University Controlled Or Owned Technology: The State Of Commercialization And Recommendations

BY MARK L. GORDON*

University technology transfer is the process by which a university commercializes inventions and innovations developed by university faculty and researchers. Technology transfer takes many forms, from patent licensing to forming start-up ventures on campus. University technology transfer programs are growing exponentially. Universities have long reflected upon, studied, and implemented transfer and commercialization programs. However, due to current economic and legal realities, an intense, if not completely new, era has emerged. Universities are increasing their commitment to, and support of, commercialization programs. Policies and missions have been revisited and reshaped. Campus research is exploding with applied innovation. Faculty and students are being recruited by the strength and virtue of commercialization programs. Economic pressures and competition are intense. Opportunities, as well as pitfalls, abound in this complex field. Universities that proceed with the proper balance of aggressiveness, creativity, and prudence will realize the many benefits of university technology transfer.

I. History—the Opening of the Era

University technology transfer did not gain real momentum in the United States until the early 1980s.[1] Several forces have coalesced to raise the prominence and expansion of university technology transfer, not the least of which are the Bayh-Dole Act,[2] the changing economy of the United States, and financial pressures on universities coupled with the potential for pay-offs from transfer programs.

The Numbers

The statistics clearly illustrate the explosive growth of university technology transfer activities over the past two decades.[3] In 1980, universities generated about $1 million in licensing revenue.[4] According to the most recent Association of University Technology Managers ("AUTM") survey for the year 2001,[5] licensing revenue for survey respondents was $1.071 billion.[6] In 1985, 589 new patents were awarded to academia.[7] AUTM survey respondents filed 6,812 new patent applications[8] and were issued 3,721 new patents in 2001.[9] During the ten-year period from 1974 through 1984, universi-

1. This is not to say that university technology transfer was previously non existent. See Kenneth Sutherlin Dueker, *Biobusiness on Campus: Commercialization of University-Developed Biomedical Technologies*, 52 Food & Drug L.J. 453, 454-61 (1997) (briefly discussing the history of university technology transfer prior to 1980). See also, Ned T. Himmelrich and Jonathan M. Holda, *Technology Transfer Agreements: Don't Be an Amateuer*, 34-Dec. Md. Bar J. 30, 31 (2001).
2. 35 U.S.C. §§ 200-12 (1994).
3. In 1972, fewer than thirty universities had technology transfer programs. See Dueker, *supra* note 1, at 476. "Today nearly every research university in the country has a technology-licensing office." Eyal Press and Jennifer Washburn, "The Kept University," *The Atlantic Monthly*, Mar. 2000, at pt. 3, p. 2, available at *http://www.theatlantic.com/issues/2000/03/press.htm*.
4. See Association of University Technology Managers, *AUTM Licensing Survey: FY 1994 Survey Summary and Selected Data FY 1991-FY 1994*, at 27 (1995). The Association of University Technology Managers began conducting in-depth surveys of university technology transfer activities in 1991.
5. Respondents to the 2001 AUTM survey included 142 U.S. universities, 28 U.S. hospitals and research institutes, 27 Canadian institutions, and one third-party patent management firm. Although the survey results did not cover all universities involved in technology transfer, nor only universities, it is nonetheless the most comprehensive study of technology transfer activities by universities available to date and clearly illustrates the increase in university technology transfer activities. The survey respondents included 92 of the top 100 universities according to amount of money spent on research activities annually. See Association of University Technology Managers, *AUTM Licensing Survey: FY 2001 Survey Summary*, at 5 (2003), available at *http://www.autm.net/surveys/01/01summarypublicversion.pdf* [hereinafter 2001 AUTM Survey].
6. See *id*. at 12. In 1995, AUTM survey respondents earned $424 million in licensing income. In 1997, AUTM survey respondents earned $611 million in licensing income.
7. See National Science Board, *Science and Engineering Indicators - 2000* ch. 6 (2000), available at *http://www.nsf.gov/sbe/srs/seind00/access/c6/c6s4.htm*.
8. See 2001 AUTM Survey, *supra* note 5, at 7. AUTM survey respondents filed 2,872 new patent applications in 1995 and 4,267 new patent applications in 1997.
9. See *id*. AUTM survey respondents were issued 1,833 patents in 1995 and 2,645 in 1997.

*Mark L. Gordon (mlgordon@ggtech.com) is a partner at the law firm of Gordon & Glickson LLC (www.ggtech.com), which is devoted exclusively to providing strategic legal counsel to the technology marketplaces. *The author wishes to express his grateful appreciation to Brian W. Farmer, research assistant and collaborator, my partner, Michael E.C. Moss, for his constructive commentary and editorial talent and, my colleague, Derek A. Roach, for his editorial assistance. Previously published, "University Controlled or Owned Technology: The State of Commercialization and Recommendations," University of Notre Dame, The Journal of College and University Law Volume 30, Number 3; 2004.*

ties granted about 1,000 licenses total.[10] In 2001 alone, AUTM survey respondents reported the execution of 4,058 licenses and options.[11] From 1980 through 1993, AUTM survey respondents were involved in the formation of a total of 1,169 start-up companies.[12] In 2001 alone, survey respondents formed 494 start-up companies.[13]

The Bayh-Dole Act

The Bayh-Dole Act[14] (the "Act") governs the commercialization of inventions and innovations resulting from research funded by the federal government. It was signed into law on December 12, 1980, and became effective in July 1981. The Act was a response to an increase in global competition in technology-related fields, and was also seen as a way for taxpayers to enjoy the benefits of the investment they made in university-based research.[15] Prior to the passage of the Act, governmental policies regarding ownership of inventions and innovations developed by entities with federal government funding lacked uniformity. Different federal agencies applied different rules.[16] One common element of all of these government agencies' policies was that title to the inventions and innovations funded by the government was presumed to rest with the government.[17] This presumption proved difficult and costly to overcome, meaning that universities rarely retained ownership of inventions and innovations developed by their researchers with federal government money.[18]

In passing the Act, Congress stated that it wanted to promote the commercialization and public availability of federally-funded inventions and innovations.[19] In order to meet this objective, the Act, in most cases, allows recipients of federal funding to retain title to inventions developed with federal funding.[20] Thus, universities that develop inventions and innovations with federal government funding may license them to third parties and keep the proceeds.[21] However, the university is required to grant the government a nonexclusive, irrevocable, paid-up license to utilize the invention throughout the world.[22] The government is also given "march-in rights" to help ensure that the public receives the benefit of the invention. This right allows the government to revoke a university's title to any invention or innovation if it is determined by the federal agency that funded the research that the university's commercialization efforts have been inadequate.[23]

The Bayh-Dole Act is essential to universities' ability to commercialize inventions and innovations developed by their researchers, because the majority of university research was, and is, funded by the federal government. AUTM survey respondents reported that 67% of their research expenditures for 2001 came from the federal government.[24] Thus, without the Act, universities would have substantial difficulties reaping

10. See General Accounting Office, *Patent Policy: Universities' Research Efforts Under Public Law* 96-517, at 2 (1986).
11. See 2001 AUTM Survey, *supra* note 5, at 9. In 1995, AUTM survey respondents executed 2,616 licenses and options. In 1997, AUTM survey respondents executed 3,328 licenses and options.
12. See *id*. at 14.
13. See *id*. AUTM survey respondents formed 223 start-ups in 1995 and 333 start-ups in 1997.
14. 35 U.S.C. §§ 200-12 (1994). The Department of Commerce developed regulations for the Act, which are codified in title the *Code of Federal Regulations* (37 C.F.R. pt. 401.1-401.16 (1997)).
15. "Simply put, American efforts at innovation, in which we were once the undisputed world leader, were stagnating and falling behind those of other nations. There were a number of theories on the various causes of these problems, but clearly the United States needed to develop a more effective overall technology transfer policy. Senator Dole and I agreed that there was an opportunity in one particular area where we could begin the process of providing a comprehensive technology transfer policy for the United States. This was in the area of federally funded research conducted by universities and small businesses… The taxpayers were getting almost no return on their investment. We came to the realization that this failure to move from abstract research into useful commercial innovation was largely a result of the government's patent policy and we sought to draft legislation which would change this policy in a way to quickly and directly stimulate the development and commercialization of inventions." *Hearings Before the Subcomm. On Patents, Copyrights and Trademarks of the Sen. Judiciary Comm.*, 103d Cong., 2d Sess. (1994), available in 1994 WL 14185684 (testimony of Sen. Birch Bayh).
16. See Association of University Technology Managers, *AUTM Licensing Survey, FY 1991-FY 1995: A Five-Year Summary of Technology Licensing (and Related) Performance for U.S. and Canadian Academic and Nonprofit Institutions, and Patent Management Firms (1997)* [hereinafter 1997 AUTM Survey]. See also, Dueker, *supra* note 1, at 460 (noting that different regulations regarding ownership of inventions and innovations created with federal money were released by 26 separate federal agencies).
17. See Dueker, *supra* note 1, at 460. If a university wished to retain rights in an invention or innovation that resulted from research funded by a federal agency, the university would have to negotiate an arrangement with the funding agency.
18. See *id*. A few universities, such as the University of Wisconsin-Madison, were able to structure patent agreements with various federal agencies that allowed them to retain rights in their inventions and innovations that resulted from research funded by those agencies, but the transaction costs and red tape involved in coming to such an arrangement were too much for most universities to overcome.
19. See 35 U.S.C. § 200 (1994).
20. See 35 U.S.C. § 202(a) (1994). In limited circumstances, the funding agreement may provide that the funding recipient may not elect to retain title.
21. A university must meet certain requirements in order to enjoy the benefits of the Act. For instance, the university must disclose any invention to the federal agency within a reasonable time after its development, must elect whether or not to retain title to the invention within two years of disclosure, and must file a patent for the invention within the statutory period. See 35 U.S.C. § 202(c)(1)-(3) (1994).
22. See 35 U.S.C. § 202(c)(4) (1994).
23. See 35 U.S.C. § 203 (1994). In 1997, a private company, Cellpro, attempted to invoke the march-in provision. Cellpro sought to obtain a license for a stem-cell separation technology that was developed by a researcher at The Johns Hopkins University under a grant from the National Institutes of Health ("NIH"). Cellpro wrote to the Secretary of the Department Of Health and Human Services and argued that march-in was warranted because Johns Hopkins and its licensee, Baxter Healthcare, had failed to take reasonable steps to commercialize the technology and that government action was needed in order to alleviate health or safety needs that were not being met by Baxter. The NIH declined to initiate march-in proceedings, although it left open the possibility of march-in if new facts arose. See Office of the Director, National Institutes of Health, *Determination of Petition of Cellpro, Inc.*, (Aug. 1, 1997), available at *http://www.nih.gov/news/pr/aug97/nihb-01.htm*. See also *Johns Hopkins Univ. v. Cellpro*, 978 F. Supp. 184 (D. Del. 1997).
24. See 2001 AUTM Survey, *supra* note 5, at 6.

the financial benefits of a great deal of their research. Likewise, the public did not receive the full benefit of this research prior to passage of the Act, because much of it was not made commercially available.[25] The Bayh-Dole Act opened the door to a new era in which both universities and the general public are able to enjoy the fruits of research funded by the federal government.

The Changing U.S. Economy

For much of the 20th century, the United States had an industrial economy based on large-scale production and manufacturing, such as automobile manufacturing. In 1960, manufacturing output was 27% of U.S. GDP and manufacturing jobs accounted for 31% of total employment in the U.S.[26] As the twentieth century came to a close, however, some manufacturing activity had moved overseas and the manufacturing firms that remain in this country have become increasingly dependent on technology to increase productivity and remain competitive. By 1997, manufacturing output was 17% of GDP and, in 1998, manufacturing jobs accounted for 14.9% of total employment.[27] A new type of American economy has emerged. The industries that have remained in the United States are more reliant and focused on scientific and technological innovation in fields such as biomedical and computer technology.[28] With this shift, the type of scientific and technology-related research conducted at universities has become more directly relevant and important to the United States' economy. The passage of the Bayh-Dole Act represented (among other things) a recognition of this shift. Private industry also recognized this trend and has significantly increased its financial support of university research.[29] Many universities have responded by embracing technology transfer and pushing for the commercialization of university-developed inventions and innovations.

Economic Payoffs / Economic Pressures

University technology transfer is "hot." Most universities are involved, and some generate a great deal of revenue from it.[30] This fact, combined with the reality of budget cuts and economic pressures faced by many universities,[31] has made success in technology transfer very important to many universities. Clearly, the payoff for such success is potentially very significant. This potential has proven attractive to many universities.

The reasons for the growth of university technology transfer, whether it be the Bayh-Dole Act, the changing economy of the United States, economic realities at universities, or a combination of these factors, may be debatable,[32] but it is hard to deny that it has grown at an amazing rate over the past two decades. A question remains debated passionately: Is this a good thing?

II. Tension of Technology Transfer with Mission

Traditionally, it has been understood that universities have a two fold mission. First, universities are charged with educating their students, and second, universities are expected to conduct research for the benefit of the public.[33] Some argue that these missions can be, and in some cases are, compromised when private interests become involved in the research process and commercialization becomes the goal of research endeavors.[34] Both universities and researchers stand to profit from the successful commercialization of inventions and innovations. Is the traditional mission of universities and their faculty members compromised by this fact?

Compromised Faculty?

Prior to the explosion in university technology transfer, it was generally presumed that university researchers toiled for the welfare of the general

25. While it was possible for a company to license technology from the federal government, the process to do so often proved too costly and cumbersome. "The bureaucratic red tape that accompanied any attempt at innovation was simply too great a disincentive to any company seeking to license directly from the government." See Howard W. Bremer, *Testimony on the Effectiveness of the Bayh-Dole Act*, 5 J. Ass'n U. Tech. Managers (1993), available at *http://www.autm.net/pubs/journal/93/testimony93.html*. Thus, a lot of important technology remained unused on the shelf, under the ownership of the federal government.

26. See Michael Knetter, *Trade Deficits and the US Economy, Part II* (Spring 2000), available at *http://mba.tuck.dartmouth.edu/paradigm/spring2000/articles/knetter-economy2.html.*

27. See *id*.

28. See Robert D. Atkinson and Randolph H. Court, *The New Economy Index: Understanding America's Economic Transformation* (1998), available at *http://www.neweconomyindex.org/index_nei.html.*

29. In 1980, private industry funding accounted for 4% of university research expenditures. See General Accounting Office, *Patent Policy: Universities' Research Efforts Under Public Law 96-517*, at 3 (1986). AUTM survey respondents reported that 8% of their 2001 research expenditures came from private industry. See 2001 AUTM Survey, *supra* note 5, at 6. In 1997, U.S. companies spent $1.7 billion on science and engineering research at universities, an increase of five-fold over 1977 numbers. See David Shenk, "Money Science = Ethics Problems on Campus," *The Nation*, Mar. 22 1999, available at *http://www.thenation.com/doc.mhtml?i=19990322&s=shenk*.

30. For instance, in 1993 alone, Stanford University earned $24.5 million from its patent on recombinant DNA. See Victoria Slind-Flor, "The Trouble With Techno Transfers, *The Nat'l L.J.*," Oct. 3, 1994. The University of Florida generates millions of dollars each year from Gatorade. See David Villano, "Big Money on Campus," *Fla. Trend*, Dec. 1, 1995, at 66, available in 1995 WL 8683002. The University of California earned over $57 million in royalties in 1995 from 548 revenue-generating licenses. See 1997 AUTM Survey, *supra* note 16, at 44. Michigan State University brought in over $15 million from 42 licenses in that same year. See *id*.

31. See Elizabeth Zeman, "Budget Cuts Hit Public Universities," *Daily Illini*, Jan. 16, 2002, available at *http://www.uwire.com/content/topnews011602001.html* (briefly discussing universities that are facing budget cuts and other financial problems).

32. See, e.g., Tamsen Valoir, Government Funded Inventions: "The Bayh-Dole Act and the *Hopkins v. Cellpro* March-In Rights Controversy," *8 Tex. Intell. Prop. L.J.* 211, 234-37 (2000) (questioning whether the Bayh-Dole Act has played an important role in the growth of university technology transfer).

33. See Hans Wiesendanger, *A History of OTL Overview*, available at *http://otl.stanford.edu/about/resources/history.html.*

34. See generally Shenk, *supra* note 29 and Press, *supra* note 3 (discussing many problems inherent to industry support of academic research). But see Dueker, *supra* note 1, at 470-71 (suggesting that industry does not necessarily have a corrupting influence on academics).

public, without regard to the commercial potential of their discoveries. More recently, however, it has become clear that this is not always the case. A consequence of increased university commercialization is that the professor/entrepreneur is becoming more and more common, and for good reason. Responsible faculty members now usually receive a portion of any revenue generated by their inventions or innovations.[35] The Bayh-Dole Act requires that the inventor receive some share, albeit an indeterminate one, of the revenue generated from his invention or innovation developed with federal funding.[36] A study from 2000 found that 28% of life sciences faculty at universities received private sponsor funding, 15% held equity in the private sponsor, 33% were engaged in paid consulting arrangements, and 32% held board positions.[37] University researchers often have a direct financial stake in the outcome of their research. Some critics argue that this fact creates conflicts of interest that can compromise their research.[38] Some critics even argue that university researchers sometimes choose their research topics based on the short-term commercial potential of the subject and that, because of this, important areas of research with less commercial appeal are often ignored.[39] On the other hand, a study by Professor David Blumenthal suggests that, instead of having a corrupting influence on faculty members, university commercialization actually has a positive impact. The study concluded that biomedical faculty who were involved in technology commercialization taught no less, published more, produced more patented discoveries, and served in more administrative capacities than faculty not involved in technology transfer activities.[40]

Another matter of concern commonly raised by critics of university technology transfer is that the free flow of ideas in the academic world is stifled by the focus on commercialization of inventions and innovations. Many in the academic community insist that it is imperative that discoveries are published immediately and that information is shared openly.[41] Companies that work with university researchers, on the other hand, often demand delays in the publication and sharing of discoveries and ideas.[42] In order to protect the value of proprietary information, it is often necessary to avoid publication, or other forms of sharing of information and data, until proper intellectual property protection is in place. In the United States, a patent cannot be issued for an invention or innovation if it has been described in a printed publication more than one year before a patent application is filed with the Patent and Trademark Office.[43] This one-year grace period is not even available in some foreign countries, meaning that any sort of publication can lead to the loss of intellectual property rights if steps are not taken to protect them.[44] Likewise, any ownership or rights in trade secrets, or "know-how," can be lost if not properly protected before the information is shared with other parties.[45] The National Institutes of Health has developed guidelines suggesting that universities not allow companies to delay publication for more than two months,[46] but lengthier delays are not uncommon.[47]

Many universities, along with their faculty members, have reacted to these concerns by adopting conflict-of-interest policies. These policies attempt to avoid conflicts of interest as much as possible, and to ensure that those conflicts that do arise do not taint research outcomes.[48]

Compromised Universities?

While university-industry partnerships have become quite common,[49] some believe that a serious conflict in

35. See Peter D. Blumberg, From "Publish or Perish" to "Profit or Perish": Revenues from University Technology Transfer and the S 501(C)(3) Tax Exemption, 145 *U. Pa. L. Rev.* 89, 101 (1996). For example, inventors at Stanford University receive 33% of the net royalties received on their licensed inventions (see Wiesendanger, supra note 33), while inventors at the University of Notre Dame receive 50% of royalty revenues after university borne expenses are covered (see University of Notre Dame Office of Research, Frequently Asked Questions in Technology Transfer, available at *http://www.nd.edu/~research/techtransfer/ttfaq.html*). Such arrangements, which were rare in the past, are now common at universities with technology transfer programs.

36. See 35 U.S.C. § 202(c)(7)(B) (1994). "[The university shall] share royalties with the inventor."

37. See Elizabeth A. Boyd and Lisa A. Bero, "Assessing Faculty Financial Relationships With Industry: A Case Study," 284 *JAMA* 2209, 2209-10 (2000).

38. See Shenk, *supra* note 29 (discussing examples of academic research being tainted, and researchers being pressured to change research results, by companies that sponsor the research).

39. See *id*. ("Scientists sometimes may not pursue drugs or tests that lack obvious short-term markets"). See also Press, *supra* note 3, part 3. Some critics also contend that the drive toward commercialization has skewed academic research away from basic research to applied research. National Science Foundation statistics show that this argument is weak, however. The composition of academic research has remained consistent since 1980 with about 66% of research being basic science, although this is down from 77% in the early 1970s. See Richard Florida, "The Role of the University: Leveraging Talent, Not Technology," Issues in *Sci. & Tech.*, Summer 1999, available at *http://www.nap.edu/issues/15.4/florida.htm*.

40. See David Blumenthal, et. al, "University-Industry Research Relationships in Biotechnology: Implications for the University," 232 *Sci.* 1361 (1986).

41. "One of the basic tenets of science is that we share information in an open way. As biotech and pharmaceutical companies have become more involved in funding research, there's been a shift toward confidentiality that is severely inhibiting the interchange of information." Press, *supra* note 3, part 2 (quoting Steven Rosenberg, National Cancer Institute).

42. See Press, *supra* note 3, part 2.

43. See 35 U.S.C. § 102(b).

44. See Dueker, *supra* note 1, at 473.

45. See *id*. This type of protection, unlike patent protection, which lasts 20 years from when the patent application is filed, lasts indefinitely.

46. See Shenk, *supra* note 29.

47. See Press, *supra* note 3, part 2. See also Shenk, *supra* note 29.

48. See Peter J. Harrington, "Faculty Conflicts of Interest in an Age of Academic Entrepreneurialism: An Analysis of the Problem, the Law and Selected University Policies," 27 *J.C. & U.L.* 775 (2001) (discussing the faculty conflict-of-interest policies of several universities).

mission arises when universities and companies partner for the purposes of research.[50] Critics have suggested that one negative impact of this phenomenon has been a reduction in funding at some universities for departments that do not produce revenue-generating inventions and innovations, such as humanities departments.[51] At the same time, some of these same universities have increased funding for science and technology departments.[52] Critics suggest that this type of resource allocation, where profit is seemingly put ahead of educational opportunities and offerings, conflicts with the mission of the university to educate students and conduct research for the benefit of the public. Conversely, supporters of university technology transfer often point out the benefits of these activities, which can include upgraded facilities and increased funding for all academic departments.[53] Universities with exceptional technology transfer programs are also able to attract top professors and offer unique learning opportunities in technology, business, and entrepreneurism, leading to a better overall academic environment and more educational opportunities for students at those universities.[54]

Whether one is a proponent or opponent of university technology transfer programs, it appears that such programs are here to stay. Those that continue to fight this phenomenon are likely engaged in a losing battle, although some universities have reacted to the criticism by implementing stronger conflict-of-interest policies. It should be noted, however, that these policies are not fool proof. Conflicts will exist and no policy will completely guard against them. This is a risk that universities must take or, alternatively, should avoid by not involving themselves in technology transfer. Universities that are aggressively pursuing technology transfer opportunities are fighting a battle of their own: attempting to succeed in a highly competitive environment.

III. Distinctive Technology Transfer Models

University technology transfer takes many different forms.[55] There is no single optimal structure or mode of operation for a university technology transfer program. Universities have developed numerous models and procedures for their technology transfer programs. Some have flourished, while others have not.

University of Wisconsin-Madison

The University of Wisconsin-Madison was a pioneer in university technology transfer. The Wisconsin Alumni Research Foundation ("WARF") was established in 1925 when nine University of Wisconsin alumni each donated $100 as capital.[56] WARF granted its first license, for an artificial Vitamin D supplement, to the Quaker Oats Company in 1927.[57] Currently, WARF has about 40 employees, as well as a board of 18 volunteer trustees.[58] In 2002, WARF claimed to have become the first university technology transfer program to open a satellite office, when it opened a branch in San Diego.[59]

Revenue generated by WARF is distributed to the University of Wisconsin-Madison Graduate School, the inventors, and the department of the inventors.[60] WARF contributes over $30 million each year to the University[61] and has generated about $600 million for the University during its history.[62] WARF received 279 invention disclosures in fiscal year 2002.[63] The University of Wisconsin-Madison has been involved in the development of 98 technology-based companies in Wisconsin since 1995.[64]

WARF sets up a licensing team for each invention that it accepts. The team consists of the inventor(s), an intellectual property manager, one or more licensing managers, WARF's in-house counsel, marketing specialists, and various support staff. Outside counsel is used for patenting.[65] WARF uses several different methods for marketing its inventions, including the listing of available technologies on the WARF Web site, direct contact with potential licensees by WARF licensing managers, direct mailings, technical presentations made by the researchers, and participation in technology trade shows.[66]

The Office of University-Industry Relations was established in the early 1960s. This Office works to facilitate interactions, and develop relationships, between University of

49.See *id*., at 778-79 (giving examples of university-industry agreements).
50. "Universities exist to do research and research exists to benefit mankind. Companies have an additional and different agenda – making profit." See Shenk, *supra* note 29 (quoting Drummond Rennie).
51. See Press, *supra* note 3, part 1and 4.
52. See *id*., part 1.
53. See Wiesendanger, *supra* note 33.
54. See Lori Pressman, M.I.T. "System of Technology Transfer," Feb. 4, 2000, available at *http://web.mit.edu/afs.athena.mit.edu/org/t/tlo/www/mitsystemtechtrans.pdf*.
55.See Dueker, *supra* note 1, at 496.
56.See Wisconsin Alumni Research Foundation, "History of WARF," available at *http://www.warf.ws/aboutus/index.jsp?catid=93* [hereinafter History of WARF].
57. See *id*.
58.See *id*.
59. See Wisconsin Alumni Research Foundation, "WARF West Coast Office Opens for Business," Oct. 21, 2002, available at *http://warf.ws/news/newsletters-article.jsp?articleid=87&printable=1*.
60. See Wisconsin Alumni Research Foundation, "About Us," available at *http://www.warf.ws/aboutus/index.jsp?printable=*1.
61. See *id*.
62. See History of WARF, *supra* note 56.
63. See Wisconsin Alumni Research Foundation, "2002 Invention Disclosures by UW-Madison School and College," Oct. 7, 2002, available at *http://www.warf.ws/news/newsletters-article.jsp?articleid=81&printable=1* [hereinafter 2002 UW Invention Disclosures].
64. See Wisconsin Alumni Research Foundation, "Report Puts UW-Madison at Head of Economic Class," Apr. 10, 2002, available at *http://www.news.wisc.edu/releases/print.msql?id=7333*.
65. See Wisconsin Alumni Research Foundation, "For Researchers: Bringing Your Invention to WARF," available at *http://www.warf.org/forresearchers/index.jsp?catid=3&subcatid=5&printable=1*.
66. See *id*.

Wisconsin research and the business/industrial community.[67] The University Research Park is home to nearly 100 companies.[68] The mission of the Research Park is to encourage partnerships between businesses and university researchers.[69] A subsidiary of WARF, the WiCell Research Institute, was created to support research on human embryonic stem cells.[70] A University of Wisconsin-Madison researcher, in 1998, was the first person to isolate human embryonic stem cells.[71]

Stanford University

Stanford University has an established and very successful technology transfer program through its Office of Technology Licensing (the "OTL"), which was established in 1970.[72] In fact, the program is so highly regarded that it is able to charge $1000-$2000 per hour for private tours of its technology transfer facilities.[73] For fiscal year 2001-2002, the OTL received 315 invention disclosures, executed 112 new licenses, generated $52.7 million in total royalties, had 42 different technologies that each generated over $100,000 in royalties for the year, and generated $405,000 from liquidated equity.[74] Some of the more prominent inventions and innovations that have come through the Stanford OTL are, injectable collagen for plastic and cosmetic surgery, optimization software used in the design of yachts for the Americas Cup, the recombinant DNA "gene splicing" techniques that have given rise to the biotechnology industry, and improved FM sound systems for electronic music devices and systems.[75]

The Stanford OTL licensing process focuses on marketing the inventions and innovations under its control.[76] So-called "Licensing Associates," who generally have degrees in science or engineering, experience in marketing, and prior licensing experience, staff the OTL.[77]These associates are given complete responsibility for evaluating, marketing, licensing, protecting, and monitoring the progress of specific technologies.[78] When intellectual property protection is necessary, the OTL seeks and selects outside counsel on a case-by-case basis based on their qualifications for the particular technology.[79] The OTL works with Stanford's Industrial Contracts Offices when negotiating contracts with outside parties.[80] The Research Incentive Fund has been established by the OTL to help turn faculty discoveries into commercially viable products.[81]

The OTL aggressively markets the services that it provides to the university community, which include intellectual property protection, marketing, licensing, and assistance with forming start-up companies. Likewise, the OTL aggressively markets the technologies under its control to potential licensees and other prospective partners.[82] The OTL works closely with private industry in the surrounding Silicon Valley community and with companies from outside the area.[83] It publishes a newsletter entitled *Brainstorm*, which is intended for audiences both inside and outside the Stanford community. *Brainstorm* touts the OTL's services and also announces recent faculty inventions and innovations.[84] The OTL Web site includes a comprehensive list of University technologies available for licensing.[85]

University of Illinois

The University of Illinois has a broad and assertive technology transfer program.

In fiscal year 2002, the University of Illinois had 220 invention disclosures, filed for 143 patents, was issued 42 new patents, executed 74 licenses, and generated over $9 million in licensing revenue.[86] In addition, in the period from 2001-2002, University of Illinois faculty launched 18 start-up companies.[87]

The University Board of Trustees created the position of Vice President for Economic Development and Corporate Relations ("VPEDCR") to oversee and facilitate all aspects of technology commercialization for the University.[88] Under the Vice President are two Offices of Technology Management ("OTM") at the Urbana-Champaign and Chicago campuses.[89] The OTMs are responsible for protecting, marketing, and licensing University-developed technology and intellectual property, and coordinate their efforts through the VPEDCR.[90] The staff at the OTM at the Urbana-Champaign campus includes a Director, an As-

67. See 2002 UW Invention Disclosures, *supra* note 63.
68. See *id*.
69. See Wisconsin Alumni Research Foundation, "For Industry: Industry Resources," available at *http://www.warf.ws/forindustry/index.jsp?catid=13&printable=1*.
70. See Wisconsin Alumni Research Foundation, "News & Information: FAQs," available at *http://www.warf.ws/news/index.jsp?catid=18&printable=1*.
71. See History of WARF, *supra* note 56.
72. See Wiesendanger, *supra* note 33.
73. See *http://otl.stanford.edu/about/index.html*. The OTL does provide free weekly tours at scheduled times.
74. See Office of Technology Licensing, "Finding the Right Match, Turning Scientific Progress into Tangible Products," at 1-3, available at *http://otl.stanford.edu/about/resources/otlar02.pdf*.
75. See Wiesendanger, *supra* note 33.
76. See *id*.
77. See *id*.
78. See *id*.
79. See *id*.
80. See *http://www.stanford.edu/groups/ICO/*.
81. See *http://otl.stanford.edu/inventors/resources/research_inc_fund.html*.
82. See Wiesendanger, *supra* note 33.
83. See *id*.
84. See *http://otl.stanford.edu/about/brainstorm/index.html*.
85. See *http://stanfordtech.stanford.edu/technology*.
86. See University of Illinois, "Annual Report 2001/2002, Technology Commercialization Activities," at 4-5, available at *http://www.vped.uillinois.edu/~pdf_files/annual_report.pdf*.
87. See *id*. at 5.
88. See Office of the Vice President for Economic Development and Corporate Relations, "Technology Commercialization at the University of Illinois: Growing the Illinois High Technology Economy," Apr. 2002, at 1, available at *http://www.vped.uillinois.edu/~pdf_files/ui_hr308_4-1-02_final.pdf* [hereinafter April 2002 Report].
89. *www.uic.edu/depts/ovcr/otm/*.

sociate Director, several Technology Managers and attorneys, paralegals, a Patent Coordinator, and various support staff.[91] IllinoisVENTURES, LLC was formed under the direction of the Board of Trustees in order to facilitate the formation of start-up companies based on University technology.[92] In addition, University of Illinois Research Park, LLC was formed to manage operations of research parks and business incubators run by the University.[93]

In order to market its technologies, the University holds events called "i emerging" every six months. These events are showcases for its technology and start-up companies and attract venture capitalists, angel investors, researchers, and representatives from industry.[94] Additionally, the OTMs sponsor technology briefings, where industry representatives are invited to hear presentations on a particular new technology.[95] The Web sites for the OTMs provide a comprehensive database of University technology that is available for licensing.[96] All of the above-mentioned organizations work closely together, and with private industry, in an attempt to bring University of Illinois technologies to market.[97]

University of Notre Dame

The University of Notre Dame's technology transfer program is somewhat less aggressive and structured than some of the more established programs. The Division of Technology Transfer, or ND Tech Transfer, was formed in June 1998[98] and is under the University Office of Research.[99] ND Tech Transfer has one full-time employee and is charged with negotiating or assisting with license agreements, new company formation, confidentiality agreements, inter-institutional agreements, collaborative research agreements, material transfer agreements, and conflict of interest matters.[100] ND Tech Transfer employs outside counsel for intellectual property protection matters.[101]

ND Tech Transfer is small, but growing. For fiscal year 1999, its royalty revenue was $250. This number grew to $209,000 last year and these revenue numbers have already been surpassed for the current fiscal year.[102] In a typical year, ND Tech Transfer receives 30 invention disclosures, files 20 new patent applications, and executes between 10 and 20 new license agreements.[103]

Notre Dame has no established formal mechanism for marketing its technologies. ND Tech Transfer gathers marketing leads from various sources, including outside companies that approach the University and the inventors themselves, which are pursued by ND Tech Transfer.[104] ND Tech Transfer also works with some venture capital firms and Notre Dame's Gigot Center for Entrepreneurial Studies to publicize its technologies.[105] In addition, the ND Tech Transfer Web site includes a list of available technologies.[106]

M.I.T.

The M.I.T. Technology Licensing Office (the "TLO") is a department of the university and reports to the Vice President of Research.[107] The TLO has a staff of 31, which includes Technology Licensing Officers, Associate Technology Licensing Officers, Technology Licensing Associates, Financial Operations Staff, Information Systems Staff, Patent and Office Operations Staff, and Administrative Assistants.[108] Most licensing officers have technical backgrounds and industry experience.[109] Individual licensing officers manage individual technologies from beginning to end, starting with evaluation and ending with monitoring licensee performance.[110] The TLO uses outside patent counsel.[111]

In FY 2002, the TLO received 484 invention disclosures, filed for 245 patents, was issued 126 new patents, granted 125 licenses (including 13 trademark licenses), granted 41 software end-user licenses, started 24 new companies, and generated $33.52 million in revenue.[112] After payment of any patenting costs are and deduction of a 15% administration fee for the TLO, licensing revenues are distributed evenly among the inventor, the inventor's academic department, and the university's general fund.[113]

The TLO does not publish a list of available technologies. Instead, they use "rifle-shot" marketing, which means that they match specific technologies with the needs and interests of companies or investors.[114] The TLO focuses a great deal of attention on the diligence of licensees in bringing products and services to market, generally insisting on mea-

90. See April 2002 Report, *supra* note 88, at 1.
91. See *http://www.otm.uiuc.edu/about-prof-staff.htm*.
92. See April 2002 Report, *supra* note 88, at 1.
93. See *id*.
94. See Office of the Vice President for Economic Development and Corporate Relations, "i emerging Showcases" *University Technologies*, Oct. 15, 2002, available at *http://www.vped.uillinois.edu/news/news2.asp*.
95. See *http://www.otm.uiuc.edu/tech-briefing.htm*.
96. See *http://www.otm.uiuc.edu/tech-main.htm*.
97. See April 2002 Report, *supra* note 88, at 1.
98. Email Interview with Michael Edwards, Assistant Director for Research Development (Feb. 11, 2003) [hereinafter Edwards Interview].
99. See *http://www.nd.edu/~research/*.
100. See Office of Research, "Frequently Asked Questions in Technology Transfer," available at *http://www.nd.edu/~research/techtransfer/ttfaq.html* [hereinafter TT FAQ].
101. See Office of Research, "Inventors at Notre Dame," available at *http://www.nd.edu/~research/techtransfer/inventors.html*.
102. Edwards Interview, *supra* note 98.
103. See TT FAQ, *supra* note 100.
104. See *id*.
105. Edwards Interview, *supra* note 98.
106. See *http://www.nd.edu/~research/techtransfer/available.htm*.
107. See Technology Licensing Office, "Questions Frequently Asked," available at *http://web.mit.edu/afs/athena.mit.edu/org/t/tlo/www/qfa.html* [hereinafter TLO QFA].
108. See *http://web.mit.edu/afs/athena.mit.edu/org/t/tlo/www/tlostaff.html*.
109. See TLO QFA, *supra* note 107.
110. See *id*.
111. See *id*.
112. See Technology Licensing Office, "TLO Statistics for Fiscal Year 2002," available at *http://web.mit.edu/afs/athena.mit.edu/org/t/tlo/www/fy02.html*.
113. See Pressman, *supra* note 54.
114. See TLO QFA, *supra* note 107.

surable milestones in the licensing agreement.

University of Cambridge

University technology transfer is not unique to the United States. For example, the University of Cambridge in England has a well-established Technology Transfer Office ("TTO").[115] Cambridge University Technical Services, Ltd. ("CUTS") was formed to hold patents on behalf of the University, to receive royalties from licensing agreements, and to hold equity in start-ups.[116] CUTS, which has no employees and is administered by the TTO, passes along all of its profits to the University.[117]

The TTO has 16 employees.[118] It receives over 100 invention disclosures[119] and is involved in the formation of about five new companies each year.[120] The TTO generates approximately $5.6 million yearly, which includes $2.4 million from licensing its technologies and $2.1 million from managed consulting services that it provides to academic staff members who wish to consult for external organizations.[121] The TTO advises such staff members on issues such as costing and pricing, negotiating terms with the client company, drafting legal agreements, and invoicing.[122] The TTO also holds equity in about 40 start-up companies based on University technology.

For marketing purposes, the TTO cultivates relationships with local, national, and international businesses and uses these relationships when appropriate in the search for licensees. Often, the researchers have relationships with potential licensees that are exploited. In addition, the TTO sometimes performs research in order to identify potential licensees and mails them a non-confidential description of the technology, which may be followed up by a phone call in order to determine interest.[123]

IV. War Stories

Not everything has gone smoothly for all universities that have thrown their hats into the commercialization ring. Numerous cautionary tales illustrate the need for universities to proceed cautiously and prudently with regard to technology transfer activities.

The University of Florida was not prepared to take full advantage of technology transfer when a University researcher invented Gatorade in 1965. At the time, the University did not have a formal policy in place regarding the ownership of faculty inventions and, initially, had no interest in marketing the new drink.[124] After the inventors independently reached an agreement with Stokley-Van Kamp to produce and sell Gatorade, the school decided that it did, indeed, want to be involved with Gatorade. By this time, in order to receive any of the licensing revenue from Gatorade, the University was forced to go to court and was only granted a 20% share of the profits. Although the University reportedly receives in the neighborhood of $4.5 million each year from Gatorade, it is easy to conclude that it would be receiving substantially more than that if it had formal revenue sharing agreements in place with its researchers at the time of the invention.[125] The University's current revenue sharing agreement with its researchers gives ownership of all inventions and innovations developed by school employees using its resources to the school and calls for the University to receive up to 70% of any licensing revenue.[126]

The University of Arizona learned the hard way that there are risks involved in technology transfer. In 1993, a licensee of the University's tech-nology transfer program brought a fraud lawsuit against the University, alleging that University researchers had violated a contract in which they agreed to consult exclusively with the company, and seeking $70 million in damages.[127] The case was settled for a reported $4.4 million, a significant sum of money especially when one considers that the University's technology transfer program only brought in about $180,000 a year at the time.[128]

The University of California at Berkeley was criticized for the public-relations aspect of a sponsored research and technology transfer agreement entered into with a Swiss company in 1998. The deal called for Norvatis to give $25 million to Berkeley's Department of Plant and Microbial Biology in exchange for first rights to negotiate licenses on roughly one third of the department's discoveries, as well as two of the five seats on the department's research committee.[129] This arrangement led to widespread protest and dissent within the University community by those who felt that the agreement gave Novartis too much control over University research and its results. Berkeley faced protests from both faculty and students, as well as outside groups. Petitions against the deal were circulated, a five-part series in the student newspaper decried the deal and the growing privatization of the University in general, and a group of students protested at graduation by wearing the Norvatis logo on their caps.[130]

Boston University fell victim to too much optimism and poor investment controls when it took a large equity position in a University start-up. During the 1980s

115. See *http://www.rsd.cam.ac.uk/tto/faq/*.
116. See Technology Transfer Office, "Frequently Asked Questions," available at *http://www.rsd.cam.ac.uk/tto/faq/*.
117. See *id*.
118. Email Interview with Becky Finnimore, Technology Transfer Office (Mar. 5, 2003) [hereinafter Finnimore Interview].
119. See Technology Transfer Office, "Licensing," available at *http://www.rsd.cam.ac.uk/tto/licensing/*.
120. See Technology Transfer Office, "New Ventures," available at *http://www.rsd.cam.ac.uk/tto/ventures/*.
121. Finnimore Interview, *supra* note 118.
122. *Id*.
123. *Id*.
124. See Villano, *supra* note 30.
125. See *id*.
126. See *id*.
127. See Slind-Flor, *supra* note 30.
128. See *id*.
129. See Press, *supra* note 3, at part 1.
130. See *id*., at part 3.

and early 1990s, the University invested $85 million, nearly one-fifth of its endowment, in one company, Seragen, a biotech firm founded by several Boston University professors that focused on cancer research.[131] Seragen eventually failed and was sold, leaving the University with a net loss of almost $60 million.[132] It was later discovered that the University's president, as well as a number of the University's trustees, had personally invested millions of dollars in Seragen.[133]

Despite the many possible pitfalls and hurdles, most universities continue to move forward in their pursuit of technology transfer success. Some universities may proceed conservatively, but few, if any, universities have been intimidated away from technology transfer by cautionary tales such as those above—rightfully so.

V. The Future of University Technology Transfer

There is every reason to believe that university technology transfer will continue to grow in years to come. All of the players involved in university technology transfer in the United States, including the federal government, state and local governments, corporations, and the universities (including researchers), have many incentives to support such activities, and to continue to increase support.

The federal government will continue to support technology transfer, both through laws and with financial aid. As discussed above, university technology transfer is an important component of the United States' fight to remain competitive in the global marketplace.[134] In addition, university technology transfer adds to the bottom line of the economy. From 1980-2001, at least 3,870 new companies were formed based on university-developed technology.[135] In fiscal year 1999, university technology transfer activities contributed almost $40 billion to the economy and supported over 260,000 jobs in the United States.[136] In addition, about $5 billion in federal, state, and local tax revenue was generated by technology transfer activities.[137] Finally, the revenue that universities generate through their technology transfer activities supplements and invigorates government funding of university research.

For many of the same reasons, state and local governments have incentives to support university technology transfer in their areas. These governments are interested in remaining competitive on a smaller scale. They will support activities, such as university technology transfer, that lead to business and job creation, as well as tax revenue and other economic growth in their areas. In addition, state governments will support university technology transfer because it can be an additional revenue stream for cash-strapped state universities and budgets.

Corporations, obviously, will continue to increase their support of university technology transfer. By working with universities, corporations are able to gain access to advanced research facilities and talent. In addition, a lot of university research is subsidized by the government, thereby decreasing research expenses for the corporations. This is a major reason why the percentage of university research funding by corporations increased from 2.6% to 7.1% between 1970 and 1997.[138] In addition, as noted, the U.S. economy has changed such that the type of research conducted at universities is more directly relevant to corporations.[139]

Despite challenges, there is every reason to believe that most research universities will continue to be involved in technology transfer. Clearly, the potential to generate significant revenues via technology transfer is a strong incentive for many universities. As Pennsylvania State University economist Irwin Feller pointed out, the fastest growing source of funding for university research is the universities themselves.[140] There are also more direct educational benefits from university technology transfer. Participation in such activities can be a means to lure top professors and graduate students to a university. It is also a way to teach students about entrepreneurism, and to demonstrate in a real world manner the social and commercial utility of university research.[141]

Because it is seemingly inevitable that all of these forces will continue to intensely support university technology transfer, it appears that the phenomenon is here to stay and will only continue to grow. Each university will determine how it will respond to this reality.

VI. Commercialization Guidelines

University commercialization presents vast opportunities, but also daunting challenges. The reality is that all too many universities do not generate sufficient return from technology transfer and many others are struggling to establish effective programs. The expectations for a return are very high at the same time these institutions are budget-constrained to invest in these programs. Technology transfer is a complex landscape that requires expertise in a wide variety of disciplines. While much guidance is available, it is also undoubtedly true that given the vast environmental differences among universities, there is no one optimal structure for programs of this type. Nonetheless, each program should do no less than carefully analyze

131. See *id*.
132. See "The Underground Staff, BU: Not So Well Endowed," *The Student Underground*, available at *http://thestudentunderground.org/print.php3?ArticleID=174*.
133. See *id*.
134. See *supra*, Part I.
135. See 2001 AUTM Survey, *supra* note 5, at 14.
136. See "Association of University Technology Managers, AUTM Licensing Survey: FY 1999, Survey Summary (2000)," at 1, available at *http://www.autm.net/surveys/99/survey99A.pdf*.
137. See *id*.
138. See Florida, *supra* note 39, at 365.
139. See *supra*, Part I.
140. See Florida, *supra* note 39, at 369.
141. See Pressman, *supra* note 54.

and focus on the following nine fundamentals.

One: Institutional Mission Alignment

A university's technology transfer program should not, and does not have to, conflict with the mission of the university. In fact, a properly developed commercialization program will only enhance a university's ability to achieve its mission by increasing financial resources and educational opportunities. A concerted effort should be made to ensure that a conflict with mission does not arise, both during the establishment of a technology transfer program and throughout its life. The participation of stakeholders from throughout the university community in a technology transfer program and the establishment of a conflict-of-interest policy are two important alignment considerations.

It should be kept in mind that it is likely not all members of a university community will be supportive of a university's technology transfer program. University technology transfer has critics.[142] Thus, in order to integrate in a healthy manner any such opposition, it is advisable to construct programs with appropriate representation from various sectors of the university community and to conduct frequent coordination and communication exercises.

Further, the development of a well-structured and comprehensive conflict-of-interest policy is a key to a successful technology transfer program. The policy should encourage commercialization of inventions and innovations, while simultaneously guarding against potential abuses or the perception of impropriety. The university's mission statement should be kept in mind during the creation of a conflict-of-interest policy, as well as throughout the life of the program, to ensure that the operation of the technology transfer program remains consistent with the mission of the university.

Two: Program Structure and Resources

As evidenced by the case studies,[143] a university technology transfer program can take many different forms. By way of example, if the leadership at a university is supportive of the idea of a technology transfer program, but is not enthusiastic about a large initial capital outlay to set up a program in-house, many of the necessary technology transfer functions, such as patenting, licensing, and marketing, can be outsourced to qualified third parties. On the other hand, if maintaining strict control of the program is critical and the necessary funding is available, professionals can be hired and brought into the technology transfer program full-time. Other relevant factors that may be considered when determining the structure for a university's technology transfer program include the size of the school, the type and nature of research conducted at the university, and the number of inventions disclosed annually.

When a university technology transfer program is in its earliest stages, it may be wise to start small with many functions outsourced.[144] As the program matures, in-house professionals and staff can be added. This strategy allows the university to avoid the large initial capital outlay required to set-up a fully functioning in-house technology transfer program. Additionally, it will allow the university to avoid mistakes in the initial structure of the program and to access the expertise of those with experience. Needs should be accurately identified and addressed slowly and methodically.

Three: Funding Sources; Projections

A university technology transfer program can be funded in many alternative manners. Usually, the university provides some level of initial funding—cash or in kind services. However, if a university cannot, or will not, budget for an adequate commitment, there are other options. For instance, individuals and private foundations sometimes fund technology transfer programs, such as in the case of the University of Wisconsin's Alumni Research Foundation.[145] Also, corporations may be willing to fund technology transfer operations at a university in exchange for rights or preferences in the technology that comes through the technology transfer office. Nonetheless, a long-term goal of any technology transfer program must be to become financially self-sufficient and, eventually, a source of sustained value for the university.

Financial planning for a technology transfer program is challenging. It is difficult to project a program's income because it is impossible to predict the quantity and quality of new technologies that will be developed by university researchers. It may also take many years before a promising technology begins to generate positive cash flow, or any cash flow at all. Nonetheless, just as in any speculative venture, the process of financial planning and projecting is essential. In essence, these programs must have a business and financial plan at least as rigorous as they require for the technology that they aspire to commercialize.

Four: Identifying, Protecting, and Defending Assets

Without assets (in this case most likely intellectual property), there is no program. But the fundamentals of identifying, protecting, and defending intellectual property rights are often undernourished. A university's property must be properly protected, even before the technology transfer program becomes involved with a particular invention or innovation. It is imperative that, at a minimum, university researchers understand the basics of intellectual property law so that the university does not unwittingly lose "control" of the

142. See *supra*, Part II.

143. See *supra*, Part III.

144. The work can be outsourced on a case-by-case basis, or as a whole.

145. See *supra*, Part III

inventions or innovations by, for instance, researchers publishing the results of their research before proper intellectual property protection is obtained. It is incumbent upon the technology transfer office to ensure that researchers are supported on these matters.

Additionally, a comprehensive intellectual property policy should be developed that clearly articulates ownership and control issues, as well as obligations of both the university and the researchers. Some of the important topics that should be addressed in an intellectual property policy include, scope, ownership of inventions and innovations, income sharing formulae, disclosure mechanisms, obligations of inventors, and publication policies.

It is also important that a process through which researchers disclose inventions and innovations be developed. Generally, universities create an invention disclosure form and mandate that researchers complete such a form for every invention or innovation they develop. Some important parts of an invention disclosure form include, research funding source, detailed description of the invention or innovation, names of potential licensees in the field, disclosures of the invention or innovation made to other persons or entities, and proposed dates of publication or presentations about the invention or innovation.

Technology transfer programs will also need to take the necessary steps to secure protection of assets—by contract, securing copyright, patent, trademark, and other legal protections, and will need to consider geographic protections.[146] Outside legal counsel or dedicated in-house counsel with appropriate expertise must be consulted and utilized. Moreover, no program is complete without a strategy to identify and deal with third party infringement and to enforce these hard-earned rights.

Five: Missionary Work

Identification and protection are essential, but marketing and distribution are synonymous with "commercialization." University researchers need to be made aware of the existence and role of the technology "transfer" program. They need to have a sense of the value to themselves, their research, the university, and community. Thus, another essential mission of technology transfer officials must be to focus on internal marketing. This includes ensuring awareness and education for university administration, alumni, boards of trustees, and any other stakeholders whose support are needed to nurture or grow a program. Public universities should be sure to take taxpayers into account, as they are an additional group of stakeholders whose support is important. The more support the program has within the university community, and among any other stakeholders, the better. Part of the education must be that the risks of undertaking certain studies must, and will, be taken, and as with any venture, some things will go well and other things will not go so well. Methods of internal marketing and raising awareness include informational meetings, publication of inventor's handbooks, mailings, and a technology transfer Web site. These activities should not only focus on the financial benefits of technology transfer, but also the educational benefits and the benefits to our society as a whole.

Six: Evaluation and Valuation of Assets

Perhaps among the more difficult aspects of university technology transfer is the evaluation, valuation, and prioritization of the inventions and innovations that are disclosed to the technology transfer office. What assets hold a reasonable chance to be marketable and under what terms? Which of the disclosures have the commercial potential such that the technology transfer program should put its precious and constrained time and resources into developing and marketing them? This process will greatly depend on the structure of the technology transfer program. Some programs are set up with this function in mind. They are staffed by licensing professionals with experience and knowledge in particular fields of technology. Other technology transfer programs have advisors that may include academics and individuals from private industry to evaluate disclosures. The use of outside consultants with expertise in the field to evaluate the commercial potential of a particular invention or innovation is also not uncommon. Once it has been determined that an invention or innovation does have commercial potential, it is sound to focus on how to derive market value—there are numerous choices.

Seven: Marketing & Distribution Channels

Direct licensing, ventures, alliances, start-ups, and donation are all distribution alternatives. Finding the right choice or choices (since few formats are mutually exclusive) is no small task. Researchers themselves are often good resources for information on potential partners in their particular areas of expertise. It is also important for a technology transfer office to develop a network of contacts both in private industry and in the venture capital community. AUTM is a resource for both marketing information and contacts. Some university technology transfer programs display their inventions and innovations at technology trade shows. Others, such as the University of Illinois, hold their own showcases of university technology. Most university technology transfer programs include a list of available technologies on their Web site. Whichever methods a technology transfer program chooses for marketing itself, it must be aggressive.

There are many different types of partners with whom a university technology transfer program may choose to work, including licensees, capital sources, investors, joint venture partners, consultants, and

146. See Robert C. Dorr and Christopher H. Munch, *Protecting Trade Secrets, Patents, Copyrights, and Trademarks* (Aspen Publishers), for a detailed resource on securing intellectual property protection.

counsel. When choosing potential partners, it is important to carefully evaluate their skills and experience in the relevant field or discipline.[147]

For example, when evaluating potential licensees or joint venture partners for an invention or innovation, the goal is to find a partner that will be able to help maximize the commercial potential of the technology. An acceptable candidate should have proven skills in commercializing products or services in the relevant field, as well as a realistic plan for developing and marketing the product or service. Other important attributes to look for include contacts in the field, financial stability, and an established distribution system. It is advisable to consult with other university technology transfer programs that may have dealt with a potential partner in the past.[148]

Part of evaluating inventions and innovations is the determination of the optimal path to market. Often, this determination will lead to licensing the technology. However, it may sometimes be better to start a new company to develop and market an invention or innovation. Factors to be considered in determining whether a start-up is the proper path to commercialization include, whether the product or service is ready for commercialization or must be developed further, the willingness and ability of the inventor(s) to work on the marketing and development of the product or service, other available managers, and, of course, funding sources.

When looking for and evaluating capital partners and other potential investors, it is important to be both practical and prudent. It can be difficult to attract investment dollars. It is necessary, therefore, to have a realistic outlook regarding potential investors and what to expect. Nonetheless, it is important to assess carefully the skills and attributes of potential investors. Characteristics to evaluate include, the types of projects in which they have invested in the past, their experience in the relevant field, experience in the management of start-ups, contacts, reputation, and experience working with universities. Contractual terms offered by the investor must also be carefully evaluated.[149] It is wise to interview multiple candidates for roles to find the professionals best suited for the desired purpose.

Eight: Documenting Transactions

No part of our commercial marketplace works without documenting understandings and expectations. Experience, knowledge, diligence, and planning are especially required at this point. Proper terms and conditions can make the difference between success and failure.

It is a good idea for a technology transfer office to develop a library of basic form contracts for different situations. This library could include exclusive and non-exclusive licensing agreements of various types (patent license, software license, etc.), sponsored research contracts, joint venture contracts, and non-disclosure agreements. These basic contracts will serve as starting points in various circumstances.

It is important to have a feel for standard terms and conditions within an industry and for the type of agreement that will be negotiated. It is also important to keep in mind that terms that may be standard in private industry may not be acceptable or standard when a university is involved. For instance, the Stanford OTL will not enter into agreements that require the university to keep all information about the license confidential, that require the university to guarantee that the invention does not infringe any patents, or that demand first rights to future inventions in the same field for a partner.[150] Laws that govern public universities may preclude them from entering into contracts with terms that are deemed standard within private industry.

Nine: Consistent, Critical and Continuous Re-evaluation

University technology transfer programs are often very focused on getting inventions or innovations to market, or the "launch." It is important to keep in mind, though, that this is not the end of the process for a technology transfer office. It is only the beginning. Continued monitoring and evaluation of both products and partners are necessary to ensure that the commercial potential of an invention or innovation is maximized and that lessons for the program can be learned and integrated. Thus, a technology transfer office should conduct regular audits of the activities of its partners. In addition, a technology transfer program should continually audit its own internal processes and make adjustments.

Conclusion

There is no conclusion. This is a very bright dawn for commercialization of university controlled and owned innovations.

147. See Paul J. Kollmer and Phillip L. Spector, *Communications and Technology Alliances: Business and Legal Issues* (West Group), for a detailed resource on joint ventures and other business alliances. See Jay Dratler, Jr., "Licensing of Intellectual Property," *Law Journal Press*, for a detailed resource on intellectual property licensing.

148. This is true for all types of potential partners.

149. See J. Robert Brown, Jr., *Raising Capital: Private Placement Forms & Techniques* (Aspen Publishers) for a detailed resource on finding and working with investors.

150. See Wiesendanger, *supra* note 33.