵⁶

There is also the traditional role of the university as a place of education, and Bayh-Dole has been criticized for its effect on how teachers teach and how students are able to participate in educational research. Faculty independence plays at least some role in this discussion; objectivity is just as important in education as it is in research. As noted above, the decline of the experimental use exception has made it nearly impossible for faculty to use patented material even for educational purposes.⁵⁷ But the presence of technology transfer policies can make it difficult for student inventors to retain control of their work, particularly graduate students.⁵⁸

Furthermore, the role of the university is not limited to advancing scientific knowledge. Even private institutes of higher

⁵³ Leiberwitz, *supra* note 51, at 760-61.

⁵⁴ *See id.* at 763.

⁵⁵ Mireles, *supra* note 14, at 1174.

⁵⁶ Leiberwitz, *supra* note 51, at 766.

⁵⁷ *See supra*, Part II.C.

⁵⁸ *See* Carmen J. McCutcheon, *Fairplay or Greed: Mandating University Responsibility Toward Student Inventors*, 2003 DUKE L. & TECH. REV. 26 (2003).

education that do not specifically place themselves within a particular cultural community (as opposed to schools that intentionally place themselves in certain communities, such as religious colleges) acknowledge the importance of social problems and their responsibility to engage public problems and interests.⁵⁹ One way in which they fulfill this responsibility is by promoting research in the social sciences, as well as supporting the cultural arts through both curricular offerings and extra-curricular activities and events. These efforts go beyond merely offering classes in a particular art form, however; universities are not just repositories for rich cultural histories but work within and for their great local populations:

The universities therefore have a cultural task, which is even more important than their educational task. It includes the overall view of experience and objectiveness, the equally important tasks of gaining knowledge and finding solutions, instruction on the immense ocean of ignorance in which, in all ages, the object of research appeared only as an island and not as a continent. In this sense, the universities are part of the 'moral culture' of a nation—'cosmopolitan local institutions'.⁶⁰

This traditional university responsibility to its social and cultural spheres of influence often manifests itself in both academic and non-academic ways; an example of the former might be a change in curriculum to reflect a changing approach to the study of gender, while the latter might entail direct involvement in or support for political movements led by non-university community members.

University patent activity, too, may have social or cultural re-

⁵⁹ See, e.g., New York University Office of Government and Community Affairs, City & Community Relations, <http://www.nyu.edu/ogca/city/> (last visited Sept. 28, 2009) ("New York University has had a tradition of being a 'private university in the public service.'"); Greetings from Stanford University President Hennessy, <http://stanford.edu/about/facts/> (last visited Sept. 28, 2009) (noting that the university's Founding Grant includes the mission to "promote the public welfare by exercising an influence on behalf of humanity and civilization."); Despite some narrowing language, religious schools also acknowledge duties to the public generally as well. See, e.g., Yeshiva University Mission Statement, <http://www.yu.edu/MissionStatement/index.aspx> (last visited Sept. 28, 2009) ("Our students learn and go forth, as both educated and ethical people, to share their special talents and wisdom with society. Our faculty's research, academic work and scholarly writing help bring wisdom to many of the most pressing social, political, medical, legal and human rights issues facing the world today."); University of Notre Dame Mission Statement, <http://nd.edu/aboutnd/mission-statement/> (last visited Sept. 28, 2009) ("The University seeks to cultivate in its students not only an appreciation for the great achievements of human beings, but also a disciplined sensibility to the poverty, injustice, and oppression that burden the lives of so many. The aim is to create a sense of human solidarity and concern for the common good that will bear fruit as learning becomes service to justice.").

⁶⁰ Wolfgang Frühwald, *Knowledge Culture or Knowledge Market? On the New Ideology of the University*, 33 PROSPECTS 103, 107 (2003).

percussions which could potentially undermine the argument for commercialization in a particular case. For example, in 2001, researchers at the University of Hawai'i obtained patents on three faculty-created cultivars of the taro plant. For many Native Hawaiians—and for others in the Hawai'i community who share such values—taro, or *kalo*, performs a sacred and essential role in their culture, history, and cosmology. In one traditional Hawaiian story,⁶¹ the taro plant is the sibling and provider of the first Hawaiians. After news of the taro patent was publicized, Native Hawaiian groups, students, faculty members, and others in the community “objected to [the school] ‘owning’ taro. They viewed it as tantamount to owing [sic] an ancestor.”⁶² In response, the university administrators decided to file a terminal disclaimer on all three cultivars.⁶³

The frequency of this kind of problem is not easy to determine. To an extent, one might expect that some of these social considerations are reflected in hiring patterns at a particular university and in the courses of research that faculty choose to pursue; for example, a “socially conservative” university may respond to its social responsibility by not hiring someone with a record of supporting certain types of stem cell research, and some faculty members at the University of Hawai'i might have chosen not to participate in research they knew to be sacred to others in the community. While it cannot be expected of either the university or a given researcher to anticipate the community's reaction in each instance, pre-research choices to embark on or avoid certain topics are more desirable than having to respond to public outcry after the fact.

III. NOT MISSING THE COSTS OF EXCLUSIVE LICENSING: GETTING FACULTY INVOLVED

As discussed,⁶⁴ the crux of the above criticisms is that universities are misevaluating the costs of exclusive licensing due to a disconnect between the incentives for exclusive licensing and the traditional mission of the university. As one scholar has stated the problem, “[t]he outstanding question is who makes the determination that a publicly funded patented invention does not need

⁶¹ See *Kalo Mo'olelo*, <http://ksdl.ksbe.edu/loi/moolelo-kalo.html> (last visited Sept. 28, 2009) for one version of this legend.

⁶² Q&A: *The Taro Plant Controversy*, 1 KAUNANA, Winter 2007, available at <http://www.kaunana.com/CurrentIssue/QATheTaroPatentControversy/tabid/93/Default.aspx>.

⁶³ *Id.*

⁶⁴ See *supra*, Part II.A.

exclusivity in order to invite commercialization, and how do they do it.”⁶⁵ The answer, then, is either to adjust the university decision-making process or to find a party in a better position to appreciate the factors missed by maximizing revenue-driven approaches—those that do not suffer from the institutional incentives affecting university TTOs that favor exclusive licensing. This Part addresses both options, and ultimately argues that faculty involvement is the best method of having an integrated evaluation of the costs of technology transfer.

A. *Other Parties Are No Better Than the Universities*

Some scholars have argued that the most obvious candidate to perform the function of making a proper evaluation of the social costs of patents arising out of federal agency funding is also in the best position to do so: the funding agency itself.⁶⁶ Although subject to budgetary constraints placed on them by Congress, the primary functions of federal agencies generally do not include raising adequate funds for their own continued existence, as universities must. In line with its legislative mandate, each agency could evaluate for itself whether it thinks the technology resulting from its research investment warranted open access, as opposed to restrictive licensing. In the biomedical field, the National Institutes of Health has taken some steps to limit restraints on closed scientific access, including adopting guidelines for research funding explicitly stating that:

The use of patent and exclusive licenses is not the only, nor in some cases the most appropriate, means of implementing the [Bayh-Dole] Act. Where the subject invention is useful primarily as a research tool, inappropriate licensing practices are likely to thwart rather than promote utilization, commercialization, and public availability of the invention.⁶⁷

However, under Bayh-Dole, the funding agencies have extremely narrow powers to interrupt the regular Bayh-Dole exclusive licensing practice, despite the contingencies built into the

⁶⁵ Ted Sabety, *Nanotechnology Innovation and the Patent Thicket: Which IP Policies Promote Growth?*, 15 ALB. L.J. SCI. & TECH. 477, 512 (2005).

⁶⁶ See Rai & Eisenberg, *supra* note 22, at 303 (“In the context of biomedical research, [the National Institutes of Health] may be the institution best suited for this task [of appreciating the tensions between widespread access and preservation of commercial incentives].”).

⁶⁷ Principles and Guidelines for Recipients of NIH Research Grants and Contract on Obtaining and Disseminating Biomedical Research Resources: Final Notice, 64 Fed. Reg. 72,090, 72,093 (Dep’t. of Health and Human Servs. Dec. 23, 1999), *cited in* Rai & Eisenberg, *supra* note 22, at 307.

statute.⁶⁸ March-in rights are “encumbered by a complex set of regulations, including provisions allowing for appeal of any decision to exercise such rights [that] could serve as a disincentive to use those rights.”⁶⁹ As such, federal agencies are zero out of three when it comes to asserting march-in rights.⁷⁰ Exceptional circumstances, as the term implies, are also rarely invoked and are designed to be difficult to claim. To reach the latter, an agency must justify its declaration of exceptional circumstances to the Secretary of Commerce⁷¹ and defend against challenges to its findings.⁷² Nor does their structure appear to make them good vehicles for allowing agencies to supplement the licensing cost-benefit analysis: an exceptional circumstances claim must be expressed in the funding agreement,⁷³ which is prepared *before* the research is conducted.

Some scholars have suggested that the agencies are still the best candidates to correct the TTO bias for exclusive licensing and that the Bayh-Dole Act should be amended to strengthen the march-in and exceptional circumstances option.⁷⁴ One response to this suggestion is that stronger agency trapdoor powers would simply signal a return to pre-Bayh-Dole conditions and that recognition of agencies’ ineffectiveness at handling patents was the very reason Congress stripped them of that control.⁷⁵ Further, it is not clear that agencies have “the institutional competence to make the decision of whether a particular invention will need further development”⁷⁶

As far as other options for third-party involvement, there seem to be few options other than the market (i.e., licensees), but it is difficult to imagine why licensees would not be subject to the same incentives to maximize profit that skew the licensing decisions made by universities. Nor is it clear what kinds of controls Congress or others could establish to correct those incentives and align licensees’ incentives with those of the public.

B. *Universities Can Be Fixed from the Inside by Involving Faculty*

This Note now turns to the universities themselves and suggests an answer to the question of how to bring about the institu-

⁶⁸ See *supra*, Part II.A

⁶⁹ Mireles, *supra* note 14, at 1155.

⁷⁰ *Id.* at 1155-56.

⁷¹ 35 U.S.C. § 202(b)(1) (2006).

⁷² *Id.* §§ 202(a)(ii), 202(b)(1).

⁷³ *Id.* § 202(a)(ii).

⁷⁴ Rai & Eisenberg, *supra* note 22, at 310.

⁷⁵ See Gary Pulsinelli, *Share and Share Alike: Increasing Access to Government-Funded Inventions Under the Bayh-Dole Act*, 7 MINN. J. L. SCI. & TECH. 393, 436-37 (2006).

⁷⁶ Mireles, *supra* note 14, at 1161 (citing Pulsinelli, *supra* note 75, at 437-40).

tional changes necessary to move TTO incentives away from favoring exclusive licensing and towards aims more in alignment with the university mission.

Before doing so, it is worthwhile to recognize that universities have the tools to address the criticisms discussed above, to safeguard against, e.g., causing barriers to scientific progress, shifting research objectives, and raising conflict of interests problems. These adjustments can all be accomplished by employing creative licensing techniques and making responsible patenting decisions.⁷⁷ For example, “a non-exclusive license, particularly on a basic enabling technology, will ultimately maximize the invention’s impact on society by allowing a large number of people to commercialize in different arenas, to try out different things and see if they work, and the like.”⁷⁸ In other instances, “[universities] might grant field-specific exclusivity, or exclusivity only for a limited term, or exclusivity only for commercial sales while exempting research”⁷⁹ Even further, “there are many circumstances in which the social impact of technology transfer is maximized either by the university not patenting at all or by granting licenses to those patents on a royalty-free basis to all comers.”⁸⁰ The key is that “universities must first recognize their proper role in society and how that role affects patent policies,” an important first step toward “end[ing] the isolation of university technology transfer or licensing offices from the rest of the university.”⁸¹

The solution to this problem is the university research faculty. They represent the one group that has a stake in all three “missing” costs (scientific, educational, and social) as well as the potential income generated by profitable licensing tactics. The remainder of this Part will explore how faculty are affected by each of these factors, and why they are best able to judge the relative values of each.

As the ones closest to the actual ground of technological and scientific research, faculty members are more intimately aware of the states of the fields in which they work than most anyone else. They will have a sense, at least, of what ideas promise expansive or revolutionary further work, and which are already close to marketability. This is important in terms of researchers’ ability to con-

⁷⁷ See Lemley, *supra* note 2, at 626; see also Geertrui Van Overwalle, *Reconciling Patent Policies with the University Mission*, 13 ETHICAL PERSPECTIVES 231 (2006) (suggesting that universities appoint an “ombudsperson for science” and use creative licensing practices) available at <http://www.kuleuven.be/ep/viewpic.php?LAN=E&TABLE=EP&ID=972>.

⁷⁸ Lemley, *supra* note 2, at 626.

⁷⁹ *Id.*

⁸⁰ *Id.* at 626-27 (noting the particular appropriateness of not patenting in the software context).

⁸¹ *Id.*

sider potential for both further scientific advances based on a given idea and for commercialization of that idea into a marketable product. Faculty researchers can evaluate these potentials in ways that other parties, who are further from the research, cannot. Researchers can also appreciate the potential reciprocity value to the progress of science in allowing access to their inventions for research purposes, which was the basis of the traditional pre-*Madey v. Duke* culture of open access to research.⁸²

On similar grounds, faculty can be expected to have a better idea of the educational potential of given research than other parties. They are the ones who had been teaching in the world before that research was performed and those discoveries announced, and they will be able to gauge how valuable the new ideas and inventions associated with that research will be in the classroom. Again reciprocity is a factor, as faculty teachers can re-establish the pre-*Madey v. Duke* culture without having to circumvent their own TTOs or risking infringement,⁸³ by insisting on creative licensing approaches to material that they know will be valuable teaching tools.

In terms of local social values, federal agencies and licensees are likely to be utterly out of tune with such values compared to members of the university itself. Faculty members participate in both inter- and intradepartmental meetings and events, interact with students, and often take on community service roles both in the university itself and the surrounding neighborhoods. While such familiarity with local values will not necessarily result in complete harmony with university practice—as values can be disputed or held to varying degrees of importance—it can be expected to ease some of the conflicts between the two and hopefully diffuse many situations before they arise.

Against the backdrop of these three values associated with patentable research, faculty would have to balance the potential income for the university from licensing. And again, faculty are in the best position for doing so. They will know, or at least have a sense of, the value such income would have for their department and future research. As they are familiar with the scientific and educational potentials of the present research, they will be able to consider whether the expected licensing revenue is worth incurring the costs of restrictive access. In cases where the discovered

⁸² See Feldman & Nelson, *supra* note 38, 19-20 (“Prior to the *Madey* decision, academic researchers routinely ignored patent rights in conducting their teaching and experiments.”).

⁸³ See Kara Moorcroft, *Scofflaw Science: Avoiding the Anticommons Through Ignorance*, 7 TUL. J. TECH. & INTELL. PROP. 71, 79-80 (2005) (discussing ways in which scientists have dealt with the research barriers erected by *Madey*).

ideas have recognizable, sizable, and potentially lucrative applications, and where the understanding is that the potential for further scientific development of those ideas is minimal, the faculty evaluation will favor patenting and exclusive licensing. By contrast, where the research presents apparent value as fundamental science and will likely open entire new fields of both theoretical and applied sciences, faculty will disfavor restricting access to that knowledge.

Another advantage of the faculty solution is availability. TTOs can involve faculty at any point in the patenting-licensing decision-making sequence with relative ease, whereas transaction costs for involvement of non-university parties (such as federal agencies) can be expected to be higher. The availability of frequent faculty input also gives faculty more opportunities to evaluate the potential costs and benefits of various patenting and licensing options. Although it may be arguable how well faculty can perfect predictions regarding the outcome of given research and the likelihood that an invention will be attractive to potential licensing partners,⁸⁴ faculty involvement is not limited to *ex ante* suggestions, and frequent input can reduce the need for guessing about an invention's future.

IV. COMMENTS AND CONCLUSION

A. Faculty Involvement Can Come in a Variety of Forms

The primary question unaddressed by the faculty involvement thesis is what form that involvement should take. TTO organizations vary with the university in which they operate,⁸⁵ although all are involved already in educating faculty about university policies regarding inventions and encouraging disclosures of inventions arising out of federally funded research.⁸⁶ But faculty input can come in a variety of forms, such as creating departmental representative positions on TTO management boards, requiring faculty conferences before certain key licensing decisions are made, or

⁸⁴ Cf. Pulsinelli, *supra* note 75, at 441 (questioning the ability of federal agencies to make these kinds of predictions at the time of drafting the funding agreement).

⁸⁵ See, for example, Donald S. Siegel, et al., *Assessing the Impact of Organizational Practices on the Relative Productivity of University Technology Transfer Offices: An Exploratory Study*, 32 RES. POL'Y 27 (2003) and Joseph Friedman & Jonathan Silberman, *University Technology Transfer: Do Incentives Management and Location Matter?*, 28 J. TECH. TRANSFER 17 (2003), for studies regarding the effect of various organizational options on the number of licenses and gross license income generated by TTOs.

⁸⁶ The standard grant contract between federal agencies and universities obligates the latter to "require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters . . . each subject invention made under contract . . ." 37 C.F.R. § 401.14(f)(2) (2009).

including faculty on hiring committees for TTO officers. At the least, any effort to involve faculty should serve to change the orientation of the TTO away from a purely profit-driven one and foster sensitivity to the various values and responsibilities discussed *supra*.⁸⁷

Because the advantages of involving faculty in evaluating licensing options depend on their familiarity with the underlying technical field, faculty involvement for a given invention should take place primarily within the department in which the invention was made. This ensures that no rivalry between departments for funding dollars influences the licensing decision-making process. However, other university stakeholders, such as those that represent particular local community interests, might also be given the opportunity to have some input into the discussion.

Faculty integration plans should also consider potential personal conflicts and conflicts of interest that may arise. Because Bayh-Dole requires that a percentage of the licensing fees go to the individual inventors, there is some risk of improper evaluation of a research product's suitability for patenting and licensing, which can be influential to the final decision, particularly in small departments. Removing the inventor from the decision-making process may not be possible in some cases, e.g., if all the members of the department are recorded inventors. Furthermore, obfuscating personal feelings may be present, both in the positive sense (as between faculty members who conspire to vote for exclusive licensing of each other's inventions) and the negative (e.g., as animosity between individuals). Freezing out potentially conflicted faculty can be difficult, particularly where such conflicts are unknown, and those that are frozen out might also be the most knowledgeable in the field. But although these concerns are impossible to avoid completely, being more inclusive of interested faculty would likely serve to dilute some of the conflicting interests, as well as act as additional sources of insight into the best use of the invention. Monitoring of the situation by the technology transfer officer and other involved individuals would also help in "weeding out" potential conflicts, as would transparency in the decision-making process.

The introduction of more people into the process will likely lead to more bureaucratic inefficiency in technology transfer decisions. To combat this, TTOs should educate faculty regarding the licensing options, not just disclosure requirements, and remind them how their licensing decisions can cause the scientific, educa-

⁸⁷ See *supra*, Part II.

tional, and social effects discussed *supra*. Intellectual property attorneys, already recognized as important factors in determining technology transfer success,⁸⁸ will also have to adjust their methods in serving the modified technology transfer motives.

Some universities have attempted to integrate creative licensing practices and reduce conflicts of interests without systematically including faculty in technology transfer decisions,⁸⁹ although the results have not yet been studied. Furthermore, it appears that these types of solutions—as well as this Note’s faculty involvement thesis—are entirely consistent with the structure of the Bayh-Dole Act, insofar as they do not affect the presumption of title in the university or discourage any and all attempts to commercialize. Rather, they simply take advantage of the leeway given to the universities in making licensing decisions. And the Bayh-Dole trapdoors remain, should an agency disagree with a licensing decision to the point of wanting to “march-in” and claim the rights for its own purposes since the availability of march-in and “exceptional circumstances” claims are unaffected by university licensing practices.

B. *No Need to Amend the Bayh-Dole Act*

It should be noted that the criticisms outlined above do not necessarily call for a legislative response, and that the faculty involvement approach does not require one. The criticisms of Bayh-Dole do not undercut the commercialization theory or refute the evidence that technology transfer has indeed increased since its passage. Further, the Bayh-Dole Act does not suffer from inefficiency in its overall structure or ambiguity in its language. Rather, it is simply a matter of assuring that those making decisions about what to do with the patent rights of a given invention are aware of all positive externalities. This can be accomplished on the university level without altering how Bayh-Dole functions.

Another advantage of avoiding Congressional involvement is that universities will be free to customize their faculty integration plans in a way that works with each one’s overall mission and struc-

⁸⁸ Siegel, *supra* note 85, at 30.

⁸⁹ See, e.g., Yale University Office of Cooperative Research, About Yale OCR, <http://www.yale.edu/ocr/about/index.html> (last visited Sept. 28, 2009) (“We use both financial and non-financial metrics to assess the value of an opportunity to society. Discoveries with high potential to improve the health or prosperity of the global community will be vigorously pursued irrespective of monetary gain to Yale.”); Stanford University Office of Technology Licensing, OTL and the Inventor: Roles in Technology Transfer, <http://otl.stanford.edu/inventors/resources/otlandinvent.html> (last visited Sept. 28, 2009) (“Thus, notwithstanding the financial interest of inventors, departments and schools in the outcome of licensing decisions, OTL makes decisions that, in the exercise of its professional judgment, best serve the efficient and effective transfer of the technology in conformance with our guidelines and policies.”).

ture. Particularly with matters that implicate a school's social mission, customization may be an integral factor in how well faculty are able to identify and preserve the benefits of research products that are overlooked. Each university has its own unique internal structure that should not have to be normalized in some way in order to allow faculty to influence patenting decisions. In addition, different universities may find it beneficial to integrate faculty differently to avoid personal conflicts and conflicts of interest.

Nor should universities need to be told to respect their traditional values. While Bayh-Dole has shifted universities away from their traditional goals by incentivizing profit-driven technology transfer policies, it is entirely within each school's power to resist these incentives.⁹⁰ At most, Congress could consider amending the purpose section of the Bayh-Dole Act stating that universities are free to consider factors other than the short-term goals of the commercialization theory when making patenting and licensing decisions. While not legally required for universities to go forward with faculty integration, such an amendment would serve as a reminder to those in decision-making positions that more than licensing revenue may be at stake.

CONCLUSION

Universities can correct the institutional incentives that lead to a lack of appreciation of the costs and benefits of licensing decisions by including faculty researchers in the decision-making process. Faculty have a direct stake in the traditional university values with regard to scientific progress, higher education, and social stewardship, and are often in the best position to evaluate the true costs and benefits of various patenting and licensing options. Furthermore, integrating faculty leaves intact most of the Bayh-Dole Act's incentives for the transfer of inventions brought about by government investment in scientific research to the public, save for situations in which the burden of such transfer on university values exceeds the university's pecuniary benefits.

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⁹⁰ See, e.g., text accompanying note 89, *supra*.

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