

**Congress of the United States**  
**U.S. House of Representatives**  
**Committee on Small Business**  
2361 Rayburn House Office Building  
Washington, DC 20515-6515

**MEMORANDUM**

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TO: Members, Subcommittee on Innovation and Workforce Development  
FROM: Jason Crow, Chairman  
DATE: February 11, 2020  
RE: Subcommittee on Innovation and Workforce Development hearing: “The Innovation Pipeline: From Universities to Small Businesses”

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On Tuesday, February 11, 2020 at 10:00 a.m. in Room 2360 of the Rayburn House Office Building, the House Committee on Small Business Subcommittee on Innovation and Workforce Development will hold a hearing entitled, “The Innovation Pipeline: From Universities to Small Businesses.”

A major reason for the rise of the U.S. as a technological power is a long tradition of close relationships and frequent collaboration between small businesses and a large network of world-renowned research universities. From licensing deals and tech transfers to patents and startups, the innovation that emerges from U.S. educational institutions is invaluable to the development of local and regional economies. For an economy as large as the U.S., the only path to sustained growth is continual innovation of new products, goods and services. This hearing will cover the innovation pipeline from universities to small businesses and the indispensable role of universities in small business development along with rural and urban revitalization.

**Witnesses**

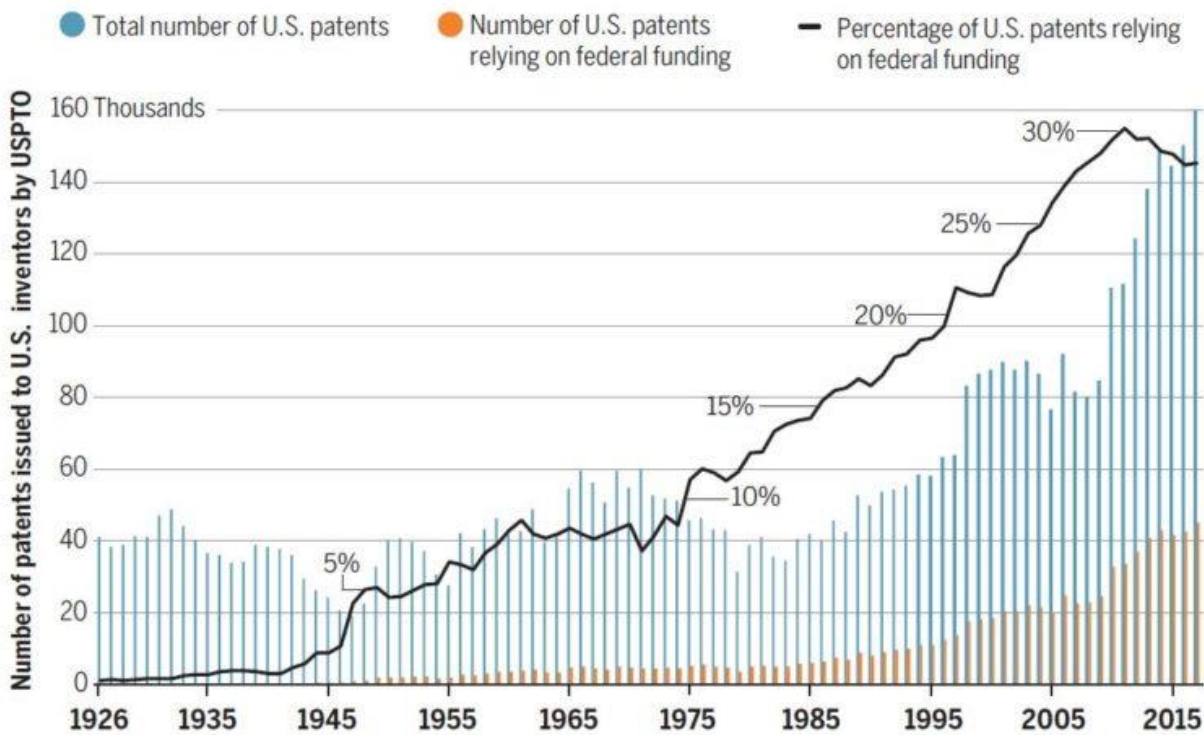
- Dr. John Younger, MD, Vice President of Science & Technology, University City Science Center, Philadelphia, PA
- Dr. Sheila Martin, PhD, Vice President, Economic Development and Community Engagement, Association of Public and Land-grant Universities, Washington, DC
- Dr. Ethan Mann, PhD, Vice President of Marketing and Business Development, Sharklet Technologies, Inc., Aurora, CO
- Dr. Gregory P. Crawford, PhD, President, Miami University, Oxford, OH

**Background**

Universities are the cornerstone of U.S. educational institutions, training the next generation of Americans for highly skilled professions including Science, Technology, Engineering and Math (STEM). While education is a high priority for these universities, they also play a crucial role in driving innovation. Each year, U.S. universities and research institutions create hundreds of patents with the potential for commercialization. However, bringing an idea developed in a university lab

to consumers is often a lengthy process. This includes developing a business plan, securing capital, filing patents, having space to research and develop to full launch. Some universities make space for their entrepreneurial students, providing resources and connections through their incubators and accelerators. Some are outside non-profits, or so-called “innovation intermediaries” that provide similar services off campus.

These institutions are not only invaluable to the universities and businesses that stand to benefit financially, but small businesses, employees, and consumers throughout the region that gain from the economic growth that emerges from their success. Federal research dollars often provide the necessary funds that universities and small firms rely on to jumpstart innovation. In addition, the number of patents supported by federally funded research has almost doubled in the last decade alone. Federal research and development funding now support approximately 30% of all new U.S. patents each year.<sup>1</sup>



Source: Science Magazine, 2019.

There are a number of federal programs that aim to make this transition easier, such as the SBIR and STTR programs, that directly help small businesses turn innovation into economic value. Incubators and accelerators run through both universities and innovation intermediaries help those small businesses develop their product or service along with connections necessary to secure funding. These programs seek to smooth the friction between universities and the private sector and create a pipeline of innovation from universities to small businesses.

<sup>1</sup> Fleming et. al., *Government-Funded Research Increasingly Fuels Innovation*, SCIENCE, June 2019.

## **University Investment Drives the Economy**

Research and development at universities in collaboration with the business community help drive the growth of regional economies. In fact, a study on the regional economic impact of universities back to 1,100 A.D. confirmed that increases in higher educational institutions are “positively and robustly associated with higher growth.” A ten percent increase in a region’s universities per capita is associated with a .4 percent higher future GDP growth rate.<sup>2</sup>

The U.S. has a long history leading the world in innovation, research, and technology through investments in federally funded research. However, one obstacle preventing scaling of projects, was that there was too much friction between research labs in universities and commercialization. Legislation enacted in 1980<sup>3</sup> smoothed this friction and began the technology transfer process we know today. Bayh-Dole, one of those bills, allows universities, companies, and nonprofits to retain the titles of federally funded inventions to facilitate their further development.<sup>4</sup> This shift democratized the ability of companies to capitalize on research funded by the government for the gain of communities. Indeed, it has fueled economic growth. Between 1996 and 2015, measures of technology transfer in the U.S. demonstrate approximately \$1.3 trillion in gross industrial product, \$591 billion in gross domestic product, and 4.3 million new jobs.<sup>5</sup>

## **Obstacles**

Despite dollar increases in federal R&D expenditures, R&D funding is significantly declining as a share of GDP. Federal R&D now makes up roughly half of what it did in the mid-1960s.<sup>6</sup> The U.S. government used to lead the world in federal R&D intensity but ranked 12<sup>th</sup> as of 2016.<sup>7</sup> While the U.S. ranked third in the top innovative countries in 2019 and first in total expenditures in both public and private R&D funding, budget cuts and decreasing discretionary spending threaten our nation’s ability to continue to lead in innovation investments.<sup>8,9</sup> Cuts to research funds for national laboratories and universities often go unrecognized but have a negative impact on the innovation that could be driving job growth in certain regions. .<sup>10</sup>

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<sup>2</sup> Valero and Reenen, *The Economic Impact of Universities, Evidence from Across the Globe*, ECONOMICS OF EDUCATION REVIEW, Vol. 68, Pg. 53-67. Feb. 2019.

<https://www.sciencedirect.com/science/article/pii/S0272775718300414> (last visited Jan. 22, 2020)

<sup>3</sup> P.L. 96-517

<sup>4</sup> U.S. DEPT. OF COMMERCE, *Return On Investment Initiative*, NIST, April 2019.

<https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1234.pdf> (last visited Jan. 22, 2020)

<sup>5</sup> Id.

<sup>6</sup> Scott Andes, *Maximizing the Local Economic Impact of Federal R&D*, BROOKINGS, Oct. 2016.

<https://www.brookings.edu/research/maximizing-the-local-economic-impact-of-federal-rd/> (last visited Jan. 22, 2020)

<sup>7</sup> Id.

<sup>8</sup> Id.

<sup>9</sup> Sintia Radu, *The U.S. is (Again) Among the World’s Top Innovators*, U.S. NEWS AND WORLD REPORT, Aug. 8, 2019.

<sup>10</sup> Id.

**Federal Expenditures on R&D as a percent of GDP (1953-2016)**



Source: National Science Foundation, 2016.

### *Universities vs. The Private Sector*

Beyond the funding cuts, there exists cultural differences between academia and the private sector that limit the ability to commercialize innovation. In many cases, private sector measures by revenue and return on individual investments. Licensing revenue makes up the top priority for many tech transfer offices, rather than aligning with the broader economic engagement efforts of the university. Technology transfer offices are frequently understaffed and under-resourced, separated from units more directly responsible for the teaching and research missions of the university.<sup>11</sup> Unfortunately, many universities tend to overlook small and medium sized enterprises when engaging with business and industry partners as providers of resources and expertise.<sup>12</sup>

### **The Intersection of Universities, Innovation and Small Business Development**

A small firm's ability to partner with a university or research institution has proven to be efficient and cost effective public-private partnership supporting research, development, and commercialization of new technologies. Whether it is the doppler radar developed at MIT or the touchscreen developed at the Universities of Delaware and Kentucky, some of the most essential technologies to the modern economy are the result of tech transfers from university labs. Some tech transfer and research grants are geared directly towards helping small businesses and come from a variety of different government agencies. In this case, not only is the government supporting R&D, but it is also helping smaller companies cross the so-called "valley of death" –

<sup>11</sup> ASSN. PUBLIC AND LAND GRANT UNIVERSITIES, *Technology Transfer Evolution: Driving Economic Prosperity*, November 2017.

<sup>12</sup> *Id.*

“that precarious stage when their technologies are not yet perfected, investors are still skittish, and customers are scarce.”<sup>13</sup>

### Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR)

To encourage startups in technology and innovation research, the Small Business Innovation Research (SBIR) program requires agencies with an extramural Research & Development (R&D) budget greater than \$100 million are required to allocate a portion of that funding to conduct a multi-phase R&D grant program for small business.<sup>14</sup> The objectives of the SBIR program include stimulating technological innovation; increasing the use of the small business community to meet federal R&D needs; fostering and encouraging participation in innovation and entrepreneurship by socially and economically disadvantaged individuals; and expanding private-sector commercialization of innovations resulting from federally funded R&D.<sup>15</sup> Over the past 35 years, the program has provided billions of dollars in early stage funding for thousands of companies that went on to generate 70,000 patents, launch nearly 700 initial public offerings, and garner approximately \$41 billion in follow-on private investment.<sup>16</sup>

The Small Business Technology Transfer (STTR) Program is largely modeled after the SBIR program and seeks to facilitate the commercialization of university and federal R&D by small companies. Under this program, each federal agency with extramural R&D budgets of \$1 billion or more is required to allocate a portion of its R&D funding to conduct a multi-phase R&D program for small businesses.<sup>17</sup> It provides funding for research proposals that are developed and executed cooperatively between a small firm and a scientist in an eligible research institution and that are aligned with the mission requirements of the federal funding agency.<sup>18</sup>

Both these programs have a high potential for job creation and growth by small businesses. They create jobs as a result of the seed capital provided to entrepreneurs and through funds that enable an existing company to expand its operations. In both cases, data indicates that jobs are retained after the SBIR funding has been expended. For thousands of small firms, the SBIR awards create both jobs related to completing the requirements of an SBIR contract and sustainable jobs associated with a new product that is the outcome of research and development funded by the grant.

Additionally, for existing companies, SBIR awards enable research firms to make new hires and provide funding for early stage research. By facilitating high-risk, high-reward research, these contracts have contributed to new innovation and resulted in job gains. Small medical companies have previously testified before the Committee that support from investors is often tied to the development and commercialization of their companies' lead therapies and technologies. Because

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<sup>13</sup> Rozansky and Atkinson, *To Grow Innovative Small Businesses, Reform America's Seed Fund*, THE HILL, Jan. 1, 2020. <https://thehill.com/opinion/finance/477565-to-grow-innovative-small-businesses-reform-americas-seed-fund> (last visited Jan. 22, 2020)

<sup>14</sup> JOHN F. SARGENT, CONG. RESEARCH SERV., R43695, SMALL BUSINESS INNOVATION RESEARCH AND SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAMS (2014) [hereinafter CRS R43695].

<sup>15</sup> *Id.*

<sup>16</sup> *Supra* note 15.

<sup>17</sup> *Id.*

<sup>18</sup> *Id.*

of these restrictions, companies are often unable to use support from investors to explore promising early stage research. SBIR contracts can provide small companies with funding for promising research that is outside of a company's primary focus.

### Incubators and Accelerators

Business accelerators are organizations, in various formats, that offer a wide range of support services and funding opportunities for early stage companies. They generally follow the model of enrolling startups in months-long programs that offer mentorship, office space, and critical supply chain resources. Most importantly, business accelerator programs offer access to capital and investment in return for startup equity which helps participating business remain viable. Accelerators can provide vital information that business angels and venture capitalists need for diversifying their portfolios of high-potential companies. They give young enterprises an opportunity to build networks, with both peer ventures and mentors, who might be successful entrepreneurs, program graduates, venture capitalists, angel investors, or even corporate and non-profit executives. Most accelerator programs end with a culminating demonstration day, also referred to as "demo day" where ventures pitch to a large audience of qualified investors with the hopes of getting more funding.

Like accelerators, incubators help start-up businesses and entrepreneurs, often providing management training or office space. They differ from business accelerators in that they are more geared toward early stage companies by providing a buffer that allows them to grow without other disturbances. They usually last longer and the selection process is generally noncompetitive with the venture stage occurring either at the early or late stage. Survival rates for startups that come out of incubators are reported as high as 92 percent and are much more likely to generate more sales.<sup>19</sup> Incubators allow founders to work with peer support and shared resources to create a dynamic and evolving business that can both plan and strategize as well as react to customer insight.

Many incubators exist within universities as a place for students to launch their new business. University incubators create businesses that are more likely to succeed, creating more jobs and generating more sales than businesses incubated elsewhere.<sup>20</sup> Furthermore, the recent growth in university sponsored incubators and accelerators show a renewed focus from simply doing higher level research to creating jobs and garnering venture capital funding. Universities can leverage their post-secondary network and resources to provide programming, mentorship, connections to investors and more.<sup>21</sup>

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<sup>19</sup> Sean Wise, *8 Lessons from the World's Number One University Startup Incubator*, INC., May 14, 2018. <https://www.inc.com/sean-wise/8-lessons-from-worlds-number-one-university-startup-incubator.html> (last visited Jan. 22, 2020)

<sup>20</sup> Aviva Legatt, *5 Amazing College Incubators*, FORBES, Jan. 7, 2019. <https://www.forbes.com/sites/avivalegatt/2019/01/07/launch-your-startup-at-these-five-college-incubators/#4a6c09a34a77> (last visited Jan. 22, 2020)

<sup>21</sup> Abdullah Snobar, *College and University Incubators Should Start Practicing What They Preach*, Forbes, Jul. 19, 2019. <https://www.forbes.com/sites/forbestechcouncil/2019/07/09/college-and-university-incubators-should-start-practicing-what-they-preach/#29430f254614> (last visited Jan. 22, 2020)

## **Conclusion**

Not only do universities play a fundamental role in developing the country's future workforce, but they leverage federal investment to develop groundbreaking technology that drives economic growth and community development. While the technology transfer process has been successful in developing regional economies and creating millions of jobs across the country, there are improvements that can help it become more productive and allow the US to truly drive the world's innovation by leveraging our small businesses to bring cutting edge technology to the market. This technology would not be possible without the federal funding that makes up over half of all research and development money every year.