



Larry Hogan | Governor
Boyd Rutherford | Lt. Governor
Kelly M. Schulz | Secretary of Commerce

January 24, 2020

The Honorable Bill Ferguson
President, Maryland Senate
State House, H-107
Annapolis, Maryland 21401-1991

The Honorable Adrienne A. Jones
Speaker, Maryland House of Delegates
State House, H-101
Annapolis, Maryland 21401-1991

RE: Department of Commerce – Small Business Innovation Research and Technology Transfer – Study – Chapter 306 of 2019

Dear President Ferguson and Speaker Jones:

In accordance with Chapter 306 of 2019, the Department of Commerce is pleased to submit the Small Business Innovation Research and Technology Transfer study.

I look forward to your review of the report and will be pleased to respond to any questions. If my staff can be of further assistance, or if you have any questions regarding this report, please feel free to contact me at 410-767-6301.

Sincerely,

Kelly M. Schulz
Secretary

Enclosure

cc: The Honorable Brian J. Feldman
The Honorable Anne R. Kaiser
The Honorable Delores G. Kelley
The Honorable Lily Qi



Small Business Innovation Research and Technology Transfer – Study

Chapter 306 of 2019

January 23, 2020

Executive Summary

Maryland is home to many federal resources, which provide employment and economic investment across the State. To ensure that these resources are taken advantage of appropriately, the Maryland Legislature passed Chapter 306 of the Acts of 2019, which required the Maryland Department of Commerce to explore issues surrounding Federal investment, research, and funding. After completing an extensive study, Commerce found the following:

(1)(i) explore ways to foster job creation and economic development in the State by capitalizing on the federal presence in the State.

The federal presence in Maryland runs deep. Almost 176 thousand federal civilian employees work in Maryland, along with 50,172 active-duty and reserve military members. Per capita, Maryland has more federal civilian jobs than any other State. Moreover, an estimated 295 thousand full-time federal civilian workers reside in Maryland, representing about one out of 10 employed civilian Maryland residents.

In FY2019, over \$33 billion in federal contract work was performed in Maryland, ranking it fourth in total contract spending and third in per-capita spending. In addition, over \$15 billion in federal grants were awarded to recipients in Maryland. Contract and grant spending in Maryland makes up 12.5 percent of the State's GDP.

Maryland ranks 7th in total research expenditures and third in the share of federal R&D expenditures expended by the federal research sector, receiving \$17 billion in federal funding for research. This represented almost 79 percent of the total funds expended in Maryland on research and development. Maryland's federal research centers spend some \$11 billion on R&D activities, making the State responsible for over one-third of the nation's total federal laboratory research expenditures.

(1)(ii) explore ways to encourage small businesses to engage in federal research and development that has the potential for commercialization.

Like the rest of the nation, the vast majority of firms in Maryland are small businesses. Firms employing fewer than 50 people made up over 95 percent of all firms and employed over 730 thousand workers. Unfortunately, federal data shows that small business research spending has been declining, while spending at the largest companies has been significantly increasing. Both federal and state data show that most research funding from businesses of all sizes comes from the manufacturing and professional services sectors, making these industries the primary targets for increasing small business research spending.

While Maryland's small businesses have been successful at obtaining federal contract funding, they have been less successful at obtaining research funding. While 33.8 percent of all of Maryland's federal contract funding went to small businesses, this was true for only 18.8 percent of all awards for research. The four agencies that account for 95 percent of all research contracts in the State (Defense, HHS, NASA, and NSF) all cluster around this percentage.

(1)(iii) explore ways to facilitate the transfer of technology from small businesses.

The universe of federal technology transfer is complex. The sheer volume of federal research and the multiple ways in which a company could conceivably obtain transferred technology make it difficult for the uninitiated to become involved in the federal technology transfer system.

Federal Commercialization Channels. There are five major channels through which federal technology transfer activities occur:

1. *Commercial transfer:* The movement of knowledge or technology developed by a federal laboratory to private organizations or the commercial marketplace;
2. *Scientific dissemination:* Publications, conference papers, and working papers distributed through scientific or technical channels, or other forms of data dissemination;
3. *Export of resources:* Federal laboratory personnel made available to outside organizations with R&D needs, through collaborative agreements or other service mechanisms;
4. *Import of resources:* Outside technology or expertise brought in by a federal laboratory to enhance existing internal capabilities; and
5. *Dual use:* Development of technologies, products, or families of products with commercial and federal [mainly military] applications.¹

The majority of federal tech transfer happens through collaborative R&D relationships:

- Cooperative Research & Development Agreements (CRADAs), the most common method;
- Entrepreneurial Leave Programs;
- Entrepreneur-in-Residence (EIR) Programs;
- Public-Private Entrepreneurial Partnerships;
- Strategic Partnership Programs;
- Use of Facilities Agreements;
- Visiting Scientist Programs; and
- Educational Partnership Agreements (EPAs).

The second most significant source of tech transfer is through licenses, either of patented or non-patented inventions or other intellectual property licenses.

The federal government is not the only place where small businesses can find technology to transfer. Maryland's universities have business offices that coordinate with private industry to develop, evaluate or transfer technology. Maryland businesses benefit from development and evaluation services that are easy to access and which save program development time and expenses.

The federal government itself has created many avenues for technology transfer from its multiple research institutions. Some of the more important are below.

- *The Federal Laboratory Consortium for Technology Transfer.*
- *Individual Technology Transfer Offices.*

¹ <https://www.nsf.gov/statistics/2018/nsb20181/report/sections/invention-knowledge-transfer-and-innovation/knowledge-transfer>

- *NSF Innovation Corps (I-Corps™)*. To expand access to I-Corps, NSF collaborated with the National Institutes of Health (I-Corps at NIH) in 2014 and the Department of Energy (Energy I-Corps) in 2015.

(1)(iv) explore ways to encourage small businesses to apply for federal SBIR/STTR grants.

The Small Business Innovation Research / Small Business Technology Transfer (SBIR/STTR) programs are designed to help domestic small businesses gain federal support for their Research / Research and Development (R/R&D) efforts. The SBIR and STTR programs each have three phases: Phase I (feasibility and commercial potential); Phase II (technical merit and commercialization); and Phase III (creation of actual products or services). One of the reasons why the SBIR and STTR programs are important to small businesses is to get them through the “valley of death,” which represents the time when a business is expending funds to develop new products without deriving income from those products. Without funding to bridge the gap between R&D and product commercialization, a company can fail before it can bring a product to market.

In 2018, Maryland ranked fourth in both the number (247) and total value (\$132.9 million) in SBIR awards, after California, Massachusetts, and Virginia. That same year, Maryland ranked ninth in the number of STTR awards received (29 awards) and seventh in STTR funding (\$17.2 million). Note that California and Massachusetts are outliers, receiving significantly more SBIR grant awards than other states. Maryland has generally ranked fourth in total SBIR grants received between 2014 and 2018 (except in 2015 when it ranked fifth after Colorado).

Maryland generally attracts more SBIR and STTR investment than would be expected for its population size, attracting 2.6 times the number of SBIR/STTR awards and 2.7 times the amount of funding. The vast majority of the funding awards that Maryland attracts comes from the Departments of Defense and Health & Human Services, which together make up 79 percent of all SBIR and STTR awards and 84 percent of all funding obligations in Maryland.

It should be noted that, on a per capita basis, Massachusetts is by far the most successful state at attracting both SBIR and STTR awards and funding, doing so at almost twice the rate that Maryland does. Massachusetts’ success comes from its sheer volume of award applications. For example, companies in Massachusetts received 50% more NIH SBIR awards in 2018 simply because they filed 50% more applications (302 vs. 201). Success rates for each state were roughly the same.

(2) study the laws and regulations of other states governing financial assistance programs for SBIR/STTR grant recipients.

Various states offer financial assistance programs for small businesses pursuing SBIR or STTR funding. Various programs offer assistance for companies in Phase I, Phase II, or Phase III. States also offer assistance to companies in “Phase 0,” or the initial proposal-writing and business planning phase of the SBIR/STTR award process. These programs differ from state to state, but most are competitively funded. There are 16 programs in 15 states that offer matching grant programs for SBIR and STTR awardees to help them reach the commercialization stage. States that currently operate supplemental grant programs are listed in detail in the report.

(3) make recommendations regarding financing options for recipients of federal small business innovation research grants and small business technology transfer grants.

Maryland already has many successful programs in place that assist companies in working with the federal government generally, but there is room for improvement in the tech transfer realm. The report's recommendations for improving tech transfer and SBIR/STTR funding are below.

- **Recommendation #1: Coordinate with Congressional Delegation.** Develop and implement a formal process for communicating with Maryland's Congressional delegation on federal issues affecting research and development and the commercialization of technology in Maryland. A formal communication process will provide a means to advocate for an increase in funding for federal research, and raise awareness about barriers to commercializing federally funded research.
- **Recommendation #2: Tech Transfer Portal.** Create a single point of entry for Maryland businesses to take advantage of all of the State's multiple tech transfer assistance and resources. This portal would be web-based and would collect and organize all of the resources listed in the Existing Programs section of this report to ensure that Maryland businesses have the information they need to locate both assistance and transferrable technologies.
- **Recommendation #3: Collaboration with Federal and State Partners.** Collaborate with appropriate partners and service providers in Maryland to create new, or expand existing, programs and events that offer opportunities for Maryland's small businesses to network with federal researchers and clinicians, learn about federal resources for small businesses, discuss regulations for new products and access federal technologies available for licensing.
- **Recommendation #4: SBIR/STTR Commercialization Training and Application Assistance.** Explore creating a State I-CORP program, and SBIR/STTR application assistance program, through a partnership between State agencies and the State's five research universities. A two-stage implementation process is recommended with the first stage being the implementation of the I-CORP training program, and the second stage being the implementation of a SBIR/STTR application assistance program.
- **Recommendation #5: Encourage the Creation of a Statewide Association of Technology Transfer Offices.** Encourage Maryland's institutions to join together and create a Maryland statewide organization of Technology Transfer Offices, based on the model of the national Association of University Technology Managers (AUTM) and the Massachusetts Association of Technology Transfer Offices (MATTO).
- **Recommendation #6: Support and Increase Awareness of Federal Programs and Partnerships.** Support and increase awareness of federal programs that augment the recommendations of this report. This includes :
 - Increasing the awareness and formation of Cooperative Research & Development Agreements between Maryland businesses and federal laboratories;
 - Supporting the creation of Entrepreneurial Leave programs, and Entrepreneur-in-Residence programs by local federal laboratories to develop the business skillsets of scientists commercializing a technology in Maryland; and
 - Increasing the awareness of Strategic Partnership programs, Use Facilities Agreements and Visiting Scientist Programs to increase the utilization of federal laboratory expertise and equipment by Maryland small businesses.

- **Recommendation #7: Examine the Creation of a State SBIR/STTR Matching Grant Program After the Implementation of a State I-Corp Program and SBIR/STTR Application Assistance Program.**
Examine creating a State SBIR/STTR matching grant program that: awards grants competitively and provides preference to applicants who have completed I-Corps training; assists small businesses; requires companies to stay in Maryland for a defined period; allows State funds to be used for expenses not allowed under SBIR grants, such as administrative expenses; and limits grant awards to prevent “SBIR mills.”

A detailed discussion of these recommendations is provided on pages 74 through 76 of this report.