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UT as tech engine: myth and reality



ENLARGE PHOTO

Keith McDowell, a retired professor of chemistry at the University of Texas at Arlington and former vice chancellor for research and technology transfer for the University of Texas System.

By **Keith McDowell**
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Innovation! Entrepreneurship! Many believe they are the twin pillars of the U.S. economy in the 21st-century war of global competition. President Barack Obama declares that we must "out-innovate" the rest of the world. Gov. Rick Perry demands that we boost entrepreneurship. But who is going to take the lead role in this new mission? Who will convert rhetoric into action? It will be the great American universities, as part of regional innovation ecosystems comprising entities such as research and development laboratories, business incubators and accelerators, entrepreneurial training programs, venture capital networks and, ultimately, research parks with co-located startup companies. Public-private partnerships will be the glue binding everyone together.

But this ecosystem model, founded on universities as the engines of innovation and the source of new entrepreneurs, is under attack. Pundits say the process of translating research discoveries into commercial products is flawed and should be revamped, even to the point of questioning the value of research at our universities. These doubts have been fed for the most part by misconceptions or myths about the current innovation ecosystem. Let's examine four of the myths surrounding the commercialization of university research and perform a reality check.

- University technology transfer offices (TTO) are a bottleneck. In the traditional model of the commercialization of university research, discoveries become inventions that are disclosed to the TTO and are protected as intellectual property in the form of patents and copyrights. The TTO transfers the technology by licensing the intellectual property to an existing company or a startup. The expectation is that the company performs the explicit commercialization through the development and marketing of a product or service and that all parties benefit from the revenue stream.

The bottleneck is perceived to occur when specific terms of the license deal are negotiated. Many say TTOs structure their licensing deals for the sole purpose of maximizing revenue to the university, even to the point of starving startups of needed cash flow. Certainly, haggling for the best commercialization deal is never fun for either party. And then there are the lawyers! But deal-making is an essential part of the innovation ecosystem. Inventions must be protected as intellectual property to control market competition, innovators must get their fair share, university investment must be rewarded, and myriad other factors must be satisfied and balanced to obtain the optimal result. Amazingly, most deals are consummated with little fanfare or angst.

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But some say they have a better business model, usually based on misperceptions about how the process works or some story they heard about a deal gone bad. They would give the intellectual property away and hope for downstream donations to the university, or allow inventors to function as free agents with no legal or financial obligations to the university or agencies that funded the research, or offer a one-size-fits-all deal structure to speed up the licensing process.

The reality is that all of these strategies and more are part of the modern TTO's arsenal and provide a spectrum of choices to accelerate commercialization. Universities are using these choices to full advantage. In the University of Texas System for the five fiscal years through 2008, new invention disclosures increased 45 percent, patent applications increased 30 percent, new licenses and options 38 percent, intellectual property gross revenue 26 percent, and startups per year more than doubled. Even more striking, the number of university startup incubators in the UT System increased from one, at UT-Austin, to 12 across the state over the past decade. Such incubators provide needed infrastructure for entrepreneurs to flourish.

- Creativity, research, innovation and entrepreneurship can be managed, programmed and measured to produce any desired outcome. In 1986, high-temperature superconductors were discovered by Georg Bednorz and Alex Mueller at IBM. Subsequent headlines proclaimed a new era of superconducting magnetic levitation trains and lossless electric power distribution. We managed, programmed, and measured in every conceivable way. But after 25 years and over 100,000 research publications, we have no accepted theory on the mechanism of high-temperature superconductivity, and we don't live in a world of superconducting gadgets. Did the university commercialization pipeline fail on a grand scale, or did society fall victim to the myth that we can produce any desired outcome quickly?

In the 1990s, the superconductivity bubble was replaced by the gene therapy and targeted molecular drugs bubble, followed in the next decade by the nanotechnology bubble. Both failed to deliver their hyped outcomes. In each case, the university commercialization pipeline came under significant pressure to produce results. Society wanted instant gratification, and failure to deliver meant something must be wrong. But it's founded on a myth. It's the foolish notion that the time-honored technology time scale can be accelerated beyond all bounds and in opposition to the constraints of Mother Nature, or the nearly random nature and serendipitous behavior of creativity and innovation. It's the green eyeshade of the accountability culture that defines reality by metrics. Albert Einstein famously responded to the metrics argument better than anyone else: "Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted."

Failure to achieve desired outcomes does not mean we abandon managed, programmed or measured activity, or attempt a major transformation of our commercialization system. Instead, we should accept and understand how the system works and design new approaches. "Open innovation" is one such approach. Procter & Gamble created a "Connect + Develop" open innovation strategy that has worked so well that more than half its product initiatives involve outside innovators. The U.S. Department of Energy launched and funded innovation hubs that network a large number of distributed researchers to attack societal grand challenges. In response, TTOs are replacing the practice of one deal at a time with the notion of building relationships similar to the Procter & Gamble model. Change is afoot; we should embrace it.

- We can do better than universities at picking useful innovations! Although fewer than 10 percent of startup companies succeed, the best track record comes from those housed in university incubators surrounded by a regional innovation ecosystem. Furthermore, venture capital over the past decade has posted one of the worst records ever for return on investment or lack thereof. Is that picking the entrepreneurial winners? Innovators more often than not must swallow a bitter pill when they learn that no one wants to license or buy their improved mousetrap. Did they not learn the lesson that

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"It's only worth what somebody will pay for it"?

The reality is even more starkly defined at the research level. Would you fund research to study a dripping faucet? Most people would not. But they would be wrong. The nonlinear dynamics of a dripping faucet reveal important information relevant to understanding how the human brain functions and, more specifically, the behavior of the brain during epileptic seizures. That knowledge has led to the production of experimental devices similar to a pacemaker and designed to stimulate the brain and protect against seizures when their onset is detected. The evidence is clear. Picking a winner from ongoing research, even in the humanities, makes no sense. As Forrest Gump said about his box of chocolates: "You never know what you're gonna get." That dynamic is absolutely essential for innovation.

• An unlimited supply of untapped and inaccessible intellectual property exists in universities. It's the pot of gold at the end of the rainbow. If only entrepreneurs had access to it! True believers say we need one-stop shopping at universities with a single point of contact, websites that list technologies available for a license deal, bundling of related intellectual property into package deals, simple deal structures, technology showcases and scouts searching for untapped intellectual property and untapped buyers and entrepreneurs. In short, we need a marketplace for buying and selling intellectual property. For the truly ambitious, we need to commoditize that marketplace and speculate on intellectual property in the spirit of pork belly futures.

Is any of this real? Yes, we need a functioning innovation marketplace, although speculating on intellectual property futures seems absurd. But the reality is that there are not that many excellent discoveries, inventions or innovations with significant commercial potential, and most are captured long before they enter the innovation marketplace, typically through interpersonal relationships with industry or through the dynamics of startup company formation. As some have said, we have too many dollars chasing too few quality deals. The real challenge is not to build a marketplace that seeks out and sells mostly unwanted intellectual property, but to find ways to increase the flow of quality intellectual property. That takes investment in universities as engines of innovation.

Are Texas universities competitive in the race to commercialize university research? According to the 2008 Association of University Technology Managers report, the UT System ranked second in startups created, third in licenses and options executed, fourth in U.S. patents issued, sixth in U.S. patents applications and 13th in license income received. These results demonstrate that Texas universities in the aggregate are leaders in the commercialization of university research.

But we are not No. 1, and our competitors are not standing still. Texans must move past the mythology associated with technology commercialization and work toward building our own reality of regional innovation communities anchored by tier one research universities. Our future economic prosperity depends on it.

Keith McDowell is a retired professor of chemistry at the University of Texas at Arlington and was vice chancellor for research and technology transfer for the UT System from 2007 to 2010.

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