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## ARTICLES

### **BEYOND EINSTEIN AND EDISON: CLAIMING SPACE FOR NON-FACULTY INVENTORS IN TECHNOLOGY TRANSFER**

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#### ABSTRACT

The Bayh-Dole Act, often credited with the explosion of university technology transfer, requires universities to incentivize invention disclosure by sharing the royalties generated by licensing. Many scholars have debated the effectiveness of university implementation of this requirement, and indeed, the low rate of disclosure of inventions by academic researchers to the university is often a bottleneck in technology transfer process. Unfortunately, most discussions focusing on inventor compliance with Bayh-Dole requirements have explored faculty-inventor motivations. Similarly, many university intellectual property (IP) policies are drafted specifically toward incentivizing faculty-inventors to comply with invention disclosure requirements. However, in most cases, university inventions are joint products of a group of university members including not only faculty but also post-doctoral researchers or graduate students. This collaborative nature of scientific research seems to have been lost in the design of the technology transfer system.

This Article contrasts the motivations and pressures of faculty with those of other members of the university research community, explores the conflicts that arise when faculty and non-faculty members are co-inventors, and explains why better incentives directed at non-faculty inventors could increase disclosure compliance. Furthermore, the Article explores the ways in which current university IP policies fail to address the issues surrounding non-faculty inventors and thus fail to fully incentivize invention disclosure by that group of university inventors.

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## INTRODUCTION

The lone scientist, toiling away over a Bunsen burner at midnight or huddled in the corner of his garage with a few tools, has long held a place in the American psyche.<sup>1</sup> As tempting as this noble image is, the truth is often much more mundane. Scientists typically work in groups, with ideas flowing among members in an often unaccounted for manner, each idea building on the one before. Thus, inventions often have multiple inventors, each responsible for a minor aspect of the final product.

Thomas Edison, although best known for inventing the light bulb, did not work alone—his greatest invention may have been the research and development laboratory.<sup>2</sup> At his Menlo Park and West Orange laboratories, he hired “muckers” to help perfect his ideas and develop new inventions.<sup>3</sup> The collaboration with others worked well; Edison was a named inventor on 1093 U.S. patents, as well as 500-600 unsuccessful patent applications.<sup>4</sup>

This system of invention is the same model used in the laboratories of research universities, colleges, and non-profit research institutions across the country.<sup>5</sup> A faculty member, called a principal investigator, leads a research team composed of a mix of research scientists, post-doctoral fellows, graduate students, and technicians.<sup>6</sup> These research teams are responsible for thousands of new inventions across the country each year.<sup>7</sup> In order to commercialize these

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1. From mythologized versions of Thomas Edison’s invention of the light bulb to the fictional mad scientist intent on ruling the world, the idea of scientists as lone inventors pervades the way Americans think about the inventive process. See, e.g., EVAN I. SCHWARTZ, *THE LAST LONE INVENTOR: A TALE OF GENIUS, DECEIT, AND THE BIRTH OF TELEVISION* 5-6 (2003) (containing Edison’s obituary, calling Edison a “solitary genius” and a “lone Titan,” and contrasting him with “the corporation research laboratory” “directed by a scientific captain”); DR. HORRIBLE’S SING-ALONG BLOG, <http://www.drhorrible.com>, archived at <http://perma.cc/7EUA-43RQ> (last visited May 21, 2014) (portraying a mad scientist intent on ruling the world by inventing transmitter/freeze/death rays).

2. See generally THERESA M. COLLINS & LISA GITELMAN, *THOMAS EDISON AND MODERN AMERICA: A BRIEF HISTORY WITH DOCUMENTS* (2002).

3. See *id.* at 16.

4. For a complete list of and access to Edison’s patents, see *Edison’s Patents*, THE THOMAS EDISON PAPERS, <http://edison.rutgers.edu/patents.htm>, archived at <http://perma.cc/DB8W-J2DM> (last visited May 21, 2014).

5. For brevity, “university” as used in the remainder of the Article will include research colleges and non-profit research institutions.

6. Even Albert Einstein, often characterized by his lack of social skills and wild hair, employed a series of research assistants. Many of those assistants, though generally unrecognized in the development of Einstein’s theories, went on to become successful scientists in their own right. For example, Peter Bergmann was a post doctoral research assistant for Albert Einstein who was later help found the field of quantum gravity. Paul Halpern, *Peter Bergmann: The Education of a Physicist*, 7 *PHYSICS IN PERSPECTIVE* 390, 390 (2005).

7. NATIONAL RESEARCH COUNCIL, COMMITTEE ON MANAGEMENT OF UNIVERSITY

inventions, universities often work with commercial entities to provide a means for the further development of the university inventions in a process called technology transfer.<sup>8</sup>

Technology transfer is a complicated dance involving numerous players and varied influences. Many universities have created technology transfer offices (TTOs) tasked with choreographing and expediting this process.<sup>9</sup> During the last three decades, technology transfer has become an economic powerhouse, and universities have become essential partners with industry, supplying innovative ideas and ground-breaking concepts—and often, patented inventions.<sup>10</sup> Technology transfer from 188 surveyed universities produced \$2.5 billion in royalties from licensing academic research innovations in 2008, likely representing fifty to seventy billion dollars in commercialized products.<sup>11</sup>

Even in the midst of such economic success, relatively few technologies are responsible for much of the income to universities, and according to some studies only about 50% of inventions are disclosed to the TTOs for licensing consideration.<sup>12</sup> To understand the reasons for the lack of disclosure, we need to look to the research team described above. Social norms, lack of education about technology transfer, and improper incentives have all been described as reasons for lack of disclosure.<sup>13</sup> However, analyses of these problems have, to date, focused mainly on the duties and attitudes of the faculty principal investigator—in large part because the majority of incentives are directed to faculty inventors.<sup>14</sup> Because graduate students, post-doctoral fellows, and other non-faculty researchers are also inventors, their role in the technology transfer process should not be overlooked. In fact, the lack of disclosure incentives and education directed at non-faculty inventors may be a large inefficiency in the university technology transfer process. Compounding the failures of university

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INTELLECTUAL PROPERTY, LESSONS FROM A GENERATION OF EXPERIENCE, RESEARCH, AND DIALOGUE: MANAGING UNIVERSITY INTELLECTUAL PROPERTY IN THE PUBLIC INTEREST 20 (Stephen A. Merrill & Anne-Marie Mazza eds., 2010).

8. For the purposes of this Article, “technology transfer” is the process by which innovations from university researchers are licensed or otherwise conveyed to entities that will eventually commercialize the innovation. The Association of University Technology Managers defines technology transfer as “the process of developing and commercializing scientific findings and fundamental discoveries into relevant applications.” ASS’N OF UNIV. TECH. MANAGERS, AUTM U.S. LICENSING ACTIVITY SURVEY: FY2008, at 7 (Rich Kordal et al. eds., 2010) [hereinafter AUTM FY2008], available at [http://www.autm.net/FY\\_2008\\_Licensing\\_Activity\\_Survey/8916.htm](http://www.autm.net/FY_2008_Licensing_Activity_Survey/8916.htm).

9. *Id.*

10. Jerry G. Thursby et al., *Objectives, Characteristics and Outcomes of University Licensing: A Survey of Major U.S. Universities*, 26 J. TECH. TRANSFER 59, 59 (2001) [hereinafter Thursby et al., *Objectives*].

11. See AUTM FY2008, *supra* note 8, at 3.

12. See *infra* note 99 and accompanying text.

13. See *infra* Parts II.B, III.

14. *Id.*

policies, conflicts between faculty and non-faculty inventors are not uncommon,<sup>15</sup> potentially resulting in many non-faculty inventors deciding to opt out of the technology transfer system rather than face such conflict.

In light of this complexity of research and invention in the university setting, the recent Kauffman Foundation proposal is particularly perplexing.<sup>16</sup> That proposal vests control of inventions created in the university laboratories to the *faculty* inventor.<sup>17</sup> Robert E. Litan, vice president for research and policy at the Kauffman Foundation, characterizes the proposal as “[o]ne simple amendment to the Bayh-Dole Act [that] would allow faculty members to choose their own licensing agents/experts and bring these discoveries to market quickly.”<sup>18</sup> While the relative efficiency of technology transfer by the university TTO versus a faculty inventor is debatable, the proposal fails to analyze, or even mention, the potential for conflict between the different types of inventors.<sup>19</sup>

This Article puts forth the idea that universities often overlook one very important group of university inventors—the non-faculty inventors, including graduate students, post-doctoral fellows, and technicians. Part I overviews university technology transfer history and process. Part II describes the research into the effectiveness of various incentives for disclosure. Part III introduces the idea that there are special problems with universities’ implementation of the Bayh-Dole Act when inventors are not faculty and analyzes recent Bayh-Dole reform proposals to determine if they address incentives directed at this group. Part IV concludes that the problem is not with the Bayh-Dole Act itself, but with university policies based thereon, and offers a few modest proposals for universities to consider when developing or revising intellectual property policies and procedures.

#### I. RISE OF THE BAYH-DOLE ACT AND THE DEVELOPMENT OF UNIVERSITY TECHNOLOGY TRANSFER

Scientific research is at heart a speculative venture. Obviously, great advancements have developed through scientific research, but the monetary cost is high. Basic scientific research often has no direct consumer application and simply contributes to base knowledge that can be built upon in future works and innovations.<sup>20</sup> Much of this basic research is funded through government grants

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15. NATIONAL RESEARCH COUNCIL, *supra* note 7, at 32.

16. Robert E. Litan & Lesa Mitchell, *A Faster Path from Lab to Market*, Jan.-Feb. HARV. BUS. REV. 52 (2010).

17. *Id.*

18. *Kauffman Foundation Experts’ Solution for University Technology Licensing Reform Named to List of ‘Ten Breakthrough Ideas for 2010’ by Harvard Business Review*, PR NEWSWIRE (Dec. 17, 2010), <http://www.prnewswire.com/news-releases/kauffman-foundation-experts-solution-for-university-technology-licensing-reform-named-to-list-of-ten-breakthrough-ideas-for-2010-by-harvard-business-review-79556367.html>, archived at <http://perma.cc/5K9F-NMQY>.

19. *Id.*

20. As used in this Article, “basic scientific research” is that research designed to improve

and performed at universities.<sup>21</sup> Because of this high cost to the tax-paying public and lack of obvious, immediate application for the research, recent decades have seen a push toward rapid commercialization of basic research by means of technology transfer.<sup>22</sup>

#### A. A Short History

The rationale most commonly referred to for the existence of patent rights is the encouragement of invention and concomitant disclosure to the public, argued to be most efficiently done by giving the inventor patent rights to the invention in exchange for disclosure.<sup>23</sup> Prior to 1980, however, federally funded academic research did not reward either inventors or the universities with ownership of these patent rights.<sup>24</sup> No uniform federal policy existed defining the ownership of innovations resulting from federally funded research,<sup>25</sup> and the presumption of many funding agencies was that ownership of such innovations belonged with the funding agency itself.<sup>26</sup> For researchers using federal funds, this resulted in an apparent lack of incentives to innovate or disclose any innovations.<sup>27</sup> Many in Congress felt that innovations from basic research were therefore being vastly under-utilized, resulting in a “technology gap” against other countries.<sup>28</sup> The Bayh-Dole Act, passed in 1980, was designed to correct this inefficiency in part through creating incentives to drive the commercialization of academic

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understanding of fundamental principles, relationships, and workings of the natural world. The main goal of basic scientific research is understanding, rather than the creation of a commercial product.

21. “The federal government provided 59% (\$32.6 billion) of the \$54.9 billion of academic spending on S&E R&D in FY 2009.” National Science Board, *Science and Engineering Indicators 2012*, available at <http://www.nsf.gov/statistics/seind12/c5/c5h.htm> (last visited May 21, 2014).

22. JENNIFER WASHBURN, UNIVERSITY, INC.: THE CORPORATE CORRUPTION OF HIGHER EDUCATION 49-72 (2005); see also Part I.A.

23. Jerry G. Thursby & Marie C. Thursby, *University Licensing*, 23 OXFORD REV. ECON. POL’Y 620, 623 (2007) [hereinafter Thursby & Thursby, *University Licensing*].

24. NATIONAL RESEARCH COUNCIL, *supra* note 7, at 16.

25. See, e.g., John E. Tyler III, *Advancing University Innovation: More Must be Expected—More Must Be Done*, 10 MINN. J. L. & SCI. 143, 146 (2009) (“Prior to the passage of the Act, there were twenty-six different federal agency policies about using the results of federally funded research.”).

26. See, e.g., Bhaven N. Sampat, *Patenting and US Academic Research in the 20th Century: The World Before and After Bayh-Dole*, 35 RES. POL’Y 772, 776-77 (2006).

27. NATIONAL RESEARCH COUNCIL, *supra* note 7, at 17.

28. See, e.g., *id.* at 38 (“Prior to the passage of the Bayh-Dole Act, the United States government held over 30,000 patents, but of those only 5% were licensed out to private industry.”); Birch Bayh et al., *Universities, Inventors and the Bayh-Dole Act*, 3 LIFE SCI. L. & IND. RPT. 1266 (2009), available at [http://webcache.googleusercontent.com/search?q=cache:http://b-d30.org/app/webroot/doc/Life\\_Sciences\\_Inventors\\_universities\\_and\\_Bayh-Dole.pdf](http://webcache.googleusercontent.com/search?q=cache:http://b-d30.org/app/webroot/doc/Life_Sciences_Inventors_universities_and_Bayh-Dole.pdf) (last visited Apr. 30, 2011). *But cf.* Sampat, *supra* note 26, at 779-80.

innovations.<sup>29</sup>

The Bayh-Dole Act provides a uniform federal patent policy for agencies that fund research by entities such as universities.<sup>30</sup> The stated policy of the Bayh-Dole Act is to “promote the utilization of inventions arising from federally supported research or development” and to promote university and industry collaboration, particularly with small businesses.<sup>31</sup> To promote the commercialization of inventions, the Bayh-Dole Act gives universities the right to “elect to retain title to any subject invention” and commercialize those inventions through licensing.<sup>32</sup> Through this process, the Bayh-Dole Act incentivizes universities to commercialize inventions by allowing them to retain much of licensing royalties. The Bayh-Dole Act also attempts to incentivize the inventors by requiring that universities share those royalties obtained from the licensing.<sup>33</sup>

Some commentators have praised the Bayh-Dole Act for providing an efficient and effective framework for technology transfer that produced considerable benefits for the public, private industry, and universities.<sup>34</sup> The Bayh-Dole Act has been famously described as “[p]ossibly the most inspired piece of legislation to be enacted in America over the past half-century.”<sup>35</sup> The growth of the academic technology transfer industry seems to bear out this assertion.

The passage of the Bayh-Dole Act in 1980 created, or at least coincided with, impressive acceleration in academic technology transfer. In 1980, there were only about two dozen technology transfer offices (TTOs) at universities and other research institutions across the U.S., but today almost every major research institution has a TTO.<sup>36</sup> The Association of University Technology Managers’ survey of 179 technology transfer offices in 2009 revealed that the offices executed more than 5300 licenses and filed 12,109 new patent applications.<sup>37</sup> This

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29. Bayh-Dole Act of Dec. 12, 1980, Pub. L. No. 96-517 § 6(a), 94 Stat. 3019-29 (codified at 35 U.S.C. §§ 200-12 (2006)). For a full description of the history leading up to the implementation of the Bayh-Dole Act, see Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663, 1671-95 (1996).

30. NATIONAL RESEARCH COUNCIL, *supra* note 7, at 16.

31. 35 U.S.C. § 200 (2006).

32. *Id.* § 202(a).

33. *Id.* § 202(c)(7)(B).

34. See, e.g., Rebecca Zacks, *TR University Research Scorecard*, TECH. REV., July-Aug 2000, at 88, available at <http://www.technologyreview.com/business/12577/>, archived at <http://perma.cc/EU6L-U8WU> (last visited May 21, 2014).

35. *Innovation’s Golden Goose*, ECONOMIST, Dec. 12, 2002, available at <http://www.economist.com/node/1476653>, archived at <http://perma.cc/J7W-ZDEP>.

36. See Gideon D. Markman et al., *Entrepreneurship From the Ivory Tower: Do Incentive Systems Matter?*, 29 J. TECH. TRANSFER 353, 353 (2004).

37. See ASS’N OF UNIV. TECH. MANAGERS, AUTM U.S. LICENSING ACTIVITY SURVEY: FY2009, at 25, 34 (Rich Kordal et al. eds., 2010) [hereinafter AUTM FY2009].

same survey revealed gross licensing revenues of approximately 2.3 billion dollars in 2009, as opposed to a similar survey conducted nine years previously that demonstrated about a billion dollars of total licensing revenue.<sup>38</sup>

However, in recent years a number of authors have suggested that the benefits attributed to the Bayh-Dole Act may be overstated.<sup>39</sup> Furthermore, these authors often contend that the framework developed by the Bayh-Dole Act produces economic inefficiencies and damages the basic research primarily funded by the federal government.<sup>40</sup>

### *B. The Technology Transfer Process Involves Complex Interactions*

*1. Process Overview.*—Operating in the shadow of the Bayh-Dole Act, the academic technology transfer process consists of three main categories of parties involved: university researchers/inventors, the university itself, and private industry. Each party has a distinct, yet interdependent, role in the technology transfer process.

The technology transfer process begins in the university research laboratory, which itself has a large cast of players. Faculty researchers who manage and direct laboratories are often termed “principal investigators” and are the lead scientists or engineers for their research group or laboratory.<sup>41</sup> Principle

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38. *Id.* at 37.

39. *See, e.g.,* Sampat, *supra* note 26, at 783-84. For an overview of the debate, see Charles R. McManis & Suheol Noh, *The Impact of the Bayh-Dole Act on Genetic Research and Development: Evaluating the Arguments and Empirical Research to Date*, in PERSPECTIVES ON COMMERCIALIZING INNOVATION (F. SCOTT KIEFF & Troy A. Paredes eds. 2012).

40. *See, e.g.,* Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663, 1666 (arguing that the structure of technology transfer encouraged by the Bayh-Dole Act requires that the public pay twice for each innovation); Katherine J. Strandburg, *Curiosity-Driven Research and University Technology Transfer*, in UNIVERSITY ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER: PROCESS, DESIGN, AND INTELLECTUAL PROPERTY 93 (Gary Libecap ed. 2005) [hereinafter Strandburg, *Curiosity-Driven Research*] (examining potential alterations of basic research driven by university technology transfer). *But cf.* McManis & Noh, *supra* note 39.

41. *See* Jennifer Carter-Johnson, *Unveiling the Distinction Between the University and Its Academic Researchers: Lessons for Patent Infringement and University Technology Transfer*, 12 VAND. J. ENT. & TECH. L. 473, 478-80 (2010); *Principal Investigator*, WASHINGTON UNIV. IN ST. LOUIS OFFICE OF THE VICE CHANCELLOR FOR RES., <http://research.wustl.edu/Resources/Roles/Pages/PI.aspx>, archived at <http://perma.cc/GPL4-4XM6> (last visited May 21, 2014) (“The Principal Investigator (PI) is charged to conduct objective research that generates independent, high quality, and reproducible results. The Principal Investigator is responsible for the management and integrity of the design, conduct, and reporting of the research project and for managing, monitoring, and ensuring the integrity of any collaborative relationships. Additionally, the Principal Investigator is responsible for the direction and oversight of compliance, financial, personnel, and other related aspects of the research project and for coordination with school, department, and central administration personnel to assure research in is conducted in accordance with Federal

investigators are ultimately responsible for the management of the laboratory and the proper use of any grant funding. Research associates often have a terminal degree and may be considered non-tenure track faculty.<sup>42</sup> While working under the principal investigator, research associates often direct nearly-independent research projects within the laboratory.<sup>43</sup> Post-doctoral fellows are most often recent terminal degree recipients. Like research associates, they often direct their own research projects, though generally in a slightly less independent manner.<sup>44</sup> Students within a research group or laboratory are generally investigating an aspect of the principal investigator's larger project and tend to be much less independent than the positions described above.<sup>45</sup> Student researchers may be pursuing undergraduate or graduate degrees, and their research within the laboratory is used by the graduate student to create a thesis in addition to any publications produced.<sup>46</sup> Finally, many research groups employ one or more research technicians who often perform general laboratory maintenance and administrative tasks and may conduct scientific research under the direction of others within the laboratory.<sup>47</sup>

Once a principle investigator receives funding and begins oversight of a resulting project, work within that project may produce inventions that the academic researcher as the inventor must recognize as potentially having a commercial market. Upon such recognition, the inventor has a duty to disclose the invention to the university's TTO.<sup>48</sup> Generally, the inventor is required to fill out a disclosure form providing basic information about the invention, relevant

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regulations and University and sponsoring agency policies and procedures.”).

42. See *Excellence in Graduate Education*, ARIZ. STATE UNIV., <http://graduate.asu.edu/grow/pff/faqs>, archived at <http://perma.cc/3CQL-EM48> (last visited May 21, 2014) (describing how the terminal degree (i.e., Ph.D.) is the highest degree awarded in most scientific fields).

43. See Carter-Johnson, *supra* note 41, at 479 (describing how research assistants direct their own research within the laboratory).

44. *Id.*

45. *Id.*

46. See *id.* at 480 (describing how “a mix of academic researchers” work for the principle investigator).

47. See *The Graduate School—Policies and Procedures*, MONT. STATE UNIV., [http://www.montana.edu/wwwdg/cat\\_grad\\_assist.html#gra](http://www.montana.edu/wwwdg/cat_grad_assist.html#gra), archived at <http://perma.cc/Y5WB-L6D2> (last visited May 21, 2014) (describing how graduate research assistants use research projects to create a thesis).

48. See *Intellectual Property Policy*, WASHINGTON UNIV. IN ST. LOUIS, <http://wustl.edu/policies/intelprop.html>, archived at <http://perma.cc/BPX4-8ZBW> (last visited May 21, 2014) [hereinafter *Wash U IP Policy*] (describing an invention disclosure as: “Typically used to describe a formal (written) description of an Invention that is confidentially made by the Inventor to his/her employer. At Washington University an Invention Disclosure should be an enabling one, should include details as to co-inventors and funding sources and should be sent to the Office of Technology Management by an Inventor. Such a Disclosure is the ‘first alert’ to the University that an Invention has been made.”).



funding, and inventors.<sup>49</sup>

Once the TTO receives the disclosure, it then begins a decision-making process to determine if the invention is one that can be patented and licensed.<sup>50</sup> The TTO often conducts market analysis to determine demand and patentability searches to determine the likelihood of receiving intellectual property protection.<sup>51</sup> Alternatively, the TTO often relies on the inventor to determine whether the product can be commercialized in various ways, including discussions of marketability, licensing partners or technical feasibility.<sup>52</sup>

Once the TTO determines that patent protection is appropriate, it then attempts to license the invention, generally to private industry entities for further development into a commercial product.<sup>53</sup> Licensing to industry at an early stage is desirable to the university since licensees often assume the costs of patent prosecution.<sup>54</sup> Licensees often continue to rely on the inventor during the development of the final products due to the basic science nature of university research and technologies.<sup>55</sup> Alternatively, faculty inventors often create “spin-out” companies to license and commercialize the very inventions the inventor disclosed to the university TTO.<sup>56</sup> In such cases, the university may continue to pay the patent prosecution costs but take a financial stake in the spin-out

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49. There are two types of disclosure often mentioned in relation to university research: (1) disclosure by the inventor to the university and (2) disclosure by the university to the relevant governmental funding agency. For the purposes of this Article, “disclosure” will refer to disclosure by the inventor of an invention to the university TTO. For an example of a disclosure form and how disclosure is made, see *Disclosing an Invention*, UNIV. OF CAL., <http://www.ucop.edu/ott/faculty/disclose.html>, archived at <http://perma.cc/Z6JW-E3LK> (last visited May 21, 2014).

50. See AUTM FY2008, *supra* note 8, at 10 (“Once the technology transfer office receives the innovations in the form of disclosures, it assesses each disclosure for commercial potential, novelty, potential for startup opportunity, and pre-existing obligations.”).

51. *Wash U IP Policy*, *supra* note 48.

52. Anne C. Di Sante, *The Role of the Inventor in the Technology Transfer Process*, ipHandbook of Best Practices, available at <http://www.iphandbook.org/handbook/ch05/p05/> (last visited June 9, 2014); Stanford University’s Office of Technology Licensing, *OTL and the Inventor Roles in Technology Transfer*, [http://otl.stanford.edu/inventors/resources/inventors\\_otlandinvent.html](http://otl.stanford.edu/inventors/resources/inventors_otlandinvent.html) (last visited June 9, 2014).

53. See Carter-Johnson, *supra* note 41, at 489 (describing how TTO’s “coordinate patent applications, promote technologies, and negotiate licenses”).

54. *Wash U IP Policy*, *supra* note 48 (describing how licensing agreements create income for the university).

55. See Richard A. Jensen et al., *Disclosure and Licensing of University Inventions: ‘The Best We Can Do with the S\*\*t We Get to Work with,’* 21 INT. J. INDUS. ORG. 1271, 1272 (2003) (describing how it is estimated that 71% of the technology licensed from a university requires further development before commercialization).

56. *Commercialization via Start-up Company*, THE FLA. STATE UNIV. OFFICE OF COMMERCIALIZATION, <http://www.research.fsu.edu/techtransfer/commercialization.html>, archived at <http://perma.cc/MM26-X9PQ> (last visited May 21, 2014).

company.<sup>57</sup>

Revenues from the licenses flow back to the university at many levels. Such revenues to the university can be viewed as returns on the taxpayer investment because the university uses part of the obtained licensing revenue to fund further research and other university educational and administrative functions.<sup>58</sup> A portion of the licensing revenue is also apportioned to the inventor as incentive to encourage invention and the disclosure of the invention to the university.<sup>59</sup> Because invention disclosure by the researcher is an early step in the chain, inefficiencies at that point will propagate through the system. The failure of an inventor to disclose her invention means that the licensing process never begins, and the university never realizes revenues based on that invention.

While this process seems very linear, it contains a number of feedback loops, making influences often hard to pick apart. For example, the private industry entities that may take licenses at the end stage often sponsor the initial research at universities or collaborate with university researchers.<sup>60</sup> Such sponsored research agreements often include rights of first refusal for future licenses of any resultant inventions, and many corporate sponsors push for outright ownership of inventions produced under the sponsored research agreement.<sup>61</sup> Many scholars, scientists and observers have expressed worry over whether such agreements influence the direction of university research today, shifting research from uncovering basic scientific truths needed to underpin technological advancements to more directly commercial work.<sup>62</sup> When the work to be accomplished is funded both by an industry sponsor as well as federal government grants and rights of first refusal are included in the sponsorship agreement, concerns should arise as to whether the public is receiving the proper amount of compensation for its investment in the initial research since the sponsor is able to negotiate the resulting license without any outside competition.

Other problems in the technology transfer process arise when faculty

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57. Jeff Stewart, *The Nanotech University Spinout Company: Strategies for Licensing, Developing, Commercializing, and Financing Nanotechnology*, 2 NANOTECHNOLOGY L. & BUS. 365, 367 (2005).

58. Elliot C. Kulakowski & Lynne U. Chronister, *Research Administration and Management* 795 (1st ed. 2006), available at <http://www.cs.unc.edu/~quigg/spring2013/Spring%202013%20Establishing%20a%20Spin-Off%20Company.pdf>, archived at <http://perma.cc/FJ42-ENYR>.

59. See The Bayh-Dole Act, 35 U.S.C. § 202(c)(7)(B) (requiring non-profit organizations, such as universities, to share with the inventors some portion of the royalties obtained by the licensing of federally-funded inventions).

60. *Guidelines on University-Industry Relations*, UNIV. OF CAL., <http://www.ucop.edu/ott/faculty/disclose.html>, archived at <http://perma.cc/AT7U-EH7M> (last visited May 21, 2014).

61. *Id.*

62. JENNIFER WASHBURN, UNIVERSITY, INC.: THE CORPORATE CORRUPTION OF HIGHER EDUCATION (2005). Cf. John P. Walsh et al., *Where Excludability Matters: Material v. Intellectual Property in Academic Biomedical Research*, 36 RES. POL'Y 1184, 1188 (2007) (noting that commercial potential was important for only 8% of respondents as a reason for choosing a research project).

members blur the line between university and private research and fail to disclose inventions to the university but rather use inventions created in the university setting in the faculty member's independent company.<sup>63</sup> John B. Fenn, a Yale University professor from 1967 to 1994 and a Nobel Laureate, was a co-inventor with two graduate students of a mass spectrometry technology.<sup>64</sup> The inventors failed to disclose the invention to the university until ten months after publicly presenting the technology, leaving the university with only two months to elect to file for a patent, a deadline that Fenn noted in the disclosure.<sup>65</sup> Fenn further informed the university that he believed there was little commercial value in the invention and that he had little time to assist in the production of any patent application.<sup>66</sup> Based on the information provided by the faculty inventor, Yale elected not to pursue the patent.<sup>67</sup> During these discussions, and without the knowledge of Yale University, Fenn filed for a patent on the invention and licensed the invention to a company in which he had a 49% stake.<sup>68</sup> Eventually, after much litigation, the patent ownership and licensing revenue were awarded to Yale University.<sup>69</sup>

2. *Importance of Inventorship to Universities.*—Additional problems in the technology transfer process arise due to ambiguities in inventorship. Under U.S. patent law, ownership of a patent initially vests in the inventor.<sup>70</sup> Therefore, the naming of the inventor on a patent defines who can transfer the rights to the patented technologies.<sup>71</sup> As stated above, the Bayh-Dole Act gives universities the right to “elect to retain title to any subject invention.”<sup>72</sup> Until recently, many assumed this provision implied automatic vesting of ownership of federally funded inventions to the university rather than through assignment by the inventor.<sup>73</sup> This assumption was rejected recently in *Stanford v. Roche*.<sup>74</sup>

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63. See, e.g., *Fenn v. Yale Univ.*, 283 F. Supp. 2d 615, 621 (D. Conn. 2003), *aff'd*, 184 F. App'x 21 (2d Cir. 2006).

64. *Id.* at 620-25.

65. *Id.* at 625.

66. *Id.* at 625-26.

67. *Id.* at 626.

68. *Id.* at 626-27.

69. *Id.* at 640.

70. See generally DONALD S. CHISUM, CHISUM ON PATENTS ch. 2 (Matthew Bender 1978).

71. See DONALD S. CHISUM, AMERICA INVENTS ACT OF 2011: ANALYSIS AND CROSS-REFERENCES 42 (2011), available at <http://www.chisum.com/wp-content/uploads/AIAOverview.pdf>, archived at <http://perma.cc/5CNZ-7AE6> (describing how previously only the inventor could file a patent application; however, section 4 of the America Invents Act provides that applications filed after September 16, 2012 may be filed by the inventor, the inventor's assignee or anyone to whom the inventor is obliged to assign the patent, even if the assignment has not yet been executed.).

72. 35 U.S.C. § 202(a) (2006).

73. See, e.g., Joseph Friedman & Jonathan Silberman, *University Technology Transfer: Do Incentives, Management, and Location Matter?*, 28 J. TECH. TRANSFER 17, 18 (2003) (“The Bayh-Dole act requires university's faculty members, students or staff members who recognize or

In *Roche*, Mark Holodniy, hired as a research fellow at Stanford University, had signed Stanford's "Copyright and Patent Agreement," obligating him to assign any inventions and related intellectual property to Stanford University.<sup>75</sup> To learn to perform a relatively new procedure, polymerase chain reaction (PCR), Holodniy made regular visits to Cetus, a biotechnology company that was later sold to Roche.<sup>76</sup> Soon after his arrival at Cetus, Holodniy signed a "Visitor's Confidentiality Agreement" that provided that he "will assign and do[es] hereby assign" to Cetus the "right, title and interest in each of the ideas, inventions and improvements" that he developed "as a consequence of [his]" work at Cetus.<sup>77</sup> After returning to Stanford, Holodniy went on to develop and assign to Stanford a PCR-based assay to detect HIV infection.<sup>78</sup>

Years later, Stanford sued Roche for patent infringement based on the Holodniy patents.<sup>79</sup> Roche countered that Stanford did not own the patents because Holodniy's Visitor's Confidentiality Agreement contained an assignment of the PCR-based invention because the assay was based on technology that Holodniy learned while at Cetus.<sup>80</sup> The Federal Circuit agreed with Roche, noting that Stanford's prior Copyright and Patent Agreement merely held a contractual obligation to assign rather than an actual assignment.<sup>81</sup> Holodniy may have breached his contractual obligation to Stanford, but the first assignment of the technology went to Cetus. The Supreme Court held that the source of funding did not affect ownership of the resulting patent and that, even though the PCR assay was developed with federal funding under the Bayh-Dole Act, ownership rights continued to vest initially with the inventor.<sup>82</sup> Therefore, because Holodniy first assigned his patent rights to Cetus, he had no rights left to assign to Stanford. As a result of this holding, universities must acquire a valid patent assignment agreement in order to have the authority to transfer ownership rights.

In light of the *Roche* decision, universities must rely on inventors to sign patent applications and assignments. Without inventor cooperation, the university cannot procure the needed patents or oversee the licensing of technologies created within its walls.<sup>83</sup> Additionally, if the TTO fails to list a co-

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discover a new technology or invention that has commercialization potential to disclose the invention to their institution's *Technology Transfer Office* (TTO).").

74. *Bd. of Trs. of Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc.*, 131 S. Ct. 2188 (2011).

75. *Id.* at 2192.

76. *Id.*

77. *Id.*

78. *Id.*

79. *Id.* at 2193.

80. *Id.*

81. *See Bd. of Trs. of Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc.*, 583 F.3d 832, 841 (Fed. Cir. 2009). This issue was not reviewed by the Supreme Court in *Roche*, 131 S. Ct. 2194.

82. *Roche*, 131 S. Ct. at 2195-99.

83. 35 U.S.C. § 202(a) (2006).

inventor on a patent and get an assignment, that co-inventor may later sue to claim her patent rights<sup>84</sup> and potentially license those rights in competition with the university.<sup>85</sup>

Unfortunately, inventorship is a central and somewhat slippery concept in U.S. patent law, making it difficult for universities and inventors to comply. Under U.S. law, an inventor is a person who conceptually creates at least part of the invention as defined in the claims.<sup>86</sup> A patent usually contains multiple claims, each relating to a different aspect of the invention.<sup>87</sup> Therefore, a patented invention can be, and often is, attributed to several inventors, each of which must have contributed conceptually to at least one of the claims in the patent.<sup>88</sup>

Joint inventorship has been defined as “the product of a collaboration between two or more persons working together to solve the problem addressed.”<sup>89</sup> However, it is not always easy to determine if two researchers are co-inventors. Multiple researchers can be co-inventors on a patent even if “(1) they did not physically work together or at the same time, (2) each did not make the same type or amount of contribution, or (3) each did not make a contribution to the subject matter of every claim of the patent.”<sup>90</sup> Inventors within universities may be any of the laboratory members mentioned in Part I.B.1—faculty researchers, research associates, post-doctoral fellows, students or staff conducting research.

Due to the definition of inventorship and the complexities of the modern university research environment, inventions often include conceptual and creative contributions by many people building on an initial idea.<sup>91</sup> Unfortunately, universities often leave the determination of inventorship, especially during the disclosure stage, to the researchers themselves.<sup>92</sup> Because these researchers lack

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84. “[I]n the context of joint inventorship, each co-inventor presumptively owns a pro rata undivided interest in the entire patent, no matter what their respective contributions.” *Ethicon v. U.S. Surgical Corp.*, 135 F.3d 1456, 1465 (Fed. Cir. 1998). If a co-inventor is not initially named on the patent, the co-inventor may sue to have the patent inventorship information corrected. 35 U.S.C. § 256 (2011).

85. In the absence of an assignment agreement, the newly named co-inventor would be an owner of the patent and thus allowed to license the patent independently of the other co-inventors. 35 U.S.C. § 262 (2006).

86. *See Burroughs Wellcome Co. v. Barr Labs, Inc.*, 40 F.3d 1223, 1227-28 (Fed. Cir. 1994) (explaining how “[c]onception is the touchstone of inventorship”).

87. Dennis Crouch, *The Rising Size and Complexity of the Patent Document*, Legal Studies Research Paper Series Research Paper No. 2008-04, available at <http://ssrn.com/abstract=1095810> (last visited May 21, 2014).

88. *See* 35 U.S.C. § 116 (2006); *Ethicon, Inc. v. U.S. Surgical Corp.*, 135 F.3d 1456, 1460 (Fed. Cir. 1998) (explaining how “each joint inventor must generally contribute to the conception of the invention”).

89. *Burroughs Wellcome*, 40 F.3d at 1227.

90. 35 U.S.C. § 116(a) (2006).

91. *See id.* § 116.

92. *See, e.g., Technology Transfer Policy*, UNIV. OF MICH., <http://www.techtransfer.umich.edu/resources/policies.php>, archived at <http://perma.cc/CJL2-GYFZ> (last visited May 21, 2014).

patent law training, their designation of co-inventors may be legally incorrect, resulting in improper patent prosecution and assignments.<sup>93</sup>

In this set of simplistic examples, it is easy to see how inventorship of the same invention, a specialized antibody for a diagnostic assay, could be very different depending on the circumstances of its development. Each example results in a different set of inventors responsible for disclosure to the TTO and required to assign any patent rights to the university.

In the first scenario, the principal investigator has an idea to make a special set of antibodies for use in an assay. The principle investigator tells a graduate student exactly what type of antibody to make, and the graduate student uses fairly common materials and techniques to create the antibodies. The principle investigator is likely the sole inventor because the principle investigator conceived of the specialized antibody and the graduate student carried out routine work at the principle investigator's direction to produce the antibody.

In a second, slightly more complex scenario, the principal investigator again has an idea to make antibodies for use in an assay and tells the graduate student to do so. However, in this case, it is the graduate student who determines that a special type of antibody would be most effective and creates materials to make a specially directed antibody. Here, our principal investigator and the graduate student are likely co-inventors because both contributed conceptually to the final invention.

Finally, in a fairly common scenario, the assay development is part of the graduate student's project, and it is the graduate student who recognizes the need to create the specialized antibody for the assay and plans how to make it. The graduate student goes to the principal investigator for approval to spend grant money and discusses the antibodies and the procedures for production. The principal investigator thinks it over and approves the project and expenses but makes no changes to the development plan. Here, the graduate student should be the sole inventor of the specialized antibody, but the principal investigator is likely to try to take some credit for the invention.<sup>94</sup>

The Bayh-Dole Act created incentives for universities and researchers as inventors to engage in commercialization efforts. In many ways, these incentives have proven to be quite effective. The rise of the TTO at most major universities and the billions of dollars in licensing revenue underscore that success. The incentives might prove to be more successful if all inventors understood the incentives to which they were entitled. These incentives are necessary because the commercialization process has proven a costly endeavor in terms of both university and inventor resources. However, despite the diversity of people at all levels who may be innovating within the university, universities tend to take a blanket approach to incentivization of these inventors—usually focusing on

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93. See John Villasenor, *Intellectual Property Awareness at Universities: Why Ignorance Is Not Bliss*, FORBES (Nov. 27, 2012, 8:37 PM), <http://www.forbes.com/sites/johnvillasenor/2012/11/27/intellectual-property-awareness-at-universities-why-ignorance-is-not-bliss/>, archived at <http://perma.cc/X5Q5-ZRR2>.

94. See *infra* Part III.B for discussion of faculty disbelief of student inventorship.

faculty incentives.

## II. INCENTIVES AND DISINCENTIVES TO DISCLOSURE BY ACADEMIC RESEARCHERS

The framework of technology transfer developed by the Bayh-Dole Act and by universities' policies is completely reliant on the desire of the researchers as inventors to disclose patentable and licensable innovations.<sup>95</sup> Any inefficiency at the disclosure stage is necessarily perpetuated throughout the technology transfer process. The duty to disclose and assign title to inventions is generally included in university policies to which universities require researchers to agree as a term of employment.<sup>96</sup> Non-employee researchers, such as graduate students and sometimes even undergraduate students, are generally subject to similar policies in which the university claims title to any inventions developed using university resources.<sup>97</sup>

Despite this duty to disclose no matter the source of funding, current evidence suggests that as many as 50% of patentable innovations are not being disclosed by researchers to their university's TTO.<sup>98</sup> To many authors, this suggests an imbalance between incentives to disclose and other influences on researchers.<sup>99</sup> The disclosure incentive is generally monetary—a slice of the licensing revenues, as is required by the Bayh-Dole Act for federally funded inventions.<sup>100</sup> Some

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95. See Bayh-Dole Act of Dec. 12, 1980, Pub. L. No. 96-517 § 6(a), 94 Stat. 3019-29 (codified at 35 U.S.C. §§ 200-12 (2006)); see, e.g., *Technology Transfer Policy*, *supra* note 92; James D. Clements, *Improving Bayh-Dole: A Case for Inventor Ownership of Federally Sponsored Research Patents*, 49 IDEA 469 (2009).

96. See, e.g., Clements, *supra* note 95; *Technology Transfer Policy*, *supra* note 92.

97. See, e.g., *Wash U IP Policy*, *supra* note 48. There is debate as to the ability of the university to claim ownership of student-created inventions in certain contexts, such as inventions created during a class. This Article is limited to inventorship in the context of a university research laboratory, which typically means that the student is also acting in many ways as an employee of the university and using substantial university resources. For more information on the debate, see Anthony J. Luppino, *Fixing a Hole: Eliminating Ownership Uncertainties to Facilitate University-Generated Innovation*, 78 UMKC L. REV. 367, 377-78, 383-84 (2009); Sean B. Seymore, *My Patent, Your Patent, or Our Patent? Inventorship Disputes Within Academic Research Groups*, 16 ALB. L. J. SCI. & TECH. 125, 137 (2006).

98. See Jensen et al, *supra* note 55, at 1272; Jerry G. Thursby & Marie C. Thursby, *Pros and Cons of Faculty Participation in Licensing*, 16 ADVANCES IN THE STUDY OF ENTREPRENEURSHIP INNOVATION AND ECON. GROWTH, UNIV. ENTREPRENEURSHIP AND TECH. TRANSFER: PROCESS, DESIGN, AND INTELL. PROP. 187, 189 (Gary D. Libecap ed., 2005) [hereinafter Thursby & Thursby, *Pros and Cons*]; Albert Link et al., *An Empirical Analysis of the Propensity of Academics to Engage in Informal University Technology Transfer*, 16 INDUS. & CORP. CHANGE 641, 642-43 (2007).

99. See Thursby & Thursby, *Pros and Cons*, *supra* note 98, at 189.

100. See Bayh-Dole Act of Dec. 12, 1980, Pub. L. No. 96-517 § 6(a), 94 Stat. 3019-29 (codified at 35 U.S.C. §§ 200-12 (2006)).

studies have found that monetary incentives to researchers in the form of royalty-sharing or equity positively affect both innovation and licensing outcomes, though other factors act in opposition to monetary incentives.<sup>101</sup>

#### A. Monetary Disclosure Incentives

University intellectual property policies generally provide for inventors, both faculty and non-faculty, to receive a share of the licensing revenue derived from their invention as incentive for disclosure.<sup>102</sup> Most policies from major research universities also reserve portions of the revenue for the academic department or college in which the inventor works, for the inventor's laboratory for future research funding, and sometimes for the TTO itself.<sup>103</sup>

The policies differ greatly on the percentage awarded to each party and whether those percentages are stable or change according to the amount of licensing revenue generated by the invention. At Washington University in St. Louis, for instance, all direct technology transfer expenses are subtracted from the gross licensing revenue, and the resulting net revenue is distributed as: 25% to the TTO, 35% to the creator(s), and 40% to the creator's school or college (which may further split this portion between the school, the department of the creator, and the creator's laboratory).<sup>104</sup> Michigan State University's policy is a staggered policy according to the amount of revenue.<sup>105</sup> The first \$5000 of net revenue (gross revenue minus direct technology transfer costs) goes to the inventor, and the next \$100,000 is split in thirds between the inventor(s), the inventor's college, and the university.<sup>106</sup> The next \$400,000 is split with 30% going to the inventor(s), 40% to the university, and 30% to the inventor's college.<sup>107</sup> These stages continue until net revenue is more than \$1,005,000, at which time the split becomes 15% to the inventor(s), 15% to the inventor's college, and 70% to the

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101. See Thursby & Thursby, *Pros and Cons*, *supra* note 98, at 192-93, 102.

102. See Thursby et al., *Objectives*, *supra* note 10, at 61 (finding that the average research university in the author's study provides a 40% share of net license revenue to the inventor). For examples of revenue sharing for university inventors, see, e.g., *Intellectual Property Policy*, JOHNS HOPKINS UNIV. § V.B., [http://jhuresearch.jhu.edu/JHU\\_Intellectual\\_Property\\_Policy.pdf](http://jhuresearch.jhu.edu/JHU_Intellectual_Property_Policy.pdf), archived at <http://perma.cc/CA4J-8PCN> (last visited May 21, 2014); *Patent and Tangible Research Policy*, N. C. STATE UNIV. § 8, [http://www.ncsu.edu/project/botbook/public/2011/06/Patent-Policy-to-BOT-7-2011\\_1.pdf](http://www.ncsu.edu/project/botbook/public/2011/06/Patent-Policy-to-BOT-7-2011_1.pdf), archived at <http://perma.cc/3WPV-3YWX> (last visited May 21, 2014); *Patents-Faculty Handbook*, MICH. STATE UNIV. § VI, <http://www.hr.msu.edu/documents/facacadhandbooks/facultyhandbook/patents.htm>, archived at <http://perma.cc/CWG3-XP5Y> (last visited May 21, 2014).

103. See, e.g., *Intellectual Property Policy*, *supra* note 102; *Technology Transfer Policy*, *supra* note 92.

104. *Wash U IP Policy*, *supra* note 48.

105. *Patents-Faculty Handbook*, *supra* note 102.

106. *Id.*

107. *Id.*



university.<sup>108</sup> In each case, these policies represent the individual university's estimation of the proper incentives for disclosure and, in some cases, further assistance with commercialization attempts for the invention.

Some commentators have suggested that monetary incentives are less effective than other types of incentives in the academic research world. Daniel Greenberg states that "academic science is not heavily populated with wealth-seeking individuals."<sup>109</sup> Greenberg and others suggest that, through a process of self-selection, academic researchers are more interested in the secure employment of tenure, intellectual freedom, and recognition of their peers.<sup>110</sup> Siegel et al., describes the primary goal of research scientists as "recognition within the scientific community," with financial gain and securing research funding as secondary goals.<sup>111</sup>

The keys to attaining these non-monetary goals and interests are grant money for research and the subsequent stream of resulting publications.<sup>112</sup> The underlying incentive for publication is different for each member of the research team.<sup>113</sup> While faculty researchers are often focused on publication for promotion and tenure, publications are equally important for post-doctoral researchers and graduate students.<sup>114</sup> Post-doctoral researchers rely on a demonstrated publication record to transition to a faculty or industry position.<sup>115</sup> Graduate students often have a publication requirement in order to obtain a Ph.D.<sup>116</sup>

This focus on publications and recognition suggests that incentives in the form of a personal share of licensing revenue may not be completely aligned with the primary motivations of academic researchers at any level.<sup>117</sup> This author has previously argued that monetary prizes for disclosure directed at funding research to further develop the new technology might be a better incentive to disclosure, as such prizes would directly impact the ability of the academic researcher to

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108. *Id.*

109. DANIEL S. GREENBERG, SCIENCE FOR SALE: THE PERILS, REWARDS AND DELUSIONS OF CAMPUS CAPITALISM 22 (2007).

110. *Id.* at 22-23. See generally Strandburg, *Curiosity-Driven Research*, *supra* note 40, at 99-104. But note that any proposed incentive models centered around these interests would not be particularly applicable to non-faculty researchers, such as students and post-doctoral researchers. See *supra* Part I.B.1 for an in-depth discussion.

111. 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, 31 (2003) [hereinafter Siegel et al., *Assessing the Impact*].

112. Paul R. Sanberg et al., *Changing the Academic Culture: Valuing Patents and Commercialization Toward Tenure and Career Advancement*, 111 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES 6542, 6542-43 (2014).

113. See Seymore, *supra* note 97, at 130.

114. See *id.*

115. See *id.*

116. See *id.*

117. Carter-Johnson, *supra* note 41.

continue research.<sup>118</sup> Supporting the notion that personal monetary gain is not the best incentive, interview studies with faculty research scientists have uncovered a desire for alternative incentives for invention and disclosure, such as promotion and tenure consideration.<sup>119</sup>

A large number of scholarly articles have investigated, by use of empirical data and modeling, the effect of incentivizing faculty researchers through share of licensing revenue.<sup>120</sup> In general, these studies conclude that monetary incentives have at least some positive impact on eventual numbers of licenses and gross licensing revenue.<sup>121</sup> As disclosure by the researchers to the TTO is the primary input into licensing numbers and revenue,<sup>122</sup> it can be extrapolated that these incentives also affect invention disclosure rates.<sup>123</sup> However, some studies have shown little or no positive impact of revenue sharing with researchers. A case study of eleven inventions from two major research universities found that potential financial incentives played no part in the decision to begin research projects.<sup>124</sup> Also, a survey of biomedical researchers found that only 8% of respondents described commercial potential as an important reason for choosing a research project.<sup>125</sup> Finally, incentivization of faculty researchers may also be unrelated to or actually damaging to entrepreneurial activities. Markman et al.,

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118. *Id.*

119. Siegel et al., *Assessing the Impact*, *supra* note 111, at 42-43, 44 (“The vast majority of interviewees also specifically commented on the fact that tenure and promotion decisions continued to be made almost strictly on the basis of publications and grants” and “[o]ne department chair phrased it as follows: It’s the height of hypocrisy for universities to claim that they value technology transfer, or that it’s supposed to be a top institutional priority, and then fail to reward it in their promotion and tenure decisions. At some point, we’ve got to resolve this discrepancy.”)

120. Almost no empirical data or model considers the effect of incentivization on non-faculty researchers. *See infra* Part III.

121. *See, e.g.*, Friedman & Silberman, note 73, at 29 (showing a positive but weak correlation of license revenue share incentives to faculty researchers with the number of licenses executed and a strong correlation with license income. This discrepancy may be due to a skewing of the data by one or more “blockbuster” inventions or could also be due to limits on TTO resources to execute more licenses.); Saul Lach & Mark Schankerman, *Incentives and Invention in Universities*, 39 RAND J. ECON. 403 (2008) (showing that license revenue sharing with scientists strongly affects licensing outcomes); Albert Link & Donald Siegel, *Generating Science-Based Growth: An Economic Analysis of the Impact of Organizational Incentives on University-Industry Technology Transfer*, 11 EUR. J. FIN. 169 (2005); Siegel et al., *Assessing the Impact*, *supra* note 111; Thursby & Thursby, *Pros and Cons*, *supra* note 98.

122. *See* Friedman & Silberman, *supra* note 73, at 27, 29.

123. Identifying true disclosure rates is problematic in that we can only positively know the numerator, i.e., the number of disclosures actually made by academic researchers. The denominator, i.e., the number of disclosures that *should* have been made is simply an informed estimate.

124. Jeannette Colyvas et al., *How Do University Inventions Get into Practice?*, 48 MGMT. SCI. 61 (2002).

125. *See* Walsh et al., *supra* note 62, at 1188.

for instance, found that in a sample of 128 universities, the number of executed equity licenses (commonly used in licensing to spin-out entities) was actually negatively correlated with incentive pay to faculty researchers.<sup>126</sup> However, it is unclear if the decrease in equity licensing is related to any decrease in disclosure rates.<sup>127</sup>

### *B. Disincentives to Disclosure*

Arrayed against these monetary incentives to disclose are a number of pressures inherent in the academic research environment. University scientists work in a community that was built on the free sharing of ideas through publications, conferences, and open discussion.<sup>128</sup> The social norms surrounding this community have made it difficult to convince university scientists that participating in the technology transfer process is valuable.<sup>129</sup> Additionally, scientists lack education about technology transfer generally. Many scientists do not understand the legal definition of an invention or inventorship. Similarly, the scientist who has created a new invention may not be familiar with the steps required to disclose the invention to the TTO or the potential rewards of so disclosing. These problems with education also reflect a larger time management problem. Scientists have a finite amount of time and many university responsibilities that take priority. Taken together, these problems mean that university scientists often perceive little immediate value to compensate for the time and effort involved in disclosure.

*1. Social Norms in the Research Community Inhibit Disclosure.*—Perhaps the most discussed and debated disincentive to disclosure is the conflict of academic technology transfer with scientific social norms.<sup>130</sup> Norms particular to academic researchers have been described by authors since at least the middle of the last century, and many of these norms appear at the surface to be

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126. Markman, *supra* note 36, at 359.

127. One problem with studies such as these is that the situations examined are rather static. There is no way to experiment, i.e., alter variables and examine effects, and so many of the conclusions are at best speculative.

128. Arti Kaur Rai, *Regulating Scientific Research: Rights and the Norms of Science in Biotechnology Research*, 94 NW. U. L. REV. 77, 90 (1999).

129. See McManis & Noh, *supra* note 39; Thursby & Thursby, *Pros and Cons*, *supra* note 98, at 189.

130. See, e.g., Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, 66 LAW & CONTEMP. PROBS. 289, 289-90 (2003) (discussing the erosion of “open science” norms resulting, at least in part, from the encouragement of university patenting of basic biomedical research); Rai, *supra* note 128, at 77 (discussing changes in scientific norms within the biotechnology research community); Thursby & Thursby, *Pros and Cons*, *supra* note 98, at 189 (“[S]ome faculty may refuse to disclose for ‘philosophical’ reasons related to their notions of the proper role of academic scientists and engineers.”). For a comprehensive discussion of the debate over the existence and effects of scientific norms on technology transfer, see McManis & Noh, *supra* note 39.

antithetical to the current academic technology transfer structure. The distinguished sociologist Robert Merton described four basic scientific norms: communalism, universalism, disinterestedness, and organized skepticism.<sup>131</sup> Of these, communalism, which is the idea that there is a common ownership of scientific discoveries, and disinterestedness, which is the idea that scientists should act in ways that are selfless, i.e., they should have no financial attachment to their research, are most applicable to discussions of incentives to disclose. Both of these ideals could obviously impact the desire of the academic researcher to comply with disclosure duties.

The disinterestedness norm immediately conflicts with monetary incentivization of the researcher. The effectiveness of a monetary incentive inherently relies on a certain amount of self-interest and pride of ownership in the invention. Even indirect monetary grant incentives directed at the inventor's laboratory and further research in return for invention disclosures may be perceived as self-interested because the research money leads to publications that lead to prestige. While non-monetary incentives, such as tenure consideration for high-quality disclosures, may not conflict as directly with the financial aspects of this ideal, any type of disclosure incentive directed at the researcher's benefit indicates some degree of self-interest.

Communalism would suggest that research results should be published and that these results should be freely usable to other researchers and the public.<sup>132</sup> Communalism further suggests that the proper reward for scientific discovery is recognition and esteem.<sup>133</sup> These ideals of communalism could easily conflict with the patent monopoly and the exclusive licensing common in academic technology transfer. Scholars such as Katherine Strandburg have refined the communalism concept, applying it to specific situations within academic research and technology transfer.<sup>134</sup> Strandburg identifies the research norms of sharing research tools and materials,<sup>135</sup> as well as the preferences of academic researchers for "performing scientific research and participating in the scientific discourse" and "learning the results of the collective research project" as examples of communalism.<sup>136</sup>

Both of these norms conflict with academic technology transfer. Patents result in exclusivity rights, which may be used to restrict use of the innovation, and patent protection requires some secrecy on the part of the researcher.<sup>137</sup> Under current U.S. patent law, publication of research more than a year before

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131. ROBERT K. MERTON, *THE SOCIOLOGY OF SCIENCE: THEORETICAL AND EMPIRICAL INVESTIGATIONS* (Norman W. Storer ed., Univ. of Chicago Press 1973).

132. Thursby & Thursby, *University Licensing*, *supra* note 23, at 623.

133. *Id.*

134. Katherine J. Strandburg, *User Innovator Community Norms: At the Boundary Between Academic and Industry Research*, 77 *FORDHAM L. REV.* 2237 (2009) [hereinafter Strandburg, *Community Norms*].

135. *Id.* at 2248.

136. *Id.* at 2249.

137. 35 U.S.C. § 261 (2012); *id.* § 271.

application for a patent will bar the approval of the patent.<sup>138</sup> Other countries are considerably more stringent, having a publication bar in which any publication of the innovation before the patent application results in an immediate bar of patent approval.<sup>139</sup> Therefore, academic researchers may fear that disclosure of innovations to the university TTO will result in requirements to delay publication or conference presentations so that patent applications can be timely filed.<sup>140</sup>

Empirical evidence supports this trepidation on the part of academic researchers, demonstrating that almost 20% of disclosing researchers in the life sciences have experienced publication delays of greater than six months due to TTO patenting.<sup>141</sup> While this amount of time may seem minor, the consequences could be drastic. In some fast-moving fields such as molecular biology, a six-month delay could easily be the difference between publishing the innovation in a premier journal as a pioneering work or in a lesser journal as merely a confirming work.<sup>142</sup> As indicated above, faculty academic researchers appear to place publication and tenure considerations above monetary considerations and so may strategically fail to disclose innovations in the face of publication delay fears.<sup>143</sup>

Violation of perceived norms can also have direct consequences for the academic researcher.<sup>144</sup> Many of the functions of academic researchers are dependent on the approval of peers. Tenure consideration is in large part dependent on local peer approval,<sup>145</sup> which can be damaged by perceived deviation from the social norms. Publication is also peer-reviewed, and while the reviewers are presumably anonymous to the author, the author's identity often is

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138. *Id.* § 102(B). While the America Invents Act will considerably alter 35 U.S.C. § 102, it retains an exemption that is likely to provide a similar one-year grace period for university inventors publishing or presenting their innovations before a patent application is submitted. America Invents Act 35 U.S.C. § 102(b)(1).

139. See generally *IPR Help-Desk*, EUROPEAN COMMISSION DG ENTERPRISE, available at <http://www.tecpar.br/appi/News/GracePeriodinventionLaw.pdf>, archived at <http://perma.cc/52E6-YJ4B> (describing grace periods for publication, or the lack of the same, in Europe and other states).

140. See, e.g., *Wash UIP Policy*, *supra* note 48 (“The publication of research results must not be hampered by agreements made to commercialize intellectual property. However, a minimal and defined delay to protect intellectual property through patent applications may be included.”).

141. See David Blumenthal et al., *Withholding Research Results in Academic Life Science*, 277 *JAMA* 1224 (1997).

142. Thursby & Thursby, *University Licensing*, *supra* note 23, at 633.

143. See also Carter-Johnson, *supra* note 41, at 483 (“[I]n spite of a government requirement to disclose government-funded inventions to the university for licensing and the university's considerable interest in licensing such inventions, academic researchers routinely publish their inventions in scientific journals without university disclosure rather than spending the extra time required to also disclose the inventions to the university.”); Siegel et al., *Assessing the Impact*, *supra* note 111, at 31.

144. See Strandburg, *Community Norms*, *supra* note 134, at 2249.

145. In addition to the number and quality of publications, which may be diminished due to the publication delays previously discussed.

not.<sup>146</sup> Even in situations in which the authors' names are removed from a draft submitted for peer review, authors commonly work in extremely specialized fields and are thus fairly easy for an informed reviewer to identify.<sup>147</sup> Finally, grant proposals are also often a peer-reviewed process. In the case of federal grants through the National Institutes of Health, the identity and "track-record" of an applicant is an explicit factor in the review for approval.<sup>148</sup> Each of these areas, all critically important to the career of an academic researcher, are opportunities for the research community to punish those seen as deviating from the scientific norms.

Some attitudes against technology transfer, perhaps formed in response to research norms, appear to be less well supported. As mentioned above, disclosure of an innovation to the university TTO is likely to result in the university obtaining a patent and exclusivity rights to the invention. This outcome could also be in conflict with university scientific research norms such as communalism, perhaps inhibiting some researchers from disclosing the innovation to the university. However, fears of patent right exclusivity impeding research at universities may be unfounded. In the case of patents on research tools, rights are rarely enforced against university researchers.<sup>149</sup> In fact, universities are rarely sued for patent infringement for any reason.<sup>150</sup>

Over the last three decades, the number of university patents has exploded, suggesting that university research communities have a greater acceptance of patenting research outputs.<sup>151</sup> Acceptance of these altering scientific norms is not universal, however. Different universities, even major research universities with hundreds of millions of dollars in federal research funding, may retain different

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146. Richard Snodgrass, *Single- Versus Double-Blind Reviewing: An Analysis of the Literature*, 35 SIGMOD Record 8, 8 (2006). As an example, the peer review policy of *Nature*, one of the leading scientific publications, can be found at [http://www.nature.com/authors/policies/peer\\_review.html](http://www.nature.com/authors/policies/peer_review.html) (last visited May 21, 2014).

147. Studies have shown that in double blinding studies where neither the reviewer nor the author is disclosed, the identity of the author remains unknown 53% to 79% of the time. Snodgrass, *supra* note 146, at Record 8, 15.

148. See *Peer Review Process*, NAT'L INST. OF HEALTH OFFICE OF EXTRAMURAL RES., available at [http://grants.nih.gov/grants/peer\\_review\\_process.htm](http://grants.nih.gov/grants/peer_review_process.htm), archived at <http://perma.cc/H8XH-CK74> (last visited May 21, 2014) (In listing the criteria and considerations that peer reviewers should use when evaluating a grant, the review process specifically examines the applicant researcher and asks "have they demonstrated an ongoing record of accomplishments that have advanced their field(s)?").

149. See Strandburg, *Community Norms*, *supra* note 134, at 2250; Walsh et al., *supra* note 62.

150. Chris Holman, *The Impact of Human Gene Patents on Innovation and Access: A Survey of Human Gene Patent Litigation*, 76 UMKC L. REV. 295 (2007).

151. Charles McManis and Suheol Noh reported that, in 1980, twenty-five universities received 150 patents, and the numbers had grown to 150 universities receiving 1500 patents by 1992. See McManis & Noh, *supra* note 39. By 2009, 179 universities reported filing 12,109 new patent applications while receiving approximately 20,000 invention disclosures that same year. See AUTM FY2009, *supra* note 37, at 22, 25.

cultures regarding exclusivity of basic research outputs, particularly research tools. Additionally, such cultures shift over time. Massachusetts Institute of Technology (MIT) is well known for its long history of successful technology transfer and faculty participation in commercialization of university innovations.<sup>152</sup> Other schools have become believers in technology transfer much more recently. In 1999 Johns Hopkins University President William Brody boasted about Hopkins' actions in putting revolutionary research tool technology into the public domain and avoiding pushing Hopkins' researchers into commercial activity.<sup>153</sup> By 2011, Johns Hopkins was ranked No.23 in the country in amount of licensing revenue by the Chronicle of Higher Education.<sup>154</sup>

It is, therefore, unclear what practical effect current scientific research norms have on disclosure of innovations to the university and subsequent patenting and commercialization. AUTM survey results indicate clear increases in gross numbers of invention disclosures, suggesting there is greater acceptance of university ownership of researcher innovations.<sup>155</sup> This suggests that social norm impediments to disclosure may be waning.

2. *Academic Researchers Often Fail to Disclose Due to Practical Limitations.*—Aside from scientific norms, another pressure against disclosure may be a simple balancing of the time investment necessary for disclosure and the expectations of recoupment. For many academic researchers, this balancing of time commitments may weigh strongly in favor of failing to disclose. Once a faculty researcher creates a new technology, she must determine the best use of the technology and her time in order to continue to receive more funding and job stability, such as tenure. Similarly, post-doctoral researchers and graduate students must make a trade-off between publication and its concomitant career advancement and the time needed for disclosure.

While an invention disclosure may result in monetary gain in the distant future, an academic researcher at any level may decide that publication or further grant writing is a better use of her time than filing an invention disclosure.<sup>156</sup> Academic researchers routinely publish their inventions in scientific journals

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152. See, e.g., GREENBERG, *supra* note 109, at 57-58 (“At MIT and several other universities with long experience in commercializing research, matchmaking between campus and corporation is carefully organized and systematically pursued.”); Shiri M. Reznitz et al., *University Commercialization Strategies in the Development of Regional Bioclusters*, 25 J. PROD. INNOVATION MGMT. 129, 135 (2008) (“MIT as a world-class educational institution has been very successful in fostering entrepreneurial approaches to technology transfer.”).

153. GREENBERG, *supra* note 109, at 58. (“Hopkins president William Brody asserted that ‘our scientists are by nature explorers. . . . Asking them to become managers, marketers, and accountants is unrealistic and ultimately inimical to the research enterprise.’”).

154. *Universities with the Most Licensing Revenue: 2011*, THE CHRON. OF HIGHER EDUC., available at <http://chronicle.com/article/Sortable-Table-Universities/133964/>, archived at <http://perma.cc/Q2RU-5WTA> (last visited May 21, 2014).

155. See AUTM FY2009, *supra* note 37, at 22.

156. For a more in-depth discussion of the motivations of academic researchers, see Carter-Johnson, *supra* note 41.

without university disclosure rather than spending the extra time required to also disclose the inventions to the university.<sup>157</sup> These academic researchers make the decision to forego disclosure in spite of near universal contractual requirements to disclose inventions to the university for licensing and the university's considerable interest in licensing such inventions.<sup>158</sup>

The choice to forego invention disclosures may be due to the perception by many academic researchers that no direct monetary benefit will be forthcoming. Such a perception is likely to be correct. Survey data has indicated that a minority of researchers who have disclosed and received a patent actually see any licensing revenues.<sup>159</sup> A study of academic biomedical researchers found that only 18% of the polled researchers received income from licensing.<sup>160</sup>

These studies align with recent AUTM data indicating that university inventors filed 20,309 new invention disclosures in 2009.<sup>161</sup> In contrast, only 12,109 patent applications were filed in that year—approximately 60% of the number of invention disclosures.<sup>162</sup> From a licensing standpoint the numbers are even less enticing. Only 6889 disclosures were licensed in 2009, a number approximately 34% of the invention disclosures.<sup>163</sup> Assuming the number of 2008 disclosures licensed in 2009 and the number of 2009 disclosures licensed in 2010 stayed relatively similar, the possibility that a new invention will yield a large return is fairly slim. With such data, researchers would understand that only a minority of invention disclosures will result in revenue generation for themselves.

Even if the invention disclosure is licensed, the vast majority of academic innovations that are licensed generate relatively little revenue. Of the 33,523

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157. Daniel W. Effenbein, *Publications, Patents, and the Market for University Inventions*, 63 J. ECON. BEHAV. & ORG. 688, 689 (2007); Jensen et al., *supra* note 55, at 1272.

158. *See, e.g., BCM Policies and Procedures*, BAYLOR COLL. OF MED. § III, [https://www.bcm.edu/research/office-of-research/baylor-licensing-group/search/BAYLOR\\_PATENT\\_POLICY.pdf](https://www.bcm.edu/research/office-of-research/baylor-licensing-group/search/BAYLOR_PATENT_POLICY.pdf) (last visited May 21, 2014) (“Any College Personnel who has Developed any Baylor Intellectual Property as herein defined shall promptly complete the applicable Disclosure Form”); *Statement of Policy in Regard to Intellectual Property*, HARVARD UNIV., <http://www.techtransfer.harvard.edu/resources/policies/IP/IPPolicy.pdf>, archived at <http://perma.cc/TQA4-PLJA> (last visited May 21, 2014) (“Covered persons are required to notify the University’s Office of Technology Development (‘OTD’) of each Supported Invention and Incidental Invention through a disclosure document as prescribed by OTD.”); *Patent Policy*, UNIV. OF CAL., BERKELEY, <http://www.spo.berkeley.edu/Policy/patentpolicy.html>, archived at <http://perma.cc/4F7X-MLD7> (last visited May 21, 2014) (“Those individuals who have so agreed to assign inventions and patents shall promptly report and fully disclose the conception and/or reduction to practice of potentially patentable inventions to the Office of Technology Transfer or authorized licensing office.”).

159. *See* Thursby & Thursby, *Pros and Cons*, *supra* note 98, at 190.

160. *See* Walsh et al., *supra* note 62, at 1187.

161. *See, e.g.,* AUTM FY2009, *supra* note 37, at 13-14.

162. *Id.* at 25. This author concedes that the number of patent applications and disclosures licensed is likely to include disclosures from 2008 and prior years as well.

163. *Id.* at 36.



active licenses in 2009, only 199 licenses generated revenue greater than a million dollars.<sup>164</sup> A poll of academic biomedical researchers found that only about 5% had received total licensing revenues of more than \$50,000.<sup>165</sup> Successful TTOs often have very few “blockbuster” licenses that make up the bulk of revenues, and as such, academic technology transfer often becomes a feast or famine situation.<sup>166</sup>

The low probability of income is not the only consideration inventors face when balancing time commitments. Most of the disclosed inventions are at “embryonic” stages and require considerable additional research and development before being ready for commercialization.<sup>167</sup> Current evidence suggests that successful licensing ventures often require additional input from the inventing academic researcher, as this person is the most familiar with the innovation.<sup>168</sup> Therefore, the savvy academic researcher will realize that the time invested is unlikely to produce substantial revenue, and even more time may be required if there is to be any successful licensing of the innovation at all.

Compounding time pressures, a lack of education regarding technology transfer may be an important issue contributing to the disclosure problem. Academic researchers do not instinctively understand when a patentable invention has been created or even recognize the existence of the duty to disclose an invention.<sup>169</sup> To the extent the time pressures discussed above exist, academic researchers are unlikely to find time to educate themselves if they lack an underlying understanding of the importance of technology transfer.

The extent of these education problems likely varies enormously between universities, based in large part on the outreach efforts of the university TTO and the social norms of the particular university.<sup>170</sup> Though not an active push against disclosure like those issues discussed above, ignorance of the academic researcher as to both duty to disclose and the researcher’s ability to recognize disclosure-worthy innovations may negatively affect disclosure rates and totally abrogate any incentive structure used to encourage disclosure.<sup>171</sup>

Finally, academic researchers may misunderstand the interaction between technology transfer and publication. The pressure to publish may force academic researchers to forego disclosure in favor of publication under the mistaken

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164. *Id.* at 37.

165. *See* Walsh et al., *supra* note 62, at 1187.

166. *See* Maureen Farrell, *Universities That Turn Research into Revenue*, FORBES (Sept. 12 2008), [http://www.forbes.com/2008/09/12/google-general-electric-ent-tech-cx\\_mf\\_0912\\_universitypatent.html](http://www.forbes.com/2008/09/12/google-general-electric-ent-tech-cx_mf_0912_universitypatent.html), *archived at* <http://perma.cc/WMV3-YCRR>; AUTM FY2009, *supra* note 37, at 37.

167. *See* Thursby et al., *Objectives*, *supra* note 10, at 62; Thursby & Thursby, *University Licensing*, *supra* note 23, at 625-26.

168. *See* Thursby et al., *Objectives*, *supra* note 10, at 62 (“71% of licensed inventions are viewed as requiring inventor cooperation for commercial success.”).

169. Eisenberg, *supra* note 29, at 24; Seymore, *supra* note 97, at 9.

170. Tyler, *supra* note 25, at 174-79.

171. Carter-Johnson, *supra* note 41, at 18-19.

assumption that the two choices are incompatible.<sup>172</sup> However, publication and university commercialization can and should co-exist. At least in the United States, publication is not a complete bar to obtaining a patent; rather publication triggers a one-year statutory window for filing a patent.<sup>173</sup> Coming changes in patent laws by the America Invents Act will largely leave in place a one-year grace period for filing after publications and presentations by the inventors.<sup>174</sup>

### III. SPECIAL PROBLEMS FOR NON-FACULTY INVENTORS

A flaw in current research on disclosure incentives is that the research tends to consider the academic inventors to be a monolithic block. Too often, scholarly articles have considered only faculty researchers in their analysis of incentivization impacts, and indeed, any other effects of technology transfer as well.<sup>175</sup> Specifically, these studies focus on how to best incentivize faculty inventors.<sup>176</sup>

The reality, however, is that large contingents of researchers in a university are students, post-doctoral researchers, research associates, and technicians.<sup>177</sup> These researchers may also be inventors, either alone or as co-inventors with a faculty researcher. Authors investigating incentivization of academic researchers rarely consider situations in which multiple inventors are listed or how incentivization schemes may fail when the primary inventor is a member of a laboratory and working for the faculty inventor. Due to this lack of previous interest, no available empirical data concentrates on the incentivization of non-faculty inventors.

#### *A. Importance of Non-Faculty Disclosure*

Due to the lack of research on incentives for non-faculty researchers, it is difficult to put a concrete number on the quantity of university inventions that faculty and non-faculty co-inventors create. However, it is clear that non-faculty inventors are listed on university patents, and lawsuits exist based on claims by graduate students and post-doctoral fellows who were excluded as inventors.<sup>178</sup> Therefore, non-faculty researchers are inventors in the university research system. These non-faculty inventors should be brought into the technology transfer system on a larger scale.

Hollywood tends to portray the inventor as a lone genius toiling away by himself to create the next great innovation, but today's reality is quite different.

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172. *See supra* Part II.B.1.

173. 35 U.S.C. § 102(b) (2006).

174. 35 U.S.C. § 102(b) (2006), *amended by* Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 3, 125 Stat. 284 (2011).

175. *See, e.g.,* Friedman & Silberman, *supra* note 73, at 20 (analyzing faculty incentives); Markman & Noh, *supra* note 36, at 354.

176. *Id.*

177. Seymore, *supra* note 97, at 5.

178. *Id.* at 9-10.

Most modern research performed both in industry and in academia is done within collaborative research groups.<sup>179</sup> The members of these groups may make up part or all of a single laboratory or even multiple laboratories, and this situation often results in multiple inventors associated with a single invention.<sup>180</sup>

More than 70% of licenses from TTOs rely on disclosures from the life sciences fields.<sup>181</sup> Within a standard academic biomedical or life sciences laboratory, the faculty researcher, also known as the principal investigator, determines the overall research direction of the laboratory, develops a research team, and is ultimately responsible for obtaining funding for the laboratory.<sup>182</sup> Principal investigators rarely perform experiments or are even involved in the day-to-day direction of a research project but are often involved in conceptual issues.<sup>183</sup> Research assistants, post-doctoral researchers, and graduate students most often conduct the day-to-day direction of discreet projects and experiments.<sup>184</sup>

Generally, post-doctoral fellows, research assistants, and technicians are considered employees of the university, working under the principle investigator.<sup>185</sup> Therefore, they would be subject to the same university intellectual property policies as the faculty researcher, including assignment of innovations developed with federal funding or university resources.<sup>186</sup> Students and graduate students are often required to agree to a similar or the same policy to work in the laboratory.<sup>187</sup> Therefore, all likely inventors would be under a duty

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179. See ROBERT PATRICK MERGES & JOHN FITZGERALD DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 1255 (Matthew Bender 3d ed. 2002); Seymore, *supra* note 97, at 130-32.

180. Seymore, *supra* note 97, at 135.

181. *The Bayh-Dole Act: A Guide to the Law and Implementing Regulations*, UNIV. OF CAL. TECH. TRANSFER, <http://www.ucop.edu/ott/faculty/bayh.html>, archived at <http://perma.cc/LFL-7CU8> (last visited May 21, 2014) [hereinafter *The Bayh-Dole Act*] (“70% of the active licenses of responding institutions are in the life sciences. . .”).

182. See Carter-Johnson, *supra* note 41, at 478-81.

183. *Id.* at 478-79.

184. *Id.* at 478-80.

185. *Id.* at 479.

186. See, e.g., *Policy on Inventions, Patents, and Technology Transfer*, DUKE UNIV., [http://olv.duke.edu/Inventors/PoliciesAndProcedures/policy\\_on\\_inventions.pdf](http://olv.duke.edu/Inventors/PoliciesAndProcedures/policy_on_inventions.pdf), archived at <http://perma.cc/8KBK-AS2Q> (last visited May 21, 2014) (“Inventions resulting from research or other work conducted by university employees in whole or in part on university time or with significant use of university funds or facilities shall be considered the property of the university.”); *Wash U IP Policy*, *supra* note 48 (“[A]ll intellectual property (including lab notebooks, cell lines, software, human samples, and other tangible research property) shall be owned by the University if significant University resources were used or if it is created pursuant to a research project funded through corporate, federal or other external sponsors administered by the University.”).

187. See, e.g., *Wash U IP Policy*, *supra* note 48 (“This Policy applies to faculty, staff (including student employees), graduate students, post-doctoral fellows, and non-employees (including visiting faculty, affiliate and adjunct faculty, industrial personnel, fellows, etc.) who participate in research projects at Washington University.”).

to assign inventions to the university.

Building on the fact that laboratory research is a highly collaborative process and even in cases where post-doctoral fellows and graduate students have no conceptual input to the invention, they are still integral to the overall process.<sup>188</sup> As the front-line laboratory workers directing the day-to-day workings of scientific projects, graduate students and post-doctoral fellows may in many cases be the most important link in the disclosure chain, recognizing and alerting the faculty researcher to potentially commercializable innovations.<sup>189</sup> However, in many cases, post-doctoral fellows and graduate students are adding conceptually and creatively to an inventive idea, making them at least co-inventors with the faculty researchers.<sup>190</sup> These determinations of inventorship are not easy for non-patent attorneys. The discussion of some basic invention scenarios in Part I.B.2 illustrates that inventorship may change based on the research path to creation. However, the inventive process is likely even more complex than those basic scenarios.

Imagine a principle investigator in a laboratory who conceives of a new electric motor for a car, including schematics. That principle investigator then enlists a post-doctoral fellow to build a prototype of the new motor. Along the way, the post-doctoral fellow changes some of the motor specifications to comply with federal safety regulations. In addition, at weekly laboratory meetings during the course of final development, two graduate students make suggestions for added ventilation to the motor prototype resulting in increased efficiency.

The inventors of the final invention disclosed to the TTO depend on the claims of the final patent and the level of contribution of each potential co-inventor.<sup>191</sup> While the changes in specification may have been necessary to comply with regulations, if the changes were routine or done under the direction of the principle investigator, the post-doctoral fellow's contributions may not rise to the level of conception.<sup>192</sup> However, post-doctoral fellows often work independently, and the changes in specification could have altered fundamental aspects of the motor; in such a case, the post-doctoral fellow might well be considered a co-inventor of at least some of the claims containing his updated specifications.<sup>193</sup> While the added ventilation may increase efficiency, the main claims may be directed toward the basic electric motor while the added ventilation may only need to be described in one or two very narrow claims. If the added ventilation is included in even one claim, the graduate student with whom that ventilation originated could be listed as a co-inventor on the patent.<sup>194</sup> Importantly, co-inventors of even one claim would have equal co-ownership of

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188. Seymore, *supra* note 97, at 136.

189. *See id.* at 146-47 (giving an example of a post-doctoral researcher disclosing an innovation to a faculty researcher).

190. *Id.* at 136.

191. *See, e.g.*, CHISUM, *supra* note 71, § 2.02(2).

192. *Id.*

193. *Id.*

194. *Id.*

the entire patent with the principle investigator.<sup>195</sup>

Therefore, universities must understand the identity of the inventors if the TTO is to receive complete assignments of the patent rights. As discussed above, ownership of all inventions, even federally funded inventions subject to the Bayh-Dole Act, initially vest with the inventors and must be assigned to the university.<sup>196</sup> Additionally, universities may be subject to substantial liability if an inventor, such as a graduate student, is intentionally excluded from a patent.<sup>197</sup>

This necessity to correctly label inventors, along with the problems with faculty disclosure to the TTOs, should lead universities to consider increasing the involvement of non-faculty inventors into the technology transfer process. As discussed above, graduate students and post-doctoral fellows employed in university research laboratories are under the same duties of disclosure as their faculty-inventor counterparts.<sup>198</sup>

To the extent that TTOs shape monetary incentives for disclosure, graduate student researchers are likely to respond to such incentives due to relatively low salaries for the work completed.<sup>199</sup> A graduate student in the sciences will work in a laboratory full-time for a principle investigator to gather research to write dissertations.<sup>200</sup> Stipends for such research are set based on the grant funding mechanism.<sup>201</sup> The National Institutes of Health (NIH) is the most common funding agency in medical sciences.<sup>202</sup> The 2012 NIH stipend level for full-time

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195. *Id.*

196. *Bd. of Trs. of Leland Stanford Junior Univ. v. Roche Molecular Sys., Inc.*, 131 S. Ct. 2188, 2195-99 (2011).

197. *See, e.g.,* CHISUM, *supra* note 71, §§ 2.03(4)(e), 2.04(4)(a). The new America Invents Act removes the requirement that the inventorship mistake arose through “no deceptive intention” to correct inventorship of an issued patent. Donald S. Chisum, *America Invents Act Analysis and Cross-References* 124, <http://www.chisum.com/wp-content/uploads/AIAOverview.pdf>, archived at <http://perma.cc/WJ5S-9YZX> (last visited May 21, 2014). Therefore, universities may have less risk of patent invalidity due to intentionally ignoring non-faculty inventors. However, challenges based on fiduciary duties of the principle investigators may still be possible.

198. *See The Bayh-Dole Act, supra* note 181.

199. *See, e.g., Why You Shouldn't Pursue a PhD*, THE PRINCETON REVIEW, <http://www.princetonreview.com/grad/why-you-shouldnt-pursue-a-phd.aspx> archived at <http://perma.cc/382N-ATGP> (last visited May 21, 2014).

200. *See, e.g., Research Appointments—Graduate School of Arts and Sciences Programs and Policies 2013-2014*, YALE UNIV., <http://www.yale.edu/printer/bulletin/htmlfiles/grad/financing-graduate-school.html>, archived at <http://perma.cc/5JQF-GNSC> (last visited May 21, 2014).

201. *See, e.g., Funding Mechanisms Supported by NEI*, NAT'L EYE INST., <http://www.nei.nih.gov/funding/neifm.asp>, archived at <http://perma.cc/CET3-WCGE> (last visited May 21, 2014); *Grant Mechanisms and Funding Opportunities*, NAT'L INST. OF MENTAL HEALTH, <http://www.nimh.nih.gov/funding/grant-writing-and-application-process/grant-mechanisms-and-funding-opportunities.shtml>, archived at <http://perma.cc/446G-74TQ> (last visited May 21, 2014).

202. *About NIH*, NAT'L INST. OF HEALTH, <http://www.nih.gov/about>, archived at <http://perma.cc/5G7Y-JT6V> (last visited May 21, 2014).

graduate researchers was \$22,032 per year.<sup>203</sup> Other funding mechanisms pay approximately \$30,000 per year.<sup>204</sup> Postdoctoral fellows receive a slightly larger stipend, earning between \$39,000 and \$55,000 depending on funding mechanism and years of experience, and may also find monetary incentives valuable.<sup>205</sup>

Non-monetary incentives might also influence graduate students and post-doctoral fellows differently than faculty inventors. In most schools having one's name associated with a patent might be considered a bonus but will not likely contribute to tenure promotions.<sup>206</sup> Showing an ability to develop a patentable product might prove useful to a non-faculty inventor whose career trajectory involves industry rather than academia.

Unfortunately, while graduate students and post-doctoral fellows contribute richly to the intellectual life of the university and the creation of new inventions, little to no research has been directed to motivations of non-faculty inventors. It is possible that monetary incentives and non-monetary outreach directed at non-faculty researchers might pay benefits to technology transfer as a whole. However, non-faculty inventors face obstacles to full involvement in the technology transfer aspects of university research.

*B. Academic Research Structure Often Fails to Recognize the Contribution of Non-Faculty Researchers to the Inventive Endeavor*

In light of the importance of non-faculty researchers to technology transfer process as inventors both in creating new technologies and aiding patent procurement and transfer, universities should be embracing these researchers and ushering them into the technology transfer proceedings. In fact, the opposite seems to be true. From the top of the administrative policies to the bottom of the nitty-gritty laboratory work, policies provide incentives solely aimed at faculty

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203. Ruth L. Kirschstein National Research Service Award (NRSA) Stipends, Tuition/Fees and Other Budgetary Levels Effective for Fiscal Year 2012, NAT'L INST. OF HEALTH, <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-12-033.html>, archived at <http://perma.cc/7NFV-NEK7> (last visited May 21, 2014) [hereinafter *Ruth L. Kirschstein NRSA Stipends*]. Undergraduates can expect to receive less than half this amount.

204. The National Science Foundation's Graduate Research Fellowship pays \$32,000. *About the NSF Graduate Research Fellowship Program*, NAT'L SCI. FOUND., [http://www.nsfgrfp.org/about\\_the\\_program](http://www.nsfgrfp.org/about_the_program), archived at <http://perma.cc/VV3B-F98Y> (last visited May 21, 2014). The Department of Defense's National Defense Science and Engineering Graduate Fellowships pay \$30,500 to \$31,500 per year. *National Defense Science and Engineering Graduate Fellowships: Stipends and Allowances*, AM. SOC'Y FOR ENG'G EDUC., [http://ndseg.asee.org/about\\_ndseg/stipends\\_and\\_allowances](http://ndseg.asee.org/about_ndseg/stipends_and_allowances), archived at <http://perma.cc/S73V-HRPW> (last visited May 21, 2014).

205. NIH post-doctoral fellows earn \$39,264 dollars in year one with increases up to \$54,180 in year seven. *Ruth L. Kirschstein NRSA Stipends*, *supra* note 203. NSF post-doctoral fellows similarly make \$45,000 to \$51,000 over the life of a three-year fellowship. *2012 Administrative Guide for the Postdoctoral Fellowships in Biology*, NAT'L SCI. FOUND., [www.nsf.gov/pubs/2012/nsf12089/nsf12089.pdf](http://www.nsf.gov/pubs/2012/nsf12089/nsf12089.pdf) (last visited May 21, 2014).

206. Sanberg et al., *supra* note 112, at 3544-46.

inventors.<sup>207</sup> Within the laboratory, principle investigators, post-doctoral fellows, and graduate student researchers fail to recognize the importance and contribution of the non-faculty inventors.

1. *Faculty May Deny Co-Inventorship of Non-Faculty Researchers.*—It is not uncommon for faculty researchers to deny that non-faculty inventors, particularly graduate and undergraduate students, have any inventive input in the laboratory.<sup>208</sup> Some faculty researchers have blatantly made declarations to the United States Patent Office declaring themselves the sole inventor despite graduate student and post-doctoral researcher co-authors on the very papers at the base of the innovation.<sup>209</sup> While it seems extremely unlikely that a graduate student or post-doctoral researcher directing the day-to-day workings of a project would bring absolutely no conceptual creativity to any part of the claimed invention, this self-serving idea of sole inventorship appears all too common among faculty researchers.<sup>210</sup>

Some scholars have perpetuated this idea, suggesting that graduate students require faculty advisors for research topics, implying a lack of conceptual creativity on the part of those students.<sup>211</sup> Such a view fails to realize that advanced graduate students become faculty members in just a few years.<sup>212</sup>

This attitude of many faculty inventors causes real problems, as illustrated by *Chou v. University of Chicago*.<sup>213</sup> Joany Chou worked for Dr. Bernard Roizman as graduate research assistant and a post-doctoral fellow at the University of Chicago's Department of Molecular Genetics and Cell Biology.<sup>214</sup> During her time in the laboratory, Dr. Chou disclosed an invention to Dr. Roizman.<sup>215</sup> Although Dr. Roizman filed a patent on the invention, he informed Dr. Chou that the invention had no commercial value and was not worth pursuing patent

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207. See, e.g., Clements, *supra* note 95, at 497.

208. See Seymore, *supra* note 97, at 143.

209. See *Chou v. Univ. of Chi.*, 254 F. 3d 1347, 1362 (Fed. Cir. 2001); Seymore, *supra* note 97, at 147. This author concedes that not every author listed on a scientific paper contributed to every aspect of the paper. Therefore, it is quite possible that an invention would not list every co-author as an inventor. But it is also unlikely that an invention based on the work of several co-authors is the sole and complete conception of only one person.

210. CORYNNE MCSHERRY, WHO OWNS ACADEMIC WORK? BATTLING FOR CONTROL OF INTELLECTUAL PROPERTY 183 (2001) (quoting a faculty researcher describing inventorship in his laboratory: "I think there's rarely more than one inventor . . . [I]f you wake up and you have an idea, that's the invention. . . . [The postdoctoral researchers] contribute to the work [around the idea], but they don't do any really innovative work [such as] contributing new concepts, [or] coming up with something that, in my lab, I haven't thought about.")

211. See, e.g., Clements, *supra* note 95, at 508-09.

212. See, e.g., *id.* at 497 (suggesting that graduate students need receive no incentives to invent beyond their yearly stipend, perhaps due to the idea that faculty members are the true inventors within the laboratory).

213. 254 F. 3d 1347 (Fed. Cir. 2001).

214. *Id.* at 1353.

215. *Id.*

protection.<sup>216</sup> Dr. Chou alleged that Dr. Roizman eventually fired her for pressing her claim as inventor on the patent upon uncovering its existence.<sup>217</sup> After leaving his laboratory, Dr. Chou sued Dr. Roizman, the University of Chicago, and ARCH Development Corporation, the University of Chicago's licensing arm, for correction of inventorship in order to have her name added to the patent as a co-inventor.<sup>218</sup> The university technology transfer policy provided for inventors to receive twenty-five of the revenue from a patent license, as well as stock in any company based on the patented technology.<sup>219</sup> As a co-inventor, Dr. Chou would have been entitled to a portion of the profits that Dr. Roizman had received.<sup>220</sup> On appeal, the Federal Circuit held that Dr. Roizman had a fiduciary duty to his student with regards to giving her credit as co-inventor on the patent application.<sup>221</sup> Although the case seems to have settled after the appeal so Dr. Chou's inventorship status was never adjudicated, USPTO data indicates that "Correction of Inventorship Papers" were filed in September 2003<sup>222</sup> along with an assignment by Joany Chou to ARCH Development.<sup>223</sup>

These sorts of problems between faculty and non-faculty inventors can be viewed as power imbalances that affect the ability of the non-faculty inventor to negotiate inventorship credit and a share of the licensing revenue.<sup>224</sup> Power imbalances are common in negotiations and are particularly prevalent in situations of employee negotiations with employer.<sup>225</sup> This idea of power in negotiations can be defined as the ability to influence the decisions of the other party and can be determined by the relative dependencies of the parties on each other.<sup>226</sup> The sources of this negotiating power are myriad and include individual characteristics such as charisma and negotiating skill, or situational characteristics such as relative positions within a company, *i.e.* a job applicant and a manager.<sup>227</sup> While courts have explicitly considered negotiation power imbalances in unconscionability and duress analyses in contract law, other applications are far

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216. *Id.* at 1353-54.

217. *Id.*

218. *Id.* at 1354.

219. *Id.* at 1353.

220. *Id.*

221. *Id.* at 1362-63.

222. *Pair Database, Transaction History for Patent 5,328,688*, U.S. PATENT AND TRADEMARK OFFICE, <http://portal.uspto.gov/pair/PublicPair>, archived at <http://perma.cc/HU5S-SDT6> (last visited May 21, 2014).

223. *Patent Assignment Database for Patent 5,328,688*, U.S. PATENT AND TRADEMARK OFFICE, <http://assignments.uspto.gov/assignments>, archived at <http://perma.cc/8XWF-HA42> (last visited May 21, 2014).

224. For a detailed review of power imbalances in negotiation and legal contracts, see Daniel D. Barnhizer, *Inequality of Bargaining Power*, 76 U. COLO. LAW. REV. 139, 146-47 (2005).

225. See Rebecca J. Wolfe & Kathleen L. McGinn, *Perceived Relative Power and Its Influence on Negotiation*, 14 GROUP DECISION AND NEGOTIATION 3, 5 (2005).

226. See *id.*; Barnhizer, *supra* note 224, at 159.

227. See *id.* at 166-68; Wolfe & McGinn, *supra* note 225, at 4-5.



more subtle and difficult to analyze.<sup>228</sup>

While no real research has been conducted on the exact situation of non-faculty researchers bargaining over invention credit and incentive share with faculty researchers, general research on power imbalances in negotiations can be revealing.<sup>229</sup> Power imbalances exist in most relationships and are particularly evident in employment situations, though the extent of imbalance depends on numerous factors.<sup>230</sup> A low-skill factory worker may have little power in comparison to a factory manager as the worker is likely seen as easily replaceable; however, a highly skilled worker in a tight labor market has considerably more power in her relationship with her manager.<sup>231</sup>

In negotiations between faculty researchers and those non-faculty researchers working in their laboratories, this power imbalance is often exacerbated. More so than in many employment situations, the faculty researcher holds a great deal of power over the future career prospects of post-doctoral fellows and students in their laboratories.<sup>232</sup> Due to the apprentice-like structure of graduate science programs, the faculty member controls degree prospects of students and publishing abilities of both students and post-doctoral fellows.<sup>233</sup> For the non-faculty researcher, this relationship makes bargaining for inventorship credit and splits of revenue problematic as the faculty member has a great amount of perceived power over the non-faculty researcher. This extreme, perceived power imbalance may result in the avoidance of conflict and lack of disclosure by non-faculty researchers.

Negotiations can be seen as two distinct types, distributive or integrative, but many real world negotiations will have aspects of both types.<sup>234</sup> Distributive negotiations are characterized by a fixed outcome range in which both parties value the available resource equally, with the differences in outcome being which party leaves the negotiation with the majority of the resource.<sup>235</sup> Distributive

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228. Barnhizer, *supra* note 224, at 146-47.

229. Wolfe & McGinn, *supra* note 225, at 4.

230. *Id.* at 1.

231. *Id.* at 4-5.

232. Herman Aguinis et al., *Power Bases of Faculty Supervisors and Educational Outcomes for Graduate Students*, 67 J. HIGHER EDUC. 267, 268 (1996).

233. *Id.*

234. Bruce Barry & Raymond A. Friedman, *Bargainer Characteristics in Distributive and Integrative Negotiation*, 74 J. PERSONALITY & SOC. PSYCH. 345, 348 (1998). For detailed discussions of distributive and integrative bargaining, see, e.g., ROGER FISHER & WILLIAM URY, *GETTING TO YES: NEGOTIATING AGREEMENT WITHOUT GIVING IN* (1981) (in which the authors describe a “principled negotiation” method that focuses on the integrative bargaining characteristic of searching for ways to create value in a negotiation); DAVID A. LAX & JAMES K. SEBENIUS, *THE MANAGER AS NEGOTIATOR: BARGAINING FOR COOPERATION AND COMPETITIVE GAIN* (The Free Press 1986); RICHARD E. WALTON & ROBERT B. MCKERSIE, *A BEHAVIORAL THEORY OF LABOR NEGOTIATIONS: AN ANALYSIS OF A SOCIAL INTERACTION SYSTEM* (Cornell University Press 1991).

235. Barry & Friedman, *supra* note 234, at 346; Sidharth Thakur & Jean Scheid, *Comparing Distributive and Integrative Negotiation Strategies*, BRIGHT HUB PM (Apr. 15, 2011), <http://www.brighthub.com/entry/2011/04/15/comparing-distributive-and-integrative-negotiation-strategies>.

negotiations are zero-sum negotiations, often involving money, a resource equally valued by each side.<sup>236</sup> Integrative negotiation occurs when the parties are able to produce a greater outcome range by cooperating and sharing information than would be evident on the surface and is characterized by a problem solving approach by the participants.<sup>237</sup> In integrative bargaining situations, there is often an ongoing or desired future relationship of the parties.<sup>238</sup>

At first glance, a negotiation between a faculty inventor and student inventor over which party gets how much of the incoming revenue from a patent license would appear to be strictly distributive, as there is a fixed amount of licensing revenue involved. However, because the parties are likely to have an ongoing relationship if the student or post-doctoral fellow continues to work in the principle investigator's laboratory, integrative bargaining may be possible.

Unfortunately, integrative bargaining can be time and resource intensive, and the skills required for successful integrative bargaining are not intuitive.<sup>239</sup> Many studies suggest that more integrative outcomes, *i.e.* outcomes with higher joint gains, result more often in situations where power distribution in the negotiation is equal than where power is unequal.<sup>240</sup> Some studies, however, demonstrate that integrative outcomes are indeed possible in situations of power imbalance but require the lower power negotiator to push for a cooperative solution.<sup>241</sup> This would require negotiation skill and, perhaps more importantly for this discussion, a willingness to face overt conflict with the higher-powered party—neither of which the non-faculty inventor is likely to have.<sup>242</sup>

A recent case also illustrates the potential power imbalance inherent in the laboratory structure. Frederic A. Stern sued Columbia University to be added as an inventor on a patent filed after he left the laboratory of Dr. Lazlo Bito.<sup>243</sup> The Federal Circuit upheld the district court's opinion that Stern failed to produce sufficient evidence of inventorship.<sup>244</sup> Although the Federal Circuit mentioned that unwitnessed laboratory notebooks would not have been sufficient alone to

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[brighthubpm.com/methods-strategies/114091-comparing-distributive-and-integrative-negotiation-strategies/](http://brighthubpm.com/methods-strategies/114091-comparing-distributive-and-integrative-negotiation-strategies/), archived at <http://perma.cc/YQ4K-PDDP>.

236. *Id.*

237. Barry & Friedman, *supra* note 234, at 348, 357.

238. Thakur & Scheid, *supra* note 235.

239. *See, e.g.*, Russell Korobkin, *Against Integrative Bargaining*, 58 CASE W. RES. L. REV. 1324 (2008).

240. *See, e.g.*, Elizabeth A. Mannix & Margaret A. Neale, *Power Imbalance and the Pattern of Exchange in Dyadic Negotiation*, 2 GROUP DECISION AND NEGOTIATION 119 (1993); Leigh McAlister et al., *Power and Goal Setting in Channel Negotiations*, 23 J. OF MARKETING RES. 238 (1986); J. P. Sheposh, & P. S. Gallo, *Asymmetry of Payoff Structure and Cooperative Behavior in the Prisoner's Dilemma Game*, 17 J. CONFLICT RESOL. 312 (1973); Wolfe & McGinn, *supra* note 225, at 5.

241. *See, e.g.*, Mannix & Neale, *supra* note 240, at 121.

242. *See id.*

243. *Stern v. Trs. of Columbia Univ.*, 434 F.3d 1375, 1376 (Fed. Cir. 2006).

244. *Id.* at 1378.

prove inventorship,<sup>245</sup> Stern never had the chance to enter his laboratory notebooks into evidence.<sup>246</sup> Dr. Bito had destroyed them.<sup>247</sup> While the outcome may not have changed if the laboratory notebooks had been offered into evidence, the control over and destruction of the laboratory notebooks by Dr. Bito is another example of the power that the principle investigator of a laboratory holds.

2. *University Policies Do Not Fully Account for Non-Faculty Inventors.*— While the power imbalance plays a role in the involvement of non-faculty inventors in the technology transfer process, the university intellectual property (IP) policy also greatly impacts that involvement. Almost all university policies recognize that non-faculty researchers are potential inventors and provide for revenue sharing for that population.<sup>248</sup> Unfortunately, universities do not recognize any differences in the incentives for faculty versus non-faculty researchers, nor do they recognize the power imbalance between the two populations.<sup>249</sup>

University intellectual property policies often give little attention to the potential problems inherent in multiple inventor situations. For example, the policy of the University of Illinois, a large research university, indicates that in the case of multiple inventor innovations, the innovators should split the royalty allotment given as incentives to the inventor(s).<sup>250</sup> The proportions are left for the inventors to work out themselves. Alternatively, Washington University in St. Louis, another major research university, uses the presumption that co-inventors split licensing revenue shares equally but leaves open the availability of an agreement to a different revenue split between co-inventors.<sup>251</sup> As a result, the principal investigator may demand a larger share of the revenue split. Most policies do have a dispute resolution provision, but this still requires that the laboratory worker be willing to risk dispute with their principal investigator.<sup>252</sup>

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245. *Id.* (citing *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1378 (Fed. Cir. 1986)).

246. *Id.*

247. *Id.* Defendants claimed the notebook was destroyed when Dr. Bito retired. *Stern v. Trs. of Columbia Univ.*, No. 01 CIV 10086RCC 2005 WL 398495, at \*1, \*7 (S.D.N.Y. Feb. 18, 2005), *aff'd*, *Stern*, 434 F.3d 1375.

248. See *General Rules Concerning University Organization and Procedure: Article III. Intellectual Property*, UNIV. OF ILL., <http://www.bot.uillinois.edu/sites/bot.uillinois.edu/files/bot-files/General-Rules-1-24-13.pdf>, archived at <http://perma.cc/5HHU-MKFL> (last visited May 21, 2014) [hereinafter *U Illinois IP Policy*]; *Wash U IP Policy*, *supra* note 48.

249. See *U Illinois IP Policy*, *supra* note 248; *Wash U IP Policy*, *supra* note 48.

250. *U Illinois IP Policy*, *supra* note 248 (“If there are joint creators, the net income shall be divided among them as they shall mutually agree. Should the creators fail to agree mutually on a decision, the University shall determine the division.”).

251. See *Wash U IP Policy*, *supra* note 48 (“If there is more than one Creator, each receives an equal portion of the Creator’s Share, unless co-Creators agree to a different distribution.”).

252. Washington University in St. Louis, for instance, includes a rather common outline for dispute resolution among inventors. It reads:

Any disputed issues related to intellectual property, or the interpretation of the

While university IP policies cover all inventors on the surface, the policies do not address the difference among the types of inventors, but rather treat all inventors as though they have similar motivations and pressures. For instance, non-faculty inventors likely will be indifferent to some incentives directed to faculty inventors. Moreover, the university policies fail to address the power imbalance inherent in the faculty/graduate-student relationship and its impact on the co-inventor relationship.

Even though non-faculty researchers are included in the inventor revenue-sharing provisions of the university IP policies, those provisions may still have greater benefits for the faculty co-inventors. University IP policies often direct a portion of the licensing revenue to the inventor's laboratory.<sup>253</sup> Once the money is directed to the laboratory, the principle investigator is in charge of disbursement of the funds for research.<sup>254</sup> Unless use of the funds by a graduate student or post-doctoral fellow co-inventor was specifically negotiated in advance,<sup>255</sup> the co-inventor may never see the extra funds funneled to her project. In addition, the funds may not materialize until after the co-inventor has left the laboratory.<sup>256</sup> Graduate students in science average five to seven years in laboratory research spent toward the Ph.D.<sup>257</sup> Post-doctoral fellows are often limited to a set number of years through funding mechanisms.<sup>258</sup> Patent licenses,

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Washington University Intellectual Property Policy, shall first be reviewed by the OTM. Any disputed issues that cannot be resolved with the assistance of the OTM shall be referred to the Vice Chancellor for Research. The Vice Chancellor for Research may refer disputed issues to a Faculty Oversight Committee on Technology Transfer for its recommendations and advice. The Vice Chancellor for Research is the final arbiter of any disputed issues related to intellectual property, income distribution or the interpretation of the Policy.

*Wash U IP Policy*, *supra* note 48.

253. See *U Illinois IP Policy*, *supra* note 248; *U Wash IP Policy*, *supra* note 48.

254. For example, in defining the term Laboratory and Laboratory Share in its technology transfer policy, the University of Chicago acknowledges that the laboratory is "supervised by a Principal Investigator who may or may not be an INVENTOR." The University of Chicago License Revenue Sharing Policy, [http://tech.uchicago.edu/docs/revenue\\_distribution\\_policy.pdf](http://tech.uchicago.edu/docs/revenue_distribution_policy.pdf) (last visited June 9, 2014).

255. Such negotiation for use of laboratory funds would also involve the power imbalance discussed above. See Aguinis et al., *supra* note 232, at 268.

256. Inventors who leave the university may continue to receive individual portions of the revenue sharing, but the laboratory share is often defined as the laboratory where the research took place and thus stays with the university. The University of Chicago License Revenue Sharing Policy, *supra* note 254.

257. Jessica Stoller-Conrad, *The 5-Year PhD: An Endangered Species?*, FIGURE ONE (Jan. 22, 2013), <http://figureoneblog.wordpress.com/2013/01/22/the-5-year-phd-an-endangered-species/archived-at-http://perma.cc/5W9E-GD6R>.

258. For example, "[t]he Kirschstein-NRSA for Individual Predoctoral Fellows will provide up to five years of support for research training which leads to the PhD or equivalent research degree." *Ruth L. Kirschstein National Research Service Awards for Individual Predoctoral*

especially ones negotiated with small start-up companies, may not bear revenue for several years after execution.<sup>259</sup> Assuming that the invention takes some amount of time to create, disclose and negotiate a license, a non-faculty co-inventor may have moved to the next stage of her career before that money would return to the laboratory.

In addition, the university IP policies do not give specific attention to situations in which one inventor, such as a graduate student, may work in the laboratory of another inventor, such as a faculty researcher. Instead, most policies leave it to the inventors to divide the licensing revenue share among all co-inventors, either initially or in lieu of a default equal split.<sup>260</sup> In either situation, the graduate student would be in an extremely weak bargaining position.

As discussed above, the principal investigator of a laboratory wields considerable influence over a graduate student in the principal investigator's laboratory. To advance in her career, the primary need of a graduate student is to attain her Ph.D.<sup>261</sup> In scientific academia, the Ph.D. is the key to the kingdom, giving access to the premier jobs in both industry and academia<sup>262</sup>. Furthermore, to advance in their careers, graduate students need to publish their work and receive a recommendation from their principal investigator.<sup>263</sup> Each of these potential levers adds to the power imbalance and makes it unlikely that a graduate student would challenge their principal investigator over inventorship or issues of allotment of any *potential* licensing revenue.

Conflict with their principal investigator over unrealized inventorship credit and incentives may be considered by the student an unnecessary risk, with failure to disclose and abandonment of patent protection being the wiser choice. In the case of Joany Chou discussed above, Dr. Chou alleged that she was fired when she pressed her principle investigator to include her as an inventor on a specific patent.<sup>264</sup> The tale of Petr Taborsky is far worse. As an undergraduate student,

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*MD/PhD and Other Dual Doctoral Degree Fellows (Parent F30)*, NAT'L INST. FOR HEALTH, <http://grants1.nih.gov/grants/guide/pa-files/PA-11-111.html>, archived at <http://perma.cc/GNT6-7ZF6> (last visited May 21, 2014).

259. Yumiko Hamano, *Commercialization Procedures: Licensing, Spin-offs and Start-ups*, WORLD INTELLECTUAL PROPERTY ORG. (2011), [http://www.wipo.int/edocs/mdocs/aspac/en/wipo\\_ip\\_han\\_11/wipo\\_ip\\_han\\_11\\_ref\\_t7b.pdf](http://www.wipo.int/edocs/mdocs/aspac/en/wipo_ip_han_11/wipo_ip_han_11_ref_t7b.pdf), archived at <http://perma.cc/352H-JULL>.

260. See *U Illinois IP Policy*, *supra* note 248; *U Wash IP Policy*, *supra* note 48.

261. *The Disposable Academic*, ECONOMIST (Dec. 16, 2010), <http://www.economist.com/node/17723223>, archived at <http://perma.cc/P5L3-3QV9>.

262. *Id.*

263. Robert Bochnak, *Graduate Student Guide to Publishing Your Research*, TUFTS UNIV. GRADUATE SCH. FOR ARTS AND SCIENCES (Feb. 2, 2012), <http://sites.tufts.edu/gradmatters/2012/02/08/graduate-student-guide-to-publishing-your-research/>, archived at <http://perma.cc/RT76-BZNK>. (“Publishing can help students land postdocs or tenure-track faculty positions, enhance the status of students in their field of study, and boost job prospects, especially in fields outside of academia.”).

264. See *supra* Part III.B.1.

Dr. Taborsky<sup>265</sup> worked in Dr. Carnahan's laboratory at the University of South Florida conducting research on wastewater treatment.<sup>266</sup> Both the university and Dr. Taborsky claimed ownership of his invention.<sup>267</sup> As a result of the dispute, the university filed criminal charges of theft of intellectual property,<sup>268</sup> and Dr. Taborsky's United States citizenship application was put on hold.<sup>269</sup> After trial and a refusal to sign his issued patents over to the university,<sup>270</sup> Dr. Taborsky was sentenced to three and a half years in prison,<sup>271</sup> two months of which was spent in a maximum security facility and involved work on a chain gang, and fifteen years of probation.<sup>272</sup> Such a tale serves as an example of the power imbalance between the university system and students and a warning against students fighting for the ownership of their works.

Therefore, an emphasis on creating more incentives directed toward faculty researchers will not similarly incentivize other inventors. In fact, more faculty incentives may exacerbate the problems that faculty have in acknowledging non-faculty contributions. If universities wish to develop policies with incentives directed at all inventors, those policies must address the different perspectives and problems encountered by each.

#### IV. BAYH-DOLE ACT AND TTO REFORM PROPOSALS SHOULD ACCOUNT FOR THE DIVERSITY OF INTERESTS OF THE POTENTIAL INVENTORS

##### *A. Current Proposals to Reform Bayh-Dole Act Generally Fail to Account for Non-Faculty Inventors*

In recent years, numerous authors have proposed reforms to correct perceived ills in the current academic technology transfer system.<sup>273</sup> Only a few of these

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265. Dr. Taborsky went on to earn his Ph.D. in chemistry and is now an assistant professor at Masaryk University in the Czech Republic. See *Mgr. Petr Táborský, Ph.D.*, MASARYK UNIV., <http://www.muni.cz/people/13423>, archived at <http://perma.cc/QDF4-BMA5> (last visited May 21, 2014).

266. *Taborsky Case Study: Wastewater Treatment*, IPADVOCATE.ORG (Jan. 6, 1989), <http://www.ipadvocate.org/studies/taborsky/Taborsky.pdf>, archived at <http://perma.cc/62GS-KVCT>.

267. *Id.*

268. *Id.*

269. Lisa Holewa, *Patent Dispute Puts Scientist on Chain Gang*, L.A. TIMES (July 7, 1996), [http://articles.latimes.com/1996-07-07/news/mn-21853\\_1\\_chain-gang](http://articles.latimes.com/1996-07-07/news/mn-21853_1_chain-gang), archived at <http://perma.cc/JH4R-UC9W>.

270. Based on his research, Dr. Taborsky was awarded patent numbers 5,082,813, 5,304,365 and 5,162,276. *Inventor: Petr Taborsky*, PATENTSTORM, [http://www.patentstorm.us/inventors-patents/Petr\\_Taborsky/2315154/1.html](http://www.patentstorm.us/inventors-patents/Petr_Taborsky/2315154/1.html), archived at <http://perma.cc/3636-WVN2> (last visited May 21, 2014).

271. Holewa, *supra* note 269.

272. *Id.*

273. For example, some authors have recommended that all university innovations should

proposals are directed, even in part, at the methods of incentivizing non-faculty academic researchers to disclose to the TTO and assist in the commercialization of their inventions. Some discussions go so far as to insist that such considerations are unnecessary.<sup>274</sup>

Some authors and courts have discussed the role of faculty researcher and members of their labs as a fiduciary relationship.<sup>275</sup> A fiduciary duty places a burden on the faculty researcher to refrain from acting selfishly at the expense of members of her laboratory. Anthony Luppino has suggested that a solution to faculty/student ownership disputes is added emphasis and training of faculty members about their potential fiduciary duties.<sup>276</sup> Unfortunately, this solution concentrates solely on faculty and ignores training of students and other laboratory members in their own rights and responsibilities, such as disclosure to the TTO. Luppino's solution further neglects to address the idea that there may be honest disagreement as to inventorship between faculty and non-faculty inventors. The complexity of patent law on inventorship and the lack of training make it difficult to believe that faculty members will always reach the correct solution, even if acting with complete openness and integrity. In the event of either an intentional or non-intentional fiduciary failure on the part of the faculty researcher, the laboratory member must still engage in open dispute with the faculty inventor, endangering their career prospects in the process.

A proposal that has received much attention in recent years is that of eliminating TTOs and vesting full control and ownership of the patentable invention with the inventor.<sup>277</sup> The rationale is that the inventor best understands the invention and its potential, and therefore, the inventor is in the best position to exploit this potential.<sup>278</sup> Supporters claim that this "Inventor-Ownership" proposal would reduce transaction costs, allowing the inventor control of the

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become public domain, as was accomplished by researchers developing the Human Genome Project. See Jorge L. Contreras, *Data Sharing, Latency Variables, and Science Commons*, BERKELEY TECH. L. J. 1601 (2010); Rebecca Goulding et al., *Alternative Intellectual Property for Genomics and the Activity of Technology Transfer Offices: Emerging Directions in Research*, 16 B. U. J. SCI. & TECH. L. 194, 212-14 (2010). Other authors have proposed the use of only non-exclusive licensing by TTOs. See Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663 (1996); Martin Kenney & Donald Patton, *Reconsidering the Bayh-Dole Act and the Current University Invention Ownership Model*, 38 RES. POL'Y 1407, 1417-18 (2009).

274. See, e.g., James D. Clements, *Improving Bayh-Dole: A Case for Inventor Ownership of Federally Sponsored Research Patents*, 49 IDEA 469, 497 (2009).

275. See, e.g., *Chou v. Univ. of Chi.*, 254 F.3d 1347, 1362-63 (Fed. Cir. 2001); Seymore, *supra* note 97, at 149-51.

276. Luppino, *supra* note 97, at 424-25.

277. For variations of this proposal, see, e.g., Clements, *supra* note 95; Martin Kenney & Donald Patton, *Reconsidering the Bayh-Dole Act and the Current University Invention Ownership Model*, 38 RES. POL'Y 1407, 1414 (2009); Robert E. Litan & Lesa Mitchell, *A Faster Path from Lab to Market*, Jan-Feb HARV. BUS. REV. 52 (2010).

278. See Kenney & Patton, *supra* note 277, at 1414.

process to continue commercial development herself or to license the invention.<sup>279</sup> Some variations of the proposal suggest that the inventor could also choose a third-party agent for licensing purposes.<sup>280</sup>

One outlier that does at least consider the role of non-faculty inventors is the American Association of University Professors (AAUP). The AAUP has recently issued final version of a report proposing sweeping new guidelines for the relationship between the university and faculty in response to an invention made using university resources or grants.<sup>281</sup> In many ways the report mirrors the Inventor-Ownership proposal in that it champions the faculty member's control and ownership of inventions created in her laboratory; however, the report does at least acknowledge non-faculty IP interests in limited ways.

The AAUP proposal is set forth as a list of Principles for universities to follow in dealing with research. Principle Eleven champions the Inventor-Ownership model and the "faculty member's fundamental rights to direct and control . . . invention management, licensing, commercialization, dissemination and public use."<sup>282</sup> Furthermore, the Principle 12 of the proposal encourages universities to use faculty senates to draft the procedures for technology transfer, giving the utmost control of such procedures to the faculty inventors.<sup>283</sup>

Within this framework emphasizing the faculty ownership, the report does acknowledge non-faculty contributions. Principles 10 and 13 recommend that non-faculty researchers have access to grievance procedures if "they believe their inventor or other IP rights have been violated."<sup>284</sup> The report further recommends that students not be required to give up IP rights as part of admission to a degree program.<sup>285</sup> Finally, if there is a conflict of interest, including a financial conflict of interest, Principle 9 calls for impartial academic evaluation while Principles 8 and 10 recommend disclosure of the conflict and a grievance procedure.<sup>286</sup>

Even these references to student and non-faculty rights are not entirely without bias. While Principle 13 acknowledges that there will be disputes that need to be adjudicated, it charges the licensing agent to take into account the interests of the "faculty inventors," the institution and even the broader public.<sup>287</sup> Furthermore, the proposal advocates the faculty senate as the body to adjudicate disputes—certainly not a completely unbiased body as to inventorship disputes between faculty and students.<sup>288</sup> The Inventor-Ownership proposal may indeed

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279. See Martin Kenney & Donald Patton, *Reconsidering the Bayh-Dole Act and the Current University Invention Ownership Model*, 38 RES. POL'Y 1407, 1408 (2009)

280. See, e.g., Litan, *supra* note 277.

281. American Association of University Professors, *Recommended Principles to Guide Academy-Industry Relationships* (Univ. of Ill. Press 2014) [hereinafter *Recommended Principles*].

282. *Id.* at 8.

283. *Id.*

284. *Id.* at 7, 9.

285. *Id.* at 9.

286. *Id.* at 7.

287. *Id.* at 9.

288. *Id.*



eliminate some impediments to disclosure, such as a distrust of the competency and motivations of the TTO, fear of TTO-imposed publication delays, and failures to disclose due to inadequate monetary incentive.<sup>289</sup> However, the Inventor-Ownership proposal would not alter, and indeed may exacerbate, issues of failure to disclose or commercialize due to philosophical reasons related to communalism.<sup>290</sup>

The Inventor-Ownership proposal may also increase the conflicts developed in multiple-inventor situations. This would be particularly true when one of the inventors is a faculty researcher and others are non-faculty researchers. To the extent that the Inventor-Ownership model explicitly focuses on *faculty* inventor ownership, it does nothing to address the problems related to faculty inability to acknowledge non-faculty inventorship and may exacerbate the problem. Now the faculty and non-faculty inventor are not fighting over a split of small share of revenue but over ownership of the patent and all revenue associated with it. Some supporters of this Inventor-Ownership proposal have alluded to this issue. But they have not provided a resolution, preferring instead to proclaim that it would not actually *increase* the “exploitation of students.”<sup>291</sup> This notion is incorrect because discarding the TTO would remove the current primary possibility of a neutral arbitrator and educator of non-faculty researchers as to their rights and obligations in academic technology transfer. The AAUP report acknowledges disputes that need to be adjudicated but its primary adjudication body is the faculty senate.<sup>292</sup>

It is perhaps surprising that the AAUP, a group dedicated to faculty governance and composed primarily of faculty members, is the best promoter of the concept that faculty are not the sole inventors—especially in light of the fact that the other proposals discussed above are based upon mostly disinterested parties looking into the university system. However, the AAUP took input on a draft version of the report from numerous parties, some of whom were interested conflicts between students and faculty mentors.<sup>293</sup> Therefore, based on the

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289. This assumes that the inventor will retain more licensing revenue share than is currently allotted. Some proposals have suggested that these rents could be divided between the inventor and the university. For example, Litan and Mitchell propose that faculty could choose their licensing agent at which time the fee for licensing would be negotiated between the university and the faculty member. Robert E. Litan & Lesa Mitchell, *A Faster Path from Lab to Market*, Jan-Feb HARV. BUS. REV. 52 (2010).

290. See *supra* Part II.B.

291. See Kenney & Patton, *supra* note 277, at 1415 (“Inventor ownership might result in the exploitation of students, but there is no evident reason that this exploitation would be more prevalent than it is today.”).

292. Recommended Principles, *supra* note 281, at 9.

293. Several research organizations have recognized that conflicts of interest occur between students or post doctoral fellows and their mentors. See, e.g., AMERICAN ASSOCIATE OF MEDICAL COLLEGES, COMPACT BETWEEN BIOMEDICAL GRADUATE STUDENTS AND THEIR RESEARCH ADVISORS (2008), available at <https://www.aamc.org/download/49870/data/gradcompact.doc> (last visited July 11, 2014); CONFLICT OF INTEREST IN MEDICAL RESEARCH, EDUCATION, AND PRACTICE

structure of the university research laboratory and the role of non-faculty researchers in the inventive endeavor, it is unclear as to why the discussion is only framed around faculty interests.

### *B. A Modest Proposal*

1. *Education.*—Academic researchers are often woefully under-educated regarding issues surrounding invention and the duty to disclose. To encourage disclosure by non-faculty researchers, the TTO should take an active role in educating non-faculty *and* faculty researchers about incentives to disclose and about each group's rights as inventors or co-inventors. Obviously, a non-faculty inventor must fully understand her rights in order to advocate for herself. But faculty education can also enhance non-faculty participation. Although a faculty member's knowledge of the patent system's requirements in regards to inventorship will not change the perceived power imbalance in negotiations, the faculty member who understands inventorship may enter the negotiations with a better attitude toward non-faculty contributions to inventorship. Additionally, education regarding very basic patent issues such as the definition of inventor and invention, as well as the consequences of failure to name inventors, would clarify who should be named in a disclosure, making it easier to comply with TTO obligations.

Not only would this education improve the ability to comply on a practical basis and increase awareness of incentives, education also combats the entrenched social norms against technology transfer generally. Once a principal investigator buys into the concept of invention disclosure and commercialization, other members of the laboratory, especially graduate students, become far more accepting of the concept.<sup>294</sup> Education of graduate students and post-doctoral fellows trains the next generation of faculty members in their rights and responsibilities as to technology transfer.

2. *University Policy Proposal.*—In addition to education, universities should put in place clear guidelines in the IP policies that recognize the possibility of non-faculty inventors. These policies should address the power imbalance between non-faculty and faculty co-inventors. They might also develop different monetary incentives for non-faculty researcher disclosure.

One such proposal would task the TTO with the responsibility of actively investigating inventorship of those disclosures involving a non-faculty member of a research group or laboratory upon the decision to proceed to the patent-filing step. Doing so would help protect the university from potential non-joinder issues,<sup>295</sup> as well as relieve some of the burden from non-faculty inventors to dispute inventorship. The TTO could ask for the disclosure to contain a narrative

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(Bernard Lo et al. eds., 2009).

294. Janet Bercovitz & Maryann Feldman, *Academic Entrepreneurs: Organization Change at the Individual Level*, 19 ORG. SCI. 69, 84-86 (2008).

295. In patent law, non-joinder occurs when an actual inventor is not named on a patent. Need citation.

of how the research proceeded, including the identity of any person associated with the research. Inventorship could then be determined by the patent attorney prosecuting the patent.<sup>296</sup> Patent prosecutors have a duty of candor to the USPTO.<sup>297</sup> They are aware of issues that could arise should an inventor come forward later so are unlikely to omit inventors given correct information.

Although patent ownership is equally divided among all inventors, not every inventor makes the same contribution to the conception of the invention. It is reasonable to assume that the inventor who conceives of a piece of the invention present in only one claim out of forty may receive a smaller share of the revenue than her co-inventor. Thus, the rules for determining how the revenue should be split are likely to be more complex than determining inventorship.

The default rule for division of licensing revenues between co-inventors should be equal division between all inventors. While this default could be protested by any of the inventors, it would set a baseline rule that would give a greater bargaining position to non-faculty inventors. If an inventor wanted to protest the equal division of licensing revenue, policies should be in place for either mediation or arbitration procedure.

Mediation would not alleviate the unequal bargaining power of the non-faculty member. However, a mediator specially trained in integrative mediation could help the parties find a solution where both parties could be satisfied. For instance, although the faculty inventor might feel she deserved a larger share of revenue, she might be willing to divert any of the revenue returned to the laboratory to the non-faculty inventor's project. Extra research money might enable the non-faculty inventor to finish his project faster, travel to conferences, or receive specialized training, which might be worth the reduced share of revenue.

Arbitration would more directly alleviate power imbalance between the two parties, though it would not cure it. The non-faculty inventor would still need to challenge the faculty inventor's request for more revenue, but the final apportionment would be based on the university invention disclosure detailing the invention process as well as any testimony. Parties undergoing arbitration would be less likely to find an integrative solution to the revenue problem but should be happy with an equitable split of the inventor revenue.

The identity of this arbitrator or mediator is also problematic. As noted above, the faculty senate would not be a good source due to the faculty's bias against non-faculty inventors. The TTO could be a source for a neutral third party because the university administration should be interested in making the technology transfer process run in such a way that all parties have incentives to take part. Therefore, the desire for a reputation for fairness might make the TTO a good source for the neutral third party. However, pushing against that reputational pressure would be faculty pressure. If the TTO perceives the faculty

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296. For example, the University of California system disclosure form specifies that the patent attorney prosecuting the patent will make final determination of inventorship. *Disclosing an Invention*, *supra* note 49.

297. 37 C.F.R. § 1.56(a) (2012).

inventors as repeat customers with whom the TTO hopes to do business on multiple occasions, it is possible the TTO might not be as unbiased as originally deemed. Therefore, the neutral third party should not be affiliated with the university in any way.

Finally, universities should feel free to experiment with policies that are directed at non-faculty inventors. Perhaps direct monetary incentives for the disclosure itself would be more successful than the small, future possibility of licensing revenue. Of course, policies would have to be put in place to make sure the TTO did not waste resources on half-baked ideas submitted solely for the disclosure reward. On a more extreme scale, perhaps the portion of the revenue to the laboratory could be split among the individual inventors, even if the graduate student or post-doctoral fellow moved to another university. In academic hiring, the ability to bring in money for research is often key because faculty without funding cannot conduct research nor get publications.<sup>298</sup> Therefore, a new faculty hire with start-up funds from a past patent might have the advantage.

#### CONCLUSION

University research is at heart a collaborative endeavor. Scientific papers have multiple authors, often from different departments or laboratories. Similarly, inventions typically name several co-inventors. The myth of the lone inventor is dead.

Unfortunately, this idea of the lone inventor still informs the education and policies surrounding university technology transfer. The Bayh-Dole Act requires incentives to be directed to university inventors in return for disclosure of inventions with university funds. For the vast majority of universities, those incentives are directed primarily at faculty inventors. To the extent that incentives are directed at faculty and non-faculty inventors, power imbalances impede non-faculty inventors from realizing the full benefit.

The mismatch between incentives directed toward faculty and non-faculty inventors may account for some of the problems in the technology transfer system. Universities often suffer from low rates of disclosure due to time pressures on faculty and research social norms. Those rates could be elevated if more people in the invention stream were a part of the process.

Universities would be well served to increase outreach to non-faculty inventors through a combination of education and policy changes. Education of faculty combats social norms that push against technology transfer generally as well as non-faculty inventorship. Non-faculty education encourages participation in the technology transfer process and empowers the non-faculty inventor to advocate for her rights. Technology transfer policies should then support that education. With a little effort, technology transfer could become the same collaborative endeavor as the science that feeds it.

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298. See Carter-Johnson, *supra* note 41, at 478-80.