

University Tech Transfer 2.0: Strategies for getting more innovation from public universities

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Public universities in America saw steep declines in funding during the last major recession in the '80s. As jobs disappeared and the tax base shrunk, state and local governments tightened their belts and cutback support for higher education and research. But even as legislators clamped down in some areas, they created opportunities elsewhere. Then, as now, new pieces of legislation were enacted to stimulate economic development, including the Bayh-Dole Act enabling universities to own the intellectual property emanating from government-funded research. The intent was obvious—technological invention would become the engine of economic development. And the fastest way to realize a return on investment of both public and privately supported research was to foster direct collaboration between

scientists and business and industry. This new model gave birth to technology transfer operations within hundreds of US public research universities.

Some tech transfer organizations have had more success than others. The most recent survey conducted by the Association of University Technology Managers, indicates that 11 of its roughly 200 member universities account for more than half of all the revenues generated from university patents, in licensing agreements and royalties. Why are some more successful than others? And, more important given the current fiscal crisis, what will it take for others to become more effective? *Cell Cycle* talked to leaders at three of the country's most successful public university tech transfer programs for insights.

Richard Miller

The University of Texas System institutions on average sign a commercialization deal every other day, are awarded two US patents nearly every week and start a new company every two weeks. When it comes to technology—and business activity associated with it—institutions with The University of Texas System rank second nationally in the number of startups created, third in licenses and options executed, and fourth in US patents issued.

-From the University of Texas Website

You launched several successful biotech startups before agreeing to lead UT Austin's technology commercialization efforts six months ago. Given your outsider's fresh perspective, what are your initial impressions?

Academic tech transfer offices were initially built to take disclosures from faculty and file patents. Discoveries were generally treated as independent events and the emphasis was on protecting each invention. We're moving into a period where we—scientists and tech transfer managers—need to become more entrepreneurial. We're shifting away from simply filing patents and focusing on how we can translate a new invention into a useful product or service. When you think entrepreneurially,

it's easy to see the translation process may require more than one invention. It may require putting several things together to make a more compelling story, offer a better solution.

How has that idea gone over with faculty?

So far it's going over very well. This approach is about doing better science, better inventions and obtaining more comprehensive knowledge. Faculty members understand the value of collaboration. They frequently bring together multiple disciplines to enrich their own research so the message about collaborating to get a better end result is easy to understand and embrace.

How have things changed since you arrived?

Overall we are much more interactive with faculty, meeting with them more frequently for one-on-one discussions. We're asking for more information from them and we're providing more guidance. I think of these discussions as learning sessions where faculty help us understand what they are working on and what the relevance is, and we teach them more about what we do and how we can help them. These conversations are already beginning to have an impact. I've heard from some scientists that the experiments they planned have been influenced by what they're hearing from the tech office and the patent council with respect to prior R&D.

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There's a real effort now to create university "ecosystems," regional research hubs that support tech transfer through every stage of the process. Is this happening at the University of Texas, Austin?

Absolutely. Our approach is divided into three distinct phases. We begin by emphasizing quality, which starts with identifying quality ideas, nurturing them, and then working diligently to make the inventions that spring from these ideas stronger, better and more relevant. Next we foster collaboration, integration and connection. We bring together all the things necessary to be truly innovative—all the various scientific disciplines, lawyers, business leaders, investors, etc. Finally, drawing from the insights and input of all this talent, we determine exactly how to translate a discovery or invention into something that benefits society.

Haven't these types of collaborations happened all along? What's different?

Actually, they haven't happened all along. I'm speaking about academic transfer in general. Academic tech transfer offices too often think in terms of processing paper. Disclosures come in and the immediate thought is let's file a patent, let's try to find in-licensing opportunities. There's not been much of a value-add component to the function. Now, we look at the disclosure and immediately begin thinking how can we make this discovery more valuable.



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-Richard Miller
Chief Commercialization Officer,
University of Texas, Austin

So instead of simply turning a promising idea over to someone else via an in-licensing agreement, you're bringing diverse groups of people together earlier to strategize ways of strengthening/building on the original idea to make it more relevant and, hopefully, more impactful?

That's our goal. Generally speaking academic tech transfer offices have evolved to process a lot of disclosures and inventions. We are very good at that. Conversely, entrepreneurs begin with a vision. They know they have to attract capital, and to do that they need to bring something to the marketplace that offers a unique value. It's a shift in thinking. I've only been at it four and a half months and instituting something like this is a multiple year project at a minimum, but this is the hope.

Does UT Austin have the kind of ecosystem needed to move an idea from concept to thriving company?

We have the beginnings of that kind of ecosystem, but it's not rich enough. In addition to my own office of tech commercialization, there's the office of technology incubators, venture labs and a couple of programs that attempt to bring together various disciplines—science, legal, intellectual property, etc. But we have yet to put them under one umbrella. We also have a lot of groups that try to introduce the right people, attempt to enlist mentors and encourage people to seek mentors, that kind of thing. We tap local talent

to work with us in an advisory role and we do things like have a venture capitalist come to a meeting once a month and advise us on how to do things better. All of this is useful, but it's not going to get us to the next stage.

What is needed to get to the next stage?

Taxpayers and governmental entities are asking is there a way to get more out of our public universities? I think there's a way to get a lot more. But we need to attract and motivate the requisite talent—scientists with entrepreneurial experience, lawyers with IP expertise, successful finance and investment managers. Then we need to give them the mandate to truly commercialize things, empower them to license and create companies. Universities will need to commit to hiring professional staff. Much as we appreciate the contributions of mentors, alums and advisors, we can't rely solely on volunteers to do the work needed to reach our goal.

Right now most tech transfer offices measure success based on the number of disclosures and patents filed. How would you like to see success measured?

Ten years from now I'd love to be able to measure success by how many great products are out there helping people. But that's the long view. In the meantime success will be measured by how many quality startups are launched. Quality meaning they get significant first-round funding, which is a real measure of confidence. *

Alan Thomas

Cumulative stats from the University of Chicago's Office of Technology & Intellectual Property, which launched in 1986: 2060 total disclosures / 1039 active patent cases / 223 active license agreements / \$101M in total revenue / \$15.5M paid to faculty / \$13.2M paid to labs / \$3.6M paid to departments / \$48.4M paid to divisions / 48 companies started.

-From the University of Chicago Website

What new trends are developing in university tech transfer?

We are beginning to think of innovation in a much larger context, not simply identifying and protecting promising discoveries. There are actually three threads emerging on an operational level. We are encouraging more conversations between faculty interested in entrepreneurship—not all of them are—and the external business community, including entrepreneurs, venture firms and corporate business development folks. To date, faculty hasn't talked much with these types of people. We're also attempting to collapse internal silos so that researchers, the business school and alumni relations staff all work more collaboratively. And finally, we're giving super early stage ideas more of a chance.

What are you doing differently with early stage ideas?

Universities have what's known as the "Valley of Death," a term used to refer to ideas that are interesting but too early stage to attract commercial investment. Because venture firms are interested in later stage ideas, the vast majority of early stage ideas die because people don't have the interest, the funding, the expertise or the time to do the proof of concept tests investors require. Universities have to be extremely creative about finding ways to bring these ideas along. We have to fill the gap until we find people on the outside willing to take on these projects.

How are universities able to nurture these nascent ideas?

It's a real challenge to create, or even adapt programs, that address the specific needs of university tech transfer. The most well-developed ecosystems, those that you find in the San Francisco Bay Area, San Diego, Research Triangle or Cambridge in the UK, generally

evolved organically rather intentionally. So they don't even know how they do what they do. They just do it. For those of us struggling to create something similar from scratch, it's usually a process of adaptation—adapting pieces of programs that work in other locales to address specific needs in our ecosystem. Right now, many universities are experimenting with various proof of concept funding formats in an effort to select, fund and guide early-stage ideas through the Valley of Death. UChicago is one of them. You'll also see universities adopting some form of a mentoring concept.

“Job creation is not a primary goal of technology transfer. It's a happy byproduct.”

-Alan Thomas
Director, Office of Technology & Intellectual Property, University of Chicago



Models like San Diego Connect, Cleveland's Jumpstart and one of the most successful to date, MIT's Venture Mentor service. UChicago has also instituted an entrepreneurs-in-residence program. Several entrepreneurs spend a couple of days a week in our office helping screen deals and identifying and working with high-potential projects.

Given that many public universities are in sectors of the country where there is no naturally occurring "ecosystem," won't the process of creating one take years?

Yes. In some ways it's like everyone trying to be Hollywood. At some point we have to stop and ask why? Wouldn't it be better to find your own niche and do what you do? There's a genuine desire to find and adopt best practice, it's just that best practice is very illusive.

And when you have roughly 300 cities, states, regions, all trying to be the next Silicon Valley, not all of them can succeed.

Is there a need for a more formalized public/private partnership?

Fundamentally, success is really about people. If you have the right people, almost any model will work. Without them, no model will work.

There has been a growing linkage between public university inventions and economic development. Given budget shortfalls, many governmental entities may peg funding to job creation. Is there any danger in that?

Job creation is not a primary goal of technology transfer. It's a happy byproduct. Those who go into the commercialization process looking to create jobs generally don't create many sustainable successes. The proxy we should be gunning for is high-quality deals, the highest quality opportunities. Unfortunately, this approach runs contrary to all the pressures politicians are under, especially in a four-year election cycle. That's not to say categorically there's no role for government. But even with the best intentions in the world, government and entrepreneurship are not often well aligned.*

Mark D. Bugher

Since its founding in 1925, the Wisconsin Alumni Research Foundation, the technology transfer arm of the University of Wisconsin–Madison, has processed approximately 6,000 inventions created by UW-Madison faculty and staff / obtained 1,900 U.S. patents on these inventions / completed more than 1,600 license agreements with companies all over the world / returned more than \$1.07B to UW-Madison to fund research, programs and initiatives. WARF currently holds equity in 40 UW-Madison spin-off companies.

-From the Wisconsin Alumni Research Foundation Website

UW-Madison has one of the oldest, most successful university technology transfer programs in the country. To what do you attribute its success?

UW-Madison ranks in the top five public universities in terms of what it generates through its patents and licensing agreements. The technology transfer organization that forms the basis for the overall technology transfer program at Madison—the Wisconsin Alumni Research Foundation—operates independently as a non-profit foundation outside the traditional bureaucracy of the university. Original funding for WARF came about in the mid 1920s through a handful of significant discoveries, including Vitamin D and certain radiation devices. Today WARF is a \$1 billion dollar enterprise that returns about \$60 million annually to UW-Madison to assist in graduate education among other things. That's a persuasive marker to put on the table and demonstrates to the business world and policy makers that what we're doing is working. That annual \$60 million contribution illustrates the value of the patents and licensing operation, which ultimately come full circle, benefitting the university at a time when public funds are being substantially reduced.

Are there any new initiatives given the current economic/political climate in your state?

Several, but the one that has the most visibility is called Discovery to Jobs, which was initiated by our Provost. It is an extensive, broad-based strategy aimed at increasing the number of faculty participating in our technology transfer efforts. Generally speaking, many faculty members are not familiar with business or tech transfer. When people are unfamiliar with something, there's a natural hesitancy. So the first thing we hope to do is reassure faculty it's acceptable to engage in tech transfer activities. It's OK to do research with an eye toward commercialization.



“Taking ideas from concept to the creation of a start-up company and then further to the creation of jobs is patient work. But it yields solid economic development over time.”

-Mark D. Bugher
Director, University Research Park
University of Wisconsin – Madison

Having top leadership within the university encourage participation goes a long way toward breaking down barriers. We're also streamlining the tech transfer structure and providing all the necessary tools to transfer technologies from the lab to the private sector.

How do you measure return on investment when talking with policy makers? It's often difficult to prove a direct correlation between tech transfer and job creation?

We put together an economic analysis and talk numbers—number of disclosures by faculty members, number of patents that have been executed, number of companies in the University Research Park facility, number of jobs created by these companies. Then we calculate the average per capita income stemming from those jobs and their tax contributions to the local, state and federal government. These are metrics that government leaders and legislators understand and it's the kind of hard data needed to convince policy makers.

Given that there's rarely an impressive link between startup companies and significant job creation, how do you sell the idea of economic development?

We preach political patience. We can't simply snap our fingers and create 10,000 jobs. Economic development, whether it's attached

to a university or a community is a long, slow, steady effort. Taking ideas from concept to the creation of a start-up company and then further to the creation of jobs is patient work. But it yields solid economic development over time.

How do you counter the argument that tech transfer is great, but given the current economic circumstances there's not enough taxpayer money to invest in these efforts right now?

What's the alternative to a slow, steady rebuilding of the economy? There really isn't one. It's going to take years, possibly decades, to fix the problems most states are facing now. Looking for quick fixes is not realistic. We have a great track record at UW-Madison. We've consistently ranked in the top five of all major public universities in terms of attracting federal spending on research to the campus, something close to \$1B annually. The University Research Park currently has 125 companies employing approximately 4,000 employees. That's hard evidence that the long-term strategy pays off.

But it's increasingly important that universities become more directly engaged in the public policy arena, beyond just advocating for a particular line item in the budget. There's been a substantial decline in state aid over the past few years and it appears that trend will continue.*

Ashley Stevens

How healthy is public university tech transfer given the current economic climate?

The sad fact is technology transfer does not carry itself economically at the majority of universities for two reasons. First, income is extremely unevenly divided. Only a few universities have big hits. In the 2009 AUTM survey (most recent), the top 11 institutions brought in half of the total money (revenues from patents, in licensing agreements, royalties, etc.) and the next roughly 167 institutions brought in the rest. Secondly, university tech transfer offices give away most of what they generate. They return a portion to the inventors and to the university to be spent on research and inventions and the things that support those efforts like labs and equipment. Only half of the revenues are retained to offset the costs associated with tech transfer. We did a study in 2006 that revealed only 16 percent of university tech transfer offices retained enough of the revenues they generated to cover ongoing tech transfer costs. That means 84 percent of US universities and research institutions run budget deficits for their tech transfer office.

In times like these, presidents of public universities don't like to see red ink. They begin to ask tough questions. If tech transfer managers say we don't cover our costs but what we do is good for the local economy, many presidents are likely to say the local economy should pay

for it. In the US, university tech transfer has always been a kind of unfunded mandate, or put another way, an unfunded opportunity.

If that's true, what needs to happen to improve the situation?

The Obama administration has expressed a lot of interest in academic technology transfer. They issued a Request For Information last February (2010) and AUTM submitted four recommendations: (1) Fund technology transfer offices directly, which would ensure all university tech offices are able to support themselves. (2) Fund proof-of-concept centers, which is where ideas are test-driven before going to market. (3) Provide funding for the establishment of mentorship programs. 4) Provide a tax credit for individuals who invest in early-stage companies. AUTM research

confirms that faculty most frequently turns to friends, family and angel investors for funding for their startup companies.

The Obama administration got over 200 responses to its RFI. My guess is that many of the suggestions they received were similar to ours. But no matter how well advised these projects might be, the question is still where is the money going to come from?

Overall, are you feeling hopeful?

Well I found one thing extraordinarily hopeful in the most recent AUTM survey. Public universities created exactly the same number of new companies (596) in 2009 as we did in 2008. In these difficult times that was remarkable. Numbers for 2010 are being compiled and we'll soon be able to see how we fared year-over-year.*

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**-Ashley Stevens
Current President, Association of University
Technology Managers**

