Should Universities Be Agents of Economic Development?

by Robert E. Litan and Lesa Mitchell[1]

It is appropriate that we are ending the conference by addressing the question of whether universities should be agents of economic development—because in doing so, we really are addressing one of the central roles of the university.

If by "university," one means an institution devoted both to the production of new knowledge and its dissemination through the teaching of students, then either implicitly or explicitly, the *effect* of such an organization, regardless of its intention or purpose, will be to foster economic "development" and thus growth.[2] Economists have well established that new knowledge, when successfully commercialized, is the leading cause of growth in economies at or near the "technological frontier" (or beyond the point where technology can be borrowed or bought from elsewhere and combined with investment in new capital goods). Furthermore, a more educated workforce is both more likely to become more productive over time and also to adapt more easily to change (and thus less likely to resist it, through trade protection or overly onerous regulation that makes the labor market less flexible). Both outcomes clearly contribute to economy-wide growth.

This much should be non-controversial, and, indeed, essentially a statement of fact. The hopefully more interesting question we wish to focus on here is whether

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2. This definition excludes for-profit universities and teaching institutions that are devoted exclusively to teaching, and not to research; and also research institutes, which are devoted to production of new knowledge and not its dissemination. Only the "university" does both, and it occupies our attention here.

universities should deliberately do more to encourage the development of products or companies, whether on a global, national, or local scale. In the process depicted in Chart 1, the question is thus whether the university should assist in some fashion in the commercialization of new knowledge and/or local economic development. In a word, should the university become "entrepreneurial," in the commercial sense of the term?

1. The University Knowledge Process

The answer, we suggest, is not "should" but "how." In our view, universities—that is, institutions of higher education engaged both in research and teaching—increasingly have no choice *whether* to be entrepreneurial, although like for-profit firms, they do have a choice about *how* they go about doing so.

The reason universities have no choice about whether to pursue some type of economic development is simple: *because competition requires entrepreneurial behavior.* To be sure, there will always be some institutions of higher learning that try to avoid this competition by staying within a narrow niche—such as teaching particular subjects and students, in limited geographic areas, without being engaged in research and thus the production of new knowledge—just as smaller retailers choose to avoid competing with larger retail chains by specializing in the sale of and service for a limited range of products. But for universities that seek the prestige and recognition to be major players in both knowledge generation and teaching, competition cannot be avoided.

Competition among universities and colleges used to be a defining feature only of higher education in the United States. In other countries, central governments have played the dominant role in funding and directing universities, in some cases (France and Germany, for example) actually employing the faculty. Where governments are so heavily involved in funding universities, they also naturally tend to limit competition among them, presumably to avoid duplication or playing favorites.

Although federal, state, and sometimes local governments in the United States contribute to funding of both public and private universities, there is no central government plan for university research and education as there is in other countries. To the contrary, in the United States, universities compete with each other on many levels: for faculty, students, administrative personnel, and research funding, and in a variety of inter-collegiate activities (of which sports is the most visible and expensive example). *The Economist*, in a well-noted survey of higher education in 2005, pointed to the central role of competition and the absence of government planning as two prominent reasons for America's success in higher education.[3]

But America is no longer alone in having a competitive higher education market. Increasingly, as *The Economist* survey pointed out and as events since then have only reinforced, higher education is now increasingly global in scope. Whether or not schools compete with each other within a country, many now compete on the global stage on all the same dimensions, except for sports, as has been true within the United States: for faculty, students, administrators, and research funding (if not from governments, then from private companies and foundations).

This global competition manifests itself in various ways. Some universities prefer to stay at home and try to lure talent to them. Others are going global, typically through partnerships with local universities on the ground, but in some cases through wholly owned and operated campuses abroad. We just heard from Alan Merten, who is leading George Mason in this latter direction.

In competitive markets, firms are compelled to match the leaders and, ideally, to surpass them. In the higher-education market, one of the dimensions in which United States and, most notably, Singaporean universities are now increasingly competing is for "star scientists," or those relatively rare individuals who combine cutting-edge research skills with a bent toward commercializing what they discover, either by licensing their discoveries to existing commercial entities or by launching (on their own or, more typically, with entrepreneurs) new companies. To a significant extent, this competition in the United States has been spawned in the wake of the Bayh-Dole Act of 1980, which enabled universities to retain intellectual property rights in the discoveries of their faculty who were funded by federal research grants. To help motivate these faculty members to make such commercially useful discoveries, universities now typically give them a share in the proceeds from the "IP" that is so commercialized.

3. "Secrets of Success," *The Economist*, September 10, 2005 (Survey).

To be fair, American universities and their faculty have long had a commercial bent, pre-dating Bayh-Dole. The same *Economist* survey to which we have just referred cited the "useful" feature of university research and teaching in the United States as the third reason for its historical preeminence in higher education. The survey quoted the famous American historian, Henry Steele Commager, as saying that, even in the nineteenth century, for the average American, "education was his religion," provided that it "be practical and pay dividends."[4]

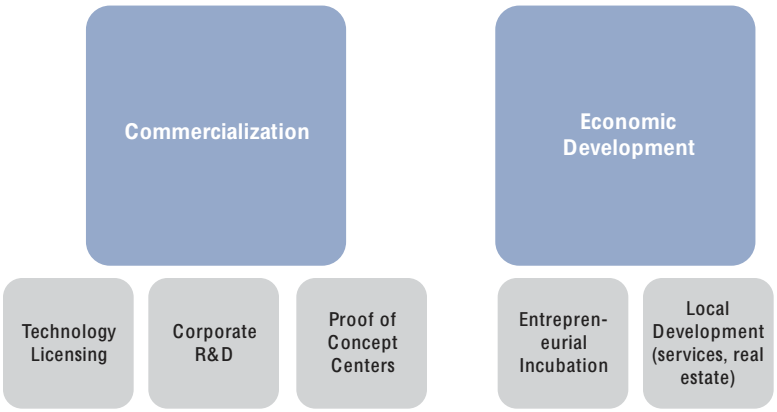
Universities in the United States have reflected this ethos, but their quest for both practicality and dividends has intensified considerably in the wake of Bayh-Dole and the substantial increase over the past several decades in U.S. government funding for university-based research, especially in the life sciences, which often can lead to commercially successful products (especially pharmaceuticals and medical devices). Many U.S. universities now have "technology licensing offices" or "technology transfer offices" (TLOs or TTOs), whose sole job is to identify commercial applications for discoveries made by university faculty and to realize revenue for the university in the process. Indeed, as we have elsewhere discussed and will return to shortly, we believe that many U.S. universities have put too much pressure on their TLOs to generate short-term profits, which ironically may be encouraging these offices to neglect many ostensibly "second tier" discoveries that also have commercial value, thus reducing the long-term benefits of technology commercialization.[5] The prominent focus at all universities today is based upon a single patent-license pathway to commercialization, while providing relatively little or minimal strategy and resources required to support other means of promoting commercialization and entrepreneurship.

Chart 2 illustrates the types of other commercialization activities that universities pursue, at least in the United States. Universities seek corporate funding to defray the costs of their existing personnel and facilities, attract new star faculty (by funding new positions and spreading the word that their university is a "hot place" for rising and established star researchers to be), and provide the opportunity for faculty and graduate students to work on commercially relevant research. (While federal agencies historically have funded only basic research, some agencies, including the National Science Foundation, are funding more applied research, with potentially nearer-term prospects for commercialization). "Proof-of-concept" centers are more

4. Ibid., at 6.

5. Robert E. Litan, Lesa Mitchell, and E.J. Reedy, "The University As Innovator: Bumps In The Road," *Issues in Science and Technology*, Summer 2007.

2. Commercialization and Economic Development Options



recent ways for universities and their faculty to test the commercial feasibility of new knowledge, and thus act as precursors to commercial licensing or to the formation of new companies.

University commercialization, to the extent it is "successful," clearly provides monetary benefits to the university and relevant faculty (and, often, typically the departments in which the responsible faculty are situated). But we believe an equally, if not more important, objective, or at least impact, of commercialization is the direct effect it has on faculty recruitment, and because star faculty tend to attract star students (especially graduate students), indirectly on the recruitment of star students.

Although we have seen no formal studies of this proposition, we know anecdotally that universities compete for star faculty not only on the basis of the salaries they can offer these individuals, but on other dimensions: the amount of research support (which typically translates into how many graduate students these stars can supervise and effectively employ) and the monetary arrangements from commercialization activities (typically the percentage of total royalties the university collects or the royalties faculty must pay the university if they launch their own companies). To our knowledge, the monetary arrangements relating to commercialization tend to be uniform across all faculty members within a university, and do not vary for individual "stars," although this could change in the future as U.S.

universities intensify their competition for these stars. Even if it does not change, it is possible that heightened competition for star faculty may lead, over time, to more uniformity *across universities* in their mechanisms to support commercialization and their royalty-sharing arrangements, because, as it is now, we understand (again, we are not aware of a study that documents this) that there currently is considerable variation across universities in these arrangements. Shortly, we will suggest that universities are beginning to compete on yet another dimension—through innovations in the ways that university-related technologies are commercialized—and that this could have significant positive benefits for both them and for society (nationally and globally).

In addition, because there is a strong correlation between the presence of star scientists at universities and entrepreneurial startups and other local commercial activity,[6] local university trustees may press university administrators to recruit star faculty with both strong research and commercialization track records (in addition to faculty in non-scientific fields, who, though they may afford no commercial opportunities for the university, still can enhance a university's prestige among faculty at other universities and among students).

Universities outside the United States that wish to attract star faculty with successful commercialization records who already have or are seeking positions at U.S. universities must be able to offer at least roughly similar terms as those faculty members can receive from U.S. institutions.

The same competitive forces that are driving U.S. universities to compete for star faculty are increasingly evident on the global stage. In particular, universities outside the United States that wish to attract star faculty with successful commercialization records who already have or are seeking positions at U.S. universities must be able to offer at least roughly similar terms as those faculty members can receive from U.S. institutions. Already, other countries have laid the groundwork for this competition by enacting their own versions of Bayh-Dole. Universities in China and India are actively competing for corporate R&D funding, which can be and is used to attract faculty from elsewhere or to prevent star faculty from leaving. Singapore, in its well-known bio-technology initiative, and, increasingly, universities in the oil-rich Middle Eastern countries (new ones and those partnering with foreign institutions), are using their ample government funds for the

6. Lynne Zucker and Michael Darby, in David Audretsch, Robert E. Litan, and Robert Strom, ed., *Openness and Entrepreneurship*, "Star Scientists, Innovation, and Regional and National Immigration" (Edward Elgar, 2008, forthcoming).

same purpose. Even European universities, historically reluctant to engage in any aspect of commercialization, may soon be compelled by the increased global competition for faculty, students, and research funding to join the commercialization race in some manner (and indeed, the British universities already have).

Chart 2 illustrates a second way in which universities also are engaged in commercialization activities, through what we have labeled "economic development." Our discussion of these activities will be focused only on U.S. universities—those we know best—though we are anxious to learn from this audience of similar ventures at universities in other countries.

In contrast to technology licensing, corporate-funded research and proof-of-concept centers, whose economic benefits may accrue widely to a broad population outside the university,[7] the "economic development activities" depicted in Chart 2 are meant primarily to benefit the local communities in which universities are located. Furthermore, these development activities may or may not commercialize new knowledge.

For example, different kinds of "entrepreneurial incubation" programs are spreading at U.S. universities. Typically, these programs provide mentors—often entrepreneurs as well as (or in place of) university faculty—and networks, including access to angel and venture capital investors, to assist university students or faculty, or even local entrepreneurs who may have only a loose connection to the university, in the formation and growth of new companies. To the extent these programs succeed, they are likely first to benefit the community in which the university is located and, secondarily, a broader population.

Various forces drive these entrepreneurial incubation efforts. In some cases, the initiative derives entirely from an entrepreneurial founder, such as the late George Kozmetsky at the University of Texas' well-known "IC-squared" program; Alec Dingee at MIT's "venture mentor" initiative; or Desh Deshpande, the funder and the idea leader behind MIT's Deshpande Center. Indeed, as we discuss again shortly, no entrepreneurial incubation effort can be successful without an entrepreneurial founder or leader.

But other, more competitive reasons may be at work as well. The founders and the universities that host these initiatives may want to impress local leaders, state

7. Local communities may and very likely do benefit from university commercialization, but local economic development is not the central object of the various commercialization activities.

legislators (in the case of public universities), and alumni with "how relevant" their activities are to local area development, in order to attract greater funding to the university. The universities also may anticipate future contributions from successful entrepreneurs who benefit from these programs. With more funding, the university is in a stronger financial position to attract star faculty and students, or undertake other initiatives aimed at improving the university's prestige.

A different competitive dynamic is at work when universities use their endowments, faculty resources, and alumni networks to promote local economic development in various ways: by operating elementary or secondary schools, offering health care to neighboring populations, and by various real estate development projects. In the United States, such activities appear to be most common for universities located in distressed urban areas, with the typical urban problems: high crime, poor K-12 education, and declining real estate values. In part, universities engage in such activities, which are unlikely to entail the commercialization of new knowledge, as a way of providing on-the-job experience for students and faculty. But universities located in distressed areas also may need to invest in surrounding areas in order to enhance their attractiveness to faculty and students who have options to attend or work at higher educational institutions located in more desirable locations.

In sum, competition among universities within countries and, increasingly, between universities in different countries, is driving many of them to be engaged in one or more "economic development" activities that extend beyond the traditional university functions of generating and disseminating new knowledge. Clearly, the greater the ambitions of the university, its trustees, faculty, and funders (often governments), then the greater will be the competitive imperative. But, having said that, universities, like firms in competitive markets, have a *choice* as to *how* they want to compete.

In terms of Chart 2, for example, universities may seek to commercialize (to earn revenue, attract/retain faculty and students) by licensing faculty-discovered technologies and/or by engaging in research funded by corporations and/or by sponsoring proof-of-concept centers. With respect to more local economic development, universities may engage in one or more entrepreneurial incubation efforts, assist in providing mentoring services, and/or pursue real estate development. We suspect that few universities will engage in *all* of these activities, but that, like most firms, will seek to specialize in one or a few of them.

What determines where universities will "pick their spots" to compete? Here again, universities are unlikely to differ from for-profit firms. Management strategists advise firms to concentrate on their "core competences," and not to stray too far into unknown or untested markets or activities. The same advice seems apt for universities, as well.

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Thus, a more active technology licensing program—subject to the qualifications we will outline shortly—makes sense only for universities with lots of technology "on the shelf," as it were, waiting to be licensed or commercialized, or with faculty having strong commercialization records. Likewise, efforts to persuade corporations to provide research funding or to support proof of concept centers only make sense if universities have the distinguished faculty, and therefore students, that can attract such funding and successfully carry out the research for which it may be provided.

Indeed, when it comes to competitive strategy, "core competence" is all about people, or talent. If a university has the talent for any of the various commercialization or economic development strategies we have identified, then that will largely define its competitive strategy.

What about acquiring talent if it is not already there? This question may be especially important to universities outside the United States that have not yet had the experience with any one or all of the commercialization and/or economic development strategies just outlined.

Clearly, "buying talent" is easier to do where the university already has some competitive strength and desires to add to it. Star scientists from other universities are less likely to move if they will be alone, or have to start a program from scratch, than if some future (or current) colleagues are already present. In addition, the further afield a university stretches, the greater are the risks in blending in the new "acquisitions" with the prevailing culture (unless, of course, university leaders deliberately seek to change that culture through an acquisition strategy).

Another challenge that universities face is managing whatever entrepreneurial endeavors it chooses to undertake. Take, for example, efforts at entrepreneurial incubation. From where we sit, most of the successful ventures of this type seem to be driven from "the bottom up," by one or more entrepreneurial leaders who may or may

not have tenured faculty appointments, but who generally do have some affiliation with the university.[8] Yet, precisely because these leaders may not be tenured and because, by nature, entrepreneurial incubation typically involves individuals from varied backgrounds, such efforts do not easily fit within a single university department. The challenge for university administrators nonetheless is to nurture these efforts without offending particular faculty or departments, and ideally to enlist the support and encouragement of as many qualified university faculty and employees as possible.

Another challenge where we expect continued innovation and competition in the future is the management of technology licensing. As we mentioned earlier, the passage of Bayh-Dole in the United States led to the formation of TLOs or TTOs to centralize and bring economies of scale to the university's technology licensing activities. Ideally, TLO officials identify technologies suitable for commercialization, potential parties interested in licensing them or launching entrepreneurial ventures surrounding them, and then negotiating licensing or other relevant agreements required to commercialize them. There are a number of highly successful TLO offices that have the requisite personnel and resources to carry out these functions efficiently and effectively.

However, too often in our view, university administrators and trustees have given TLO impossibly difficult missions—to generate substantial profits for the university *and soon*—with insufficient numbers of people with the right combination of skills required to perform at peak levels. These kinds of mandates can drive TLOs to have a "home run mentality"—to search for and then spend much, if not most, of their efforts on commercializing the few technologies that seem to promise the highest payoffs, or the "home runs." Not only can this strategy shortchange many other university-developed technologies that have strong commercial potential, but it does not even guarantee the "home runs" themselves, since TLO personnel may not be in the best position to judge, or have the industry network to help them judge, whether a particular discovery will or will not lead to a home run. In addition, the bureaucratic procedures that are common to TLOs (and to universities themselves) can slow commercialization, frustrating entrepreneurial faculty and delaying the benefits of their discoveries for the consumers for whom they are intended.

Accordingly, we have urged university leaders to experiment with other commercialization models: allowing other commercialization "agents" to compete with the university TLO, forming multi-university TLOs to generate economies of scale and to

8. Indeed, it would be surprising to find tenured individuals—who gain that status through research rather than hands-on entrepreneurial experiences—to lead or have an interest in devoting significant time to entrepreneurial incubation.

take advantage of industry-specific expertise at other institutions, or even giving university faculty the intellectual property to their discoveries and relying on their post-success donations to the university as the (more than) equivalent of up-front compensation for the IP rights and the ability to commercialize without the involvement of the TLO.[9]

There are signs that U.S. universities and even state officials are beginning to recognize the virtue of this kind of experimentation. We have heard at this conference the decision by Michael Crowe, the president of Arizona State, to permit the university's departments to experiment with different technology commercialization models. The University of Washington is trying a similar approach with its engineering school.

In Texas, Governor Perry has proposed that all public universities make the commercialization of research one of the several factors considered when granting tenure to professors. Significantly, Texas is measuring commercialization not by licensing revenue but instead by counting the volume of innovations moved to the marketplace. State officials also have requested that the words "technology commercialization" and "economic development" be added to university and college mission statements. In 2006, Texas A&M University became what is believed to be the first public university in the United States to formally incorporate commercialization into its criteria for granting tenure to professors. That change appears to have led to a marked increase in patent applications filed by tenure-track faculty at the university (although time will tell whether the Texas A&M policy may unintentionally lead to excessive patenting by the university, which could slow overall commercialization).

Meanwhile, at Kauffman, we have received inquiries from other universities, or those affiliated with them, about how to go about pursuing one or more of the alternatives to the current technology commercialization model we have just identified.

If these experiments prove successful—and we believe they will be—they should begin to change the way technology licensing has been traditionally practiced, and more importantly, identify the additional pathways that must be utilized to support commercialization and entrepreneurship. Star faculty understandably will be attracted to those schools that offer them greater freedom—and potentially greater rewards—in commercialization than other schools that do not. Eventually, what may start as "experiments" in commercialization at a few schools should spread to many others.

9. Litan, Mitchell, and Reedy (2007). At Kauffman, we have launched an Internet platform, www.ibridgenetwork.org, which offers participating universities the ability to showcase their technologies for potential matches with entrepreneurs and capital sources that may be interested in commercializing them.

If new approaches to technology commercialization begin to diffuse more widely throughout the university world—most likely beginning at first in the United States but ultimately finding their way to leading schools in other countries—society (national and global) should benefit in at least two ways.

First, the new models should be "win-wins"—in that society gets more innovation, more rapidly, while universities also should realize higher returns (counting licensing revenue, donations, and any other revenues that may be derived from commercialization activities).

Second, American higher education, in particular, may benefit in another way, as well. It recently has been noted that endowments among universities are increasingly concentrated in the Ivy League and other "rich universities." Table 1 illustrates this point, providing the top twenty-five-ranked universities by size of endowment. Some may argue that this growing concentration of wealth and, thus, faculty talent, is a good thing, because it permits the richer universities to take advantage of economies of scale in physical research facilities and to realize the "agglomeration benefits" of having many talented researchers in such close physical proximity.

The U.S. experience runs counter to this, however. Without disputing the presence of these agglomeration benefits, there are offsetting benefits to a society of diversity—having talented researchers, all competing with one another, at many different locations (both within and outside the United States). Different locations and cultures give rise to differences in perspectives, which are important for promoting innovation, especially "radical" or "disruptive" innovation. Where resources and talents are too concentrated, inquiry can be subject to too much "group think." Fortunately, the United States is large enough and rich enough to host many centers of excellence that can counteract group think.

In fact, if one looks at the universities that have been the most successful thus far in technology commercialization, the list looks very different than the one shown in Table 1. Table 2 provides the top twenty-five U.S. universities ranked by total licensing revenue during 2006, with their ranking on the endowment top twenty-five listed in parentheses by each school. We admit that licensing revenue is an imperfect measure of commercialization, or, more precisely, the total *social benefits* of university commercialization. Nonetheless, it does provide a rough guide to how active and successful universities are in commercialization activities. And, as Table 2 illustrates, few

of the most richly endowed schools listed in Table 1 are present in the list of the most successful universities in technology commercialization, and vice versa (and for those listed in both tables, the rankings tend to differ between the two lists).

We point all of this out to suggest that not only is technology commercialization an important force that counteracts the ability of the most richly endowed institutions to attract and retain the "best" faculty, but if the schools that experiment most aggressively with alternative approaches to commercialization come from outside the "rich list" of endowed schools, as we suspect will be the case, then the counter-force provided by commercialization should exercise a more equalizing impact in the future than it already has. We believe this is good for higher education and good for U.S. society.

In sum, universities in the United States and elsewhere around the world clearly are in the "economic development" business, and are likely to be more so in the future. This trend should benefit the broader societies that support and draw sustenance from universities. And we owe it all to a more competitive environment, one that globalization is making possible.

The challenge for universities now is to figure out where they want to play in the economic development arena. They are likely to be most successful, in our view, if they play to their strengths, and if they permit and ideally encourage the "bottom up" entrepreneurial endeavors that may come to them from their faculty, students, alumni, and other supporters.

Table 1: Top Twenty-five Universities by Size of Endowment, 2006

	Institution	2006 Endowment Funds
1	Harvard University	$28,915,706,000
2	Yale University	$18,030,600,000
3	Stanford University	$14,084,676,000
4	University of Texas System	$13,234,848,000
5	Princeton University	$13,044,900,000
6	Massachusetts Institute of Technology	$8,368,066,000
7	Columbia University	$5,937,814,000
8	University of California System	$5,733,621,000
9	University of Michigan	$5,652,262,000
10	The Texas A&M University System and Foundations	$5,642,978,000
11	University of Pennsylvania	$5,313,268,000
12	Northwestern University	$5,140,668,000
13	Emory University	$4,870,019,000
14	University of Chicago	$4,867,003,000
15	Washington University – St. Louis	$4,684,737,000
16	Duke University	$4,497,718,000
17	University of Notre Dame	$4,436,624,000
18	Cornell University	$4,321,199,000
19	Rice University	$3,986,664,000
20	University of Virginia	$3,618,172,000
21	Dartmouth College	$3,092,100,000
22	University of Southern California	$3,065,935,000
23	Vanderbilt University	$2,946,392,000
24	Johns Hopkins University	$2,350,749,000
25	University of Minnesota and Related Foundations	$2,224,308,000

Source: National Association of College and University Business Officers, 2006 NACUBO Endowment Study (2007).

Table 2: Top Twenty-five Universities by Licensing Revenues, 2006

	Institution	2006 License Revenues
1	University of California System (8)	$193,499,879
2	New York University	$157,412,824
3	Stanford University (3)	$61,310,739
4	Wake Forest University	$60,588,512
5	University of Minnesota (25)	$56,193,050
6	Massachusetts Institute of Technology (6)	$43,500,000
7	University of Florida	$42,900,000
8	University of Wisconsin – Madison	$42,363,611
9	University of Rochester	$38,016,557
10	University of Washington	$36,199,485
11	Northwestern University (12)	$29,990,550
12	University of Massachusetts	$27,183,583
13	Harvard University (1)	$20,849,993
14	University of Michigan (9)	$20,438,727
15	Emory University (13)	$17,790,432
16	University of Iowa	$16,912,938
17	University of Georgia	$16,805,484
18	University of Utah	$16,295,064
19	Johns Hopkins University (24)	$13,938,457
20	California Institute of Technology	$13,234,236
21	University of Texas Southwestern Medical Center	$12,277,436
22	Washington University – St. Louis (15)	$11,582,912
23	Rensselaer Polytechnic Institute	$10,837,438
24	Case Western Reserve University	$10,794,377
25	University of Illinois – Urbana-Champaign	$10,222,735

Source: Association of University Technology Managers.