



## Incentivize Entrepreneurial Behaviors at Universities – Especially in the Heartland

*By Ross DeVol, Walton Fellow*

March 7, 2018

Thomas Edison relied on a simple philosophy to guide research that led to world-changing inventions such as the first practical lightbulb, the motion picture camera and an early version of the phonograph. “Anything that won't sell, I don't want to invent,” said Edison. “Its sale is proof of utility, and utility is success.”

This approach might be a bit extreme for public research universities, but closer alignment with Edison’s thinking could result in greater prioritization being placed on creating intellectual property that can lead to new products and services in the marketplace. This would benefit America’s economy and provide new sources of revenue to fund additional, and potentially society-changing research, at academic institutions. Having recently relocated back to the heartland in Bentonville, Arkansas, from the West Coast, I feel that the heartland area of the nation could benefit the most by providing greater incentives for faculty and students to engage in commercial endeavors and improving the entrepreneurial support infrastructure offered at its universities.

The inventions produced at Edison’s Menlo Park, New Jersey, research laboratory touched nearly every aspect of commercial electronics. To name a few more: an alkaline battery that became a staple for the auto industry; a telephone transmitter that made long-distant calls practical; and improvements to the telegraph that enabled high-volume, automated messaging over a single wire.

That these inventions made Edison very wealthy, or that he was a fierce competitor is beside the point. They improved the lives of ordinary people by making new technologies cheap and accessible. And they created thousands of jobs in the process.

Edison’s pragmatic, commercial approach is especially relevant today. The U.S. economy still is mired in a slow recovery, with both productivity growth and new start-up formation rates remaining below those experienced prior to the 2007-2008 financial crisis. These drop-offs are alarming because startups have been key to the innovation that creates new technologies and products. Perhaps our best prospect for reversing the trend is for more research scientists to follow Edison’s example.

The relationship between entrepreneurial research and economic growth is well established: Google, which began as a Ph.D. project by Stanford graduate students Larry Page and Sergey Brin, employs more than 60,000 people; Facebook, which emerged from Harvard undergraduate Mark Zuckerberg's dorm room, employs 17,000. Biotech pioneer Genentech, with a payroll of nearly 15,000, was the result of research at Stanford and the University of California, San Francisco.

In 2015 alone, intellectual property from university research accounted for the creation of 1,012 startups, and patent licensing from universities and nonprofit research organizations supported 3.8 million jobs, according to the Association of University Technology Managers.

Despite the evidence, many universities fail to provide incentives that encourage graduate students and younger faculty to think like entrepreneurs. While most, if not all, research universities now have technology transfer offices and incorporate business skills in their science and technology curriculums, tenure — the holy grail for most young faculty members — still is tied primarily to publishing in academic journals and securing research grants. Obtaining patents, licenses and activity in other commercial activities have little if any bearing. Starting a business is often a negative in the eyes of tenure committee members.

The self-taught Edison wasn't constrained by the rules and culture of academia, nor were visionary entrepreneurs like Mark Zuckerberg, Bill Gates, or Twitter co-founder Jack Dorsey, all of whom dropped out of college to start companies. While I don't advocate that today's burgeoning entrepreneurs do the same, there is much to be learned from their success stories. Software creators often require modest investment in the early stages of development. For example, Zuckerberg famously created the earliest iteration of Facebook in his Harvard dormitory room. At the other end of the spectrum, research and development in fields such as biology, physics or chemistry, require sophisticated laboratories. Researchers in these disciplines might fare better, and perhaps more intellectual property would find its way into the economy if the university career path were more accommodating to the scientist-entrepreneur.

For more than half a century the U.S. has maintained a competitive edge in the world economy in large measure because of its leadership in research and innovation. To assume that this will continue without change is naïve.

There are steps that can be taken to make sure this happens. The first is to enhance funding for the Small Business Innovation Research (SBIR) program rather than cutting funding as the White House's

2018 Fiscal Year Budget proposes. The SBIR program is administered by the National Science Foundation but funding is provided by eleven different federal agencies. The SBIR funding program's mandate is to enhance the commercialization of intellectual property from scientific research—much of it being created at research universities—by getting it across “the valley of death.” Roughly two-thirds of SBIR funded firms had one or more founders who hung their hat at a university. Qualcomm was one of the first recipients under this program in 1982 and today employs more than 17,000 and University of California, San Diego supplied some of the original IP.

The second is to strengthen the technology transfer offices to ensure that patents are filed for groundbreaking discoveries and their commercial potential is exploited. A program of state and federal matching grants for these offices is one way to make certain universities have the resources they need to improve commercialization programs. At the same time, universities should investigate how revising tenure programs might contribute more to the community, potentially creating jobs for their graduates by recognizing entrepreneurial research and encouraging faculty member's patent and start-up activity.

Furthermore, higher rates of academic entrepreneurship could address some of the entrepreneurial awareness and support system shortfalls that exists in the U.S. heartland which is harming overall job creation and wages in the region. For example, none of the top 10 in the Kauffman Foundation's 2016 Index of Metro Startup Activity hail from the heartland. Among the 39 large metros included in Kauffman's rankings, Kansas City was highest at 15<sup>th</sup>. The disparity in economic performance between the two coasts and the central part of the country is contributing to a series of wider chasms. Universities themselves can take actions to encourage and support technology transfer and commercialization at their institutions.

In a study, “Concept to Commercialization,” that I led in 2017 for the Milken Institute on which American research universities were best at technology transfer through licensing and startup activity, there weren't any universities among the top 25 in Ohio, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, Kansas, Missouri, Nebraska, Iowa, South Dakota, North Dakota or Wisconsin. At 32<sup>nd</sup>, the University of Nebraska had the best performance among universities in these states, followed by University of Missouri at 34<sup>th</sup> and the University of Wisconsin-Madison at 35<sup>th</sup>. Purdue was the highest in the heartland at 12<sup>th</sup>, and first among public universities without a medical school, followed by the University of Minnesota at 14<sup>th</sup> and University of Illinois Chicago-Urbana at

18<sup>th</sup>. The regions in which these universities are located have higher per capita incomes and witnessed stronger economic growth in recent years.

Purdue serves as an effective case study for how quickly commercialization improvements can be achieved. Utilizing the same methodological approach back in 2006, Purdue was 39<sup>th</sup> in commercializing its research. A jump from 39<sup>th</sup> to 12<sup>th</sup> in roughly a decade is a significant and meaningful improvement. How did this happen? Purdue has long been a leading research university. Part of the answer rests with a change in leadership when former Indiana Governor Mitch Daniels became President in 2013 which resulted in an increased focus on commercialization at Purdue. In a press release on Purdue ranking 12<sup>th</sup>, President Daniels explained the institution's transformation. "For the past four years, we have focused our efforts on creating the most supportive structure possible for our entrepreneurial faculty, students and staff. We have knocked down the barriers that often kept important Purdue-based research from reaching the marketplace in a timely way, and built what we believe to be the most friendly, conducive environment to ensure our research and the innovations that result reach their fullest potential."

Former Indiana commerce secretary Dan Hasler followed his former boss by becoming CEO of the Purdue Research Foundation. Hasler challenged administrators and faculty to formulate a new system for fostering and nurturing startups. Two critical organizational pieces were proposed: The Purdue Foundry and Purdue Ventures. Established in 2013, The Foundry added a commercial accelerator to the mix of entrepreneurial support. Enhancing access to early-stage risk capital was addressed by the creation of Purdue Ventures, which setup three venture capital funds with assets ranging from \$2 million to \$12 million. It also provided social network assistance in connecting talent and mentors among Purdue alumni with skills that align with a particular startup.

Prior to Daniels arrival, Purdue had begun a review of its tenure program to update and clarify guidelines. There was an increasing awareness that impact measures beyond publications and citations needed to be more codified. The review concluded that departments, schools and labs needed to have additional discretion to include commercialization metrics among the set of impact criteria for tenure decisions. The task force even debated whether licensed technology should be utilized instead of invention disclosures or both. This debate depicts how Purdue was already moving toward recognizing more direct commercialization outcomes in tenure decisions. Academic entrepreneurship metrics either weren't a criteria or, at best, given a low weight in tenure decisions at Purdue prior to this review. Commercialization metrics were made a criteria.

Another important conclusion from this tenure review was that a growing number of faculty were undergoing interdisciplinary work and had joint appointments. Many believe that the most important problems can only be solved or business opportunities exploited through multiple perspectives addressing them jointly. This encouraged collaboration which improved the odds of greater success in the marketplace.

There is more current information that these efforts are having an impact on the rate of commercialization. In 2016, Purdue reported a record 27 startups founded on an innovation from its research. In contrast, in 2005 there were just six startups created. Given that Purdue Ventures' funds weren't active until 2015, these startup rates are likely to accelerate in the future.

I believe that public universities in the heartland should learn from Purdue's example and provide greater incentives and support for faculty to participate in entrepreneurial activities. If heartland universities made patenting, licensing or startup activity key factors in faculty tenure decisions or placed more weight on them, it would send a strong signal to young researchers that they support entrepreneurial activities. Eventually, it would tip the academic culture to be less focused on publishing in peer-reviewed journals for professional advancement. Nevertheless, publishing in peer-reviewed journals should remain an important part of academic life as it reflects the advancement of knowledge which is a key component of a university fulfilling its mission. Further, public universities in the heartland could increase the IP ownership rate provided to academic inventors. By providing greater financial incentives for these endeavors, it should nudge more in the direction of where Edison aimed.

I can't help but notice some similarities between Purdue of five or six years ago and the University of Arkansas (UA), Fayetteville of today. While not having a research funding platform as extensive as Purdue's, there are some excellent research programs such as agricultural sciences, nanomaterials, biochemistry, biomedical engineering, chemical engineering, supply chain, retail and transportation, to name just a few. Further, both Purdue and UA, Fayetteville don't have medical schools. Given that life sciences represents a majority of licensing income at the top universities in commercialization, the presence of a medical school is a key asset.

UA, Fayetteville had already developed a new strategic plan for research and development prior to current Chancellor, Joe Steinmetz's arrival in 2016. This plan called for strengthening the University's research culture and to "grow the Arkansas economy through university research, industry engagement

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and innovation.” Just as Purdue had revised its tenure criteria prior to installing new leadership, UA, Fayetteville stated its goal in this area, “reinforce the inclusion of faculty commercialization activities in promotion and tenure criteria.” Additionally, UA, Fayetteville has a top-30 business school which tends to augment success rates in academic entrepreneurship. Greater awareness of the importance of supporting university commercialization in fostering economic growth, job creation and income gains among policy leaders in Arkansas would assist Steinmetz and UA, Fayetteville in achieving goals in this area.

Pure research will always be the foundation of scientific advancement, but to ignore the economic imperative of more entrepreneurial research is to ignore reality that the declining pace of start-up creation puts U.S. economic growth at risk. Higher rates of academic entrepreneurship are essential to reviving declining start-up rates and productivity throughout the U.S. economy, but the U.S. heartland would have the most to gain.

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