

ASEE PUBLIC POLICY BRIEFING

University-Industry Partnerships and Technology Transfer

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Issue Statement: Universities and private industry together are the driving force of technological innovation, yet barriers exist to achieving a healthy, mutually-beneficial relationship.

Summary

With divergent short-term goals and pressures, university and industry outlooks can shift from partnership and shared objectives to antagonism and misunderstanding. In addition, a changing global landscape has significantly reshaped the dynamic between universities and industry. In particular, significant barriers to a productive university-industry relationship include:

- Lack of consensus for how to resolve arduous intellectual property licensing issues;
- Attracting research funding from private industry, as foreign universities have become increasingly competitive with many;
- Recruiting and retaining top student and faculty researchers; and
- Forging lasting consulting and applied research agreements with private industry and venture capital firms.

Natural differences between universities and businesses have been exacerbated by a changing environment of increased global competition. For universities, the natural barriers of location and communication that previously restricted American businesses from forming partnerships with foreign universities have fallen, introducing added competitive pressures to the race to attract research funding.

Meanwhile, operating in an intensely competitive global marketplace has forced down the costs of development (in time and money) companies can afford to spend, dramatically shortening the window in which to commercialize new technologies and still maintain a healthy profit margin (necessary to fund ever newer products).

However, easier access to research funding around the world cuts both ways. With many of the top engineering universities in the world, the US stands to gain from increased market access if it can lower the barriers to forming research pacts (in time and money).

A more competitive market for global research and development funding clearly points to a need for universities to identify and highlight the positive differentiators they can offer. Given the significant red tape often involved in partnering with industry, universities

would be well-advised to focus on improving their collaborative mechanisms. With respect to licensing, creating efficient methods to reduce the barriers to commercialization is the key to establishing positive, durable university-industry relationships.

More to the point, universities and private industry have common cause in fostering dynamic regional economic growth. Innovative technology—developed through cutting-edge research—creates jobs and competitive products, translating into comparative advantages regionally and nationally that are attractive to enterprising business leaders, researchers, and students.

Background

As creators of knowledge, research universities form a natural fit with private industry, capitalizing on innovative research to produce goods and services that drive economic growth across regions and nations, raising the standard of living around the world. Economic growth comes in the form of new jobs and greater resources with which to attract more cutting-edge companies and top-flight scholars, students and entrepreneurs. Thus, university-industry partnerships exist as part of a larger scheme of community and interdependence.

Federal legislation has prompted a massive increase in private funding for university research in the latter part of the 20th century. Passage of the Bayh-Dole Act in 1980, in particular, has spurred dramatic growth in privately-funded university research.

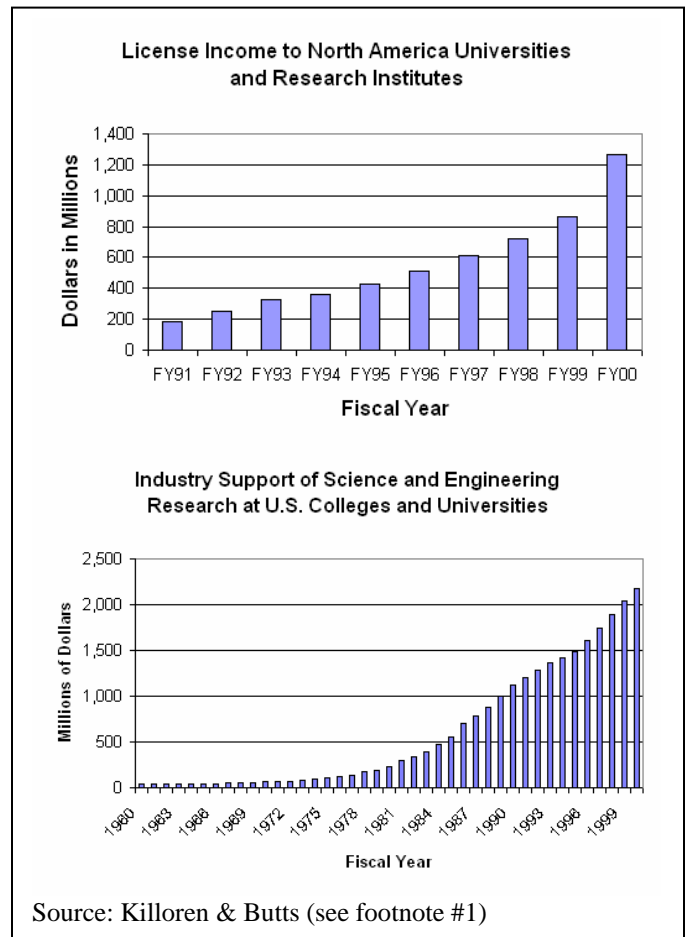
Along with the passage of the Bayh-Dole Act, as technology streams merged a shift occurred in private industry away from big central research laboratories that had previously engaged in basic research toward leveraged funding of research institutes, federal labs, and universities. As a result, the National Science Foundation reports industry funding of science and engineering research at U.S. universities grew 150% from 1988 through 2000.¹

IP Licensing

Bayh-Dole Act

Passed in 1980, the Bayh-Dole Act gave US universities, small businesses and non-profits intellectual property control of their inventions that resulted from federal government-funded research.

Perhaps the most important contribution of Bayh-Dole is that it reversed the presumption of title and permitted a university, small business, or non-profit institution to elect to pursue ownership of an invention before the government.



Source: Killoren & Butts (see footnote #1)

¹ "Industry-University Research In Our Times." *White Paper* (Bob Killoren and Susan Butts) http://www7.nationalacademies.org/guirr/IP_background.html, Jun. 2003

The licensing of university-created technology and intellectual property remains a significant barrier to forging productive partnerships with industry. University-industry partnerships can lay the groundwork for streamlined commercialization of products. By building trust and understanding through regular interaction, progress on even the most challenging problems becomes possible.

University research plays a critical role in driving regional economic growth through technological innovation. From a university's perspective, the goals of university-industry partnerships are two-fold: (1) to promote research; and (2) to use the results of that research to spread the broadest possible benefit to society.

A white paper published in March 2007² listed nine points to consider from the university perspective, representing many of the common challenges faced regarding licensing agreements:

- Universities should reserve the right to practice licensed inventions and to allow other nonprofit and governmental organizations to do so.
- Exclusive licenses should be structured in a manner that encourages technology development and use.
- Strive to minimize the licensing of “future improvements.”
- Universities should anticipate and help to manage technology transfer related to conflicts of interest.
- Ensure broad access to research tools.
- Enforcement action should be carefully considered.
- Be mindful of export regulations.
- Be mindful of the implications of working with patent aggregators.
- Consider including provisions that address unmet needs, such as those of neglected patient populations or geographic areas, giving particular attention to improved therapeutics, diagnostics and agricultural technologies for the developing world.

From the business perspective, the ability to accurately forecast the development costs of a given idea is of paramount importance to making an informed decision about which ideas to fund. Meanwhile, universities rightly expect to be fairly compensated for the innovative research work they've done. An objective way to determine the fair market value of inventive research is needed to build the trust and consensus required for any agreement.

Thus, a predictable framework for licensing and developing university-researched ideas and technology is needed to be able to make decisions with any degree of precision. Universities and their industry partners need a flexible, objective framework for valuing ideas, predicting development costs, and strengthening long-term research relationships.

Background Rights

² “In the Public Interest: Nine Points to Consider in Licensing University Technology” *White Paper*: <http://news-service.stanford.edu/news/2007/march7/gifs/whitepaper.pdf>, Mar. 2007

The complexity of modern research and technology can often lead to related or overlapping inventions.³ Thus, the issue of who owns the rights to any particular invention or idea has become increasingly arcane. Nonetheless, the success of any university-industry partnership often hinges on such matters, as the sponsor's return on investment is directly tied to their rights to the research results.

Innovations often come from unexpected quarters, and it remains difficult to accurately predict where a solution may come from. So the risk of infringement of another company's (or individual's) intellectual property is real and hard to gauge.

Yet a university that accepts funding from private companies has ethical and legal obligations to their sponsors to ensure they receive their contractually mandated due. Thus, the issue of due diligence with respect to background rights is one both sides must be clear about up front in any university-industry partnership, and universities should disclose as fully and completely as possible any background rights that may exist related to any privately-funded research project. Periodic updates on the course of research, and its effect on background rights may also be necessary to keep the relationship on track.

Research Funding

Basic vs. applied research – The federal government has typically played a major role in funding basic research and the consensus in Congress today is that this posture will not change in the near future. At the university level, however, spreading around limited federal funding for basic research often requires tough decisions. For businesses, basic research is fundamental to spurring new ideas to fill the pipeline of potential projects for development. Thus, the burden falls to individual university leaders and regional alliances to develop a holistic approach to:

- Persuading the US Congress and Executive Branch to provide federal funding;
- Incorporating state and local governments into the process to provide seed money for new programs, and to develop the infrastructure needed for advanced research; and
- Attracting venture capital and business firms to provide funding for specialized, applied research.

Increased competition from abroad - American universities today no longer hold a monopoly on industry-sponsored research. Several factors point to a decline in America's competitive advantage in the global research and development marketplace. With just 5.7 first university degrees per 100 in natural sciences and engineering to the college-age population in the US (versus 8/100 in Japan and 11/100 in Taiwan and South Korea), the US also has fallen to 6th in total R&D expenditures as a percentage of GDP, and its share of worldwide high-tech exports has been in a 20-year decline. Greater saturation of the market with competitors would undoubtedly erode the historical advantage enjoyed by the US relative to its competitors. However, these measures taken together with a decline to 6th in total R&D expenditures as a percentage of GDP by the US (behind Sweden,

³ "Industry-University Research In Our Times." *White Paper* (Bob Killoren and Susan Butts) http://www7.nationalacademies.org/guirr/IP_background.html, Jun. 2003

Japan and South Korea) serve as compelling evidence that the downward trajectory is more than an anomaly.⁴

Foreign universities have shown they can successfully compete for industry support from even U.S.-based companies. Many universities in developing countries have shown a greater willingness than their American counterparts to grant favorable intellectual property rights to sponsors in order to attract research funding. In addition, the race to collect licensing income as part of research agreements often does not play as much of a role for many foreign researchers.

Federal Legislation and the Mixing of Funds

As research becomes more and more complex, it has become increasingly difficult to keep funding streams separated. Under the current umbrella of federal legislation the rights of private sponsors to the research results that they support can be imperiled.

- Under the Bayh-Dole Act, universities are not allowed to assign IP rights to a third party for any invention conceived as a result of federally-funded research.
- IRS Procedure 97-14 limits the use of university facilities that are funded by tax-exempt bonds. As noted in a white paper put out by the National Academies, universities may risk the tax-exempt status of the affected bond issues if royalty rates are set in advance or ownership assignment is given to private industry sponsors. However, the intent of this regulation is to prevent private research sponsors from receiving a direct benefit from the use of tax-exempt bonds, and many companies argue that “universities should not use [this regulation] to limit pre-licensing terms in research agreements unless the university can show that the privately-sponsored project receives direct benefit from facilities or equipment financed by a tax-exempt bond.”⁵

Universities and businesses need to take extra care to evaluate potential industry-funded research projects to ensure there is no cross-over with federal funding, and that their sponsor’s rights to research results are secure.

Policy Options

Innovation begets innovation.

- By stimulating interest in cutting-edge research and technology centers from prospective students and scholars, and attracting funding from private industry, venture capitalists, and government, universities can find themselves in a virtuous cycle of upward mobility and prestige.
- Research leads to breakthroughs; breakthroughs lead to technological innovation; and technological innovation leads to higher standards of living and better quality of life.

⁴ “U/I Collaborations: Recent Trends, Challenges, and Advances in Creating Successful Engagements” (Beth Burnside, Lou Witkin) *Research-Technology Management Magazine*. Jun. 2007

⁵ “Industry-University Research In Our Times.” *White Paper* (Bob Killoren and Susan Butts) http://www7.nationalacademies.org/guirr/IP_background.html, Jun. 2003

On the other hand, despite enormous effort on the part of any single group, the ultimate goal of economic growth and prosperity as a society remains elusive. A vicious cycle of decline can also take hold, leading to falling levels scholarship, less competitive students and faculty, and finally a less competitive region as companies move to greener pastures.

The key differentiators between the two are *environment* and *engagement*.

- By setting about to create the conditions that make universities attractive research centers, universities will attract students and companies, leading to greater funding and more research.
- Creating the right environment requires engagement among leaders of universities, private industry, and government to create a symbiotic relationship geared toward the shared goal of creating and developing cutting-edge technology.

Cultural differences between universities and industry (as well as between public and private institutions), not to mention regional differences, point to the need for unique, adaptable approaches for addressing these issues and creating partnership agreements. Here are two.

Addressing Partnerships through GUIRR

Many of these complex issues have begun to be addressed at the regional and national levels. Nationally, the Government-University-Industry Research Roundtable (GUIRR) has worked to develop a set of general principles governing intellectual property negotiations between U.S. universities and industry, with the goal of promoting a healthy relationship between universities and industry that favors economic growth and academic excellence.

Regional Alliances

Templates currently exist across the country for creating durable partnerships between universities and engineering-, science- and technology-intensive companies.

From holding regular local and regional dialogues with technology companies on an informal basis, to formalized “alliances” that combine university and business leaders and state and local governments, these cross-over partnerships offer positive platforms for economic growth. Regular collaboration between universities and local/regional business leaders has many other benefits, not the least of which is the ability to combine their clout and resources to persuade state and federal representatives to provide funding (making the region more competitive).

Universities have begun to proactively address the difficulties of forming partnerships by opening offices that focus exclusively on servicing industry relations. At the University of California at Berkeley, for example, the new Intellectual Property and Industry Research Alliances office (IPIRA) was opened to serve as a one-stop-shop for partnerships with industry. With two divisions focusing on industry alliances and technology licensing respectively, IPIRA was able to nearly triple the amount of corporate-sponsored research, and dramatically reduce time spent negotiating agreements in the first year of operation.

Another such creative approach is found in Georgia, where the state's research universities, the business community and state government have formed the Georgia Research Alliance (GRA). Leveraging the research capabilities of the universities with the resources and needs of technology-intensive industry and the state government, GRA has successfully generated economic growth by building the necessary infrastructure of a world-class research and technology sector.

The advantages are apparent:

- Universities and companies are able to discuss the direction of research and innovation and their mutual needs and interests on a regular basis.
- With greater resources available and a coordinated plan for developing technology and rewarding innovation, universities are able to attract eminent scientists and scholars, as well as the top-level students they bring. Regional businesses, meanwhile, can tap a ready-made job pool of top-flight graduates.
- A strong alliance can speak with a uniquely powerful, positive and unified voice when dealing with the local, state and federal governments to create solutions.