

OVERVIEW OF THE SMALL BUSINESS INNOVATION RESEARCH AND SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAMS

HEARING BEFORE THE COMMITTEE ON SMALL BUSINESS UNITED STATES HOUSE OF REPRESENTATIVES ONE HUNDRED SEVENTEENTH CONGRESS FIRST SESSION

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THURSDAY, MAY 13, 2021

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SMALL BUSINESS

Washington, DC.

The Committee met, pursuant to call, at 11:00 a.m., in Room 2360, Rayburn House Office Building, Hon. Nydia Velázquez [chairwoman of the Committee] presiding.

Present: Representatives Velázquez, Crow, Davids, Mfume, Phillips, Newman, Bourdeaux, Delgado, Houlahan, Mr. Kim of New Jersey, Craig, Luetkemeyer, Williams, Stauber, Meuser, Tenney, Garbarino, Ms. Young Kim of California, Van Duyne, Salazar, and Fitzgerald.

Also Present: Representative Schneider.

Chairwoman VELAZQUEZ. Good morning. I call this hearing to order.

Without objection, the Chair is authorized to declare a recess at any time.

Let me begin by saying that standing House and Committee rules and practice will continue to apply during hybrid proceedings. All Members are reminded that they are expected to adhere to these standing rules including decorum.

House regulations require Members to be visible through a video connection throughout the proceeding, so please keep your cameras on. Also, please remember to remain muted until you are recognized to minimize background noise. If you participate in another proceeding, please exit this one and log back in later.

In the event a Member encounters technical issues that prevent them from being recognized for their questioning, I will move to the next available Member of the same party and I will recognize that Member at the next appropriate time slot provided they have returned to the proceeding.

For those Members physically present in the Committee room today, we will also be following the health and safety guidelines issued by the attending physician. That includes social distancing and especially the use of masks. Members and staff are expected to wear masks while in the hearing. With that said, Members will be allowed to briefly remove their masks when recognized by the Chair for their statement and questions. Otherwise, masks are ex-

pected to remain in place. I thank you in advance for your commitment for a safe environment for all here today.

During my tenure on this Committee, I have seen countless examples of how small businesses drive innovation. Technology has changed rapidly over the years thanks to pioneering entrepreneurs leading the way. Congress has facilitated this innovation through investments in federally funded research and development, also known as R&D. As a result, federally funded R&D has produced countless inventions and discoveries that have changed our country for the better. From Doppler radar to computers to the first wind energy turbines, government-funded research has a rich legacy of helping launch ground-breaking inventions. For innovative small businesses, it can often be a struggle to access early funding critical to building a new product.

To reduce risks of investment in small businesses and encourage entrepreneurs to commercialize federal R&D innovations, SBA launched the Small Business Innovation Research (SBIR) program in 1982. Ten years later, the agency launched the Small Business Technology Transfer (STTR) program to stimulate partnerships between small businesses and nonprofit research institutions. These programs are funded through federal set-asides of government agencies, and development funds. SBIR and STTR have an impact on small businesses across a variety of different sectors every year. In FISCAL YEAR 2020, agencies contributed \$454 million for 1,030 awards to 744 small businesses. Not only do these figures represent an investment in our nation's small firms, but they are also funding our country's future.

Over the course of the last 3 decades, SBIR/STTR have funded small businesses that are now economic powerhouses. The programs provided companies like 23andMe, Qualcomm, Semantic, and Da Vinci Surgical Systems with the early funding they needed to develop new technologies and build their enterprises into what they are today. These programs also have the potential to address persistent barriers that hold back women and people of color operating in the STEM fields. Minorities often have a harder time accessing seed capital to pursue the creation of new technologies and this program helps bridge that gap.

Women hold less than 20 percent of U.S. tech jobs and only 5 percent are in leadership positions at technology companies. According to a recent survey by Pugh Research, Asian Americans hold 13 percent of STEM jobs while African Americans hold 9 percent and Latinos hold 8 percent. These numbers are staggering and show we have a long way to go. And I may add, increasing the number of women and minorities who participate in the SBIR/STTR program is a top priority of mine.

Today, our country is at a crossroads when it comes to our innovative capacity, just as we were when Congress created SBIR/STTR. In the latest Bloomberg Innovation Index, the United States dropped out of the top 10 entirely. Regaining our footing as one of the world's most innovative nations should be a bipartisan goal. If we are to accomplish it, it is vital that we utilize the power of small businesses.

I hope that today's discussion sheds light on the importance of small business innovation, and I look forward to working with my colleagues to improve these critical programs.

I now yield to the Ranking Member for his opening statement, Mr. Luetkemeyer.

Mr. LUETKEMEYER. Thank you, Madam Chair. And good morning to all.

I thank all of you for being here as we examine the Small Business Innovation Research and Small Business Technology Transfer or SBIR and STTR programs. Innovation is the engine that drives our economy. Technological breakthroughs and the entrepreneurship it spurs build our economy and creates new jobs by finding state-of-the-art solutions to difficult problems and capitalizing on those new products. This correlation is particularly important in the small business arena. Small businesses tend to be more nimble, responding to the market changes more rapidly than their bigger counterparts. They drive the innovation sector and make us more agile in the world economy. In this area of globalization, making it easier for small businesses to develop and commercialize new, innovative products is essential not only for America's competitiveness but for its national security as well.

This is why programs like SBIR/STTR are very important. These programs, envied and emulated around the world, were created based on the premise that small technology-based firms tend to be highly innovative and inventive and that this innovation should be better harnessed by the Federal Government. Binding these new developed technologies with other Federal R&D efforts was seen as a natural extension to both boost small business participation in Federal R&D activities and to solve agency institutional problems, whether at the Department of Defense, National Institutes of Health, or Department of Energy.

All too often, good ideas never materialize because of a myriad of obstacles. It can be lack of funding, lack of understanding, or perceived lack of a marketplace for the truly new and amazing technology. The SBIR and STTR programs bridge the gap between the fantastical and the practical, while building our economy and improving the function of the Federal Government in the process.

The small businesses that participate in these programs are rapidly pushing the boundaries of what is possible in a variety of fields. From supporting our warfighters, to battling cancer and COVID, the SBIR and STTR programs are emboldening our small firms to contribute mightily to the fight.

Current authorization for these programs is set to expire at the end of the next fiscal year. Getting a jump on this process is essential and I am very happy the Chairwoman worked with me to schedule this hearing and discuss our normal mutual problem here. Thank you very much, Madam Chair.

Today, we have an excellent panel of witnesses to discuss these programs and provide the Committee with suggestions to make them better for small businesses and participating agencies alike. I am looking forward to the hearing, hearing those ideas, and working with my colleagues across the aisle and across the capital to draft legislation we will all be proud of and support.

With that, Madam Chair, I yield back. Thank you very much.

Chairwoman VELÁZQUEZ. Thank you, Mr. Luetkemeyer. The gentleman yields back.

I would like to take a moment to explain how this hearing will proceed. Each witness will have 5 minutes to provide a statement and each Committee Member will have 5 minutes for questions. Please ensure that your microphone is on when you begin speaking and that you return to mute when finished.

With that, I would like to introduce our first witness.

Our first witness is Dr. Joyce Tung, the Vice President of research for 23andMe in Sunnydale, California. Now considered a startup unicorn worth approximately \$4 billion, 23andMe received its first SBIR grant from the National Institute of Health in 2020. She joined 23andMe in 2007 and leads the research team which is responsible for consumer health and ancestry R&D, academic and industry collaborations, and new research strategies. She earned her Ph.D. in genetics from the University of California, San Francisco, where she was a National Science Foundation graduate research fellow. Welcome Dr. Tung.

Our second witness is Ms. Pat Keady, cofounder, CEO, and President of Aerosol Devices, Inc., in Fort Collins, Colorado. She is the past President of the American Association for Aerosol Research. Ms. Keady received her Master of Science degree in Mechanical Engineering from the University of Minnesota and holds two patents from Aerosol Instrumentation with three more pending. Earlier this month, she was awarded a Businesswoman of the Year award by CEO Today. Congratulations and thank you for joining us, Ms. Keady.

Our third witness is Ms. Rebecca Todd, the Innovation Consultant for the Arkansas Small Business and Technology Development Center located in Little Rock, Arkansas. Ms. Todd assists technology-based small businesses and university researchers throughout Arkansas with navigating federal funding opportunities within the SBIR and STTR programs that support innovation with high commercial potential. She leads SBIR/STTR training events and has strong working relationships with agency program managers and state funding organizations. Welcome, Ms. Todd.

Now I yield to the Ranking Member to introduce our final witness.

Mr. LUETKEMEYER. Thank you, Madam Chair.

Jerry Glover serves as executive director of the Small Business Technology Council, SBTC, a trade association of small, high-tech companies, most of whom are highly involved in the SBIR program. Through the laws existence, she has been one of its most active supporters. Mr. Glover has a unique blend of private and public sector experience. A former CEO and attorney in private practice, he has testified before Congress over 30 times and appeared in over 100 agency proceedings, including rulemakings, adjudications, enforcement proceedings predominantly within the SBIR and STTR programs. He probably knows or would be able to know what our questions are before we even ask him, Madam Chair. He obtained his undergraduate law degrees from the University of Memphis and a LLM in administrative law and economic regulation from George Washington University. Mr. Glover, we welcome your participation in today's hearing and look forward to your testimony.

I yield back.

Chairwoman VELÁZQUEZ. Thank you, Ranking Member. He yields back.

Dr. Tung, you are now recognized for 5 minutes.

STATEMENTS OF DR. JOYCE TUNG, VICE PRESIDENT OF RESEARCH, 23ANDME, INC.; PAT KEADY, FOUNDER, CEO, AND PRESIDENT, AEROSOL DEVICES INC.; REBECCA TODD, INNOVATION CONSULTANT, ARKANSAS SMALL BUSINESS AND TECHNOLOGY DEVELOPMENT CENTER; JERE GLOVER, EXECUTIVE DIRECTOR, SMALL BUSINESS TECHNOLOGY COUNCIL

STATEMENT OF JOYCE TUNG

Ms. TUNG. Chairwoman Velázquez, Ranking Member Luetkemeyer, and other members of the Committee, thank you for the opportunity to testify at today's hearing and share our experience with the Small Business Innovation Research Program.

23andMe is a leading consumer genetics and research company. Founded in 2006, based exclusively in the U.S. with offices in California and testing performed in North Carolina, the company's mission is to help people access, understand, and benefit from the human genome. 23andMe has pioneered direct access to genetic information as the only company with multiple FDA clearance for over-the-counter genetic health information and has created the world's largest crowdsourced platform for genetic research.

In 2010, the year of our first grant application, we had fewer than 50 employees and minimal revenue from our direct-to-consumer genetics product. The business also had a goal to accelerate scientific discovery by developing a highly scalable, consumer-centric research platform. This platform needed a significant amount of investment in order to develop the infrastructure, breadth, and size needed to make it a scientifically valuable asset that would meaningfully benefit the company. Because we were a small business and because our mission was aligned with the mission of the National Institutes of Health, we decided to apply to the SBIR program. Over approximately 8 years, 23andMe applied for 10 SBIR grants and received eight.

Reflecting back on our participation in the SBIR program, we believe that we saw four main benefits. First, our SBIR funded work helped us establish our scientific credibility. In total, the work funded by our SBIR grant produced at least 32 scientific presentations and publications. This credibility allowed us to realize the second benefit which was the development of a commercially viable research platform.

By 2014, paid research partnerships with industry partners made an important contribution to the company's revenue. The growth and development of the research platform also enabled the establishment in 2015 of the Therapeutics development program at 23andMe.

Third, our SBIR grants helped us to make a substantial contribution to the scientific community. The scientific publications mentioned previously shared genetic insights on conditions ranging from asthma and allergy to Parkinson's disease. More than half of

those publications were written in collaboration with academic researchers at no cost to them. We have also used SBIR funding to improve the ethnic diversity of data in a protected NIH data repository for use by other researchers.

Lastly, the SBIR program has helped us develop our early career scientists. The exercise of applying for and executing a grant builds very useful skills for the investigator which benefits not only the individual but also the company.

The main challenge we experienced was the administrative overhead of running the grant, specifically, the challenge of adequately meeting the accounting requirements. The accounting system requirements, which include time tracking on an hourly basis and audit preparation were very intimidating, and even with help from our finance department, the team spent multiple hours every week on time tracking. Given the cost of setting up the accounting program, having a singular small grant was not really worth the effort. Thus, the dollar limit to the awards was also a disincentive to applying.

Based on this experience, we have three recommendations. The first is to reduce the administrative overhead for time tracking and creating an accounting system.

The second is to consider increasing the max award. Given the cost of setting themselves up to administer an SBIR award, some small businesses may be more motivated to apply for the program if the potential reward were greater.

Lastly, we recommend continuing to fund venture-backed companies. In our early days as a venture-backed company, most investors were interested in the development of our consumer product rather than the research platform and there was skepticism about our value as a research partner. Without SBIR support, it would have been more difficult for us to build our program. We see venture funding and SBIR funding as complementary resources to drive higher risk, higher award, technology innovation, and commercialization.

SBIR grants supported our scientific innovation at a time when we lacked the track record and credibility to get significant funding from other sources for our research and development work. We believe research in industry, particularly in small startups, will play an increasingly important role in innovation and that the SBIR program can play a key role in nurturing that innovation.

Though we are now too large to be eligible for SBIR grants, we appreciate the opportunity to express our support for this important program. Thank you.

Chairwoman VELÁZQUEZ. Thank you, Dr. Tung.

Now we recognize Ms. Keady for 5 minutes. Welcome.

STATEMENT OF PAT KEADY

Ms. KEADY. I would like to thank Chairwoman Velázquez, Ranking Member Mr. Luetkemeyer, and the entire Committee on Small Business for inviting me to testify.

My name is Pat Keady. I am CEO and president of Aerosol Devices, Inc., a small woman-owned business incorporated in 2014 in the state of Colorado. We develop advanced sampling and measurement instruments sold primarily to scientists studying the chem-

ical and biological properties of airborne particles. Our method of gently collecting aerosolized viruses, including SARS-COV2, is considered by leading scientists to be the best approach for determining whether airborne viruses present, as well as the infectivity or viability of such viruses.

In 2020, we had revenue of \$2.17 million, approximately half in product sales and half in grants. We have 11 employees, including nine with science and engineering degrees. We have been named by Biz West Magazine as one of the 50 fastest growing private businesses in Northern Colorado 2 years in a row, ranking number one in our size class in 2019.

Most people recognize that starting a company is no easy task and often requires significant financial resources. This is especially true when developing a physical product that requires design, prototypes, testing, patents, regulatory approvals, tooling, and inventory. Having a good idea for a product that customers will buy is essential but is certainly not sufficient for achieving economic success.

Ninety-six percent of the startup funding for our company came from the personal assets of the two cofounders, including myself. Our startup capital totaled \$587,000. This amount covered the commercial development of our first product but was insufficient for product refinement, global marketing, or continuing new product research and development.

This is the point in our company history where the SBIR/STTR program came in with necessary financial assistance. Since our first NSF STTR phase one grant was awarded in 2017, we have been awarded six phase one, three phase two, and two subawards for a total of \$4.68 million. Nearly half of our grants were awarded in just the past 12 months to address the COVID pandemic threat and to provide early warning of a bioterrorist attack.

With an NSF grant awarded 1 year ago, we fast tracked development of a compact, easy-to-use virus sampler that was launched into the market last week. COVID-focused developments can also be used for measurement of other respiratory pathogens, such as seasonal influenza and tuberculosis. Our grant funding has come from five different Federal agencies demonstrating the versatility that our platform technology has for addressing a wide variety of industry and societal needs.

Approximately half of the funding is a passthrough to our university and industry collaborators. We have partnered with five public universities and three companies, two of which are also small private businesses. The university collaborations support graduate students and help to build our Nation's intellectual capital. Other products at least partially funded by the grants include three patent applications, two publications and journals, and dozens of conference presentations.

Our primary interest lies in developing commercial products, not simply doing cool research projects. We look forward to the day when we can fund our own internal research and development without government support. Writing grant proposals and the reporting requirements and managing the projects is a considerable effort for a small company. A weakness in the SBIR/STTR model

is that there is no true funding to launch a product, what is called commercialization.

Because of the shortfall, we are actively seeking an outside investor. But bringing on an investor has its own set of complications and is not the right path for all businesses. Until we reach that critical revenue milestone where we can truly self-fund, we are grateful for the financial assistance of the SBIR/STTR programs. Our goal is to offer an increasing number of good-paying jobs and sell quality products to customers around the world. We aim to provide an exceptional return on the taxpayer investment.

The SBIR/STTR grants have been a lifeline for our small, early stage company. I strongly encourage Congress to continue and strengthen this vital program that provides essential funding for America's entrepreneurs and helps de-risk technology for potential investors.

Thank you. I look forward to your questions.

Chairwoman VELAZQUEZ. Thank you, Ms. Keady.

Ms. Todd, you are now recognized for 5 minutes.

STATEMENT OF REBECCA TODD

Ms. TODD. Good morning. My name is Rebecca Todd, innovation specialist at the Arkansas Small Business and Technology Development Center (ASBTDC) based at the University of Arkansas at Little Rock. I am proud to be here to share some success that the Federal and State Technology (FAST) program has brought to innovative Arkansas businesses. Hopefully, too, I can share some insight on how I believe Congress could and should expand the success of the FAST program.

The ASBTDC has competed for and successfully performed on FAST grants, averaging 125,000 for 1-year projects that are matched by the University of Arkansas at Little Rock and the state in 2010. This program has made an important impact on our ability to provide the statewide average about the SBIR/STTR program and related ASBTDC services.

From 2016 to 2020, ASBTDC assisted mentees with winning 52 SBIR/STTR awards totaling more than \$23 million. The mentees that we served through our FAST project are often too early stage to attract private investment but as the largest source of non-diluted funding for early stage research based companies, the SBIR/STTR program critical to helping them successfully develop and commercialize new products and services.

We continue to see sustained growth in our mentees' success, both in number of SBIR/STTR proposal submissions, and more importantly, awards. Since our 2010 opening FAST project, ASBTDC has seen a 467 percent increase in total number of SBIR/STTR awards for our mentee clients. Our participation in the programs has positioned us as the state's leading resource in providing SBIR/STTR proposal development services.

As a rural state, Arkansas has many areas that are underserved. They lack the awareness of funding opportunities available through the SBIR/STTR program. Our staff routinely travel the state and utilize data conferencing to offer formal and informal educational outreach specific to the SBIR/STTR program and related ASBTDC service offerings. As a result of this outreach, two faculty members

of this program engaged our services to submit SBIR applications to the U.S. Department of Agriculture.

ASBTDC has used its participation in the FAST program to reach strong statewide partners over the last decade. Referrals from these partners and through mentees learn of our centers SBIR/STTR services and expand the research of our program. Mentees are often inspired by success stories. Women leaders in innovation often serve as speakers at our training events and their SBIR/STTR successes are featured in our Lab Launch newsletter. For example, GSS Group, woman-owned horticulture company, GSS Group won USDA SBIR phase one awards on their first try after engaging our center services. This company's CEO has been a strong champion for our center, leading to a number of new mentee referrals from other AgTech companies. This success story in our Lab Launch newsletter and in our YouTube SBIR success stories video have attracted attention of other women researchers across the state.

As the number of programs grows in Arkansas, particularly at the university level, it has become increasingly important that ASBTDC grow capacity to actively serve potential mentee base.

In essence, the FAST program has enabled us to establish a network of support for small business innovation and provide access for all small businesses that would not have existed without the support of the FAST program.

While the funds supporting our efforts have been limited, ASBTDC has still managed to help mentees, especially with SBIR and FAST projects. We believe other underserved areas should have the ability to access the FAST program funds to increase SBIR programmatic outreach and services to their populations. The FAST program [inaudible] greater value for grant participants if the amount of the grants was expanded. This would support programmatic offers. If the FAST grant was extended to 3 years per project, it would allow FAST awardees, like ASBTDC to expand efforts, dedicate more time to existing and new programmatic offerings.

The more that FAST awardees like ASBTDC can cultivate SBIR/STTR success for small businesses across the country, the greater the economic payoff in terms of growth and the number of new innovative companies, high-tech, high-paying jobs that will attract more students willing to go to universities and new solutions for technological challenge areas.

For every state that participates in FAST, as word continues to spread about Arkansas's success in growing innovative companies and jobs around a founder's scientific passions, the motivation for companies to participate in the SBIR/STTR program will continue to grow all across our state. This has been a successful model for Arkansas, and we believe that it can and should be replicated.

Chairwoman VELAZQUEZ. Thank you, Ms. Todd.

Now we recognize Mr. Glover for 5 minutes.

STATEMENT OF JERE GLOVER

Mr. GLOVER. Good morning. I am Jere Glover, executive director of the Small Business Technology Council of the National Small Business Association.

I had the privilege 40 years ago of testifying before Congress in support of the SBIR legislation. At that time, the U.S. was the world leader, worldwide leader in innovation. We dominated the technology capital world. We had the best education system and the strongest patent system in the world, America's small business, the most innovative sector of the economy and a wellspring of entrepreneurial energy but received only 5 percent of Federal R&D funding. Today, about half of venture capital investments are made overseas. Eighty percent of all venture capital seed investments, early stage investments go into just four industries and to a limited number of states. Our patent system is severely weakened and small business still receives a very small portion of the Federal R&D dollars.

Small business, with the help of the SBIR program, is still the most innovative sector in the U.S. The SBIR program provides seed corn for innovation combining private enterprise with American ingenuity to enable innovations and Federal R&D funding while building on the new products and new businesses.

When it comes to worldwide competition, the United States, as the Chairwoman has pointed out, has dropped from first to 11th, not even the top 10. Basically, China is simply eating our lunch. The Beijing Institute of Collaborative Innovation has funded 150 U.S. universities' technologies. One hundred eight of those they have commercialized. They have a venture fund now to develop these U.S. technologies of \$616 million. Europe, the European Union is funding 20 percent of its R&D to small business. That is at least twice what the U.S. does. France has created a \$13 billion disruptive technology fund.

The one important thing to remember about the SBIR from an international competition point of view, it is the only U.S. program that requires funding to U.S. companies owned by U.S. citizens and the work be done in America. The SBIR program is working and working well. After 20 National Academy of Sciences study, four economic impact studies that look over half of the SBIR phase two awards, we can clearly say that it is an engine that drives innovation in America. The return on investment for the STTR/SBIR firm program at the National Cancer Institute is 33 to 1. At DOD, it is 22 to 1. For every dollar invested, \$3 of Federal, state, and local taxes are generated.

In terms of success, I can guarantee you that at least three technologies you use on a regular basis were funded by SBIR. The GPS on the chip, combining Wi-Fi and Bluetooth and the CMAS camera technology, all of which are used in your cellphones. So you can clearly see that this, among all the technologies, there is a list of SBIR success stories in the back of my testimony.

The market actually loves the SBIR program. Seventeen countries have copied it. As I pointed out, China has done an excellent job of copying it and taking it further. Ten percent or 3,000 SBIR firms have VC inventions. Eight hundred twenty-nine SBIR firms have gone public. Thirteen hundred have been acquired by other companies. And 70 percent of all university licenses are going to small business, which recognizes the importance of small business to university commercialization.

What is working with the SBIR program? One, job creation. Small business created over 1.5 million jobs. And it is a state-by-state analysis how many jobs are being created in each. Fifty to 70 percent of all phase two SBIRs are commercialized.

GSA has done one billion dollars worth of phase three contracts in the last 2 years. Likewise, the Air Force and Navy combined have done over \$2 million of phase three contracts. Agencies are speeding up the contracting process but more needs to be done.

We need to encourage innovation and support small business innovation by, one, making SBIR permanent; two, doubling the SBIR/STTR program and restoring the Rapid Innovation Fund funding. We need to strengthen the patent system. We need to increase the Federal R&D spending. We need to set a goal of 15 percent for Federal R&D for small businesses. And we need to continue streamlining and simplifying the contracting process. If we take these actions, you will unleash new technologies for America while strengthening our economy, rejuvenating America's leadership in innovation. We can beat China and become number one in innovation again if we effectively use the SBIR/STTR program.

SBIR is like printing money without inflationary effect. Three dollars are generated for every dollar spent.

It is working well. Thank you.

Chairwoman VELAZQUEZ. Thank you, Mr. Glover.

I will begin by recognizing myself for 5 minutes.

Dr. Tung, I would like to address my first question to you.

One of the goals of the SBIR/STTR program is to increase private sector commercialization of innovations derived from federally funded R&D. Dr. Tung, how did early seed funding from SBIR help develop the genetic testing services available today?

Ms. TUNG. I can provide a few examples. In the early days of 23andMe, the genetic health information we provided to customers was based solely on published research and the scientific literature. Today, many of our new genetic health reports are based on scientific results from our own research platform, the development of which was partially supported by SBIR funding. In addition, we have published 32 scientific papers supported by SBIR funding. Those results may be used by others in the scientific community to develop their own products and services.

Chairwoman VELAZQUEZ. Thank you.

Ms. Tung, the SBIR and STTR programs share four goals and one is to foster inclusion and diversification among innovative firms. Yet, this continues to be a challenge. One of my top priorities for the upcoming reauthorization is to improve participation of minority and disadvantaged persons in the program. In your experience, what strategies have worked and what are the greatest challenges to this effort?

Ms. TODD. So our primary areas of industry and regions where large populations of these groups are based, it would be helpful if SBIR/STTR opportunities were presented in a way that highlighted specific research interests that align with these industry types. For example, SBIR/STTR research topics might be highlighted in regions where agriculture is a prominent industry. Sharing success stories of companies with team members who share demographic features of the groups that you are targeting for increased SBIR/

STTR program participation is always helpful. Videos and feature articles in newsletters that have photos are a couple of ways to communicate these inspirational stories. To encourage participation from HBCUs, highlighting the partnership opportunity inherent in both SBIRs and STTRs would be particularly helpful.

ASBTDC previously hosted an introductory SBIR/STTR workshop at an HBCU that featured SBIR awardees both from local companies and their university subcontract leadership team.

Chairwoman VELAZQUEZ. Thank you, Ms. Todd.

We hear time and again about the struggles that small businesses face in overcoming the "Valley of Death" where research is derailed because of a lack of funding. This Committee is dedicated to modernizing the program in such a way to better assist businesses in overcoming this stumbling block.

To the panel, what have you found to be the best mechanisms to help businesses commercialize their products?

Mr. Glover, I would like to start with you.

Mr. GLOVER. I think Phase III of the SBIR program, which is no Federal money and no SBIR money. It has been the single best. That is why I wanted to highlight how many billions of dollars are now going into Phase III. We are starting to see that happening. It needs to happen a lot more. There are agencies that do virtually nothing in that area and do not have a good record. Some are just getting started. But phase three is an opportunity. The use of venture funding was the core for the first 20 years of the SBIR program for Phase III. As VC moved on to later stage investments, that VC investments of RAVC waned. I think phase three has got to be the best way we can do that and make sure focus where it is not SBIR dollars but it is private sector and non-SBIR government dollars.

Chairwoman VELAZQUEZ. Thank you.

Ms. Keady, would you like to comment?

Ms. KEADY. Well, I would definitely agree that the phase three commercialization grants would be extremely helpful. We have never gotten one. The agencies where we have gotten our grants do not offer money for this and so we have just had to do our own bootstrapping in terms of paying for the commercialization. And because we have a global product, it is also quite expensive to adequately market internationally. And so one of the things we are looking at is trying to start a search for investing funding. Investors are very risk averse so the SBIR funding is good for helping de-risk that. But so far we have been deemed too early for significant investment in terms of attracting a lot of investment money. But we are starting that path. But that is the biggest challenge I would agree.

Chairwoman VELÁZQUEZ. Thank you, Ms. Keady.

My time has now expired. I will recognize the Ranking Member, Mr. Luetkemeyer.

Mr. LUETKEMEYER. Thank you, Madam Chair.

Mr. Glover, I would like to start with you. One of my biggest priorities on the Committee is to root out and rectify the waste, fraud, and abuse in every SBA administered program. Recent audits that we have been told about here are very concerning with regards to this. So my question basically is, how are these two programs

faring with regards to waste, fraud and abuse in comparison to other SBA programs?

Mr. GLOVER. In the history of the program, I think there have been less than 20 waste, fraud, and abuse cases that have been brought and that is .0001 percent of all of the SBIR program awards. Because of the competitive nature, it is really tough to try to engage in fraud there. You have got to first win a phase one, then win a phase two, and it has been not fraud free but has been very limited, and most of those cases involved university connection with a small business where they crossed the line and did something—

Mr. LUETKEMEYER. So the competitiveness of the program sort of minimizes the ability for fraud because it is not something that if you qualify you automatically get the money. If you qualify for it you compete for other people against that. Therefore, there is sort of a bump in the road there to prevent that from happening. Would that be a fair statement?

Mr. GLOVER. Absolutely, sir.

Mr. LUETKEMEYER. Okay. Thank you very much.

Ms. TODD, can you explain to me how the FAST program differs from the original SBDC model of outreach in counseling, please?

Ms. TODD. I am not familiar with the original model. I can speak to some of the offerings of our FAST program. Would that be—

Mr. LUETKEMEYER. Well, the SBDC model is such that they do have outreach. They do have counseling in it. And is that not what a big part of the FAST program is?

Ms. TODD. Okay, yes. In addition to the standard services offered through our center through the FAST program, we are able to offer enhance outreach specific to our technology clients across the state, including SBIR/STTR program exploration, proposal planning guidance and review.

Mr. LUETKEMEYER. I wish you would answer me rather than reading your answer. I understand what you are doing there but I asked you a question with regards to the SBDC model. It is not in your answer. Would you please answer that question? What is the difference between the FAST program and the outreach and counseling program of SBDCs?

Ms. TODD. The FAST program allows us to create programs and other offerings of our own that we know will be tailored to address the needs of our audiences here in the state. So we were able to identify what the needs are among all the—

Mr. LUETKEMEYER. Okay. That is what the FAST program is. You still have not answered my question.

So the problem here is that the FAST program for almost 2 decades, almost 20 years has not been appropriated. The annual appropriation has not come through; yet, they have been able to get the money for it. And my question I guess is why is it so essential that somebody apparently in the Senate keeps putting money in there in spite of the fact that it is not authorized? Do you have an idea on that?

Ms. TODD. We have been able to achieve lots of success in the state of Arkansas through the FAST program, so obviously they have more capacity to serve companies and inspire companies

across the state. Help them with the very competitive and challenging process of preparing and submitting these applications.

Mr. LUETKEMEYER. You are doing it better than——

Ms. TODD. So we have things——

Mr. LUETKEMEYER. So you are doing it better than what the SBDC model can actually accommodate?

Ms. TODD. We are able to expand on that through the FAST program to tailor it and make it our own. It is successful here in the state of Arkansas.

Mr. LUETKEMEYER. Okay. Mr. Glover, you made a lot of comments with regards to the phase three here stuff and I think Ms. Keady may have misstated here when she indicated that it was money that they need for this from the standpoint that it is actually not a grant. It is a contract that the government, if I am not mistaken here, has with the individual or the company. To the first two phases, money is granted, and to the third phase you are then given a contract to provide this good or service to the government or to whomever as the phase three. Is that not correct?

Mr. GLOVER. It is correct. The phase three money from the government would be in the case of the Defense Department, now \$4 billion over the last couple of years buying SBIR technology and putting it in the field for the warfighter or taking the technology to a further level of readiness so that it is ready——

Mr. LUETKEMEYER. Okay, so you wanted to further dollars to the government to be able to purchase whatever the innovation is that is being paid for through the SBIR program; is that correct? Is that what you are saying?

Mr. GLOVER. That is correct.

Mr. LUETKEMEYER. Very good. I see my time is up. Thank you very much.

Madam Chair, I yield back.

Chairwoman VELAZQUEZ. Time has expired and now we recognize the gentleman from Colorado, Mr. Crow, Chairman of the Subcommittee on Innovation, Entrepreneurship, and Workforce Development.

Mr. CROW. Thank you, Madam Chair.

Ms. Keady, last year you developed a product that helped researchers confirm that COVID spreads through the air and your technology likely saved lives by informing scientists and policy-makers on how to prevent infection. And your case also demonstrates why Federal investments in R&D are so important. In your testimony, you mentioned that your grant funding came from the National Science Foundation, the Department of Energy, the NIH, Department of Defense, and Department of Homeland Security. Can you just briefly explain the differences between each agency's administration of the SBIR and STTR programs?

Ms. KEADY. All of the agencies have very different policies, procedures, web portals for submitting grants. They have different procedures for reviewing proposals and for funding. So each one of them we have to treat as an entirely separate thing. It would very helpful if there were common portals or common procedures but that is not the case today. We have only recently gotten grants from the DOD and DHS, so I am less familiar with what all of that entails. We are just at the very, very beginning of those. I have the

most experience with NSF and they have lots of opportunities for learning. For example, we participated in an I-Corps program which is about customer discovery. I think that was initiated by NSF and some of the other agencies have taken that up. But they are all very, very different. So we just really have to treat them all as a separate customer if you will and learn what their particular process is.

Mr. CROW. And you kind of got to my point by just talking about how more complicated it is if you are having to review and understand and learn all these different entities, different processes. Could you just paint a very short picture for us as to how, if you had a common portal and a common process, how would that impact you and what type of resources would be freed up for you to do the R&D that you do so well?

Ms. KEADY. Thank you for that question.

I just think from an administrative point of view it would save time in having to create the reports that are needed, submit the reports. I just think it would streamline the administrative side. The R&D, you know, is unique for each grant and so that does not change but the administrative side would be much easier.

Mr. CROW. And then you mentioned that the SBIR/STTR has limited support for the final stage of development in bringing a product to market. What could be done in your view through these programs or through other programs to help businesses find investors for that final stage that is obviously so critical to getting it done?

Ms. KEADY. So I appreciate the comment earlier about that there are phase three contracts but only certain agencies issue those, and DOD being one of them. We have just started with them so we have not gotten that far yet. NSF does not, and I do not believe NIH does, at least not for the programs that we have had.

Now, your question about how to help companies find investors, I think we have been very successful at getting the grants. We have so far not gotten an investor, although we are trying. And we need to learn how to attract investors because they are looking for different things. And I would just say that an investor is a long-term commitment, just like a marriage. You are entering this relationship for the long term, at least until you have an exit. So you have to be very careful about who your partner is and so the investor and the company's goals are in alignment. And so that is what we are seeking. We are confident we will find an investor. We just have not yet.

Mr. CROW. Thanks, Ms. Keady. I know, you know, I hail from your home state as well, from Colorado, and we are all very proud of you in Colorado. And the picture behind you of the mountains is making me anxious to head west. So I will be heading your way shortly. Thank you for your testimony.

Madam Chair, I yield back.

Chairwoman VELAZQUEZ. The gentleman yields back.

Now we recognize the gentleman from Texas, Mr. Williams, Vice Ranking Member of the Committee for 5 minutes.

Mr. WILLIAMS. Thank you, Madam Chair.

The Small Business Administration under President Biden has had problems overseeing programs for the past few months. Just

to name a few, there has been miscommunication between the Inspector General and Administrator Guzman, fraud with the EIDL program, and delays of implementing critical funding programs like the Shuttered Venue operator grants. The SBIR and the STTR programs discussed today are carried out by several agencies that are overseen by the SBA. And before we authorize these programs we must ensure the proper guardrails are in place so that both are fulfilling their intended purpose in helping small business grow.

So Mr. Glover, what recommendations can you give to the SBA for these programs so that we can avoid some of the problems we have seen out of the agency this year and some of those that I just mentioned?

Mr. GLOVER. Well, the SBIR program relies extremely strongly on competition. And it has been targeted for audits. They looked at everything very carefully. And quite frankly, they found very little. And I think it is because there is so much competition.

Quite frankly, it is tough to win an SBIR award. It is very hard to do. And you do not find somebody who wants to commit fraud having to spend that kind of energy putting it together. SBIR proposals are reviewed primarily by scientists who are familiar with the technology and familiar with the area. It is hard to con those reviewers. So I think the SBIR program is fortunate in that regard but I think that there is a problem with the agencies that could be doing more Phase III. We have been talking to the Department of Energy about their cost share. They have for follow-on grants outside the SBIR program and even for Phase III cost sharing. You have a million dollar award. You have to come up with \$200,000 cost share. Small business just cannot do that. So basically, small business is shut out of all DOE's follow-on, non-SBIR funding. They get less than 3 percent there. So it is a problem but it is a problem that is diminished because of the way the program was carefully structured at the very beginning when it first started and what we maintained throughout its history.

Mr. CROW. Let me move on. Thank you.

Innovation drives economic growth and gives America a strong presence in global markets. Many of these innovators start out as small businesses with great ideas but maybe do not have the knowledge on how to expand operations to get in the pipeline for Federal contracts. Often there is excessive amounts of red tape, administrative burdens that make it overwhelming for small businesses to attempt to do business with the Federal Government.

So Ms. Tung, you mentioned in your testimony that this can be intimidating for scientists who are not familiar with this process. So can you discuss personal challenges you experienced with the application process for 23andMe and how we can cut red tape to streamline proposals for SBIR and STTR programs?

Ms. TUNG. Sure. So I would say that our primary challenges were not with the application process itself which I think was relatively straightforward. I think we were more intimidated by the rules that we saw afterwards for setting up an accounting system and for tracking time because that is how we got reimbursement for the funding that we received. So we were very fortunate in having a colleague who had done some accounting and auditing work. And so he helped us sort of understand and interpret the guide-

lines. But I would say some of our scientists, of course, were also scientists who had gotten grants in academia and those sorts of RO1 grants did not have the same sort of accounting, auditing, and time tracking requirements. So I think if you want to use those dollars to allow the scientists to spend more time on the actual research, you might consider reducing some of the auditing, accounting, and time tracking requirements.

Mr. WILLIAMS. All right. Thank you.

The SBIR program has had bipartisan support since it began during the Reagan administration. Each reauthorization since then has made significant changes from increasing award sizes to shifting focus of the program to commercialization. Currently, it is set to expire September 30th of 2021. As reauthorization conversations continue, we should be looking to make sure we are getting the maximum return on investment for these taxpayer dollars. So finally, Mr. Glover, can you explain the effects it would have on small business if this program was not authorized?

Mr. GLOVER. Well, the first thing, there would be 7,000 individuals and farms around the country that would not be getting money to take their ideas, their technology, and even advanced innovations at all. Given the fact that venture capitalists only make a couple thousand seed investments a year, that 7,000 SBIR is absolutely critical to fund it. It should be a lot higher. When we look at the rest of the world, we look at what China is doing, we look at even what the European Union is doing, everybody else is doing more. They far passed us. They have taken the SBIR program, copied it, and then made it bigger and better. So it would mean a lot of companies would not have any chance at all to get their technology advanced at all.

Mr. WILLIAMS. Okay. Thank you. And I yield my time back.

Chairwoman VELAZQUEZ. The gentleman yields back.

Now we recognize the gentlelady from Kansas, Ms. Davids, Chairwoman of the Subcommittee on Economic Growth, Tax, and Capital Access for 5 minutes.

Ms. DAVIDS. Thank you, Chairwoman. And I am, of course, glad we are holding this hearing to review the importance of the SBIR and STTR programs. And how we can improve them as Congress must reauthorize the programs this year.

As we have heard, these programs play an incredibly valuable role in our entrepreneurial ecosystem by providing support to innovators and entrepreneurs throughout their creation, development, and commercialization stages of their products and businesses. And the Kansas 3rd Congressional District, of which I have the privilege of representing, has some pretty amazing SBIR and STTR funded centers and partners. Folks like the Mid-America Manufacturing Technology Center, the Bio Science and Technology Business Center at the University of Kansas Medical Center. You know, these centers are invaluable resources to entrepreneurs and innovators who are looking to develop and advance their small businesses and to commercialize their products. But even with these awesome resources that we have in my state, Kansas has historically received a pretty low number of SBIR/STTR awards.

In 2019, I had the chance to hold a field hearing in Kansas City, Kansas, to focus on what we like to call the Silicon Prairie in the

technological entrepreneurship and innovation that is going there in the heartland. And these programs are essential in expanding and supporting the small businesses that we have got.

So I would like to start off with Ms. Todd. As an expert on bringing these federally funded R&D products to the marketplace, I am curious if you could talk to us a little bit about the programmatic changes that would have the most impact on the types of businesses that you have been supporting.

Ms. TODD. Sure. Thank you.

So in terms of commercialization, many of the agencies have adopted the Technical and Business Assistance Program, even in phase one. And I have seen here in Arkansas, it has been a great support for our companies as they are looking to expand on not just the research and development projects but also to put into place practices that would help them further down the road as they plan their marketing sale strategies for successfully commercialized products and services.

So I would say one thing that would help is to have all the resources needed to help all the agencies, even if they wanted to offer these TABA programs for awarded companies, so they can have those resources to be successful in commercialization.

Also, many of the agencies offer programs that are on Customer Discovery, the act four models. And I think that would be helpful for all the agencies to offer. It is a key piece of successful commercialization. They learn about the market need and limitations of current solutions. So this is a great way for awardees to be able to ensure that their final technology really aligns with what those needs are which typically changes over time as well.

Ms. DAVIDS. Yeah. Well, I appreciate that.

And Mr. Glover, you know, I kind of want to take you back on some of what you were bringing up earlier. I am curious if you could maybe, if you have some recommendations about ways to support businesses through phase three. You had mentioned that in your previous response. Just curious if you have some recommendations for us.

Mr. GLOVER. Well, one, getting a Phase III from the government is part of it, but getting Phase III from the private sector. We were challenged with the "Valley of Death." We may sometimes make the "Valley of Death" wider but we do not make it any shallower. And our venture capital, which had been the mainstay of American ingenuity for 40 years. It came shortly before the SBIR program really kicked in. It really has moved offshore and to later stage investments, so it is really tough. Creating a program to help there. Angel investors are there but they are not as busy as we think they should be. They are not making as many investments. So it really is a challenge. And what is scary is when you see other countries doing a better job of this than we do. So creating funds that will take technology to a next level, not necessarily SBIR funds because we want to keep that program that has worked so well pure but it is time for us to realize that we are at a competitive disadvantage and we need to create new activities. This is the only small business program for innovation out there. There should be more.

Ms. DAVIDS. I appreciate that.

Chairwoman VELÁZQUEZ. Thank you.

Ms. DAVIDS. Thank you. And I yield back, Madam Chair.

Chairwoman VELÁZQUEZ. The gentlelady yields back.

Now we recognize the gentleman from Pennsylvania, Mr. Meuser, for 5 minutes, who is the Ranking Member on the Subcommittee on Economic Growth, Tax, and Capital Access.

Mr. MEUSER. Thank you, Madam, Chair. Thank you to our witnesses. I appreciate your input and your information.

So Mr. Glover, in your testimony you say that the primary strength of the SBIR program is invest in early innovation well before venture capital firms and such. Yet, many companies receive the SBIR grant year after year. So is that common or is it usually they receive it for 1 year, maybe 2, but not 8 to 10 years in a row?

Mr. GLOVER. Well, when we look at the government's pattern of buying things what we see is that if you are a large company, we buy from them every year forever. If you are a large university like Johns Hopkins with \$2 billion a year of coming in, everybody accepts that. For small business, we need more small businesses at every level. Roughly 25 percent of all SBIR winners are brand new to the program and that has been true for the whole history of the program. The government actually buys SBIR research for technology for government purposes. So a big part, one of the core reasons the SBIR program was founded in the congressional mandate is to give the government research that it needs. So there are companies, yes, that do year after year and they do it because they are really good. It is a very competitive program. If they were not giving the government the research they wanted for their programmatic needs, they would not get follow-on awards. So you need the mix of all.

Mr. MEUSER. I can appreciate that. I can appreciate that. I have been a small businessperson for almost 25 years and I worked with thousands of small businesses over time, some doing business with the government, many with R&D budgets. I am not sure I know of any that have actually received this. And our role here is not to be critical but to provide oversight.

So when the companies do receive these investments, okay, the taxpayer dollar investments, do you review their EBIDTA at the end of the year? What sort of financial disclosures go into it? I mean, if a company, you invest \$200,000 and 2 years later their net earnings are \$10 million and their R&D budget is pretty substantial as well, does that perhaps disqualify them or does that make them more attractive because you are seeing a perceived return on investment?

Mr. GLOVER. The criteria to be eligible for the SBIR program is 500 employees. And if you are a very wealthy company and doing very well, that is okay. It is perfectly legal under the program and it happens.

Mr. MEUSER. But it is not necessary.

Mr. GLOVER. Many of our companies graduate. They get bigger. They get acquired by new companies. I have in the back of my testimony a list of 10 major DOD contractors that have acquired SBIR firms through the years, a list of the first them have acquired. One company I think has acquired 44 SBIR firms through the years.

Mr. MEUSER. Okay.

Mr. GLOVER. So it is a career ladder. If you try to only seed companies, you may get a few home runs. What we see in the program is—

Mr. MEUSER. Do you do a real ROI estimate annually on the taxpayer dollars that go in versus the company's growth?

Mr. GLOVER. We do audits certainly for defense. Now, grants, some agencies do grants and only grants for universities, for small business, and for everybody else. Those grants are a little softer audits. The DOD audits SBIR firms. DCAA is working on that. So they do look at it. But what they are auditing for is to make sure that there is no waste and fraud and that the money is properly spent. The return on investment is what we have seen, the economic impacts that it shows, and that is where you are getting 22 to 33 percent return on investment and the taxpayer is getting \$3 of taxes for every dollar they invest in the SBIR program at the National Cancer Institute and at DOD which is well over half the program.

Mr. MEUSER. Okay. Well, I had a couple of questions for Ms. Keady to see what her experience is but my time is about wrapped up. So Ms. Keady, I may send those questions over to you if you do not mind.

But I yield back, Madam Chair.

Chairwoman VELAZQUEZ. The gentleman yields back.

Now we recognize the gentleman from Maryland, Mr. Mfume, Chairman of the Subcommittee on Contracting and Infrastructure for 5 minutes.

Mr. MFUME. Madam Chair, thank you very much. And thank you for what clearly is a very important hearing to look at seed programs and other things that are available.

I would like to just, if I might, direct my question to Dr. Tung. I was going through your testimony, Doctor, and you mentioned that you had an 80 percent success rate with SBIR applications. And I do not know if this question may have been previously asked, but that just strikes me as an extraordinarily high number. And so I wanted, for the sake of better understanding, to get you to talk about what you think is directly attributable to that rate and can it be or is it being replicated. So I would like to know whether or not it is a matter of innovation, it is a matter of who the innovator is, or if it is a matter of the nature of the research so that I might better understand how we get up to and maintain, I guess, an 80 percent figure, success rate.

Ms. TUNG. So, you know, of course I cannot speak to the grant review Committees who are the ones who actually assess the grant applications. I can say that what we were told by our program officer was that the comments they had gotten back was that the quality of the science that we were doing was very high. It was like fairly unique and I think we also have a track record, to Mr. Glover's point, of actually executing on the things that we said that we did and really getting the results out there into the scientific community because it is a competitive process. So I think that if we had not continued to do that grant over grant, my guess is that we probably would not have continued to receive them.

Mr. MFUME. And Mr. Glover, may I go back to the line of questioning of the gentleman before me with respect to the average

number of years that a business can qualify and get funded with follow-up rewards? And I am assuming, this is only my assumption, that there is no limit to that, or is there?

Mr. GLOVER. There is no limit to that.

Mr. MFUME. Okay. Does anyone at your agency review their earnings before interest, taxes, depreciation, and amortization, to see whether or not these businesses are growing or not growing the way they should be?

Mr. GLOVER. The agencies have had economic impact studies done that do analysis of that and show how many follow-on research dollars are given, how many follow-on jobs are created. They have done a careful analysis of over half of all the SBIRs in the last 10 years. And so they look at all of that. They do detailed reports and provide those back to the public and to the agency and to Congress.

Mr. MFUME. But are they also looking at the EBIDTA of each one of those applicants that continue to get funded?

Mr. GLOVER. No. And quite frankly, I would urge you not to have that happen because that is more paperwork and more challenge. This is a program that is primarily driven by science. The science and innovation. And when we add different layers of review, it slows down the process. It makes the scientists take time away from doing the science and innovation and have to do paperwork. And one of the common complaints we have now is that there is already way too much paperwork involved in this process.

Mr. MFUME. I am sure the members of this Committee would argue with you that there is too much paperwork that we are involved in, but in order to assure taxpayers that there is not any waste, not any fraud, not any abuse, I think that additional work in that area is warranted. I think it is justified.

What I am really concerned about though is if I can get unlimited awards year after year because of my innovation, who I am as an innovator or the research or whatever, it seems to me that reduces the amount of money available for a larger pool of applicants who want to get funded but the money is not there because if it is 3 or 5 years, 6 or year 10, one particular business continues to get awards. Could you just kind of speak to that?

Mr. GLOVER. This is basically the only program that gives small business a clear window into the Federal R&D research funding. And you have got giant corporations, you know, who get hundreds of billions of dollars of Federal money. Small business needs this window open and it has worked very successful. Remember, one of the missions is to give the government research that it wants. Without this program, small business is virtually shut out of the Federal R&D research program. We need to open up more windows for small business.

Mr. MFUME. I understand. It just seems that without any cap on the number of years, Business A could get these awards for 15, 20 years, let's say, and there are a ton of other small businesses trying to get in because they have got clear needs for innovation and research but there is a finite number of dollars available today. And so if those dollars are eaten up because we do not try to get people in and graduate them out, it just seems to me that we are complicating the problem.

But I will yield back, Madam Chair. Thank you for the opportunity to ask questions.

Chairwoman VELAZQUEZ. Is he on? Mr. Garbarino, I think that you are muted.

Mr. GARBARINO. Thank you very much, Chairwoman.

I just have a quick question. This is a lot of good testimony, a lot of great answers so far about the SBIR program. But this is really for anybody on the panel.

I know Mr. Crow asked about standardizing the template or making things easier or standardizing some of the paperwork, but based on the experiences with SBIR, do any of you have any specific recommendations? And I know some of you touched on it a little bit in the testimony, about how to help improve the program to make it even better?

And anybody can just jump right in.

Ms. KEADY. I have one thing I would like to mention that has not been mentioned yet. There is a significant time gap between receiving a phase one and a phase two and that can be very challenging for a small company who is trying to keep their employees on the payroll. Sometimes it is 4 months, it could be 12 months or more gap, and so you want to continue the work but there is this challenge of how to overcome that as well.

Mr. GARBARINO. So you would say making it more of a standardized time? I mean, a 4 month to a year delay, that is a big gap. What would your recommendation be, just making it more standard or moving paperwork quicker?

Ms. KEADY. I have not thought about it in depth but some way to streamline the reviews of going from a phase one to phase two would be helpful. And we are also not guaranteed of getting a phase two so there is that uncertainty as well, although the phase twos have a higher success rate in general than the phase ones just because it is a smaller pool of applicants and they are already successful in having gotten the phase one. But that is something that if there was a way that that could be shortened that period of time for review and granting award would be shortened, that would be extremely helpful as well.

Mr. GARBARINO. I appreciate that.

Mr. GLOVER. If I may comment, last year's NDAA required DOD to at least standardize, simplify, and expedite a contract award. The GAO did a study a few years ago that shows it takes 2 years to get between phase one to phase two in many cases. There should be oversight on that making sure that, in fact, happens. There ought to be a standard contract for phase one, a standard contract for phase two, and a standard contract for phase three. And once a decision is made it should happen. And that delay is costing valuable time, especially with innovation happening so fast and having such a short half-life. We have got to do it quickly and the government is years behind in terms of that area. You hit a very sensitive area. I would be happy to talk to you more about that.

Mr. GARBARINO. I appreciate that. It seems like we get in our own way sometimes. So I think we should look into addressing that.

From the other witnesses, is there anything else you would like to add to that specifically or any other ideas that we should be looking at? If not, I yield back.

Chairwoman VELAZQUEZ. The gentleman yields back.

Now we recognize the gentleman from Minnesota, Mr. Phillips, Chairman of the Subcommittee on Oversight, Investigations, and Regulations for 5 minutes.

Mr. PHILLIPS. Thank you, Madam Chair. And greetings to our witnesses. Thank you for being with us.

I represent a district in Minnesota that is home to a number of the world's largest medical device firms, many of them founded and cultivated right in the Twin Cities and started in garages. And those are the great American success stories that we all love and wish to nurture more of. I, like many of my colleagues on this Committee are dismayed by the fact we seem to be falling behind other countries in the world.

My first question is on that subject to you, Mr. Glover. You had mentioned in your earlier comments that China and the EU have taken the SBIR model and made it "bigger and better." I would love for you to take a little time and share with our Committee how they have done so with some specifics so that we might be able to better understand how they have leveraged it and do better ourselves.

Mr. GLOVER. Well, they have steadily increased the percentage of their research dollars going to small business. And I footnote that because most frankly most people do not believe it but it is going on. A few years ago it was 16 percent. It is now up to 20 percent. So they are putting more money there. Now, quite frankly, Europe does not have the entrepreneurial spirit, the entrepreneurial drive that we have but they are putting more money into it. So the main thing is more money.

I highlighted the one Chinese institute because they did 18 universities in China get together with dozens of universities in America to take U.S. research, collaborate with them, often, and I suspect most times, the follow-on research and commercialization is done in China. But they have taken 150 products and gotten 108 of them into commercialization. Now, SBIR is 50 to 70 percent commercialization but there is \$600 million the Chinese Government has set up as an, in effect, venture fund to fund those technologies that they are basically taking from the United States and developing over there. So it is heartbreaking. To be honest with you, I mean, SBIR set out to be U.S. companies, U.S. ownership, and the work done in the United States. Much government research can be done elsewhere and seeing our technology go overseas is heartbreaking. It should not happen.

Mr. PHILLIPS. Right. I could not agree more.

Dr. Tung, I would like to ask you, too, about your testimony highlighting the importance of maintaining venture capital as a source of outside cash flow for companies that are trying to secure other forms of early stage capital. Can you elaborate a little bit on the complementary relationship that you see between VC and the SBIR program?

Ms. TUNG. Certainly. So I think for us, we have a model in which our research platform is based upon a consumer research co-

hort. About 80 percent of our customers consent to participate in research. It is those people participating in research that allows us to have this highly scalable platform. Now, the SBIR funding funded the research specifically, the collection of data, the analysis, the publication. However, the development of the actual online platform itself, all the design, all the product, all the engineering, all of that was funded by venture funding. So we could not have done what we did without the other part of the business having already been funded. So really, those two pieces had to exist together or we would not have been able to build what we did.

Mr. PHILLIPS. Okay, thank you. I appreciate.

With my remaining time, if any of you might chime in, I remember when I was a kid in elementary school, business day was perhaps one of my greatest forces to have to think about. Starting a little business, creating, generating revenues, identifying expenses, selling stock, and marketing. And I just wonder if you see opportunities in the United States to inspire younger generations still in school about the possibilities of entrepreneurship and innovation and are there any programs of which you are aware that we can go a little further upstream so that programs like SBIR and others will have an even wider universe to allocate resources to? Are you familiar with any programs trying to teach entrepreneurship to kids? Okay.

Ms. TUNG. Well, I actually do have one thing. This may sound facetious but I actually do mean it seriously. There is a TV show called Shark Tank in which people are allowed to bring their ideas in front of a set of investors. But it is not uncommon that you actually see very young people, teens and sometimes younger than that, who actually have been inspired by that show to bring their ideas into businesses. So I think that sort of thing, making it relevant and part of popular culture is I think inspiring for a large portion of the community.

Mr. PHILLIPS. And I agree.

All right, well, I am running out of time. I thank you all. I appreciate this conversation and your testimony. I yield back.

Chairwoman VELAZQUEZ. The gentleman yields back.

Now we recognize the gentlelady from California, Ms. Young Kim, Ranking Member of the Subcommittee on Innovation, Entrepreneurship, and Workforce Development.

Ms. YOUNG KIM. Thank you, Chairwoman. And I want to thank all the witnesses for being with us today to discuss these important programs. And thank you, Mr. Phillips, for asking the question, and for Ms. Tung answering it. Shark Tank is one of the programs I watch regularly, too.

Getting back to our discussion here, SBIR and STTR programs are critical tools for small businesses to reach, develop, and commercialize innovative technologies to create good paying jobs for increasing our competitiveness abroad.

China and other nations are making concerted efforts to bridge that innovation gap with the United States and put more resources to commercialize their own technologies. So we must not relent our country's position as the world leader on innovation and the development of new technologies.

So keeping that in mind, I am concerned the Biden administration has yet to appoint an associate administrator in the SBA's Office of Investment and Innovation. So I would like to pose this question for all the witnesses. Considering SBA's responsibilities under the programs, including agency coordination, policy guidance and data collection, how important do you think it is to have an associate administrator appointed as soon as possible? I know this could be a very simple yes or no question. Respond very quickly.

Mr. GLOVER. Yes. The Investment and Innovation Office should report directly to the administrator. Yes.

Ms. YOUNG KIM. Thank you.

Other witnesses, your answer, yes or no, how important is it to appoint an associate administrator right away? We need somebody to coordinate these important programs. You agree; right? Okay.

Well, let me go to the next question.

The Small Business Act requires the SBA to report annually to Congress on the SBIR and STTR programs but unfortunately, SBA compliance with this requirement has been an ongoing issue. So if we do not have the timely reports, it is difficult for Congress to legislate and improve the programs. So in your view, what can Congress do to ensure SBA's meeting the statutory reporting requirements?

Mr. GLOVER. We mentioned in our detailed recommendations in our testimony making the reports available as soon as the agency does and put them on their website. In the old days you had to filter them through. DOD, for example, the services have to send it to DOD which has to review it, which sends it to SBA which the SBA has to send it to OMB to review. So there is a built-in process. There is no reason all that information should not be put on the web immediately. And so make those reports in a much shorter timeframe but put it on their own website immediately.

Ms. YOUNG KIM. All right.

Do you currently, Mr. Glover, do you think that SBA has the online web portal that makes it easier for different agencies to put together their report, that way the SBA can put together an overall report to Congress in a timely manner?

Mr. GLOVER. The review process makes it untimely. So let's eliminate the review process. Put it on the web, be done with it, and move on. Right now, we have been working with DOE and we are looking at inside DOD data. DOE data, we are looking at things that they do not look at for years but were available—spending USA track down how many phase threes are being awarded. What is happening? We did not know that 2 years ago but SBA could do it as well.

Ms. YOUNG KIM. Thank you. I sense your frustration, sir. Thank you very much.

Let me direct my last question to Ms. Pat Keady. With our experience of being women entrepreneurs, can you offer any advice to other women entrepreneurs who would like to participate in the SBIR program?

Ms. KEADY. I appreciate that question. And one of the things that I wanted to mention is that there is a huge funding gap from venture capital or investors in general for women-owned businesses. That needs to change. I do not know if that is government's

responsibility but that definitely needs to change. We start out with a disadvantage. I do not know if it is a bias or whatnot but there is definitely a gap.

I think when I started my career in the '80s, there were very few women in aerosol science and now there are lines at the restroom at the conferences so I think we have made huge gains in terms of participation in STEM fields. I find that the field that I am in is very respectful of women. It is a very comfortable place to be. And so I feel that women should not hesitate. They just need to jump in.

Ms. YOUNG KIM. Thank you. I know my time is up, so thank you very much all the witnesses. I yield back.

Chairwoman VELÁZQUEZ. The gentlelady yields back.

Now we recognize the gentlelady from Illinois, Ms. Newman, for 5 minutes.

Ms. NEWMAN. Good morning, everyone, and thank you, Chairwoman Velázquez and Ranking Member. Great conversation this morning. Thank you to all our witnesses. Learned a lot and appreciate our entrepreneurs so much. Having been one I am thrilled to see progress like this.

And I will also just share a point with Ms. Keady. I agree. When I was an entrepreneur, I pitched my idea to over 60 VC firms and there was exactly one woman in the room. Exactly one across. And that probably meant about 150 people. So we need more women in entrepreneurial places but also in VC firms I will add, too.

Turning my attention to Mr. Glover, thank you so much for your comments today, sir. And really appreciate your recommendations.

So if I heard you correctly, it sounds like, and I agree with this because if you read the Wall Street Journal, it is clear that that is the case, but it sounds like over 80 percent of current funding goes to tech firms. Is that correct, sir, in the VC world and PE probably, too?

Mr. GLOVER. Eighty percent goes to telecommunications, the Internet, healthcare and Biotech. It is on my chart in the testimony.

Ms. NEWMAN. Okay, sure. So primarily tech? Can we agree on that?

Mr. GLOVER. Yes.

Ms. NEWMAN. Okay, good. And that is VC and PE funding probably, too, overall.

So knowing that, is there a possibility that you would be comfortable recommending and adding to your recommendations that we look at, on our side of the fence, meaning this government-based program, balancing that out a bit and prioritizing things like green technologies, green infrastructure, those in green building substrates, anything in the space in the 21st economy, green economy. Do you think that there is an opportunity to recommend maybe not fully prioritizing but adding some priority to green-based technologies as well as women and people of color owned organizations?

Mr. GLOVER. There has always been a reluctance for the Federal Government to pick winners and losers when that was pre-China and pre the rest of the world. When I look at the Beijing Institute of Collaborative Technology, their focused areas are robot-

ics, optoelectronics, structural and functional materials, energy technology, water treatment, and biomedical engineering. They are giving money in those areas so they are doing it, and the U.S., we have got to get back in the game. I am sorry. My answer 20 years ago was different. Today, they are doing it, we are not.

Ms. NEWMAN. Yes. And I agree 100 percent.

So I encourage you to put a little data behind that and suggest how we can prioritize a few areas. And certainly green technologies should be one of them but maybe it is robotics and others as well to reassert our competitiveness in the international community. Your initial comments, and I have certainly read it before, but startling. We have got to assert our competitiveness again. I think the best way to do it is to look at a 21st century economy and not look backward, which would include green technologies and renewables and robotics and other such things. So I encourage you to include that in your recommendations. And I appreciate your work on this. And I appreciate all our entrepreneurs today. And I yield back.

Ms. HOULAHAN. Thank you. The gentlewoman yields back.

The gentleman from Wisconsin, Mr. Scott Fitzgerald is now recognized for 5 minutes.

Mr. FITZGERALD. Thank you, Madam Chair. I know at this point there might be some redundancy, so let me apologize for that in the questions.

To Mr. Glover, you talked a little bit about streamlining or just fully eliminating specific parts of the process. But so without sacrificing and without putting into play waste, fraud, and abuse protections, the elimination of those, is there other things that, you know, the paperwork burden for small businesses, as we move forward in technology, we should be reviewing that on a regular basis and making changes. Is that right or is this something that most of these small businesses are able to keep up with on their own?

Mr. GLOVER. When the SBIR program first started, they limited the proposals to 25 pages. There were virtually no other rules or regulations. Now, the proposal and the solicitations that go out have 100 pages of rules, regulations, and procedures. It has gotten awfully complicated. Our guys do not like it. The small businesses, especially the new companies that come into the program have to spend a lot of time trying to understand it.

Having said that, they are willing to do it because that is the only way to do it. But should it be simpler? Should we have an automatic system? Yes. We need to go back to what was there when we first started. You have got an idea. We will give you 25K. You work hard on it. We will give you another quarter million dollars if you come back and it seems like it is working. So yes, the numbers are higher now because of inflation over time but yes, we need simpler.

Mr. FITZGERALD. That is great. That is helpful. Thank you very much. And I would yield back, Madam Chair.

Ms. HOULAHAN. The gentleman yields back.

The gentlewoman, Carolyn Bourdeaux from Georgia is now recognized for 5 minutes.

Ms. BOURDEAUX. Thank you very much.

Georgia is home to countless innovators and companies that are on the cutting edge of new technologies. Georgia Tech's Enterprise

Innovation Institute provides some critical expertise to businesses as they seek to bring technology and research-intensive products to market. And we have many small business incubators and accelerators that work closely with Georgia Tech on a variety of different projects.

However, any product that relies on research and development of innovative technology is likely to have significant concerns around protecting intellectual property developed for these projects.

So one question for Mr. Glover is how do small businesses go about protecting the IP that is developed through these SBIR and STTR projects?

Mr. GLOVER. One of the beauties of the SBIR program in the IP area is that they are given their rights to that technology. And the government cannot disclose that. There are some things that should be done to tighten that up because we run into battles and fights on the fringes but the SBIR data rights is an important provision in there that helps us in many cases. But you are right. In those cases where the government really wants it, they demand to have, you give away your rights or we will not give you the contract. And that happens often, even though it is in the law they cannot do that. But they still do that and they do that frequently. So data rights are critical.

Ms. BOURDEAUX. What would you recommend doing to tighten that up?

Mr. GLOVER. We will get back to you on that with some specifics. It is becoming more of a problem recently. The Army especially seems to be really tough on that data rights now. But some of the services are better than others but it is critical that you let small business keep their rights so they can go commercialize it. We know the government labs just do not do a real good job of commercializing. And small business, at least if they have got it you have got a chance.

Ms. BOURDEAUX. Thank you.

Do any of the other witnesses have any thoughts on this matter? Okay.

Moving on to another question. Ms. Keady, did you have something?

Ms. KEADY. I was just going to say that, again, as an entrepreneur, there is no free time in our lives. And so all of these things take time and effort. And IP is extremely important. We have patents pending right now. Again, it is helpful to have TABA money to help support some of that funding but that is just one more thing on our plate that we want to do right. And so any help we can get is much appreciated. Thank you.

Ms. BOURDEAUX. Got it. I appreciate it.

I just want to follow up on one other issue that came up earlier which was that after the venture capital phase launching to a larger business often proves very challenging. But I know that there are programs. There are tax credits. There are Federal programs out there to help move into that next sort of mid-sized business phase.

And I wanted to check with you, Mr. Glover. Do you have any thoughts about those kinds of programs and whether there is anything more we can do to enhance and help women-owned busi-

nesses, minority-owned businesses, but just businesses in general make that next leap?

Mr. GLOVER. The problem with R&D credits is that you have to have a profit to be able to use it. To be honest, our guys do not make profits for a long time. Sometimes never. And so those R&D credits really do not help you. And the R&D credit, if you could sell it or transfer it to somebody who has money and you get some cash for it, some of the states have programs like that that work.

But, look, we have done so little to help entrepreneurs in the innovation space. There is a whole bunch of things that we should have done and we certainly can do. And right now in the competitive world we are in, we need to rethink everything we are doing. We need to come up with brand new ideas knowing why are we still giving less than 10 percent of Federal R&D dollars to the most innovative sector of small business? Why is SBIR primarily the only program that really focuses on helping small business? It is outdated thinking. We are now in a situation where the world has passed us and that is happening over and over again and we have got to come up with new ideas and a new approach.

Ms. BOURDEAUX. Thank you very much. I agree.

I yield back the balance of my time.

Ms. HOULAHAN. The gentleman yields back.

The gentleman, Pete Stauber from Minnesota, is now recognized for 5 minutes.

Mr. STAUBER. Thank you, Madam Chair.

As with every government program, finding success is not always easy. When I first got to Congress, I assisted a small business obtain feedback from the Air Force regarding an SBIR application denial. They were never able to get a straight answer before my involvement but I was certainly happy to get things cleared up.

I think this leads me to a question that any of our panelists can feel free to answer. Do some agencies provide better feedback to their applicants than others? Or more generally, do you feel that certain agencies make it easier for participation than others? Any of the panelists.

Ms. KEADY. I just want to say in particular I am thinking about some of the NIH reviews. It is really a bit of a crap shoot as to who your reviewers are as to what kind of scoring or feedback you get. And so while I think it is really good to have outside experts reviewing these proposals, sometimes we get faulty information. I can say one time where we submitted a proposal, it was not quite in the pay line, and so we resubmitted addressing all of the reviewers' concerns and we got a worse score the next time. So that was a little bit frustrating.

Mr. STAUBER. To that point, tell me what we can do to eliminate that issue. What is your solution?

Ms. KEADY. That is a great question and I will have to think about that.

Mr. STAUBER. Okay.

Ms. KEADY. I do not have an innovative answer.

Mr. STAUBER. No, that is fine. It was not a trick question. Those are some things that are important for us to hear to be able to change the regulations or rules to have the ability to accommodate more so.

And then I also have the question, do you think standardization of paperwork requirements across agencies would help or increase population of small businesses and make them more likely to succeed? So the standardization of paperwork and maybe the vast majority of the process? And this is for any of the panelists.

Mr. GLOVER. It would definitely help. The challenge for new companies, to make a short, simple claim, you will get more people participating in the program and you will have them spend more time on the science and less time on the paperwork. So the more you can standardize and simplify everything in the SBIR process, go back to the way it was early on, you are right. Yes. It is critical. It would be very helpful.

Mr. STAUBER. Okay. Any other panelists?

Ms. KEADY. Again, I am going to bring up a challenge, not necessarily a solution, but I think the success in winning grants is very much in a person's ability, or a team's ability to tell a good story. And so there is a certain amount of skill in just writing the grants. And this does not necessarily, you know, what about the company who has a great idea but is not as skilled at writing or telling the story? I would hope that there is a way for those companies to also get to participate.

Mr. STAUBER. That is an excellent point. We are seeing some of the bigger companies hire grant writers and people that specialize in that which would give them obviously a better opportunity, and we are looking for that small business who may not have the capital to hire an individual like that. So that is a great point and we cannot forget that. These grants, we have to really have them open and available for our small businesses. Thank you for bringing that up.

Thank you to all the witnesses. And Madam Chair, I yield back.

Ms. HOULAHAN. The gentleman yields back.

And I now recognize myself for 5 minutes.

My community is just outside of the city of Philadelphia. I, as well, am an entrepreneur with a technical background.

And my first question is for Ms. Keady. With your testimony, and actually also with many of the other folks' testimony, you have spoken about hiring an outside investor to help with the cost of commercialization for your business. In your experience, does the SBA offer resources for business owners who seek commercialization? Did the SBA offer your business any assistance on how to ensure commercialization on your aerosol devices?

Ms. KEADY. I know that NIH and NSF have had programs where they have a meet the investor kind of thing. But again, you know, it takes time to write the executive summaries, the pitch deck, to create the videos. And we have had no real strong connections. It is helpful in just honing our message and thinking about what we would want to say to an investor. So I know they are trying.

One of the things that we have found, and maybe it is our industry, is that investors do not necessarily value grants. What they want is traction in the market. And so it is that getting to market and having real customers and having real success is what attracts investors. Just having grants, you know, yay, good for us, but it is not the magic bullet for getting an investor.

Ms. HOULAHAN. Yeah. And if I could follow up on that, largely what my role has been in all the entrepreneurial ventures that I have participated in has been the operator, the person who does operationalize the idea. And so I do recognize how important it is. And in fact, that is why I introduced a bill with Mr. Balderson, Rhett Balderson, and it is called the RAMP for Innovators Act. And it takes exactly about all of the things that we have been talking about this time around. Whether it is help with commercialization, whether it is help with IP and patents, it is those things that are the things that bog us down as entrepreneurs, that make us struggle with the next level of investment.

And so I would love if I could ask you guys to share your experience. What worked and what did not? What would you share in terms of legislative ways to ensure that the SBIR and STTR investments are leading to commercially-viable products or services and that next level of investment?

So if I could, I would turn that back to you, Ms. Keady, and then to anybody else who might have input in that.

Ms. KEADY. Well, I would have to say that we are early in our journey in seeking an investor. And so I do not have a success story yet. But I am very interested in learning what other people have done.

Ms. HOULAHAN. Could I ask Dr. Tung if she might be able to give us some ideas of what has worked and what has not worked in the commercialization area and how we could be more helpful here in this body?

Ms. TUNG. I think for us, to some of the comments earlier, biomedical research takes a long time. A lot of these grants have a term of like a year, year and a half, and it is very easy for a research project to last 3, 5 years. And so that is one of the reasons why you do have to kind of look at trying to get grant funding over a long period of time. And I think that was critical. It took us a long time and a lot of proof of concept of what we were doing was high quality before we got to a point where there were outside groups who were willing to either pay us for our services or our products or invest in that part of the business.

Ms. HOULAHAN. And Ms. Todd, do you have anything that you would like to contribute here?

Ms. TODD. I would just say as a support organization for these innovative small businesses, we always encourage scientists to be able to articulate the value proposition of what they are bringing to the marketplace as early as possible rather than focusing so much on the technical aspects that maybe they are naturally more comfortable with. So we definitely help them to think through those processes, through our consulting services. Also, as part of that we have market research that allows us to dig pretty deep into potential in terms of long-term market potential, what the competition is looking like, demographics of their customers. I think all that feeds into helping them tell a good story about the commercialization opportunity when they fill out these applications.

Ms. HOULAHAN. I only have 15 seconds and I appreciate all of your time. I guess my struggle is it is not about just the story; it is actually about the execution on the story and actually operationalizing things and actually getting patents and IP pro-

tected our hard processes. And that is indeed what the RAMP Act that we are trying to push forward is addressing.

I appreciate your time and I yield back.

And I think I am supposed to be recognizing Mr. Schneider. And so the gentleman from Illinois, Mr. Schneider, is now recognized for 5 minutes.

Mr. SCHNEIDER. Thank you, Madam Chair. And I want to thank the witnesses for sharing your perspectives today on this critically important issue.

Small businesses are the engine of our economy. As you said a moment ago, Mr. Glover, they are what drive innovation in our economy and it is critical that we support them. And that is why having this hearing is so important.

While the programs we talked about today have always been critical, they have special significance as we focus on the economic recovery post COVID-19. This has undoubtedly been a difficult year for small businesses and for all Americans. With vaccines being distributed throughout the country and restrictions being lifted, it is time to look towards the future. Small business innovation will be a key driver of economic recovery as we seek to tackle new economic challenges, get people back into the workforce, and adapt to the changes brought on by the crisis.

I have heard from businesses all over my district about the lengths they have gone to just to stay afloat. These programs are instrumental in giving small businesses necessary R&D capital to innovate which they often lack prior to the pandemic but which for many is totally out of reach now. Knowing how important SBIR and STTR, I have advocated in the past for allowing firms more flexibility in spending and for continued funding of these programs.

Ms. Keady, you talked about your recent experience as a business owner, developing new technology using SBIR/STTR funds and the limitations in using funds to launch the program. Can you talk more about what you could do with a more flexible spending structure, as well as how challenging the road to profitability was under the current restrictions?

Ms. KEADY. Well, we were in the fortunate position of having a product, albeit in a prototype stage, but having a product that was immediately useful for addressing the COVID pandemic for researchers in trying to determine whether or not the virus was airborne transmitted. And so we benefitted this past year in selling to researchers. So for us the challenge in terms of flexibility of spending is the SBIR programs by and large just fund R&D. And so I think for us, having more flexibility, and especially some of the phase one grants having higher overhead rates so that we could hire help to do some of these other things. As entrepreneurs, we end up doing everything ourselves most of the time because we just do not have the staff. And so having more flexibility in how the money is spent would be helpful.

Mr. SCHNEIDER. Great. Thank you.

I do not know if any of the other witnesses want to share your perspective on that?

With the time that is left, and maybe I will start with Mr. Glover, from experience, if you were to pick one, two, maybe three things that we can do to have the biggest impact as we begin this

recovery and get to the other side of the pandemic, what would you have us do?

Mr. GLOVER. I think I would first set a goal for small business R&D of the Federal R&D dollars. We are spending a lot of our R&D dollars and have historically with other institutions, large firms, labs, and universities, and small business is the innovator and we send such a small share there. SBIR is primarily the majority of that money. So that would be the first thing.

I think when we talk about paperwork, we could set a rate of return for small business of say 15 percent. We go in and fight on what the profit level is going to be on contracts and that wastes time, 7, 8, 9 percent. But the regs say you can go up to 15. Just automatically set that at 15. Eliminate some paperwork there. I think that governing the SBIR program would mean twice as many companies would be able to participate and fund their technology and make it move forward.

I think the STTR program, the universities are challenged. Seventy percent of their technology is licensed to small business. Less than 1 percent does over a million bucks. STTR should work. Make the STTR program as big as the SBIR program so that you get universities and have the labs participate and have a path to get their technology out of the universities, out of the laboratories. Team them up with a small business with a business plan that goes forward.

I think those things would all be helpful. I am quite frankly concerned with the elimination of capital gains. Taxes will remove an incentive for entrepreneurship. I would focus it just on small business, just on businesses in commerce, but capital gains for small business, especially technology businesses should stay.

So those are some things off the top of my head that would be meaningful.

Mr. SCHNEEIDER. I have gone over my time. Thank you. I am sorry I could not get to the other witnesses. But to everybody, thank you for sharing your time today. I very much appreciate it. I yield back.

Ms. HOULAHAN. The gentleman's time is expired and the gentleman yields back.

Thank you again to our witnesses for joining us today. Your testimony is proof positive of what small businesses can create when they receive investment and support. Our country has a long way to go when it comes to reclaiming our title as the world's most innovative Nation. We must examine the programs that have driven innovation in the past and work to empower them. The SBIR and STTR program has decades of demonstrated positive return on investment and funding of groundbreaking technology.

And if there is no further business to come before the Committee, we are adjourned.

[Whereupon, at 12:56 p.m., the Committee was adjourned.]

APPENDIX



Joyce Y. Tung, PhD
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**Testimony Before The
Committee on Small Business
U.S. House of Representatives**

**Joyce Tung, Ph.D.
Vice President Research
23andMe, Inc.**

May 13, 2021

Chairwoman Velázquez, Ranking Member Luetkemeyer, and other members of the Committee:

Thank you very much for the opportunity to share our experience with the Small Business Innovation Research (SBIR) program with you as you consider the reauthorization of the program. 23andMe benefited greatly from this investment in research, and we are pleased to express our support for the continuation of this important program.

Background on 23andMe

23andMe is a leading consumer genetics and research company. Founded in 2006, based exclusively in the United States with offices in California and testing performed in a laboratory in North Carolina, the company's mission is to help people access, understand, and benefit from the human genome. 23andMe has pioneered direct access to genetic information as the only company with multiple FDA clearances for over-the-counter testing ("OTC") for carrier testing and genetic health reports, and has created the world's largest crowdsourced platform for genetic research, with 80 percent of its customers electing to participate. This research platform has generated more than 180 publications on the genetic underpinnings of a wide range of diseases, conditions, and traits. The platform also powers the 23andMe Therapeutics group, currently pursuing drug discovery programs rooted in human genetics across a spectrum of disease areas, including oncology, respiratory, and cardiovascular diseases, in addition to other therapeutic areas.

History of 23andMe's Participation in the SBIR Program

Over approximately eight years (2010-2017), 23andMe applied for ten SBIR grants and received eight (Table 1). When we first began applying for SBIR grants, 23andMe was a small company: in 2010, the year of our first grant application, we had fewer than 50 employees and minimal revenue from our

direct-to-consumer genetics product. In addition to selling a consumer product, the business also had a goal to accelerate scientific discovery by developing a highly scalable consumer-centric research platform. A significant amount of investment was required in order to develop the infrastructure, breadth, and size needed to make this platform scientifically valuable asset. Because we were a small business and because our mission to help people benefit from the human genome aligned with the mission of the National Institutes of Health's (NIH) mission to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability, we felt the SBIR program could be an appropriate mechanism to fund some of the development of the consumer-centric research platform.

Table 1. SBIR applications submitted by 23andMe

| Year Applied | Grant Title | PI | Awarded (Y/N) | Amount | Year Closed |
|--------------|--|-------------------------------------|---------------|-------------|-------------|
| 2010 | Web-based Phenotyping for Genome Wide Association Studies of Drug Response | JOANNA L MOUNTAIN | Y | \$189,844 | 2012 |
| 2011 | Web-based studies of the genetics of Parkinson's disease | NICHOLAS ERIKSSON | N | N/A | N/A |
| 2012 | Development of DNA Sequence Data-Quality Metrics for Personal Genomics | BRIAN T NAUGHTON | Y | \$197,398 | 2013 |
| 2012 | Development of a web-based database and research engine for genetic discovery | NICHOLAS ERIKSSON | Y | \$232,602 | 2014 |
| 2012 | Genetics of Allergic Disease in a Participatory Research Cohort | DAVID A HINDS | Y | \$143,253 | 2014 |
| 2013 | Development of a web-based database and research engine for genetic discovery (Phase 2) | NICHOLAS ERIKSSON → JOANNA MOUNTAIN | Y | \$1,367,504 | 2015 |
| 2014 | A new reference panel to boost African American genotype imputation | ADAM AUTON | Y | \$1,758,557 | 2018 |
| 2015 | Estimating disease risk using genetic data | NICHOLAS A FURLOTTE | Y | \$241,905 | 2019 |
| 2016 | Admixture-driven discovery of disease-associated genetic variants not found in Europeans | KATARZYNA BRYC | Y | \$260,360 | 2018 |
| 2017 | Fast track SBIR for Latino Sequencing project | ROBERT GENTLEMAN | N | N/A | N/A |

Benefits

Reflecting back on our participation in the SBIR program, we believe we saw four main benefits to being a grant recipient:

1. Establishment of scientific credibility
2. Development of a commercially viable research platform
3. Contribution to the scientific community
4. Development of the next generation of scientific leaders

More details on each of these benefits are provided below.

Establishment of scientific credibility

One of the major challenges that our research program faced initially was significant skepticism from the scientific community about our ability to produce high quality research. Thus, an initial focus of our SBIR-funded work was to publish in peer-reviewed scientific journals and present at scientific conferences, which are the primary currency of credibility amongst scientists. In total, the work funded by our SBIR grants produced at least 32 scientific presentations and publications, many of which were in collaboration with academic researchers (Table 2). We believe this body of work substantially improved our scientific reputation. For example, in 2012, a group of academic researchers rejected our participation in a collaboration on asthma; in contrast, today we receive approximately one hundred requests for collaboration from academic researchers each year and have collaborated with many of the major pharmaceutical companies as well.

Development of a commercially viable research platform

As mentioned above, the work we were able to conduct with SBIR funding helped us establish a strong scientific reputation. This was critical to developing a research platform that could contribute meaningfully to the business. By 2014, paid research collaborations with industry made an important contribution to the company's revenue. The growth and development of the research platform also enabled the establishment in 2015 of a 23andMe Therapeutics group whose drug discovery program is rooted in human genetics insights from the 23andMe research program.

Contribution to the scientific community

As mentioned above, one of the reasons we sought funding by the SBIR mechanism was because our mission to help people benefit from the human genome was well aligned with the mission of the NIH. As shown in Table 2, the work funded by our SBIR grants directly contributed to at least 32 scientific papers and presentations, and shared genetic insights on conditions ranging from stretch marks, to asthma and allergy, to Parkinson's disease. More than half of those publications were written in collaboration

with academic researchers, at no cost to them, and the underlying statistics have been shared with a broader set of researchers upon request.

We have also used SBIR funding to chip away at the large gap in diversity in genetics research. The vast majority of genetic research has been performed with participants of European descent which limits the benefits of that research (Figure 1). As part of our grant, "A new reference panel to boost African American genotype imputation", we generated whole genome sequence data from more than 2,300 of our African American research participants and, with their consent, deposited those data into a protected NIH data repository for use by other researchers. This expands the diversity of the toolkit that is available to researchers. We believe that we have an important obligation to be a contributing member of the scientific community and moreover, our research participants, who are also our customers, [want us to make a contribution to society](#). The SBIR program has helped us make good on that obligation.

Table 2. Scientific publications and presentations stemming from 23andMe research funded by SBIR grants.

| |
|---|
| Mountain et al., "Web-based phenotyping yields replication of genetic associations with sensitivity to warfarin" (Abstract #626). Presented at the Annual Meeting of The American Society of Human Genetics, 2012 Nov, San Francisco, California. |
| Barnholt et al., "Web-based phenotyping for pharmacogenomics research" (Abstract #1391). Presented at the Annual Meeting of The American Society of Human Genetics, 2011 Oct, Montreal, Canada. |
| Durand et al., "Reducing pervasive false positive identical-by-descent segments detected by large-scale pedigree analysis". Mol Biol Evol. 2014 Apr 30. |
| Kiefer et al., "Genome-wide analysis points to roles for extracellular matrix remodeling, the visual cycle, and neuronal development in myopia". PLoS Genet. 2013;9(2):e1003299. |
| Tung et al., "Genome-Wide Association Analysis Implicates Elastic Microfibrils in the Development of Nonsyndromic Striae Distensae". Journal of Investigative Dermatology (2013) 133, 2628–2631. |
| Shmygelska et al., "Genome-wide association analysis identifies novel associations in uterine fibroids". Presented at the Annual Meeting of The American Society of Human Genetics, 2013 Oct, Boston, Massachusetts. |
| Tian et al., "GWAS Identifies Classical HLA Alleles Associated with Susceptibility to Infectious Diseases". Presented at the Annual Meeting of The American Society of Human Genetics, 2013 Oct, Boston, Massachusetts. |
| Hinds et al., "A Large Scale Genome Wide Association Study of Asthma in the 23andMe Cohort". Presented at the Annual Meeting of The American Society of Human Genetics, 2013 Oct, Boston, Massachusetts. |
| Tung et al. "Genome-wide association analysis of diverse immune-related phenotypes highlights complex overlapping pathways of immune response". Presented at the Annual Meeting of The American Society of Human Genetics, 2013 Oct, Boston, Massachusetts. |
| Eriksson et al., "Using correlated phenotypes to functionally classify GWAS loci". Presented at the Annual Meeting of The American Society of Human Genetics, 2013 Oct, Boston, Massachusetts. |
| Hinds et al. "A genome-wide association meta-analysis of self-reported allergy identifies shared and allergy-specific susceptibility loci". Nature Genetics volume 45, pages 907–911(2013). |

| |
|---|
| Revez et al., "A new regulatory variant in the interleukin-6 receptor gene associates with asthma risk " Genes and Immunity, 15 Aug 2013, 14(7) 441-446 |
| Ferreira et al. "Genome-wide association analysis identifies 11 risk variants associated with the asthma with hay fever phenotype". The Journal of Allergy and Clinical Immunology" 2014 Jan. |
| Campbell et al , "Escape from crossover interference increases with maternal age" Nat Commun. 2015 Feb 19. |
| Chang et al., "Assessment of the Genetic Basis of Rosacea by Genome-Wide Association Study". J Invest Dermatol. 2015 March 12. |
| Day et al., "Shared genetic aetiology of puberty timing between sexes and with health-related outcomes" Nat Commun. 2015 Nov 9. |
| Day et al., "Causal mechanisms and balancing selection inferred from genetic associations with polycystic ovary syndrome". Nat Commun. 2015 Sep 29 |
| Dorsey et al , "Virtual research visits and direct-to-consumer genetic testing in Parkinson's disease" Digital Health. 2015 Jun 29. |
| Ferrera et al., "Genome-wide association analysis identifies 11 risk variants associated with the asthma with hay fever phenotype". J Allergy Clin Immunol. 2013 Dec 30 |
| Fuchsberger et al., "Minimac2: Faster genotype imputation". Bioinformatics. 2014 Oct 22. |
| Gharahkhani et al., "Chronic gastroesophageal reflux disease shares genetic background with esophageal adenocarcinoma and Barrett's esophagus" Hum Mol Genet. 2016 Feb 15 |
| Hromatka et al., "Genetic variants associated with motion sickness point to roles for inner ear development, neurological processes and glucose homeostasis". Hum Mol Genet. 2015 Jan 26. |
| Hu et al., "GWAS of 89,283 individuals identifies genetic variants associated with self-reporting of being a morning person". Nat Commun 2016 Feb 2. |
| Jorgenson et al. "A genome-wide association study identifies four novel susceptibility loci underlying inguinal hernia." Nat Commun. 2015 Dec 21. |
| Lubke et al., "Gradient Boosting as a SNP Filter: an Evaluation Using Simulated and Hair Morphology Data". J Data Mining Genomics Proteomics. 2013 Oct 20,4 |
| Lunetta et al., "Rare coding variants and X-linked loci associated with age at menarche". Nat Commun. 2015 Aug 4 |
| Minikel et al., "Quantifying prion disease penetrance using large population control cohorts" Sci Transl Med 2016 Jan 20. |
| Nalls et al., "Diagnosis of Parkinson's disease on the basis of clinical and genetic classification: a population based modelling study". Lancet Neurol. Epub 2015 Aug 10. |
| Nalls et al , "Large-scale meta-analysis of genome-wide association data identifies six new risk loci for Parkinson's disease". Nat Genet 2014 Jul 27 |
| Paternoster et al., "Multi-ancestry genome-wide association study of 21,000 cases and 95,000 controls identifies new risk loci for atopic dermatitis". Nat Genet. Epub 2015 Oct 19 |
| Rietveld et al., "Replicability and Robustness of Genome-Wide Association Studies for Behavioral Traits". Psychol Sci. 2014 Oct 6 |
| Zheng et al., "Whole-genome sequencing identifies EN1 as a determinant of bone density and fracture". Nature. Epub 2015 Sept 14. |

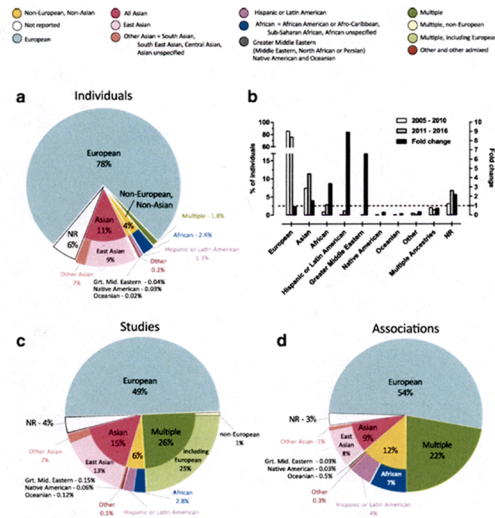


Figure 1. Ancestry category distribution in the GWAS Catalog (this is Figure 2 from Morales, J., Welter, D., Bowler, E.H. et al. A standardized framework for representation of ancestry data in genomics studies, with application to the NHGRI-EBI GWAS Catalog. *Genome Biol* 19, 21 (2018). <https://doi.org/10.1186/s13059-018-1396-2>).

Development of the next generation of scientific leaders

A final benefit that might be less obvious - the value of SBIR grants in the development of scientists themselves - should not be overlooked. Many of the principal investigators on our grants were first time recipients of NIH grants. The exercise of applying for and executing a grant builds very useful skills for the investigator, which benefits not only the individual herself (a grant is a very positive line item on a CV), but also the company by developing a highly trained workforce. While most NIH-administered grants focus on funding academic research, an increasing amount of research is conducted in industry, and investing in those scientists will pay off in greater innovation and discovery. As Vannevar Bush said in his report to President Franklin D. Roosevelt, *Science - The Endless Frontier*, "The responsibility for the creation of new scientific knowledge — and for most of its application — rests on that small body of men and women who understand the fundamental laws of nature and are skilled in the techniques of scientific research. We

shall have rapid or slow advance on any scientific frontier depending on the number of highly qualified and trained scientists exploring it."

Challenges

We were very fortunate in having a high success rate with our SBIR applications (80% success rate; the [overall success rate for SBIR applications in 2020](#) was 15.9%). Despite our success, the main challenge we encountered was the administrative overhead of running the grant. Specifically, one of the most challenging aspects of executing on the grant was adequately meeting the accounting requirements. Unlike academic research institutions, most small businesses do not have a formal grants office to help manage all the paperwork and navigate the funding guidelines. Moreover, the accounting system requirements, which include time-tracking on an hourly basis, audit preparation, and setting up an accounting infrastructure, can be extremely intimidating to scientists who have little to no training in this kind of work. There are eight tutorials alone for the accounting system on the SBIR website (<https://www.sbir.gov/tutorials/accounting-finance/>). The first tutorial itself states, "Many SBIR/STTR applicants underestimate the importance or difficulty of the cost proposal portion of their Phase I or II submission. Errors made here usually result in financial losses to the applicant, and reductions in the SBIR/STTR award amount, both of which are detrimental."

We were lucky enough to have a colleague in our Finance department with audit experience who was able to wade through all the requirements and help us set up a system for time-tracking that was audit-ready. Even so, the team spent multiple hours every week recording time, moving time-tracking reports back and forth for signature, following up on people who hadn't submitted reports, etc. Our impression is that NIH grants for academic investigators do not have this degree of administrative overhead.

Another challenge was the size limit to the awards. Some of the large-scale types of projects we considered involved generating genetic information on large cohorts and would not fit into the dollar limit. In particular, given the costs of setting up an accounting program for time-tracking and audits, we eventually realized that smaller grants (in the low hundreds of thousands) would only be worth applying for if we already had a grant management system actively running.

Recommendations

Based on our experience with the SBIR program, we have three recommendations:

1. Reduce administrative overhead (e.g., time-tracking)
2. Consider increasing the maximum award
3. Maintain participation from venture-backed companies

Reduce administrative overhead

Time-tracking and setting up and maintaining an accounting system was by far the most difficult and costly part of accepting an SBIR award. This certainly impacted our grant strategy and motivation to apply for grants. While we understand the desire to ensure that taxpayer money is being used responsibly, we suspect many small businesses with good ideas look at these requirements and give up before they even get started. In addition, the time our scientists spent on paperwork and accounting was time they were not spending on science. We believe there is likely a better balance between accounting for how grant dollars are spent and having scientists focus on the science.

Consider increasing the maximum award

As described above, the size limit to the awards did influence the ambitiousness of the projects we tried to pursue through the SBIR program. Given the costs of setting themselves up to administer an SBIR award, some small businesses might be more motivated to apply for the program if the potential reward were greater.

Maintain participation from venture-backed companies

As described above, the development of our consumer-centric research cohort and platform, which is unique in its scale and breadth, was supported in part by the SBIR grants we received. This cohort and platform now plays a central part in our business (see slide 15 of the [23andMe investor presentation](#)). In the early days, however, there was skepticism about our ability to build a high quality research program in this way, and most investors were interested in the development of the consumer product rather than the research platform. Without SBIR support, it would have been more difficult for us to build our program at the pace that we did. In addition, the venture-backed development of the consumer business provided some resources that allowed us to execute on the grants successfully (e.g., finance and accounting, product and engineering). Two of the goals of the SBIR program are to stimulate technological innovation and to increase private-sector commercialization of innovations derived from federal research and development funding. For this, we see venture funding and SBIR funding as complementary resources to drive higher risk, higher reward technological innovation and commercialization.

Closing

SBIR grants supported our scientific innovation at a time when we lacked the track record and credibility to get significant funding from other sources for our research. This additional source of funding helped us bridge to a stage in which we were able to demonstrate our capabilities and potential, and thus acquire paid research partnerships, develop a therapeutics business, support the broader scientific community through published research, and even contribute a small part to closing the diversity gap in genetics research. We believe supporting research in industry, particularly in small startups, will play an increasingly important role in innovation and that the SBIR program can play a critical role in nurturing that innovation. Though we are now too large to be eligible for the SBIR program, we are happy to add our vote of support to its reauthorization.



May 13, 2021

RE: Congressional Committee on Small Business, hearing titled "Overview of the Small Business Innovation Research and Small Business Technology Transfer Programs".
Written Testimony by Pat Keady.

I would like to thank Chairwoman Nydia Velázquez, Ranking Member Blaine Luetkemeyer and the entire Committee on Small Business for inviting me to testify.

My name is Pat Keady. I am CEO and President of Aerosol Devices Inc, a small-women-owned business incorporated in 2014 in the State of Colorado. We develop advanced sampling and measurement instruments sold primarily to scientists studying the chemical and biological properties of airborne particles. Our method of gently collecting aerosolized viruses, including SARS-CoV-2, is considered by leading scientists to be the best approach for determining whether airborne virus is present as well as the infectivity, or viability of such viruses. In 2020 our collector technology was used in one of the key studies, referred to by the New York Times as "A Smoking Gun" (Mandavilli, <https://www.nytimes.com/2020/08/11/health/coronavirus-aerosols-indoors.html>), demonstrating that viable aerosolized SARS-CoV-2 was confirmed in a hospital room with COVID-19 patients. This study and our technology likely saved lives due to the profound implications on the debate about masking during the pandemic.

In 2020 we had revenue of \$2.17M, approximately half in product sales and half in grants. We have 11 employees including 9 with science or engineering degrees. We have been named by BizWest magazine as one of the 50 fastest growing private businesses in Northern Colorado two years in a row, ranking #1 in our size class in 2019.

Most people recognize that starting a company is no easy task and often requires significant financial resources. This is especially true when developing a physical product that requires design, prototypes, testing, patents, regulatory approvals, tooling and inventory. Having a good idea for a product that customers will buy is essential but is certainly not sufficient for achieving economic success. We are no exception.

Ninety-six percent of the startup funding for our company came from the personal assets of the two co-founders, including myself. Our startup capital totaled \$587K. This amount covered the commercial development of our first product, but was insufficient for product refinement, global marketing or continuing new product research and development. This is the point in our company history where the SBIR/STTR program came in with necessary and greatly appreciated financial assistance. Without this support I am not sure the business could have survived.

Aerosol Devices Inc.
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Email: info@aerosoldevices.com Phone: +1 (970) 744-3244

Since our first NSF STTR Phase I grant was awarded in 2017, we have been awarded six Phase I, three Phase II, and two subawards for a total of \$4.68M. Nearly half of our grants were awarded in just the past 12 months to address the COVID pandemic threat, and to provide early warning of a bioterrorist attack. With an NSF grant awarded one year ago, we fast-tracked development of a compact, easy-to-use virus sampler targeted for use in medical facilities, schools, nursing homes, offices – all industries that are particularly vulnerable to COVID transmission. The product was launched into the market last week. The COVID-focused developments for environmental samplers, direct-read monitors and breathalyzers can also be used for measurement of other respiratory pathogens such as seasonal influenza and tuberculosis. Our grant funding has come from five different Federal agencies demonstrating the versatility that our platform technology has for addressing a wide variety of industry and societal needs. These agencies include National Science Foundation, Department of Energy, National Institutes of Health, Department of Defense/Defense Logistics Agency and Department of Homeland Security. Of the \$4.68M that has been awarded, just \$2.23M has been spent as of March 31, with \$2.45M remaining. Approximately half of the funding is a pass through to our university and industry collaborators. We have partnered with five public universities and three companies, two of which are also small private businesses. The university collaborations support graduate students and help to build our nation's intellectual capital. Other products at least partially funded by the grants include three patent applications, two PhD theses, three refereed publications and dozens of conference and seminar presentations, with many more to come.

Our primary interest lies in developing commercial products, not simply doing cool research projects. We look forward to the day when we can fund our own internal research and development without government support. Writing grant proposals and the reporting requirements in managing the projects is a considerable effort for a small company. A weakness in the SBIR/STTR model is that there is no true funding to launch a product -- what is called "commercialization". Because of this shortfall we are actively seeking an outside investor. Bringing on an investor has its own set of complications and is not the right path for all businesses. Until we reach that critical revenue milestone where we can fully self-fund, we are grateful for the financial assistance of the SBIR/STTR programs. As a primary employer, our goal is to offer an increasing number of good-paying jobs and sell quality products to customers around the world. We aim to provide an exceptional return on the taxpayer investment.

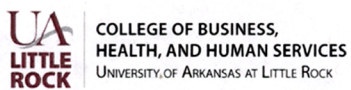
The SBIR/STTR grants have been a lifeline for our small early-stage company. I strongly encourage Congress to continue and strengthen this vital program that provides essential funding for America's entrepreneurs and helps de-risk technology for potential investors. Thank you. I look forward to your questions.



Testimony
of
Rebecca Todd
Innovation Specialist

May 13, 2021
Committee on Small Business
US House of Representatives

Overview of the Small Business Innovation Research and Small
Business Technology Transfer Programs



Chairwoman Velazquez, Ranking Member Luetkemeyer, Members of the Committee

Thank you for inviting me to testify today on behalf of Arkansas Small Business and Technology Development Center (ASBTDC). I am the Innovation Specialist for the ASBTDC and serve as the Project Director for the FAST grant where I lead accelerators, instruct training events, conduct outreach, and provide consulting assistance to small firms seeking funding through the Small Business Innovation Research and Small Business Technology Transfer Programs (SBIR/STTR).

The Arkansas Small Business and Technology Development Center (ASBTDC) helps Arkansans start, run, and grow businesses. Headquartered at the University of Arkansas at Little Rock (UA Little Rock), ASBTDC is funded by nine (soon to be 11) Arkansas public institutions of higher education and the U.S. Small Business Administration. ASBTDC provides a range of no-cost services, including one-on-one, confidential consulting and affordable or no-cost training events on a variety of topics. We assist clients with every aspect of business creation, management, and operation.

Established in 1980, the ASBTDC is an accredited member of the America's SBDC national network. Technology accreditation was received in 2007, and the program was reaccredited without condition in 2017.

As the state's premier business assistance provider, ASBTDC is dedicated to helping small businesses achieve success and to promoting economic development throughout the state. Unique among Arkansas economic development organizations, ASBTDC serves businesses from any county in Arkansas, in any industry sector, at any stage of business development. Our team of experts works with all types of for-profit businesses, from home-based to high-tech. According to the most recent economic impact study, ASBTDC clients generated a return on investment of \$12.82 for every dollar invested in the ASBTDC program.

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ASBTDC SBIR/STTR Assistance

ASBTDC assists innovation-based startup companies with exploring and responding to SBIR/STTR funding opportunities. The Small Business Innovation Research and Small Business Technology Transfer programs provide very early stage, non-dilutive federal funding that is often critical to ready a technology for private investment and commercialization. ASBTDC guides research-capable startups through the application process, reviews proposals, and provides supporting market research to help Arkansas companies win SBIR/STTR grants and contracts. In 2020, ASBTDC assisted companies in accessing more than \$8.86 million in federal SBIR/STTR Awards and state Technology Transfer Assistance Grants and SBIR Matching Grants.

Organizational Experience and Capacity

The Arkansas Small Business and Technology Development Center (ASBTDC) began in 1979 and is a statewide, university-based small business assistance and economic development program. Through its nine office locations (with two slated to open later in 2021), ASBTDC is close in proximity to entrepreneurs and established companies across the state. The ASBTDC serves rural, underserved areas and its university affiliations enables it to readily serve the state's research institutions. ASBTDC is accredited by the Association of Small Business Development Centers and received its technology accreditation in 2007. The program reaccredited without condition in 2017.

ASBTDC demonstrates core competencies in these areas: technology transfer/commercialization; research and development funding; intellectual property issues; technology commercialization; networking and resource identification, and alternative financing (equity). These core competencies directly align with the needs of constituencies targeted through the FAST project.

ASBTDC has over 40 years' experience in providing small business assistance services to entrepreneurs in the state. Through its SBDC and FAST projects, ASBTDC is experienced in

conducting outreach, providing technical/business assistance and financial support to small businesses including R&D-focused small businesses. With robust consulting, market research, educational events, and outreach, ASBTDC is assisting next-generation technology firms.

ASBTDC has served as the state's lead entity for SBIR/STTR assistance for more than a decade. Since this time, our FAST projects have allowed us to serve a steadily increasing number of mentees with exploring the SBIR/STTR program. Our mentees' SBIR/STTR proposal submission rate has continued to rise since 2010, along with their SBIR/STTR award success. Additionally, the FAST program has also allowed us to offer an increasing number of training events each year that continue to attract higher levels of nationwide participants. A snapshot of ASBTDC's FAST program success since 2010 is in the chart below.

| FAST Project | # Mentees | SBIR/STTR Submissions | SBIR/STTR Awards | Training Events | Event Participants |
|--------------|-----------|-----------------------|------------------|-----------------|--------------------|
| 2010-11 | 13 | 17 | 3 | 6 | 69 |
| 2014-15 | 64 | 21 | 5 | 17 | 325 |
| 2019-20 | 122 | 39 | 14 | 13 | 375 |

From 2016-2020, ASBTDC assisted innovation clients in obtaining financial awards from federal and state sources totaling \$25,010,875 million to further commercialization. Of these, 52 were SBIR/STTR awards totaling more than \$23 million with 100% of awards to small firms.

Project Design and Target Markets

ASBTDC focuses its project efforts on university-based researchers and small tech-based firms. The FAST project is designed to provide maximum assistance as needed to mentees, particularly for the following types of businesses: 1) women-owned, 2) rural-based, and 3) socially and economically disadvantaged and small firms that have not traditionally participated in the program.

ASBTDC's FAST Project is implemented throughout the state of Arkansas through its Lab2Launch program. Services are available online and via webinars and specific efforts are made to provide outreach, education, and mentoring services in underserved areas of the state. As illustrated on the following chart, these activities have resulted in an increase in submissions and awards in the SBIR/STTR program by Arkansas companies as well as program participation by women-owned, minority-owned, and rural firms.

| FAST Project | # Submissions | | | | | # Awards | | | |
|-----------------------|---------------|----------------------|-------|-------|----------|----------|-------|-------|----------|
| | # Submissions | # Mentees Submitting | Women | Rural | Minority | # Awards | Women | Rural | Minority |
| 2017-18 | 32 | 20 | 5 | 8 | 2 | 7 | 3 | 1 | 1 |
| 2018-19 | 34 | 22 | 9 | 8 | 2 | 11 | 5 | 1 | 1 |
| 2019-20 | 39 | 25 | 12 | 5 | 3 | 17 | 3 | 2 | 1 |
| 9/29/2020 - 3/31/2021 | 26 | 23 | 6 | 8 | 8 | 8 | 4 | 2 | 2 |

Trends

- Number of submissions and awards are increasing
- Number of submissions by women and minorities are increasing

ASBTDC mentees who win SBIR/STTR awards and complementary state funding consistently credit ASBTDC's consulting and proposal development services as being key to their success. These testimonials can be found on ASBTDC's blog (<http://asbtcd.org/blog/>) as well as its YouTube video, "[SBIR Stories: How Early-Stage Funding Is Supporting Arkansas Innovation](#)." Without FAST funding, ASBTDC would not be able to offer these highly regarded services and innovative Arkansas companies would be lacking the established support services needed to succeed in the highly competitive SBIR/STTR program.

As part of its current FAST project, ASBTDC is conducting two Lab2Launch accelerators (one NIH SBIR/STTR cohort and one USDA SBIR cohort). I lead these eight-week cohorts that offer step-by-step guidance on every aspect of preparing and submitting a robust SBIR proposal. Participants receive assistance with topic selection, budget preparation, writing and editing, market research, and more. Sessions are virtual, making it highly accessible.

Additionally, we host training events including SBIR/STTR introductions; women-focused events and agency-led SBIR/STTR webinars specific to those agency programs.

Through initial feedback, mentoring, development support, and customized funding options, ASBTDC equips researchers with the tools needed to launch and grow their tech-based firms. ASBTDC augments internal capabilities with a network of outside experts and industry collaborators that allow for a wide range of needed support services to assist with rapid business formation.

ASBTDC provides direct assistance with market validation and SBIR/STTR proposal writing and provides mentor support specific to exploring the SBIR/STTR program, including helping mentees locate appropriate research topics, bridging communication with potential project partners and federal agency program managers, and providing guidance with proposal narrative and budget development.

Collaboration and Leveraging Resources

Arkansas' FAST program leverages the resources of the ASBTDC statewide network and general support for small businesses.

ASBTDC's FAST program continues to increase the strength of the Arkansas' SBIR/STTR stakeholder network. Governor Asa Hutchinson has continued to designate ASBTDC as the state's SBIR/STTR resource. The state's economic development agency, Arkansas Economic Development Commission, provides in-kind support for the FAST program.

In the 2017 legislative session, the Arkansas legislature and Governor Hutchinson approved and appropriated funds for a SBIR State Matching Grant Program that will match up to 50% of federal grant funds, up to a cap of \$50,000 for Phase 1 SBIR awards and up to \$100,000 for Phase 2 SBIR awards. Since inception of the program, ASBTDC has assisted 14 companies with 20 awards totaling \$1.275 million in state matching funds to advance their projects.

ASBTDC works closely with Arkansas' four research institutions at Arkansas State University; University of Arkansas, Fayetteville; UA Little Rock; and University of Arkansas for Medical Sciences. ASBTDC has offices at the first three of these institutions, and a monthly call is held with research staff from these institutions to discuss research projects and which ones may want to pursue SBIR/STTR funding.

ASBTDC assistance has led to an increase in the number of SBIR/STTR awards in Arkansas. ASBTDC works with Tech Launch, the technology transfer office at its UA Little Rock university host, to support researchers and spin-off companies, such as NuShores Biosciences. ASBTDC assisted NuShores with six awards (Phase 0, Phase 1, Phase II, Fast Track) totaling \$1,617,500. ASBTDC works closely with BioVentures, a technology licensing and IP commercialization entity that facilitates technology transfer and startup companies focused on technology developed at the University of Arkansas for Medical Sciences. ASBTDC also partners with Arkansas Biosciences Institute at Arkansas State University and supports the work of several programs at the University of Arkansas, Fayetteville including commercialization retreats and NSF I-Corps Site summer program. In Northwest Arkansas, Startup Junkie, Rooted Startups, and the Science Venture Studio have programming to assist Northwest Arkansas ventures and refer clients to ASBTDC for assistance with SBIR/STTR proposal writing.

Arkansas SBIR/STTR Success Stories

NuShores Biosciences – UA Little Rock spinout company NuShores Biosciences received a NIH SBIR Fast Track award in 2018 to develop new scaffold technology for bone and tissue regeneration that is modulated to match existing bone architecture. ASBTDC staff assisted NuShores with proposal review and extensive market research that supplemented the Commercialization Plan section of their proposal. ASBTDC also assisted the company with preparing applications for Phase 0 and SBIR Matching Grants from the state.

NuShores was sponsored by the NIH to attend and exhibit their results at the BIO 2019 international convention in Philadelphia. The team received a Department of Defense

manufacturing contract to manufacture their NuCress™ bone void filler scaffold products. NuShores is currently completing Good Laboratory Practice studies and expects a 510(k) submission to the FDA within the next two years.

GSS Group – Woman-owned horticulture company Grow.Supply.Sustain (GSS) Group won SBIR Phase I and II awards from the USDA on the first try as a result of engaging ASBTDC services with proposal development. GSS Group is developing a new vertical hydroponic tower design that allows producers to maximize their production capacity so that they add value to existing farm operations and balance up-front investment against long-term operating costs. ASBTDC also assisted GSS Group with state-level applications for Phase 0, Technology Development Program and SBIR Matching Grant funding to support and extend SBIR project efforts. GSS Group expects to be ready to commercialize its HydroFresh™ tower system once their USDA SBIR Phase II project concludes in the fall of 2022.

SolaRid – Rural-based agtech company SolaRid won a National Science Foundation SBIR Phase I award on their first try with NSF to develop a "smart" insect control system for farmers that automates insect counting and identification using artificial intelligence. SolaRid also received Phase 0 and SBIR Matching Grant state funding to support this SBIR project effort. ASBTDC staff provided extensive proposal development for SolaRid's SBIR and state-level applications and contributed detailed market research findings that were used in the SBIR application.

Ozark Integrated Circuits – Rugged systems solutions company Ozark Integrated Circuits (Ozark IC) develops design techniques, modeling and design tools for integrated circuits and systems on chip for extreme environments. To date, Ozark IC has received 22 SBIR/STTR awards totaling \$8.97 million from agencies including NASA, DoD Air Force, Department of Energy and DoD DARPA. ASBTDC was instrumental in this team's SBIR/STTR proposal development, providing detailed market research and proposal reviews. In the last two years, Ozark IC began selling SBIR/STTR-funded evaluation copies of its XNodes™ products to the private sector.

Why FAST should be Continued and Expanded Across the States

FAST funding enables organizations like the ASBTDC to dedicate personnel specifically to the mission of increasing the number of SBIR/STTR proposal submissions and awards from states and populations (women, minority, rural) who have not traditionally participated in the program. Without FAST funding, ASBTDC would not be able to offer these highly regarded services and innovative Arkansas companies would be lacking the established support services needed to succeed in the highly competitive SBIR/STTR program. SBIR/STTR funding is critical to advancing research and commercialization of small firms that will lead to needed solutions and support higher wage jobs.

How FAST Could Be Improved

ASBTDC has demonstrated great competency to date with maximizing the value of limited FAST program funds. The following improvements would allow ASBTDC to better serve the needs of Arkansas' emerging technology companies.

1. Increase annual awards from \$125,000 to \$200,000. Additional capacity is needed to engage more expertise to serve a growing demand, target special populations, and provide continuity of high-quality, reputable services.
2. SBA is currently piloting awards of a base year with two option years. This longer timeframe enables grantees additional options for growing program offerings and expertise for mentees.
3. Additional funding and longer timeframes could also allow a portion of program resources to target the growing number of university-level and regional programs in Arkansas that draw in STEAM student researchers who are interested in entrepreneurship. Since career opportunities in academia are often limited, STEAM students benefit from learning about the option for starting their own innovative companies and obtaining seed funding for new and needed commercial solutions through the SBIR/STTR program. It would be beneficial to have more capacity as an

8

R. Todd
5/13/21

organization to effectively engage with these university programs and their participants over the long-term. Many of these programs could easily feed in to ASBTDC's established SBIR/STTR services and lead to more SBIR/STTR proposal submissions and awards for Arkansas.



Testimony of

Jere W. Glover

Executive Director

Small Business Technology Council

Washington, DC

Prepared by Jere Glover, Kevin Burns, Robert Schmidt and Alec Orban

**BEFORE THE COMMITTEE ON SMALL BUSINESS
UNITED STATES HOUSE OF REPRESENTATIVES**

Innovating America: 40 Years of SBIR Success

13 May 2021

On behalf of

The Small Business Technology Council

www.sbtc.org

SBTC is the nation's largest association of small, technology-based companies in diverse fields, and represents more companies that are active in the federal Small Business Innovation Research (SBIR) Program than any other organization. SBTC is proud to serve as the technology council of the National Small Business Association.



Executive Summary

SBIR/STTR Boosts American Innovation and Economic Infrastructure

In 1982 a bi-partisan Congress and President Reagan created the **Small Business Innovation Research (SBIR)** program. They knew very little Federal R&D was going to small businesses. America was missing the opportunity to better mobilize small business entrepreneurship and innovation to meet Federal R&D needs and to bridge the technology gap eroding American competitiveness and jobs. So, they created this highly competitive program to make sure at least a small fraction of Federal R&D goes to small businesses. Time has shown they were right.

America's basic science is a primary national strength, but converting that science to American innovation and jobs faces increasing international competition. **The SBIR/STTR programs provide seed corn for this challenge, combining private enterprise with American ingenuity to enable new innovations while building new products and businesses transforming American industry.** SBIR asks our nation's small businesses, employing 35% of our scientists and engineers and led by American entrepreneurs, to convert American science into new scientific breakthroughs and useful innovations to meet Federal R&D needs and to commercialize that tech to build their businesses. SBIR firms must be American-based and owned small businesses, with work done in the U.S. The new technology, products and services are selected by the agencies based on merit; meet agency objectives; meet market and societal needs; and create new sustainable high quality, high paying manufacturing and service jobs in the U.S. while raising living standards and making American products more competitive. Today, facing uneven economic growth; aging infrastructure; and international competition, appropriation and intellectual property theft that is draining American jobs, we can strengthen SBIR/STTR¹ investment, further unleashing small business energy and jobs towards a new wave of 21st century American-made products and services.

SBIR solely funds R&D selected by agencies to meet their objectives, but it has created an outsized proportion of America's innovations while addressing agency technology challenges. The follow-on commercialization economics are dramatic. Plus when an American small business creates jobs, the jobs tend to be created in and stay in the U.S.

SBIR/STTR Phase 1 and 2 R&D funding together account for \$3.7 billion, or about 3.5% of Federal **extramural** R&D. Even though small businesses employ some 35% of America's scientists and engineers, overall SBIR/STTR phase 1 and 2 R&D is less than 2% of the total Federal R&D budget. Each year 11 Federal agencies make 7,000 competitively-selected awards based on merit (only 1 in 20 Phase I proposals advances to Phase II). **Initial small Phase 1s** prove the validity and promise of the innovation, with a second competition selecting **larger Phase 2** projects for development. Phases 1 and 2 encourage intellectual property development to support company and product growth and development. They also advance the technology towards **Phase 3 commercialization**, including further R&D with non-SBIR Federal or private sector support followed by product or service sales. For a description of how the program works see www.sbir.gov.

¹ Congress passed and George H. W. Bush signed Public Law No: 102-564, which created a smaller, companion Small Business Technology Transfer (STTR) program in 1992, for academic partnering.



SBIR R&D projects are technology seed corn, planted in small businesses committed to grow them into new products. Despite <2% of overall Federal R&D funding, SBIR/STTR's outsized results are a primary driver of American economic strength. SBIR/STTR firms have created over 20% of the world's major innovations², and as many patents as all universities combined. High quality R&D tackles Federal challenges and creates new innovation while seeding new startups and driving the growth of small businesses with their new technology products and services. Global giants such as Qualcomm, Symantic, Biogen, iRobot, Genzyme, Illumina, and Genentech emerged from SBIR funding. Other SBIR businesses and technologies were sold or licensed, revitalizing older industries while cutting costs and growing competitive strength, and generating new divisions and new jobs located here in America. Follow-on new product investment and sales have totaled many hundreds of billions of dollars.

SBIR firms have produced life-changing breakthroughs in defense, energy, communications, information and bioscience - new tech building blocks for American manufacturing. Agency mission objectives were accomplished. DOD strengthened capabilities while cutting costs. The Air Force saved over \$500M on the F-35 aircraft. A Navy project saved over \$1M per hull on the Virginia Class submarine.

Two technologies initially funded by the SBIR/STTR Program that are in most American's pockets are purses: the technology that allows your cell phone to use GPS on a chip was developed by Dr. Reza Rofougaran under an SBIR award. And the fast CMOS camera technology used by most cell phones and digital cameras was developed for military use under an SBIR award as well.

A primary strength of SBIR/STTR is it invests early in innovation – well before VCs and banks will provide risk capital, although successful SBIR technologies often do advance to use VC and bank lending as they mature towards products. Also SBIR innovation is directed across America's innovation opportunities, not just in VC-investing sectors such as software, internet, telecommunication and healthcare (receiving 83% of VC deals³) but also in higher jobs-producing areas such as manufacturing, defense, energy, and the environment, that are key to building America's good job economy. And small businesses have a great record on keeping their jobs in the U.S.

The data supports SBIR, and suggests doing more can increase its success. The SBIR/STTR program clearly provides a big bang for the federal R&D dollar, an unmatched economic growth engine.

- Around 20 National Academy of Sciences studies have been conducted on the programs, and have concluded that SBIR has met its goals, and showed SBIR/STTR Phase II awards commercializing at rates from 45-70 percent.
- Economic impact studies at the Navy, Air Force, DOD and the National Cancer Institute show remarkable impact on America, e.g. in excess of \$15 to \$23 for every SBIR dollar

² Fred Block and Matthew Keller, *Where Do Innovations Come From? Transformations in the U.S. National Innovation System 1970-2006*, Information Technology and Innovation Foundation, July 2008.

³ Source: PwC/CBI Insights MoneyTree™ data explorer <http://www.pwc.com/moneytree>; VC Seed & Angel Deals By Industry Sector, 2011-2020



over a 14 year period.⁴ Results included improved military strength and capability, significant cost-savings, new industries with new products and services, and new life saving medical techniques and products. Job quality was high, with high average incomes, e.g. \$68,535 in the Navy study.

- The studies understate the impact, not capturing the impact from SBIR technology licenses or business acquisitions on the licensing or acquiring business's sales and competitiveness.
- Tax income in the period more than repaid the SBIR R&D funding: over \$3 in increased Federal, state and local taxes for every dollar spent on SBIR.
- Depending on agency, 45-70% of SBIR small business awardees including university faculty. 70% of all university licenses are to SBIR and other small and startup firms.⁵

Even with a remarkable success record, there is much more than can be done in continuous improvement of the SBIR program, not least to spread the best practices among the agencies. And the DoD Section 809 Panel recommended more than doubling the SBIR allocation, to 7%, and making it permanent.⁶ The European Union is investing 20% of its R&D in small businesses.⁷

SBIR/STTR reaches out to underserved states and groups, broadening the impact and strengthening national STEM results. SBIR/STTR is leveraging the nation's dramatic spread of "innovation hubs" in geographically disenfranchised regions, led by regional industry/academic/ government partnerships, and redefining STEM. New products meeting important American STEM challenges are energizing new generations looking for better and more sustainable jobs. Increased heartland investment in SBIR/STTR can become a keystone of the Rustbelt's manufacturing revival.

Further American economic infrastructure revitalization offers the same opportunity for improved performance via SBIR/STTR innovation and new STEM impacts that have transformed the defense, energy, bioscience, communication, and information industries. SBIR/STTR infusion offers the potential for simultaneous performance improvements and dramatic cost reductions throughout our economy as we reinvigorate and grow our economy, export base and competitive strength.

As we consider how to sustainably grow America's economy with new products and jobs capable of fully engaging and employing America's workforce with high quality jobs, **SBIR/STTR offers a highly-efficient proven innovation lever for American economic infrastructure revitalization that creates new technology and jobs while solving agency R&D challenges and within existing R&D budgets.**

⁴ Swearingen, Will and Jeffrey Peterson, "National Economic Impacts from Air Force and Navy SBIR/STTR Programs, 2000-2013"; "1998-2018 National Economic Impacts from the National Cancer Institute SBIR/STTR Programs"; and "National Economic Impacts from the DOD SBIR/STTR Programs 1995-2018" Techlink

⁵ Association of University Technology Managers (AUTM), FY2016 AUTM US Licensing Activity Survey, 2018

⁶ DOD Section 809 Panel, Jan. 2018: "Report of the Advisory Panel on Streamlining and Codifying Acquisition Regulations", Sub recommendation 21b.

⁷ <https://ec.europa.eu/programmes/horizon2020/en/area/smes>



We should build on programs that work in creating economic strength, and make them stronger. The new Administration and the 117th Congress have an opportunity to improve the impact of American skill and entrepreneurship building on America's scientific strength, with the SBIR/STTR program as the fulcrum for creating new innovations and better jobs.

Recommendations:

1. *Make SBIR/STTR permanent*
2. *Increase SBIR allocation increase to 7%*
3. *Increase STTR allocation to 1%*
4. *Ensure agencies follow SBIR/STTR policies, including for Phase III recognition and support. Ensure further streamlining of proposals, admin and accounting.*
5. *Maintain strong IP protection for these new technologies and businesses. Support the STRONGER Patents Act*
6. *Support the DOD Rapid Innovation Fund (RIF). Develop similar programs at other agencies.*
7. *Require updates of FAR and DFAR regulations to match Congressional law*
8. *Don't weaken SBIR/STTR selection criteria that focus on merit*
9. *Expedite Security Clearances for SBIR/STTR firms*
10. *Require all agencies to set goals of at least 15% of all R&D goes to small business,*
11. *Require all agencies publish all on their website required reports as soon as possible and no later than when they are submitted to other organizations or SBA*



DISCUSSION

SBIR/STTR: Innovation-focused R&D for New Products, Services and High-Quality Jobs

Planned by Congress to ensure American R&D competitiveness, the program has a simple three-phase structure (Figure 1), with competition as its keystone: just one in eight Phase I proposals is awarded, and only 1 in 20 of initial proposals go on to Phase II. Annually, about 30 percent of awardees are new to SBIR/STTR.

Phase I: Feasibility study, typically 6-9 months, \$80-\$150K. Proof of concept.

Phase II: R&D/prototyping, 24 months, up to \$1.5 M. Additional Phase IIs possible.

Phase III: Commercialization from Federal government or private sector outside of SBIR/STTR funding. Includes further R&D with non-SBIR funding and/or sales of products or services

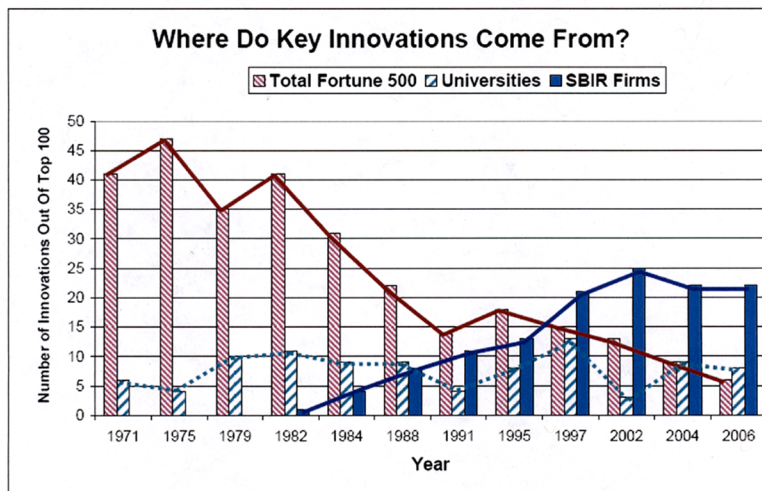
Objectives include stimulating innovation, meeting agency R&D needs, stimulating the growth of small and start-up businesses, and broadening the reach of Federal R&D. Phases I and II are funded within large agency R&D budgets, targeted to meeting agency mission objectives, in a disciplined, highly competitive structure. Phase III describes follow-on activity outside of SBIR funding, wherein the newly created innovations enter the economy through Federal or private sector follow-on R&D and/or product or service sales. The Phase I/II SBIR R&D dollars are leveraged by the follow-on R&D and sales, as well internal investment and energy from the small business. Around 14 percent of all SBIR firms have eventually received venture capital and one of every eight dollars invested by VCs is to an SBIR/STTR involved firm. Many large companies have acquired smaller growing firms driven by SBIR technology, for both the products and the technology, transforming themselves with the infusion of the new technology.

Why SBIR works: designed for success

- Federal R&D directed to solve Federal R&D challenges in support of agencies' missions
- Agencies select topics, select winners, make awards to meet their needs
- Taps small business entrepreneurship, innovation, drive and competitive flexibility
- Merit selection based on science and technology
- Highly competitive: Only 1 in 20 proposals advances to the main Phase 2 R&D work.
- Leverages university research: some 50-70% of SBIR work is done either with direct university faculty involvement or employing former university faculty, focused into small business growth drivers.
- Stimulates innovation for Phase 3 follow-on by mainline Federal R&D or private sector
- While performing R&D for Federal purposes, SBIR/STTR is simultaneously a unique seed fund for American technological innovation, stimulating early stage innovation in pre-commercial technologies prior to stages at which Venture Capital or banks are interested.
- The impact on American industry is broad, not just on medical, software and IT, reinvigorating American industry from the ground up.
- At the same time, firms with SBIR-validated technologies attract subsequent VC investment as they advance towards products and market entry.



- American manufacturing on-ramp: SBIR focus on products is re-invigorating American manufacturing with a flow of new products designed and made in America.
- Small technologies businesses tend to growth their employment base in the U.S., and are less likely to outsource the jobs their technologies create.
- SBIR supports new startup formation and provides technical and commercialization business assistance, a virtual incubator for entrepreneurs across the country including in non-traditional locations for technology businesses including center cities and rural areas.
- Focus on intellectual property development and protection to support business growth, development and high quality jobs.
- Small business performance has been demonstrated to be remarkably high
- SBIR/STTR program has been continuously improved over time



The SBIR Program started with a modest \$45 million (only 0.2% of the extramural R&D budget). To date over 28,000 firms have received SBIR over 127,000 awards. Today, the SBIR/STTR program has grown to 3.65% of extramural R&D funds, over \$3 billion dollars and 7,000 awards per year. The European Union is investing 20% of its R&D in small businesses.¹ And France recently announced a \$13 Billion fund for "disruptive technologies".² (See Appendix C: History of SBIR)



National Academy of Sciences: Repeated Stamps of SBIR Approval

While the Government Accountability Office and Office of the Inspector General have scrutinized and reported on SBIR/STTR Program mechanics more than 25 times since 2000, NRC made a definitive SBIR assessment in a series of reports from 2004 to 2009, comprising thousands of pages, on the SBIR programs at the Department of Defense (DoD), National Institutes of Health (NIH), National Aeronautics and Space Administration (NASA), Department of Energy (DoE), and National Science Foundation (NSF)—the five agencies responsible for 96 percent of SBIR operations. **The Rate of technology commercialization across these agencies were found to be from 45 to 70 percent**, and direct university collaboration in between 33 and 63 percent of SBIR awards.

The Market loves SBIR

The Federal government benefits from SBIR technology. But the market also appreciates SBIR technology. Some facts that show that SBIR makes a difference include:

- 10% of all VC investments go to SBIR firms
- Universities license 70% of all their technology to small business, and are using SBIR and STTR to help get their technology into the market. VC have invested twice as much as the Government in SBIR firms
- 19% of IN-Q-Tel (DARPA) investments are in SBIR
- 829 SBIR related firms have gone public
- 2120 SBIR firms have been acquired
- L3 Com, GE, SAIC, BAE, Lockheed Martin, Raytheon, Gen Dynamics, Philips, Teledyne have each acquired 10 or more SBIR Firms One firm L3 Com has acquired 43 SBIR Firms
- Many SBIR companies have licensed their technologies, with the licenses reinvigorating the technologies of the typically larger and older-technology firms that are granted licenses.
- The DOD Section 809 Panel Recommends doubling SBIR and RIF for DOD
- The SBIR/STTR Programs have been copied by seventeen countries around the world. While the SBIR/STTR program accounts for only 3.65% of the Federal extramural R&D budget over the last 4 years, SBIR has created 22% of our key innovations.



National Cancer Institute

One agency's remarkable success story

The recently finished SBIR/STTR economic impact study for the National Cancer Institute showed a return of \$3.68 in taxes for every dollar invested. (It's like printing money without the inflationary effect.) New innovations, good jobs, and we get back more in taxes than we invested. The study looked at 12 years and 690 NCI Phase II SBIR/STTR awards totaling \$787 million dollars to develop new medical devices, drugs, research tools and in-vitro diagnostics for treating cancer. The results were \$9.1 billion in sales, \$2.9 billion in tax revenues, and 107,918 new jobs, as well as 45 spinouts, 103 licenses, \$4.26 billion in added outside investment, and 103 of the companies being sold for another \$21 billion to invigorate the larger companies looking for new technologies. SBIR is a GDP and jobs engine producing high leverage economic power. SBIR success stories were for Breast, Lung, Prostate and multiple other cancers. There are literally thousands of success stories here, and all of our lives are better for them.

| <i>*dollar amounts in millions</i> | NCI ('98-'10) | |
|---|---------------|---------|
| Total Awards | 690 | |
| Total SBIR/STTR Award Investment | \$787 | |
| Rate of Commercialization | 53% | |
| Cumulative Sales | \$9,144 | \$11:1 |
| Follow-on R&D | \$957 | \$1.2:1 |
| Total Value of Acquired Firms | \$21,630 | \$27:1 |
| Total Outside Investment Funding | \$4,260 | \$5:1 |
| Total Economic Output | \$26,100 | \$33:1 |



DOD SBIR/STTR Has Also Been Tremendously Successful

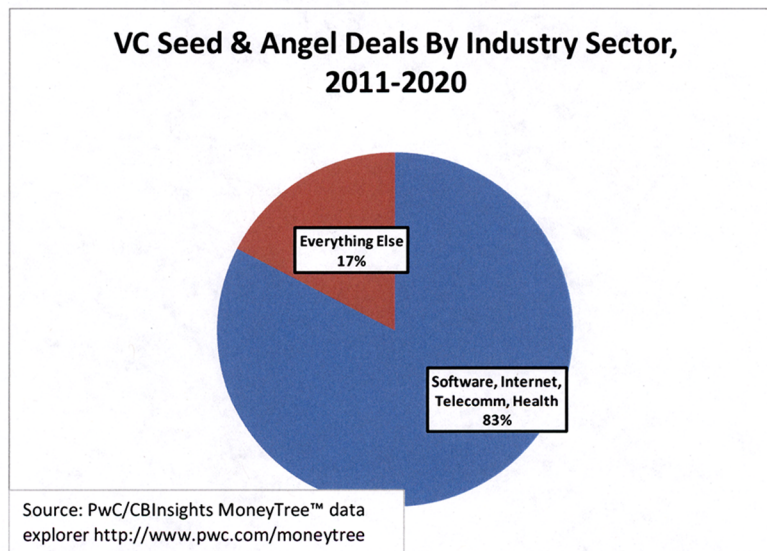




SBIR is often the only source of funding for innovation research

SBIR innovations reflect the needs of America across the nation. In many cases there is no other source of funds for developing early stage technology in America, and this holds true even for advanced stage technologies outside of the favored venture capital/angel industry sectors of software, internet, telecommunications, and healthcare that comprise 83% of the VC deals. All other industry sectors combine for only 17% of the total funds VC invests in seed and angel stage deals. VCs are also focused on only a few states, with most flowing to California and Massachusetts. SBIR funds **7000** deals last year with **\$3,700,000,000** dollars across a wide spectrum of technology, industries and regions.

SBIR/STTR invests at the innovation stage – well before VC and banks will provide risk capital. Successful SBIR technologies do advance to use VC and bank lending as they mature towards products. Also SBIR innovation is directed across America's innovation opportunities, not just in VC-investing sectors such as software, internet, telecommunication and healthcare (receiving 83% of VC deals) but also in higher jobs-producing areas such as manufacturing, defense, energy, and the environment, that are key to building America's good job economy. And small businesses have a great record on keeping their jobs in the U.S.



Many universities and government labs have had difficulty translating their research into inventions. A recent Association of University Technology Managers study shows that less than 1% of their licenses generate more than \$1 million, and that 70% of university licenses are with



SBIR firms.³ Small business and SBIR/STTR are now a huge part of how universities and their professors advance their technologies out of the lab.

But those who can't find funding in the U.S. are turning overseas for help commercializing their research. One Chinese organization, BICI has developed 158 U.S. research projects and has funded over \$616 million for commercialization of U.S. funded research, moving the commercial jobs from U.S. research to China. So far BICI has commercialized 108 such projects.⁴

Success stories

You probably use technologies initially funded by the SBIR/STTR Program on a daily basis, and probably have at least two of these in your pocket or purse right now. The technology that allows your cell phone to use GPS on a chip was developed by Dr. Reza Rofougaran under an SBIR award. And the fast CMOS camera technology used by most cell phones and digital cameras was developed for military use under an SBIR award as well.

| | | | |
|---|--|--|--|
| <p>GPS/WiFi/Blue-tooth Chips Physical Research/ Broadcom</p> | | <p>CMOS Cameras Photobit/Micron</p> | |
| <p>GPS on a chip, and combined WiFi and Blue-tooth communications used globally in cell phones and U.S. military systems, are derived from a DoD SBIR award to Dr. Reza Rofougaran.</p> | | <p>SBIR supported Photobit in developing fast CMOS imagers for military use, now used in all cell phones and most other digital cameras.</p> | |

Successful alumni of the SBIR program include: Qualcomm (cell phone communications), Symantec (computer security), Genzyme (biotech therapies), Affymetrix (GeneChip), Amgen (biopharmaceuticals), Jarvick Heart (artificial heart), Titan (now Intersection, interactive computer graphics), Chiron (pediatric vaccines), AMTI (advanced materials, radars), Amorworks (military armor), Biogen (Idec, neurological, autoimmune therapies), American Biophysics (mosquito control), Millennium Pharma (gene databases), Geron (telomerase inhibitors for cancer treatment), Neocrine Bioscience (neurological and endocrine pharmaceuticals), ABIOMED (world's smallest heart pump), Aerovironment (unmanned aircraft), iRobot (unmanned robotic vehicles, vacuum cleaning, Roomba), JDS Uniphase (fiber optics, lasers, software), Stem Cells Inc. (cell based therapies for CNS and liver disorders), and Nanosys (quantum dot displays), as well as thousands of others. (For more success stories see Appendix D).

Phase III is another area of success. In recent years, the Navy has entered to \$2.5 billion dollars of Phase III contracts, the Air Force over \$1.5 billion contracts and the GSA has entered into contracts that could be worth \$4 billion. All three agencies have shorten the time it takes to get some Phase III contracts awarded.



SBIR Job Creation

The DOD Economic Impact Study shows that the Phase II award winners had \$121 billion in sales and added 1,500,000 jobs in America between 2000 and 2013, more than the combined total employment of Google, Apple, Cisco, and Microsoft.⁵

Ann Eskesen, CEO of the Innovation Development Institute of Swampscott, MA (IDI), is a pioneer in the SBIR movement. Ann has supplied data and information in support of the SBIR Program for 45 years. IDI has tracked the SBIR program beginning. [Appendix A](#) shows the number of STEM and overall SBIR jobs created by state. When looking at the entire SBIR program nationwide, SBIR involved firm's employ 883,000 graduate-level engineers & scientists across every field of industrial/technical endeavor, which is arguably largest single concentration of demonstrated technical talent.⁶

While virtually all states do better with SBIR than with venture capital, some states do better than others. The Fast Program at SBA resulted in SBIR awards of 111 million dollars. Two states, Oklahoma and Montana, have done an excellent job of increasing SBIR outreach and awards. For more information on Oklahoma and Montana's FAST successes, see Appendix A.



Other indicators of SBIR success

SBIR acquisitions

2,120 SBIR/STTR firms have been acquired. This shows that large firms value SBIR/STTR technology. Companies active in acquiring SBIR/STTR firms include L3 Communications with 40 acquisitions, SAIC with 13, General Electric with 12, Raytheon with 11 and BAE and Lockheed Martin with 10.

http://www.innovation.com/images/slides-to-senate_Conference/03_Paper_4.jpg

| Corporations having acquired multiple SBIR-involved <i>Italics=SBIR involved firms</i> June 2017 | | |
|---|--------------|----|
| L3 Communications Recently, L3 divesting several | L3:41 | 25 |
| <i>Titan Corporation</i> (acquired by L3) | | 16 |
| SAIC; General Electric Company | | 13 |
| Raytheon Company, Lockheed Martin Corporation | | 11 |
| Agilent Technologies Inc.; BAE Systems; ECO Corporation; General Dynamics Corporation; <i>Invitrogen Corporation</i> | | 10 |
| JDS Uniphase Corporation; Philips | | 9 |
| Johnson & Johnson; Northrup Grumman Corporation (Litton); PerkinElmer, Inc.; Pfizer Inc.; Teledyne Technologies, Inc; Thermo Fisher Scientific, Inc | | 8 |
| Becton, Dickinson & Company; <i>Sierra Nevada Corporation</i> | | 7 |
| <i>Amgen</i> ; ATK Inc.; Beckman Coulter, Inc; Boeing Company, BristolMyers Squibb; Charles River Laboratories; Corning, Inc.; Danaher Corporation, <i>Genzyme Corporation</i> ; ICx Technologies, Inc.; ManTech International Corporation; Novartis AG; Medtronic, Inc.; Qiagen NV; Roche Holdings AG; Ultra Electronic Holdings | | 6 |

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SBIR Patents

Another indication on innovation success is the number of patents that have been issued. There have been **137,443** patents issued to SBIR firms. In most years SBIR firms receive more patents than all colleges and universities combined.

Taxes

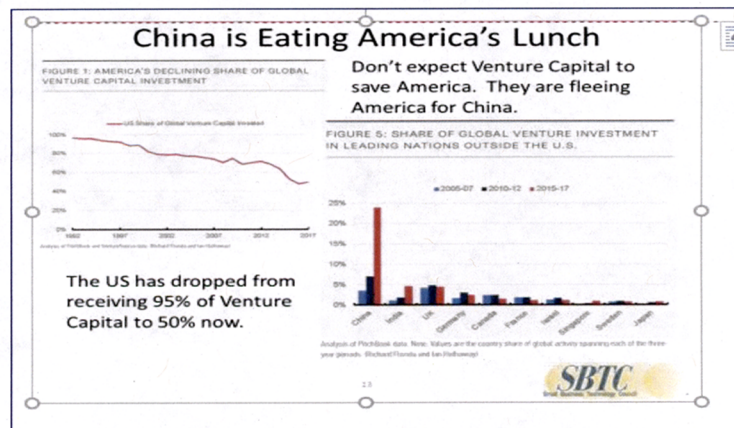
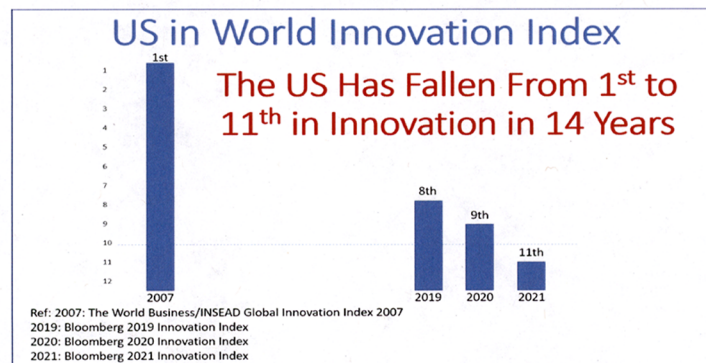
The NCI Study states that every dollar invested in SBIR at NCI results in **\$3.68** in state, local and Federal taxes.



U.S. innovation leadership in the World is challenged

When the SBIR was created, the United States was the undisputed leader in innovation. All venture capital was invested in U.S. companies and we had a very strong patent system. Today our leadership in innovation is threatened, other countries are doing more to support small business and innovation in their countries. The European Union has committed to investing 20% of its R&D in small businesses.⁷

France has created a \$13 billion dollar fund. China is eating our innovation lunch. American venture funds are investing in Chinese firms. China has close relationships with many U. S. universities to develop U.S. funded technology and even has a 616 million dollar fund to commercialize U.S. university research. America has dropped to #11 in the Bloomberg Innovation Index. Foreign firms file more patents in the U.S. than resident firms.





- **Beijing Institute of Collaborative Innovation (BICI)** is a non-profit innovation institute jointly established by 14 U.S. universities including Peking University and Tsinghua University in 2014
- BICI is industry-oriented and has set up 18 Innovation Centers focusing on robotics, optoelectronics, structural and functional materials, energy technology, water treatment and biomedical engineering.
- So far, around 150 projects have been invested since the establishment of BICI, among which 108 projects have been commercialized upon completion
- Meanwhile, BICI has set up a four-billion RMB investment fund to support the commercialization of completed projects and to make direct equity investment in other deep-tech startup companies.
- Link <http://innovator.co/>

America's leadership in innovation and technology is being challenged. While America leads in the number of scientific articles and journals, we no longer lead in high tech exports and patents filed. The rest of the world is far exceeding America in filing patents and in exporting high technology.

| High Tech Exports 2013 | |
|---|---------------------------------|
| Country name | High Tech Exports (millions \$) |
| China | 715,843 |
| Hong Kong | 322,039 |
| Korea | 208,678 |
| Germany | 208,678 |
| United States | 156,074 |
| Singapore | 150,959 |
| Source: http://wdi.worldbank.org/table/5.13 | |

The amount that the US exports High Tech has become anemic, only 21.8% of China's. We are only slightly above the tiny city/state of Singapore, a country whose land mass is 0.007% of the US.⁸



VC Investment in SBIR Firms

innovation.com
 SBIR

Has SBIR been a “Good Investment”
what does VC SBIR involvement suggest?

Given the serious uptick recently in VC investment levels overall: total number and size of investments -- \$192B in the THREE years 2014-2016 -- an amount that required SIX years to achieve even after 2008 recession -- it is still the case that

ONE in every TEN Dollars
of VC Investment in US
recently has involved
an SBIR firm

(down from One in SIX-SEVEN)

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Appendix A

SBIR Impact on Job Creation & STEM Employment

- SBIR involved firms – current or previous - collectively have been factor in some 9.26% of US STEM jobs
- ...yet as firms, SBIR Awardees in almost every state consistently factor to significantly less than One-Quarter of ONE percent of establishments.

US House of Representatives Small Business Committee:
by Member State SBIR employment: STEM Employment Impact

| State | Total Employment ¹ | STEM Employment ² | % STEM Related | Calculated SBIR-STTR Employment (Note 1) | % Stem Jobs SBIR related | SBIR % State Establishments ³ |
|----------|-------------------------------|------------------------------|----------------|--|--------------------------|--|
| CA | 16,430,660 | 1,307,860 | 7.96% | 224,098 | 17.13% | 0.35% |
| CO | 2,578,000 | 244,390 | 9.48% | 20,884 | 8.55% | 0.43% |
| FL | 8,441,750 | 427,060 | 5.06% | 20,935 | 11.60% | 0.12% |
| GA | 4,308,600 | 272,580 | 6.33% | 7,958 | 2.92% | 0.15% |
| IL | 5,627,670 | 337,880 | 6.00% | 11,329 | 3.35% | 0.19% |
| KS | 1,331,960 | 79,110 | 5.94% | 1,342 | 1.70% | 0.13% |
| MD | 2,523,030 | 256,930 | 10.18% | 40,301 | 15.59% | 0.75% |
| ME | 575,230 | 30,010 | 5.22% | 2,676 | 8.92% | 0.23% |
| MN | 2,708,760 | 199,150 | 7.35% | 16,375 | 8.22% | 0.21% |
| MO | 2,691,620 | 156,370 | 5.81% | 5,334 | 3.41% | 0.13% |
| NJ | 3,782,740 | 264,950 | 7.00% | 30,488 | 11.51% | 0.49% |
| NY | 8,691,440 | 489,030 | 5.63% | 1,410 | 7.80% | 0.21% |
| PA | 5,512,120 | 350,520 | 6.36% | 1,190 | 8.98% | 0.32% |
| TX | 12,102,370 | 811,360 | 6.70% | 1275 | 4.22% | 0.17% |
| WI | 2,709,940 | 167,970 | 6.20% | 13,834 | 8.24% | 0.21% |
| US Total | 142,628,620 | 9,539,180 | 6.69% | 883,460 | 9.26% | 0.09% |

(1) and (2) US Department of Labor, Bureau of Labor Statistics 2020

Note 1: Tracking by Innovation Development Institute (idi) of SBIR-STTR employment is by range: small for lower ranges (1-4, 5-9 etc); large for limited number of larger firms (250-499). Firms exceeding SBIR size standards (500 employees) designated 500+ (not small). Except for those Awardees recently SBIR-STTR graduated - and then only for employment numbers at time of last award - latter not factored into estimated employment numbers

3. Calculation from Innovation Development Institute, LLC, Swampscott, MA SBIR-STTR tracking systems 2021



Data on this slide specific to states represented on US House of Representatives Small Business Committee May 2021. Anchored in comprehensive, complex (proprietary) SBIR-STTR impact data by arrangement of variables assembled and managed by Innovation Development, Swampscott, MA since soon after passage of original SBIR enabling legislation in 1983.

* SBIR firms are universally tiny percentage of any State's business establishments

* BUT often represent important percentage of STEM job employment in that state



| Analysis of extent to which SBIR-STTR Awardees by State (and overall) are factor in US STEM employment | | | | | | | |
|--|-------------------------------------|--|----------------------------|--------------------------|--|------------------------------|--------------------|
| State | Total State employment ¹ | STEM Jobs in state (2020) ² | STEM employment as % total | Total SBIR-STTR Awardees | SBIR-STTR employment ³ (Note 1) | SBIR related STEM employment | % all US STEM jobs |
| AK | 296,300 | 19,710 | 6.65% | 37 | 1213 | 6.15% | 0.21% |
| AL | 1,903,210 | 112,570 | 5.91% | 351 | 19436 | 17.27% | 1.18% |
| AR | 1,177,860 | 48,220 | 4.09% | 90 | 618 | 1.28% | 0.51% |
| AZ | 2,835,100 | 193,370 | 6.82% | 481 | 10410 | 5.38% | 2.03% |
| CA | 16,430,660 | 1,307,860 | 7.96% | 5724 | 224098 | 17.13% | 13.71% |
| CO | 2,578,000 | 244,390 | 9.48% | 954 | 20884 | 8.55% | 2.56% |
| CT | 1,540,870 | 113,190 | 7.35% | 394 | 12596 | 11.13% | 1.19% |
| DC | 687,150 | 72,750 | 10.59% | 135 | 3539 | 4.86% | 0.76% |
| DE | 426,380 | 28,710 | 6.73% | 90 | 2055 | 7.16% | 0.30% |
| FL | 8,441,750 | 427,060 | 5.06% | 899 | 20935 | 4.90% | 4.48% |
| GA | 4,308,600 | 272,580 | 6.33% | 457 | 7958 | 2.92% | 2.86% |
| HI | 574,010 | 28,340 | 4.94% | 116 | 1689 | 5.96% | 0.30% |
| IA | 1,469,920 | 81,590 | 5.55% | 169 | 3410 | 4.18% | 0.86% |
| ID | 718,820 | 44,080 | 6.13% | 100 | 2349 | 5.33% | 0.46% |
| IL | 5,627,670 | 337,880 | 6.00% | 732 | 11329 | 3.35% | 3.54% |
| IN | 5,627,670 | 337,880 | 6.00% | 327 | 5356 | 1.59% | 3.54% |
| KS | 1,331,960 | 79,110 | 5.94% | 120 | 1342 | 1.70% | 0.83% |
| KY | 1,782,580 | 80,010 | 4.49% | 183 | 1901 | 2.38% | 0.84% |
| LA | 1,801,290 | 69,150 | 3.84% | 122 | 4414 | 6.38% | 0.72% |
| MA | 3,349,800 | 320,080 | 9.56% | 2258 | 100415 | 31.37% | 3.36% |
| MD | 2,523,030 | 256,930 | 10.18% | 1295 | 40301 | 15.69% | 2.69% |
| ME | 575,230 | 30,010 | 5.22% | 126 | 2676 | 8.92% | 0.31% |
| MI | 3,924,010 | 291,370 | 7.43% | 707 | 15466 | 5.31% | 3.05% |
| MN | 2,708,760 | 199,150 | 7.35% | 393 | 16375 | 8.22% | 2.09% |
| MO | 2,691,620 | 156,370 | 5.81% | 290 | 5334 | 3.41% | 1.64% |
| MS | 1,076,810 | 38,200 | 3.55% | 66 | 1448 | 3.79% | 0.40% |
| MT | 455,450 | 25,760 | 5.66% | 124 | 2422 | 9.40% | 0.27% |
| NC | 4,288,450 | 291,450 | 6.80% | 711 | 15434 | 5.30% | 3.06% |
| NE | 400,040 | 17,750 | 4.44% | 38 | 1858 | 10.47% | 0.19% |
| ND | 942,550 | 56,440 | 5.99% | 80 | 1327 | 2.35% | 0.59% |
| NH | 619,430 | 47,970 | 7.74% | 213 | 10836 | 22.59% | 0.50% |
| NJ | 3,782,740 | 264,950 | 7.00% | 776 | 30488 | 11.51% | 2.78% |
| NM | 785,720 | 52,690 | 6.71% | 349 | 8396 | 15.93% | 0.55% |
| NV | 1,250,860 | 48,330 | 3.86% | 99 | 2362 | 4.89% | 0.51% |
| NY | 8,691,440 | 489,030 | 5.63% | 1410 | 34603 | 7.08% | 5.13% |
| OH | 5,137,540 | 307,910 | 5.99% | 923 | 23090 | 7.50% | 3.23% |
| OK | 1,562,780 | 81,190 | 5.20% | 137 | 3778 | 4.65% | 0.85% |
| OR | 1,806,950 | 131,590 | 7.28% | 386 | 11778 | 8.95% | 1.38% |
| PA | 5,512,120 | 350,520 | 6.36% | 1190 | 31485 | 8.98% | 3.67% |
| PR | 819,750 | 36,430 | 4.44% | 24 | 219 | 0.60% | 0.38% |
| RI | 442,900 | 28,730 | 6.49% | 122 | 4574 | 15.92% | 0.30% |
| SC | 2,015,260 | 102,520 | 5.09% | 166 | 2658 | 2.59% | 1.07% |
| SD | 411,250 | 20,380 | 4.96% | 63 | 830 | 4.07% | 0.21% |
| TN | 2,903,810 | 150,610 | 5.19% | 284 | 6422 | 4.26% | 1.58% |
| TX | 12,102,370 | 811,360 | 6.70% | 1275 | 34253 | 4.22% | 8.51% |
| UT | 1,489,020 | 113,790 | 7.64% | 376 | 11019 | 9.68% | 1.19% |
| VA | 3,701,220 | 353,730 | 9.56% | 1304 | 66447 | 18.78% | 3.71% |
| VT | 281,070 | 16,440 | 5.85% | 84 | 1566 | 9.53% | 0.17% |
| WA | 3,195,200 | 340,330 | 10.65% | 796 | 24018 | 7.06% | 3.57% |
| WI | 2,709,940 | 167,970 | 6.20% | 388 | 13834 | 8.24% | 1.76% |
| WV | 650,010 | 28,690 | 4.41% | 52 | 1342 | 4.68% | 0.30% |
| WY | 261,690 | 12,060 | 4.61% | 69 | 874 | 7.25% | 0.13% |
| US | 142,628,620 | 9,539,180 | 6.69% | 28055 | 883460 | 9.26% | 100.00% |



2020
Tibbetts Award
Recipient for Top
Organization
& Individual!

OK CATALYST

SPARK OPPORTUNITY. IGNITE CHANGE.

AN OFFICE OF THE TOM LOVE INNOVATION HUB
THE UNIVERSITY OF OKLAHOMA

We're Committed to Transforming Oklahoma Into a Leader of Innovation & Technology!
Through a mix of training, networking, and mentoring we help founders leverage the SBIR/STTR programs to launch new products and grow their business.

Our Programs Offer A Comprehensive Approach to Using SBIR Funding. Not Just Winning It!
We guide companies through every step of the proposal process, from solicitation matching to the art of competitive writing. We also provide technical and business assistance to maximize their startup success.

ROADMAP

From Lab to Market
A crash course in technology commercialization for faculty & grad students at Oklahoma's universities & research institutions.

ACCELERATOR

Setting Innovation in Motion
Intensive 8-week course focused on the DoD, NASA, and NSF SBIR/STTR programs, open to all entrepreneurs in the Heartland.

ENDEAVOR

Now, Go Forth & Conquer!
Business mentorship & commercialization support for Phase I & II SBIR/STTR awarded companies & owners.

21
FIRST TIME EVER
AWARDEES

4X
THE NATIONAL
AVERAGE WIN RATE

16M
TOTAL FUNDING
SECURED

55
JOBS CREATED
SINCE 2017

OK CATALYST'S IMPACT SINCE 2017

- Climbed 7 Spots in SBIR/STTR Rankings!**
Oklahoma's performance with the SBIR/STTR programs has historically been subpar. Since launching OK Catalyst in 2017, Oklahoma has advanced from #46 to #39, according to the FAST FOA announcements for FY22 and FY17.
- Doubled Oklahoma's Annual SBIR Awards!**
From 1982-2016, Oklahoma received ~12 SBIR/STTR awards annually. In 2019, 21 Oklahoma companies won SBIR/STTR awards. When complete data is available for the calendar year 2020, we anticipate that number to increase.
- Tripled DoD SBIR/STTR Performance!**
OK Catalyst has focused on improving DoD SBIR/STTR performance in Oklahoma since 2017, and that focus has resulted in a dramatic improvement in the number of companies winning DoD awards and the total amount of DoD SBIR/STTR award dollars coming to Oklahoma.

15
STATES
CONNECTED

125
OUTREACH
EVENTS

400
TRAINING
OPPORTUNITIES

5K
FUTURE FOUNDERS
MENTORED



Montana Innovation Partnership

powered by TechLink

Growing Montana's Innovation Economy

The Montana Innovation Partnership (MTIP) powered by TechLink is a cooperative partnership between Montana State University TechLink, a center within the Office of Research, Economic Development, and Graduate Education, the Montana Department of Commerce, and the U. S. Small Business Administration through the Federal and State Technology (FAST) program.

We help early-stage tech founders and researchers learn about and compete for SBIR/STTR seed funding through outreach, training, business and technical assistance, and collaboration with university, industry, and economic development partners.

Expert SBIR/STTR Assistance and Collaboration

Clients receive tailored no-cost expert consulting, coaching, and mentoring designed to ensure that SBIR is right for their business, to help them identify agencies and funding opportunities, provide guidance on building their team, protecting their intellectual property, customer discovery, commercialization of new technologies, and in-depth proposal preparation guidance and reviews.

SINCE 2018

45%

APPLICATION SUCCESS

12

FIRST TIME
AWARDEES

35%

OF CLIENTS ARE
UNDERREPRESENTED
SMALL BUSINESSES

\$20M

SBIR/STTR FUNDING TO
CURRENT MTIP CLIENTS

A HISTORY OF INNOVATION

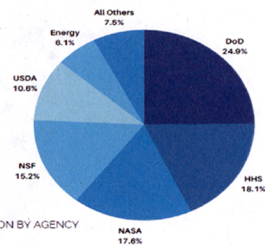
82%

of all Montana SBIR/STTR
awardees have received
assistance from
MTIP/TechLink
in the past
21 years

Montana has one of the nation's top **photonics** clusters, a rapidly growing **bioscience** cluster, and cutting-edge research in **agriculture, energy, and software**. Sectors that drive innovations addressing our nation's technology needs.

Montana small businesses have received **over \$233 million** in **SBIR/STTR funding** since the inception of the program.

SBIR/STTR seed funding has allowed over **110 Montana small businesses** to launch, scale, and, for many, attract talent and investment capital to the state.



MONTANA SBIR/STTR AWARD DISTRIBUTION BY AGENCY



Worldwide Jobs Added by Big Tech Firms

- SBIR Firms employ over 3X as many American workers than the Google, Cisco, Microsoft, and Apple combined

| Employer | Worldwide | References |
|--------------|------------------------|---|
| Google | 135,000 | https://www.statista.com/statistics/273744/number-of-full-time-google-employees/ |
| Cisco | 75,900 | https://www.bing.com/search?q=number++of+jobs+at+cisco&qsn&form=QBRE&sp=-1&pg=number+of+jobs+at+cisco&sc=1-23&sk=&cvid=B540C9D3394D4896AD166A44D47FC0AA |
| Microsoft | 175,508 | http://news.microsoft.com/facts-about-microsoft/#EmploymentInfo |
| Apple | 80,000 | http://www.apple.com/about/job-creation/ |
| Total | 466,400 | |
| SBIR Firms | 1,508,295 All in US | DOD Economic Impact Study Pg 2 |



Appendix B

State-by-State SBIR/STTR Figures for House Small Business Committee

| California | | |
|------------|-----------|-----------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 1142 | \$561,652,660 |
| 2017 | 1256 | \$636,593,030 |
| 2018 | 1111 | \$634,459,886 |
| 2019 | 1407 | \$730,461,896 |
| 2020 | 1426 | \$800,778,016 |
| 2016-2020 | 6342 | \$3,363,945,488 |

| Georgia | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 67 | \$30,106,675 |
| 2017 | 72 | \$41,806,209 |
| 2018 | 58 | \$42,136,962 |
| 2019 | 97 | \$52,429,524 |
| 2020 | 90 | \$55,463,493 |
| 2016-2020 | 384 | \$221,942,863 |

| Colorado | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 103 | \$117,195,547 |
| 2017 | 126 | \$115,208,773 |
| 2018 | 130 | \$143,951,628 |
| 2019 | 159 | \$165,647,584 |
| 2020 | 177 | \$159,436,415 |
| 2016-2020 | 695 | \$701,439,947 |

| Illinois | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 137 | \$59,315,299 |
| 2017 | 137 | \$59,186,158 |
| 2018 | 126 | \$69,659,960 |
| 2019 | 159 | \$70,261,176 |
| 2020 | 145 | \$77,194,992 |
| 2016-2020 | 704 | \$335,617,585 |

| Florida | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 153 | \$62,352,880 |
| 2017 | 176 | \$75,328,717 |
| 2018 | 177 | \$84,842,189 |
| 2019 | 211 | \$119,737,967 |
| 2020 | 200 | \$94,615,785 |
| 2016-2020 | 917 | \$436,877,538 |

| Kansas | | |
|-----------|-----------|--------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 9 | \$5,930,196 |
| 2017 | 14 | \$6,549,569 |
| 2018 | 22 | \$6,914,915 |
| 2019 | 21 | \$8,003,117 |
| 2020 | 24 | \$9,679,956 |
| 2016-2020 | 90 | \$37,077,753 |



| Maine | | |
|-----------|-----------|--------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 10 | \$4,073,289 |
| 2017 | 6 | \$4,001,371 |
| 2018 | 9 | \$3,940,878 |
| 2019 | 9 | \$3,426,856 |
| 2020 | 14 | \$5,313,216 |
| 2016-2020 | 48 | \$20,755,610 |

| Missouri | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 40 | \$17,554,613 |
| 2017 | 44 | \$23,364,320 |
| 2018 | 60 | \$27,263,342 |
| 2019 | 62 | \$31,680,401 |
| 2020 | 56 | \$30,876,151 |
| 2016-2020 | 262 | \$130,738,827 |

| Maryland | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 129 | \$134,642,799 |
| 2017 | 142 | \$141,846,940 |
| 2018 | 142 | \$148,513,218 |
| 2019 | 169 | \$174,584,237 |
| 2020 | 194 | \$184,664,077 |
| 2016-2020 | 776 | \$784,251,271 |

| New Jersey | | |
|------------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 122 | \$56,448,477 |
| 2017 | 121 | \$60,681,490 |
| 2018 | 101 | \$49,584,048 |
| 2019 | 146 | \$71,147,862 |
| 2020 | 128 | \$61,782,493 |
| 2016-2020 | 618 | \$299,644,370 |

| Minnesota | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 79 | \$37,954,870 |
| 2017 | 97 | \$50,338,415 |
| 2018 | 78 | \$43,648,405 |
| 2019 | 96 | \$62,420,237 |
| 2020 | 77 | \$53,046,237 |
| 2016-2020 | 427 | \$247,408,164 |

| New York | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 138 | \$120,006,502 |
| 2017 | 140 | \$128,829,304 |
| 2018 | 161 | \$133,225,262 |
| 2019 | 199 | \$151,609,724 |
| 2020 | 236 | \$184,930,318 |
| 2016-2020 | 874 | \$718,601,110 |



| Pennsylvania | | |
|--------------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 214 | \$103,906,671 |
| 2017 | 225 | \$115,866,142 |
| 2018 | 234 | \$133,826,901 |
| 2019 | 260 | \$153,940,871 |
| 2020 | 273 | \$161,473,794 |
| 2016-2020 | 1206 | \$669,014,379 |

| Texas | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 257 | \$109,389,808 |
| 2017 | 269 | \$121,038,248 |
| 2018 | 254 | \$124,272,219 |
| 2019 | 356 | \$154,011,974 |
| 2020 | 370 | \$160,150,260 |
| 2016-2020 | 1506 | \$668,862,509 |

| Wisconsin | | |
|-----------|-----------|---------------|
| Year | SBIR/STTR | |
| | # Awards | \$ Amount |
| 2016 | 38 | \$24,738,699 |
| 2017 | 45 | \$22,629,539 |
| 2018 | 51 | \$25,406,240 |
| 2019 | 54 | \$26,396,981 |
| 2020 | 39 | \$27,153,808 |
| 2016-2020 | 227 | \$126,325,267 |



Appendix C

HISTORY OF THE SBIR PROGRAM

SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

1982 Establishment of SBIR: 'Small Business Innovation Development Act of 1982' (P.L. 97-219, S. 881, July 22, 1982)

The federal SBIR program was created more than 25 years ago out of growing concern since the 1960s that, despite the increasing prominence of small businesses in innovation, federal research and development expenditures had disproportionately been awarded to large businesses, colleges, universities, and federally funded research and development centers. As a result, in 1976, Roland Tibbetts, at the National Science Foundation (NSF), took the lead in directing a greater and more significant share of its extramural research and development funds to small business in a new innovation and research program, with a focus on discovering, funding, and evaluating the initial, highest-risk, most cutting-edge exploratory research that is necessary to achieve significant technological innovations and breakthroughs. The purpose was to make small but sufficient awards to test as many ideas as possible. The program at NSF led policymakers to consider taking further steps to unleash the innovative potential of small businesses. 5

[Footnote] On August 9 and 10, 1978, the House and Senate Committees on Small Business held a joint hearing on the underutilization of small businesses in American innovation. There was a clear consensus that small businesses deserved a greater share of federal research and development funds, not only because of the innovative and development successes of small firms, but also because of their achievements in job creation and cost efficiency and their powerful contribution to the greater science and technology communities. The 1980 White House Conference on Small Business echoed these sentiments and recommended legislation to expand the NSF concept to other agencies. 6

[Footnote] The end result of the recommendation was the Small Business Innovation Development Act of 1982, which first authorized the SBIR program (P.L. 97-219, S. 881, July 22, 1982). The bill was introduced by Senator Warren Rudman (R-NH), and had 84 cosponsors, 12 of whom are still serving in the Senate. 7

[Footnote] Senator Snowe, then serving in the House of Representatives, was an original co-sponsor of the SBIR legislation adopted in 1982. The Act creating SBIR had four objectives:

[Footnote 5: Joint Hearings before the U.S. Senate Select Committee on Small Business and the U.S. House of Representatives Subcommittee on Antitrust, Consumer and Employment and Subcommittee on Energy, Environment, Safety and Research of the Committee on Small Business, 'Underutilization of Small Business in the Nation's Efforts to Encourage Industrial Innovation,' 99th Cong. (1978) (Transcript of the two-day proceedings).]

[Footnote 6: National Research Council, *SBIR Challenges and Opportunities*, 1999.]



[Footnote 7: Senators who cosponsored P.L. 97-219 and still serve in the Senate: Max Baucus; Robert C. Byrd; Thad Cochran; Christopher Dodd; Chuck Grassley; Orrin G. Hatch; Daniel K. Inouye; Edward M. Kennedy; Patrick J. Leahy; Carl Levin; Richard G. Lugar; and Arlen Specter.]

1. To stimulate technological innovation;
2. To use small business to meet federal research and development needs;
3. To foster and encourage participation by minority and disadvantaged persons in technological innovation; and
4. To increase private sector commercialization of innovation derived from federal research and development.

The intent of the 1982 Act and the original NSF program was not for the SBIR program to be merely a commercialization program. Small businesses in SBIR were designed to be vehicles for fulfilling the priority research needs of federal agencies and the nation at large while stimulating local economies. Further, as mentioned earlier, the program was designed to fund as many ideas as possible, rather than to take only a few ideas from concept to market or insertion into a government product or technology. The allocation of funds for SBIR in its first year of existence totaled \$45 million, or 0.2 percent of the extramural research and development budgets of federal agencies that had extramural research and development budgets that exceeded \$100 million. Per P.L. 97-219, the allocation was gradually increased over six years, until the final mandated allocation for SBIR of 1.25 percent was reached. Modeled after the NSF program, the program was structured in three phases. Phase I awards were modest and capped at \$50,000 and were meant to test the feasibility of an idea or product. Phase II awards, capped at \$500,000, were meant to be used to begin product development and prototyping. In Phase III, the graduation stage of SBIR, small businesses were to obtain outside funding, whether private funding or non-SBIR federal funding, to continue development toward a commercial product or products or systems to further the mission of an agency.



Appendix D

SBIR/STTR Success Stories

The SBIR and STTR programs have experienced considerable success in meeting agency needs as reported by National Research Council (NRC). The agencies first provided reports of these successes and later developed web sites listing their successes. In some cases they improve agency research, in others they resulted in new products that could be commercialized, and for DoD, there were new products that provided advanced technology to the warfighters on a quick-reaction basis. Almost all of the SBIR/STTR agencies post their SBIR/STTR success stories on their web sites as follows:

- a. SBIR Success Stories: <https://www.sbir.gov/news/success-stories>
- b. DOD: <http://www.acq.osd.mil/osbp/sbir/about/success-stories.shtml>
- c. NIH: <https://sbir.nih.gov/statistics/success-stories>
- d. DOE: <http://science.energy.gov/sbir/highlights/>
- e. NIST/DOC: <http://www.nist.gov/tpo/sbir/sbir-success-stories.cfm>
- f. USDA: <http://nifa.usda.gov/impacts>
- g. EPA: <http://www.epa.gov/sbir/sbir-success-stories-and-highlights>
- h. Tibbets' Award & SBIR Hall of Fame: <https://www.sbir.gov/about-tibbetts-awards>
- i. Overall, if one performs a web search for "SBIR Success Stories" there are approximately 59,600 responses on Google and 146,000 on Yahoo (of course, some are redundant).



SBIR Economic Impact

Dollar amounts in millions

| Awards and Sales | DOD ('95-'12) | NCI ('98-'10) |
|---|----------------------|----------------------|
| Total SBIR/STTR Award Investment | \$14,400 | \$787 |
| Rate of Commercialization | 58% | 53% |
| Cumulative Sales | \$121,000 | \$9,144 |
| Sales to Investment Ratio | \$8.4:1 | \$11.6:1 |
| Military Sales | \$28,000 | --- |
| Military Sales % of Total | 23% | --- |
| Follow-on R&D | \$15,200 | \$957 |
| Follow-on R&D to Investment Ratio | \$1.1:1 | \$1.2:1 |
| Total Acquisition Value of Acquired Firms | \$35,600 | \$21,630 |
| Acquired Firms Value to Investment Ratio | \$2.5:1 | \$27.5:1 |
| Total Outside Investment Funding | \$9,500 | \$4,260 |
| Outside Investment to SBIR Investment Ratio | \$0.7:1 | \$5.4:1 |

¹ <https://ec.europa.eu/programmes/horizon2020/en/area/smes>

² **Jean Baptiste Su**, France Creates \$13 Billion Disruptive Innovation Fund, <https://www.forbes.com/sites/jeanbaptiste/2018/01/17/france-creates-13-billion-disruptive-innovation-fund-hopes-to-become-the-next-startup-republic/#62fcc8e5405e>

³ Association of University Technology Managers (AUTM), *FY2016 AUTM US Licensing Activity Survey*, 2018

⁴ <http://innovator.co/> Beijing Institute of Collaborative Innovation (BICI)

⁵ Swearingen, Will and Jeffrey Peterson, "National Economic Impacts from the DOD SBIR/STTR Programs 1995-2018" Techlink, 2019

⁶ <http://www.inknowvation.com/sbir/about-us#sthash.YfgTc7qg.dpuf>

⁷ <https://ec.europa.eu/programmes/horizon2020/en/area/smes>

⁸ US = 3,797,000 mi². Singapore = 281.2 mi².

**Follow-Up Answers and Additional Information for the House Small Business
Committee regarding the May 13 2021 Hearing on SBIR/STTR**

Jere W. Glover
Executive Director
Small Business Technology Council

*In response to **Ranking Member Leutkemeyer's (R-MO)** questions on Phase 3 funding, I wanted to clarify an interchange we had:*

Ranking Member Leutkemeyer questioned me about Phase 3 money, and I believe asked whether I was saying that the government should put up money under contracts to purchase the innovations that had been paid for through the SBIR program, to which I said yes. But I want to clarify I wasn't saying we should appropriate *additional* dollars for this purpose – the government will want to spend money from its already-appropriated budgets for Phase IIIs because it will choose the SBIR products as best for its needs. I am saying that the result of successful SBIR funding will be new SBIR-developed products and services that the government will want to purchase out of its established budgets, because the innovations will be worth it.

Federal Phase III purchases of goods or services or advanced R&D should be made by the government in its discretion and interests as it decides how best to spend its budgets to purchase products or services in general, and this is being done now to various degrees across the government.

SBIR success will come from the government recognizing the high quality of SBIR innovations, and choosing to buy SBIR-developed products and services. For example, the \$4 billion in Phase 3s recently purchased through the GSA were paid for from regular government budgets because various programs decided they wanted to buy the SBIR goods and services. This is an important sign of the success of the SBIR program – that the DoD or NASA for example would want to purchase products developed under the SBIR program or that they would think that the SBIR innovations that had been developed under the SBIR program would be sufficiently worthy that they want to further advance those technologies with regular non-SBIR funding from their mainline R&D program. I was not suggesting that such Phase III money be somehow newly appropriated and funneled through the SBIR program itself.

Some agencies are open to recognizing successful SBIR technologies, while some agencies just want to buy from their established sources and are not as open to new innovations in their procurement. There are also as I said later some institutional inhibitions on the government buying SBIR Phase IIIs, such as at DOE where cost share requirements screen out most SBIR technologies from even competing because the small businesses can't afford the cost share, or at other places where government red tape and regulatory requirements place an especially heavy burden on small businesses trying to sell new goods and services to the government.

In response to Rep. Williams' (R-TX) questions about what steps SBA should do to ensure the SBIR/STTR programs are being properly run, and beareaucratic paperwork burden to small businesses:

The sheer challenge and competition in winning and performing under SBIR awards is a deterrent to fraud and abuse, and the high success rate of Phase II projects is another quality measure. Small businesses are already burdened with excess rules and regulations that keep them from focusing on their innovations; I believe the existing rules in this area are sufficient.

But the SBA's guardrails also keep the agencies from failing to follow their rules for the SBIR program. The SBA does well with ensuring the agencies follow some rules, but could do more in other areas, including:

1. better enforcing rules requiring recognizing SBIR Phase IIIs at agencies that have resisted this – some agencies do this, but others resist, and as a result hold back the success and commercialization of their SBIR small businesses,
2. better enforcing rules against using Federal power to strip small businesses of their data rights,
3. better protecting the innovative designs of the small business: some agencies notably DoD believe they can share R&D prototypes from SBIR projects with the small business's competitors, allowing competitors to reverse engineer the innovative designs. The SBA has moved very slowly on this issue, not fixing the problem.
4. For greater transparency, the SBA could require the agencies to publish their SBIR reports on their websites shortly after the end of each period. Currently these can be years behind.
5. It would be helpful to the agencies if they would share best practices in running their SBIR programs. The SBA could arrange this, and follow up to evaluate which agencies have implemented improvements.

Issues such as these are very important to the success of the small businesses as they work to commercialize their innovations.

Regarding red tape in proposals, grants and contract awards, and operational requirements: you were right to question this area. Streamlining and simplification allows more focus on advancing the innovations themselves, and the red tape slows everything down and also drains away time and money, draining the innovations.

Regarding reauthorization: uncertainty of course adds risk and distraction. It is very difficult for all these small firms to not whether SBIR will continue when they are working to develop innovations that will take years of their time and risk their survival. This uncertainty also freezes agency action, which can react by running their programs in caretaker mode and with near-term focus until they know it won't be discontinued (this happened last renewal). There is already ample evidence of the value of the SBIR/STTR programs. I strongly hope we can finish reauthorization this year, with improvements, and not at the last moment.

In response to Rep. Davids' (D-KS) question about improving SBIR Phase 3 engagement and returns:

It's important for agencies to actually care about Phase III, to track it so they can evaluate the performance of their SBIR program, and to recognize when the agency makes a Phase III award in their non-SBIR funded R&D program. It's easy to do, and some agencies and DoD departments do this pretty well (e.g. Navy), but many others are indifferent or consciously don't do this, and as a result hold back the success and commercialization of the SBIR small businesses and technologies they have already invested in through their SBIR program. While such Phase III attention and recognition are already part of the SBIR regulation and policy directive, the indifferent or avoiding agencies are just ignoring this. Congress could take action to more clearly require this.

Agencies apparently also need better clarity from Congress that it really means they should not use Federal power to strip small businesses of their data rights. This is already clearly stated, but ignored and evaded in some agencies.

SBA should monitor and report on how each agency is doing relating to Phase IIIs, including on recognition of their Phase IIIs, tracking the Phase 3s, and consciously evaluating whether the agency may want to further advance the best SBIRs into Phase 3 when they offer to meet agency objectives.

There is a current issue where some agencies believe they can share R&D prototypes from SBIR projects with the small business's competitors, allowing those competitors to reverse engineer the innovative designs. The DOD has taken this position generally, and the SBA has moved very slowly on this issue, and to date has not fixed the problem.

Issues such as these are very important to the success of the small businesses as they work to commercialize their innovations.

In response to Rep Meuser's (R-PA) question about Phase 3, and the economic and innovative returns the nation receives from the SBIR program:

Going back to its inception, SBIR was created by a bipartisan 1982 Congress and President Reagan, who realized very little Federal R&D was going to small businesses and America was missing the opportunity to better mobilize small business entrepreneurship and innovation. They created SBIR to make sure at least a small fraction of Federal R&D goes to small businesses. In 2000 they realized another objective was entrepreneurially-driven commercialization of innovations, so they added commercialization as an objective.

You asked if economic success was a positive factor in award selection or a negative factor. Awards are selected based on merit using specified selection criteria that vary by agency, department and even solicitation. The criteria are generally some variation on innovation, capability to do the work, and potential impact on agency objectives and the likelihood that commercialization will emerge from the work. One strength of this process is its reliance upon competition and merit. The agencies are trying to pick the best innovations from capable companies that have the greatest likelihood of a favorable outcome on agency objectives and/or in terms of commercialization.

I think that the SBIR program more than other government programs has been very successful in creating positive agency, company and economy-wide returns while also encouraging successful business formation and growth, all done within government R&D budgets. The agencies are acting in their own best interests to get the R&D they want, so their focus is on solving agency technical challenges and enabling transformative innovations to enter the marketplace, not on some ROI outcome.

There have been studies relating to evaluating SBIR program success, which can include assessments of the degree to which companies have succeeded in terms of post-SBIR sales and resulting jobs creation. I have attached several of these for your interest. These have shown remarkable economic impacts per SBIR dollar spent on the R&D. In addition, our national economy has been helped when a larger company acquires an SBIR firm or licenses its technology, because the larger company's technology and products and services are thereby improved and its competitive position improved.

In response to Rep Newman's (D-IL) question about how to help SBIR cover a broader range of American technological challenges:

Currently VC early stage money is largely (83%) spent in just four sectors of the economy: internet, software, health care, and telecom, with little coverage of other important areas. VC has largely moved out of early-stage funding in technology sectors where there is little expectation of explosive growth. These sectors still do have utility for the government, and to help the agencies fulfill their respective missions.

A strength of the SBIR program is that it actually does cover a wide sector of American technology, including green tech, robotics, materials, agriculture, energy efficiency, and defense. Essentially SBIR is early stage R&D into whatever areas our agencies consider important enough to ask for R&D proposals. SBIR also reaches more broadly into America's diversity of people and regions than does VC money.



NEW ENGLAND INNOVATION ALLIANCE
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Written Testimony

By Mark Allen

Chairman, New England Innovation Alliance

Hearing Entitled, "Overview of the Small Business Innovation
Research and Small Business Technology Transfer Programs"

U.S. House Committee on Small Business

May 13, 2021

Dear Chair Velázquez, Ranking Member Luetkemeyer, and Members of the Committee,

Thank you for holding this hearing today to discuss the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. I write on behalf of the New England Innovation Alliance (NEIA), a coalition of small high-technology companies across the New England area. Collectively, NEIA members employ more than one thousand scientists and engineers and generate more than \$300 million a year in revenue. NEIA members have experienced firsthand the benefits that the SBIR and STTR programs provide for small businesses as well as the federal government. These programs should be permanently reauthorized because of their proven track record of success, significant return on investment for federal spending, and consistently strong performance reviews.

As you are well aware, Congress initially established the SBIR and STTR programs in order to increase small business participation in federally funded research and development (R&D). The programs also facilitate the commercialization of federal R&D by small companies. Currently, eleven federal agencies set aside a portion of their R&D budgets to finance SBIR programs. A key operative principle is that the SBIR and STTR programs are competitive, science-based grant programs made up of three phases. The purpose of SBIR and STTR is to help meet federal R&D needs, increase private sector commercialization of federally funded investments, and encourage diversity of participation in technology innovation.

Since their inception, SBIR and STTR programs have proven to be incredibly successful at stimulating innovation in small businesses and generating returns for the federal government. Through FY2017, federal agencies had made over 166,000 awards, totaling \$47.9 billion, under these programs. Phase II awards, which receive over 75% of SBIR funding, had a success rate of 60% in generating subsequent government and commercial sales. Studies have found that SBIR and STTR generate “one of the highest returns on research and development dollars for the federal government.” The most recent economic impact report, which was published in 2018, found a 22:1 return on the Department of Defense’s investment. This included \$28 billion in direct military sales attributable to SBIR investments, \$347 billion in overall economic impact, and the creation of 1.5 million high quality jobs. Other participating agencies have reported similar outcomes. Finally, independent review studies have demonstrated the enormous success of these programs. For instance, a study conducted by the National Academy of Sciences (NAS) found that 49% of Phase II awards examined at the Department of Energy generated revenue from the sale of products or services associated with the SBIR/STTR awards, and 78% attracted additional investment.

Due to this proven record of success, NEIA strongly advocates that Congress reauthorize and make permanent the SBIR and STTR programs this year. It is imperative that Congress acts this year – even though the programs are set to expire on September 30, 2022 – in order to avoid the possibility that the SBIR/STTR programs are attached to a series of temporary extensions as they were from 2008 to 2011. Both small businesses and participating agencies faced tremendous planning and financial uncertainty during those years. We urge Congress

to repeat the successful approach in 2016 when reauthorization occurred a full year before expiration.

As the Committee begins its efforts on SBIR/STTR reauthorization, we put forward the following as core principles for consideration:

(1) The SBIR/STTR program should be permanently reauthorized in its current configuration to provide stability.

(2) The permanent reauthorization should reinforce the intent that the program remains committed to a competitive, merit-based participation and award structure.

(3) The existing “pilot” components of the program should be made permanent. Currently, SBIR/STTR have pilot authority for the following programs:

- Commercialization Assistance Program
- Program to Accelerate Department of Defense SBIR and STTR Awards
- Direct Phase II Award Pilot Program
- Program to Allow for Funding of Administration, Oversight, and Contract Processing Costs
- Program for Funding Technology Development, Testing, Evaluation, and Commercialization Assistance
- Program for Streamlined Technology Transition from the SBIR and STTR Programs of the Department of Defense

(4) The reauthorization should require a quantitative assessment of the merits of experimental changes in a publicly available report to Congress within 5 years of initiating such a modification.

NEIA commends this committee for holding a hearing on this successful government program. We invite members of the committee to reach out to our organization with any questions they have regarding the SBIR and STTR programs or our written testimony. Thank you again for your time.

