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REAUTHORIZATION OF THE SBIR AND STTR PROGRAMS

HEARING

BEFORE THE

COMMITTEE ON SMALL BUSINESS AND ENTREPRENEURSHIP UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

FEBRUARY 17, 2011

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REAUTHORIZATION OF THE SBIR AND STTR PROGRAMS

THURSDAY, FEBRUARY 17, 2011

UNITED STATES SENATE,
COMMITTEE ON SMALL BUSINESS
AND ENTREPRENEURSHIP,
Washington, DC.

The Committee met, pursuant to notice, at 10:06 a.m., in Room 428–A, Russell Senate Office Building, Hon. Mary L. Landrieu, Chair of the Committee, presiding.

Present: Senators Landrieu, Cardin, Shaheen, Snowe, Risch, Rubio, Ayotte, and Brown.

OPENING STATEMENT OF HON. MARY L. LANDRIEU, CHAIR, AND A U.S. SENATOR FROM LOUISIANA

Chair LANDRIEU.

Chairman LANDRIEU. Good morning, I would like to call this hearing of the Senate Small Business and Entrepreneurship Committee to order this morning. Senator Snowe is on her way, but for everyone's schedule, I would like to go ahead and begin. I thank our witnesses for juggling their busy schedules to be here today for this important hearing.

The purpose of today's hearing is to discuss the reauthorization of the Federal Government's two largest research and development programs for small, highly innovative companies in America, the Small Business Innovation and Research Program and the Small Business Technology Transfer Program, better known as SBIR and STTR. These programs, as we know, were created in 1982 and 1992, respectively, by Senator Warren Rudman and Congressmen John LaFalce and Ike Skelton, and many others, but those were our leaders.

Unfortunately, these programs have been operating on short-term extensions since October of 2008, and it is a high priority for me, and I hope for this committee, to adopt a comprehensive, long-term reauthorization bill as soon as possible, but certainly before this current extension expires on May 31. The agencies of the Federal Government that participate in these programs, and the entrepreneurs who depend on their smooth operation, deserve our best efforts, and three-month, six-month, nine-month authorizations is not getting the job done.

Of course, we are not in this mess for lack of trying. This committee under my leadership and also under the leadership of Senators Snowe and Kerry has literally tried since 2006 to get a bill to the President's desk. We have compromised. We have worked.

We have met with a variety of organizations and groups, trying to find a path forward to provide the long-term stability and reauthorization these programs deserve, our businesses need, and our entrepreneurs in America are depending on.

We have passed bills out of this committee and through the full Senate numerous times with broad bipartisan support. We have also successfully attached this reauthorization legislation to must-pass bills, like the Defense Authorization Act, with the help of the leadership of that committee. However, in December of last year, we were able to pass and send to the House a new compromise that blended the House and Senate versions as well as we could, bringing advocates together who had been divided for six years. Representatives of the two key negotiators of that compromise will testify here today, the Biotechnology Industry Organization, BIO, and the Small Business Technology Coalition (SBTC).

In addition to BIO and SBTC, the compromise continues to have the support of the National Small Business Association, the U.S. Chamber of Commerce, NFIB, the National Venture Capital Association, local technology groups, and some universities, many, actually, including LSU in my home state, and Louisiana Tech, and the University of Akron, just to name a few, and I will submit other letters of support for the record.

No other SBIR and STTR authorization bill in Congress up to this point has had the support of all of these organizations, so I am hoping with the firepower behind this particular compromise, we can actually get it to the President's desk in just a few months. It is a delicate balance, and I really appreciate everyone's support.

We wanted, of course, a permanent reauthorization. We thought that would send a very positive signal; however, with the good work of Senator Coburn and others, we have agreed to an eight-year reauthorization which we think that we can live with and meets the goals of some sort of long-term outlook. This compromise will not only give small businesses the confidence to invest in these programs, but it will also preserve the integrity of the program that has a history of creating jobs in our country.

I am going to briefly go through a few quick examples because I think it is worth restating for the record. In Louisiana, we are home to Mezzo Technologies. Mezzo received a $100,000 grant. It funded some new developments regarding a radiator that runs cooler, basically to help the Bradley Tank with all of its deployments into hot places in the world. We thought that would be very helpful. Not only has it exceeded its goals in that regard, but now this technology is being transferred to the racing car industry that can also use radiators that run much cooler, and I do not need to explain how that would work on a racetrack.

In St. Francisville, Louisiana, R–BAT received a $100,000 SBIR award to jump-start their research, and these are just two examples of small businesses. I think they created suits for our Army and military that also used heating and cooling technology, opportunities to keep troops safe and cooler in their deployments.

In the State of Maine, and I am sure Senator Snowe will talk about others, but I want to mention a small company that developed controls to monitor the accuracy in medical test results for leukemia patients. The Maine Molecular Quality Control firm could

not function without the SBIR program when it first started, but today it is completely supported by its own revenues.

One of our witnesses today is Dr. Irwin Jacobs, co-founder of Qualcomm, a very famous company now, but many years ago it was not so famous. Dr. Jacobs, we are interested in your testimony explaining how this particular program was helpful and supportive to your firm. Until then, let me just tell attendees what the San Diego Chamber of Commerce said about Qualcomm. According to the San Diego Regional Chamber of Commerce study in 2008, Qualcomm's total impact to the San Diego region was approximately $5.5 billion and has supported more than 26,000 jobs. That is Qualcomm's story, and Dr. Jacobs will fill in a lot of those details.

Maybe some of you woke up this morning and picked up an electric toothbrush. You can thank SBIR for keeping the plaque off of your teeth and gingivitis, too, because the SBIR program helped fund some initial technology that created the mechanism inside of those toothbrushes with grants from the SBIR program that have wide applications now throughout our country.

And finally, in Huntsville, Alabama, GATR Technologies, with a $1.2 million grant, created an inflatable antenna which provides immediate emergency Internet access and cell phone coverage. I was personally shocked in the aftermath of Katrina to be standing on the platform of the Superdome with an entire region underwater and literally hundreds of thousands of people screaming for help, and the phone technology that we had just five-and-a-half years ago was not sufficient to organize that evacuation.

Research like this, inflatable technologies, little balloons that can literally be landed in an area where there are no roads and no access by train, or when the airports shut in—Haiti comes to mind or other places—that can give immediate communication, these are the kinds of things that are being developed in this country that are not only life-saving measures, but they produce the kind of innovative technologies that lead to new companies, growing companies, and jobs for America.

I am going to submit the rest of my remarks for the record and call on Senator Snowe, but I would like to congratulate NiFTy Technology in Ruston, Louisiana, on being awarded this year the Tibbetts Award for, of course, the founding scientists that helped to develop this program after 30 years of work with the National Science Foundation, and they, coincidentally, received the award, Senator Snowe, this year, so we are very, very proud of them.

[The prepared statement of Chair Landrieu follows:]

Remarks for February 17, 2011
Small Business Committee Hearing
"Reauthorization of the SBIR and STTR Programs"

Good Morning. I would like to call to order this hearing of the Senate Committee on Small Business and Entrepreneurship. I want to thank the witnesses for juggling their busy schedules to be here.

The purpose of today's hearing is to discuss the reauthorization of the federal government's two largest research and development programs for small, high technology firms -- the Small Business Innovation and Research (SBIR) and Small Business Technology Transfer (STTR) programs.

These programs have been living off of numerous short-term extensions since October 2008, and it is a priority for me get a comprehensive, long-term reauthorization bill to the President before the current extension expires on May 31st.

Of course, we aren't in this mess for lack of trying. This Committee, under my leadership, and also under the leadership of

Senators Snowe and Kerry, has tried since 2006 to get a bill to the President to provide long-term authorization to operate these programs.

We've passed bills out of this Committee and through the full Senate numerous times with broad bipartisan support. We've also successfully attached the reauthorization legislation to important bills, like the annual National Defense Authorization Acts, with the help of Senators Levin and former House Armed Services Chairman Ike Skelton.

Most recently, in December of last year, we were able to pass and send to the House a compromise that blended the House and Senate bills bringing together advocates that had been divided for about six years. Representatives of the two key negotiators of that deal will testify today – the Biotechnology Industry Organizatin (BIO) and the Small Business Technology Coalition (SBTC).

In addition to BIO and SBTC, the compromise continues to have the support of the National Small Business Association, the U.S.

Chamber of Commerce, the NFIB, the National Venture Capital Association, local technology groups, and universities such as LSU, Louisiana Tech and the University of Akron. **I will submit the letters of support for the record.**

No other SBIR and STTR reauthorization bill in Congress, up to this point, has had the support of all those communities. It is a delicate balance, and I fully appreciate the concessions everyone has made.

We've compromised with an eight-year reauthorization instead of a permanent reauthorization. This deal will not only supply small businesses with the confidence to invest in these programs, but also to preserve the integrity of a program that has been saving approximately 200,000 jobs each year. These programs are providing the government and the private sector with cost-effective technology and scientific solutions to challenging programs.

Take Louisiana for example—a state well known for its seafood and oil industries. They are home to Mezzo Technologies. Mezzo

received $99,000 in grant funding to develop the radiator that helps the Bradley Tank keep its engine cool. You may not realize that soldiers will soon have advanced technology heating and cooling system suits thanks to a company in the small town of St. Francisville, Louisiana, R-BAT. R-BAT received more than $99,000 to jump start their research. These are just two simple success stories from a long list of small businesses with innovative ideas from the SBIR and STTR programs.

For example, in my ranking member's home state of Maine, one small company developed controls that monitor the accuracy in medical test results for leukemia patients with a $700,000 SBIR grant. At the start, Maine Molecular Quality Control could not function without SBIR funding, but today, they are completely supported by their own revenues.

One of our witnesses today is Dr. Irwin Jacobs, Co-Founder of Qualcomm. Through their time in the program, the company received roughly $1.5 million in awards. Over the last 25 years, Qualcomm's innovations in wireless communications technology have become the

backbone of our communication infrastructure worldwide. A company that started with only 35 employees now has 16,000 worldwide with a market capitalization of $80 billion.

Maybe you woke up this morning and picked up your electronic toothbrush? You can thank an SBIR grant for keeping off the plaque and gingivitis too. SBIR funding helped Optiva Corporation create the SONICARE mechanism inside electronic toothbrushes with grants equating $100,000 in 1995 and nearly $750,000 in 1998.

Finally, we are able to communicate easily in disaster zones using technology from a small company GATR [GATOR] out of Huntsville, Alabama. With more than $1.2 million dollars in grant funding, GATR Technologies created the inflatable antenna which provides emergency internet access, cell phone coverage, and phone lines over satellite networks. We used the prototype during Katrina and it came to first responders' aid after the quake in Haiti.

For each member of this Committee, as well as states across America, we find stories just like these. The SBIR and STTR programs fund technology that help save lives, communicate in disaster zones, reduce government expenses, and create jobs. These advanced technologies come from businesses that could have started in your garage. Or, they are the brain child of a scientist with a dream who took this program and made their dream an innovation. We find these new technologies thanks to a grant system that works and brings results to the government and private sector.

If these stories don't impress you enough, you can ask my staff for more. We have a stack of them.

Today, it is time to hear from some success stories, a technology expert who has thoroughly examined the programs' effectiveness and merits for continuation, and organization representatives to explain why their members support the program and our compromise. It's time to realize the importance of this program for America. It's time to understand why we need to give small businesses and innovators,

working with universities, the confidence that this program is here to stay.

I would now like to turn it over to our Ranking Member Olympia Snowe, for her opening statement.

Chair LANDRIEU. I would now like to turn it over to Ranking Member Snowe for her opening statement. Then we will go right into the record of experts here who can talk from their perspective about the importance of this program. Senator Snowe?

OPENING STATEMENT OF HON. OLYMPIA J. SNOWE, RANKING MEMBER, AND A U.S. SENATOR FROM MAINE

Senator SNOWE. Thank you, Chair Landrieu, for holding this hearing on these two critical programs—the Small Business Innovation Research Program and the Small Business Technology Transfer Program.

We are able to accomplish much for our nation's entrepreneurs through these programs and thank you again for the bipartisanship that has been the hallmark of this committee, and once again we demonstrated that with the passage of this legislation unanimously in the United States Senate in December. I know that we will have the same success this time and I am pleased we are able to work out a number of issues with the Senator from Oklahoma, Senator Coburn.

I also want to welcome all of our distinguished panelists here today that certainly can speak volumes in testimony about the value of these programs.

Especially with the unemployment rate hovering around nine percent for 21 consecutive months, it is all the more important that we do everything we can to give value to our small businesses and provide access to innovation and capital. They remain uncertain about the future, unable to invest, unable to access lending. So being able to have these programs reauthorized will help foster an environment of innovative entrepreneurship by directing more than $2 billion annually in Federal research and development funding to the nation's small firms most likely to create jobs and commercialize their products.

We know that small businesses not only are job generators, but as the Chair indicated, they are also our most effective innovators, producing roughly 13 times more patents per employee than large firms, patents which are at least two times as likely to be among the top one percent of high-impact patents. In a budgetary environment where the Small Business Administration will be required to do more with less spending, it is crucial that these programs, one of the strongest examples of a very successful public-partnership, be a key part of the agency's job creation agenda.

These programs have been front and center in improving our nation's capacity to innovate. According to a report by the Information Technology and Innovation Foundation, SBIR-backed firms have been responsible for roughly 25 percent of the nation's most crucial innovations over the past decade, "a powerful indication that the SBIR program has become a key force in the innovative economy of the United States."

In fact, there are a wide range of remarkable success stories, as demonstrated here today, from Qualcomm, which now employs 17,500, I think started out with less than a dozen people when you set it up back in 1985, Dr. Jacobs, to Cambrian Innovations, which focuses on the next generation of energy technologies, to Fiber Materials, a company from my home State of Maine with whom I met

Tuesday. They received a Tibbetts Award, as well, in recognition of their contributions to the SBIR program. One of Fiber Materials' many creative technologies is a heat shield used in NASA's Stardust mission, which spent seven years in space and is now on display at the Smithsonian National Air and Space Museum.

Regrettably, the SBIR program, as you all know, expired in September of 2008. It has been subject to a series of ten short-term temporary extensions since then, plaguing the program with uncertainty and potentially dissuading some of our nation's most promising firms from participating in it. That is why Chair Landrieu and I had extensive negotiations and debate on the reauthorization of this legislation and I am pleased that we reached the consensus we did with our colleague, Senator Coburn, in terms of the length of the reauthorization. Additionally, the Chair and I worked to increase the allocation for SBIR from 2.5 percent of an agency's extramural research and development budget to 3.5 percent over ten years and doubling the STTR allocation from 0.3 percent over six years. Our legislation would also codify increased award sizes from $100,000 to $150,000 for Phase 1 and from $75,000 to $1 million for Phase 2 in the SBIR program and apply those same levels to the STTR program.

I will not go on because I think we all understand the value. We want to hear from our panelists. But suffice it to say we have broad support, as the Chair indicated.

I would like to conclude my remarks by quoting from President Reagan when he signed the law establishing the SBIR program in 1982, which I happened to cosponsor, Madam Chair, although I hate to date myself——

[Laughter.]

But I think Mr. Glover might have been around.

[Laughter.]

President Reagan said, "Our nation is blessed with two important qualities that are often missing in our other societies, our spirit of entrepreneurship and our capacity for invention and innovation. These two elements are combined in the small businesses that dot our land." Well, I think reauthorizing these programs represents a profound opportunity to reaffirm the truth in this very optimistic vision of America that the small business community has presented.

Thank you, Madam Chair.

Chair LANDRIEU. Thank you, Senator Snowe.

Senator Cardin and Senator Rubio have joined us. Do you all have just very brief remarks? I would like to get to our panel, but I would love to recognize you.

Senator CARDIN. Madam Chair, I just want to recognize Mr. Hernandez, who is from Rockville, Maryland. He is one of those companies that we are talking about that has been responsible for not only creating jobs, but creating innovation in the biotech field and it is a pleasure to have him before our committee.

Chair LANDRIEU. Thank you, Senator Cardin.

Senator Rubio.

Senator RUBIO. No opening statement.

Chair LANDRIEU. Okay. Well, let me introduce our panelists. Our first panelist is Dr. Charles Wessner. He is the Director of Tech-

nology, Innovation, and Entrepreneurship for the U.S. National Academies. Dr. Wessner is recognized nationally and internationally for his expertise on innovation policy, including public-private partnerships, entrepreneurship, and early-stage financing. We are very happy to have you, Dr. Wessner.

Dr. Irwin Mark Jacobs, Co-Founder of Qualcomm, is one of the world's leaders in the next generation mobile technologies. They are pioneers of codivision multiple access digital wireless technology, otherwise known as CDMA. Dr. Jacobs is here to share a remarkable story about how the SBIR program actually helped Qualcomm that now employs, what, 16,000 people?

Mr. JACOBS. A little over 17,000.

Chair LANDRIEU. Seventeen thousand, moving up. How this program helped them to get started and have the tremendous impact on the private sector that they are having now.

Dr. Matthew Silver is Co-Founder and President of IntAct Labs, as has been noted, which is focused on technological and business innovations with the potential to revolutionize their domain of applications. Dr. Silver, we thank you for being here.

Next, Mr. Jere Glover, whose experience with SBIR is wide ranging. As a former Counsel of the House Small Business Committee, he directed a comprehensive set of hearings on this legislation, and we continue to thank Jere for the advice he is giving to this Chair at this time on a wide variety of issues. Thank you, Jere.

Finally, as Senator Cardin pointed out, Mr. Joe Hernandez from the State of Maryland. He has received graduate degrees in molecular genetics and business administration from the University of Florida, is currently Chairman for Principia, a biotechnology company that manufacturers novel and proprietary molecular imaging agents and other treatments for cancer and other diseases. I hope I got that right?

We have a very qualified panel with us this morning, and let us start with Dr. Wessner. Just press the button, and you might have to speak a little bit more closely into your microphone.

STATEMENT OF CHARLES W. WESSNER, PH.D., DIRECTOR OF TECHNOLOGY, INNOVATION, AND ENTREPRENEURSHIP, THE NATIONAL ACADEMIES

Dr. WESSNER. Well, please, Senator, may I first thank you for your kindness in inviting us to talk about our research. The research is here for anyone who——

Chair LANDRIEU. I wanted to point out to the committee, Dr. Wessner, when we say he is the expert, those are all the books that he has written on this program. So if any of you all have any questions about anything related to this program, you are welcome to ask me, but please go to Dr. Wessner or pick up one of those books, Senator Rubio.

Dr. WESSNER. We would also like to recommend this if you have trouble sleeping at night. These would probably help you out a little bit.

[Laughter.]

Let me first congratulate you, if I may, Senator. You know, your committee and the Congress as a whole should be congratulated on having one of the most innovative, effective, and adaptive programs

for small business the world has ever seen. And I would particularly like to commend you for emphasizing the importance of stability to the program. I just wanted to start there. Thanks very much.

Please interrupt me if you have any trouble hearing me. My son complains that I speak more loudly than I should, but sometimes in public, it is not enough.

[Laughter.]

One of the things that is very important for us to keep in mind, and I say this with great respect, but we have a tendency here to make references to the global economy, and then once we talk about legislation and programs, we get completely lost within the beltway. And it is really important. We have traveled recently to Germany, to China, to Korea. The rest of the world is spending really hard. I sometimes feel like we are talking about the 1930s and about whether we need an army. You know, we do.

The very good news is that we have a President who has quite rightly focused our attention on innovation, education, and competitiveness, so we would agree, I think everyone around this table, that innovation is good. What is harder to keep in mind is that it is actually a little harder than it might seem. Why? Because there is what we would call a valley of death, and I am very pleased to note here that in no small part thanks to the work of the National Academies in this area, people are recognizing that this valley of death exists.

We put a lot of money in federally funded research, but the problem is, when you have new ideas, they are new and they do not have supporters, and that exists in large corporations as well as in small corporations. How do you move this across the valley?

An important point to keep in mind is you can have really good ideas that die. They will die because they do not have the funding. SBIR brings capital to transform these ideas into innovations. You are not done then, as the gentlemen here on my right, all of them, can explain. But that gets you the innovation and the product development and the start of the uptake.

So how do we get across here? Well, the rest of the world thinks that the SBIR program is the greatest thing since sliced bread. I could put up a list of ten countries that have copied this program, and there is a source of dismay to us. The rest of the world is copying it, putting it on steroids, while we are debating it.

So I also want to stress, as you were kind enough to do, Senator, that we have not just done—there are a lot of think tanks in this town and I sometimes think they should be called tanks, because there is not necessarily a lot of thinking that is involved. They make up their opinion over the weekend. They make three phone calls.

We did not make three phone calls. We talked to everybody in town, as some of the gentlemen in this room can tell you. We looked for best practice. We focused on these four things. There is really no one we did not talk to, including the distractors to the program.

We surveyed over 7,000 projects, not seven, not 20, but 7,000. We did 100 case studies. And these are the books that you have mentioned here. This was our principal finding for the program, and I

want to stress, this is a National Academies finding. You cannot just say this. There were 30 reviewers on this, 20 people on the research team, 20 people on the committee, and this is what they decided.

The vernacular expression here is that the program works. Of course, one of the important things to keep in mind is that it works in a variety of ways for a variety of things. Its focus is where we hurt most. We put almost $150 billion into research. How much do we put into translational research? How much do we put in to pool things across to our companies? That is something, in all sincerity, we really need to work on, not just with this program but with other programs. As I asked Dr. Haldron in the roll-out for the budget, $32 billion for NIH, what do we spend to bring it to the market? It is stable, and you know that is important. It is large scale. This is really best practice. You need a portfolio of investments, as any venture capitalist can tell you. You cannot make just a few investments and expect to win.

One of the key effects is it is decentralized and adaptive. When we first started the study, we were alarmed because everybody was not doing it exactly the same way, and then we realized that is why it works. The National Institutes of Health works very hard at assembling—at keeping people healthy. Part of the defense agencies work hard at disaggregating them when necessary. So our point here is that the Navy, the National Science Foundation, and NASA all have different things.

The program brings in over a third new companies every year. This is really extraordinary. It is not captured by a small group. Twenty percent of the companies are created because of the awards, bringing things out of the research community into the market, its core function. It encourages partnering with the university community. This program is great for universities, and I will be happy to elaborate on that.

Almost 50 percent of the firms that get awards reach the market, and those numbers are going up. Why are they going up? Because over time, more and more of these companies are, in fact, reaching the market. And it is also significant because SBIR is, in fact, in an early stage, earlier than venture capital, with risky technologies. And by the way, if I may, Madam Chairman, one of the key points to keep in mind, if the program ever hits 100 percent, it will be a bad thing. We do not want——

Chair LANDRIEU. I am sorry. Repeat that again, please?

Dr. WESSNER. If the program ever hits 100 percent success rate, that would be a bad thing because that would mean they are making very conservative——

Chair LANDRIEU. Correct.

Dr. WESSNER [continuing]. Safe, inside the box investments.

Chair LANDRIEU. There are going to be some failures in this.

Dr. WESSNER. There has to be. The best way I refer to it is it is like shooting a basketball. You have to shoot to win, and you cannot be disappointed if you miss a shot, especially me. I have a lot of experience in that.

But when people say, does the program work, just very quickly, what does it mean by work? Well, it creates jobs. It helps solve problems for the military. Sometimes it helps solve problems—one

of our apocryphal jokes is if it makes a better nuclear trigger, we are really not interested in widespread commercial success.

[Laughter.]

Innovation success. You already mentioned the toothbrush, which one might smile at, but that is a $5 billion business.

Distribution—I know this is of interest to you. One of the key variables for success here is application. It is tightly linked, by the way, to population, to the number of scientists and engineers, to the business environment, the level of VC activity, and above all, to the number and orientation of universities. Some universities are really into commercialization, some are not. It is important to note that.

So one of our key recommendations, please, keep the program. Reauthorize the program. And reauthorize the program for a long time.

Keep as much flexibility as you can. I would much rather you make a phone call to a program manager than pass a law.

Draw from best practices, and your bill emphasizes the importance of that, and we are very pleased to note that there has been increased learning. One of the things a new administration, particularly in DARPA, is working hard on is shortening the cycle time. If we can get the cycle time, the decision time down to a few months rather than six months or nine months, the value of the program, and I am sure my colleagues here in the business world can emphasize that, goes up enormously.

We need to do more in outreach. There is interesting work by Sidney Pandos in Silicon Valley that women-owned firms are a great under-utilized asset in this country. They actually have a higher success rate than many firms.

We also would really emphasize the importance of funds for managing the program. As these two programs approach $3 billion a year, having a little money to evaluate, to assess, to know whether your experiments are working, to be able to check on your firms, is increasingly important and would get more buy-in within the agencies themselves.

Should we put more money into it? This is the Academy finding. We cannot tell you that this is more important than the second jet engine for a military aircraft. We cannot tell you that it is more important than having troops on a cliff—on a peak in Afghanistan. But we can tell you that if you put more money in this program, it will be used effectively.

Already, these are some of the things that are happening within the program as a result of the recommendations we have made. There has been an explosion of experimentation——

Chair LANDRIEU. One more minute, Dr. Wessner.

Dr. WESSNER. You have been very kind with me already. So let me close by saying that SBIR is an outstanding innovation program and I would urge you with all my heart and all our expertise to reauthorize this program and to get this on the President's desk for a sustained period of time. That stability is very important.

Thank you very much for your patience.

[The prepared statement of Dr. Wessner follows:]

Testimony of Charles W. Wessner
National Research Council

To the
United States Senate
Small Business and Entrepreneurship Committee

February 17, 2011

The Small Business Innovation Research Program

Good morning Senator Landrieu and members of the Committee. My name is Charles Wessner, and I work at the National Research Council's Board on Science, Technology, and Economic Policy. The National Research Council is the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine of the National Academies, chartered by Congress in 1863 to advise the government on matters of science and technology.

The Small Business Innovation Research (SBIR) program was created in 1982 through the Small Business Innovation Development Act. The 11 federal agencies administering the SBIR program disburse over $2.5 billion dollars in competitive awards to innovative small firms. As the SBIR program approached its twentieth year of operation, the U.S. Congress requested the National Research Council (NRC) of the National Academies to "conduct a comprehensive study of how the SBIR program has stimulated technological innovation and used small businesses to meet Federal research and development needs" and to make recommendations with respect to the SBIR program.

The NRC study has assessed the SBIR program as administered at the five federal agencies that together make up some 96 percent of SBIR program expenditures. The agencies, in order of program size, are the Department of Defense (DoD), the National Institutes of Health (NIH), the National Aeronautics and Space Administration (NASA), the Department of Energy (DoE), and the National Science Foundation (NSF).

Based on that legislation, and after extensive consultations with both Congress and agency officials, the NRC focused its study on two overarching questions. First, how well do the agency SBIR programs meet four societal objectives of interest to Congress? That is:

(1) to stimulate technological innovation;

(2) to increase private sector commercialization of innovations;

(3) to use small business to meet federal research and development needs; and

(4) to foster and encourage participation by minority and disadvantaged persons in technological innovation.[1]

Second, can the management of agency SBIR programs be made more effective? Are there best practices in agency SBIR programs that may be extended to other agencies' SBIR programs?

To satisfy the Congressional request for an external assessment of the program, the NRC analysis of the operations of the SBIR program involved multiple sources and methodologies. A large team of expert researchers carried out extensive NRC-commissioned surveys and case studies. In addition, agency-compiled program data, program documents, and the existing literature were reviewed. These were complemented by extensive interviews and discussions with program managers, program participants, agency "users" of the program, as well as program stakeholders.

The study as a whole sought to understand operational challenges and to measure program effectiveness, including the quality of the research projects being conducted under the SBIR program, the challenges and achievements in commercialization of the research, and the program's contribution to accomplishing agency missions. To the extent possible, the evaluation included estimates of the benefits (both economic and non-economic) achieved by the SBIR program, as well as broader policy issues associated with public-private collaborations for technology development and government support for high technology innovation.

Taken together, this study is the most comprehensive assessment of SBIR to date. Its empirical, multifaceted approach to evaluation sheds new light on the operation of the SBIR program in the challenging area of early-stage finance. As with any assessment, particularly one across five quite different agencies and departments, there are methodological challenges. These are identified and discussed in the text of the Academies' report.[2] This important caveat notwithstanding, the scope and diversity of the report's research should contribute significantly to the understanding of the SBIR program's multiple objectives, measurement issues, operational challenges, and achievements.

SUMMARY OF KEY FINDINGS

The core finding of the study is that the SBIR program is sound in concept and effective in practice. It can also be improved. Currently, the program is delivering results that meet most of the Congressional objectives.
Specifically, the program is:

- **Stimulating Technological Innovation**

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[1]These Congressional objectives are found in the Small Business Innovation Development Act (PL 97-219). In reauthorizing the program in 1992 (PL 102-564), Congress expanded the purposes to "emphasize the program's goal of increasing private sector commercialization developed through Federal research and development and to improve the Federal government's dissemination of information concerning small business innovation, particularly with regard to woman-owned business concerns and by socially and economically disadvantaged small business concerns."

[2]See National Research Council, *An Assessment of the SBIR Program.* C. Wessner, ed., Washington DC: National Academies Press, 2008

- **Generating Multiple Knowledge Outputs**. SBIR projects yield a variety of knowledge outputs. These contributions to knowledge are embodied in data, scientific and engineering publications, patents and licenses of patents, presentations, analytical models, algorithms, new research equipment, reference samples, prototypes products and processes, spin-off companies, and new "human capital" (enhanced know-how, expertise, and sharing of knowledge).

- **Linking Universities to the Public and Private Markets**. The SBIR program supports the transfer of research into the marketplace, as well as the general expansion of scientific and technical knowledge, through a wide variety of mechanisms. NRC surveys find that SBIR is playing an important role in linking universities to the market. Over a third of respondents to the NRC Phase II Survey reported university involvement in their SBIR project. Among those reporting university involvement, more than two-thirds of companies reported that at least one founder was previously an academic; about one-third of founders were most recently employed as academics before founding the company; and some 27 percent of projects had university faculty as contractors on the project. These data underscore the significant level of involvement by universities in the program and highlight the program's contribution to the transition of university research to the marketplace.

- **Increasing Private Sector Commercialization of Innovations**
  - **A Commercial Enabler for Small Firms.** Small technology companies use SBIR awards to advance projects, develop firm-specific capabilities, and ultimately create and market new commercial products and services.
    - **Company Creation**. Just over 20 percent of companies responding to the NRC Firm Survey indicated that they were founded entirely or partly because of a prospective SBIR award.
    - **The Decision to Initiate Research**. Companies responding to the NRC Phase II Survey reported that over two-thirds of SBIR projects would not have taken place without SBIR funding.
    - **Providing Alternative Development Paths**. Companies often use SBIR to fund alternate development strategies, exploring technological options in parallel with other activities.
    - **Reaching the Market**. Although the data vary by agency, respondents to the NRC Phase II Survey indicate that just under half of the projects do reach the marketplace. Given the very early stage of SBIR investments, and the high degree of technical risk involved (reflected in risk assessment scores developed during some agency selection procedures), the fact that a high proportion of projects reach the market place in some form is significant, even impressive.
  - **A Small Percentage of Projects Account for Most Successes**. As with investments made in early stage companies by angel investors or venture capitalists, SBIR awards result in sales numbers that are highly skewed. A small percentage of projects will likely achieve large growth and significant

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sales revenues—i.e., become commercial "home runs." Meanwhile many small successes together will continue to meet agency research needs and comprise a potentially important contribution to the nation's innovative capability.

- **SBIR is an Input, not a Panacea**. SBIR can be a key input to encourage small business commercialization, but most major commercialization successes require substantial post-SBIR research and funding from a variety of sources. SBIR awards will have been in many cases a major, even decisive input—but only one of the many contributions needed for success.

- **Using Small Businesses to Meet Federal Research and Development Needs**
  - **Flexible Adaptation to Agency Mission**. The effective alignment of the program with widely varying mission objectives, needs, and modes of operation is a central challenge for an award program that involves a large number of departments and agencies. The SBIR program has been adapted effectively by the management of the individual departments, services, and agencies, albeit with significant differences in mode of operation reflecting their distinct missions and operational cultures. This flexibility in program management and modes of operation is one of the great strengths of the program.
  - **Meeting Agency Procurement Needs**. The SBIR program helps to meet the procurement needs of diverse Federal agencies. At the Department of Defense, the Navy has achieved significant success in improving the insertion of SBIR-funded technologies into the acquisition process. The commitment of upper management to the effective operation of the program appears to be a key element of this success. Teaming among the SBIR program managers, agency procurement managers, the SBIR awardees, and, increasingly, the prime contractors is important in the transition of technologies from projects to products to integration in systems. At DoD, the growing importance of the SBIR program within the defense acquisition system is reflected in the growing interest of prime contractors, who are seeking opportunities to be in support of SBIR projects—a key step toward acquisition.[3]

- **Providing Widely Distributed Support for Innovation Activity**
  - **Large Number of Firms**. During the fourteen years between 1992 and 2005, inclusive, more than 14,800 firms received at least one Phase II award, according to the SBA Tech-Net database.
  - **Many New Participants**. Each year, over one third of the firms awarded SBIR funds participate in the program for the first time. This steady infusion of new firms is a major strength of the program and suggests that SBIR is encouraging innovation across a broad spectrum of firms, creating additional

[3]The growing interest of Defense prime contractors is recorded in National Research Council, *SBIR and the Phase III Challenge of Commercialization*, Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007.

competition among suppliers for the procurement agencies, and providing agencies new mission-oriented research and solutions.

- **Fostering Participation by Minority and Disadvantaged Persons in Technological Innovation**
  - **A Mixed Record.** Woman- and minority-owned firms face substantial challenges in obtaining early-stage finance. Recognizing these challenges, the legislation calls for fostering and encouraging the participation of women and minorities in SBIR. Given this objective, some current trends are troubling. Agencies do not have a uniformly positive record in collecting data and monitoring funding flows for research by woman- and minority-owned firms.
    - While support for woman-owned businesses is increasing, support for minority-owned firms has not increased. For example, at DoD, which accounts for over half the SBIR program funding, the share of Phase II awards going to woman-owned businesses increased from 8 percent at the time of the 1992 reauthorization (1992-1994) to 9.5 percent (in a program increasing in overall size) for the most recent years covered by the NRC Phase II Survey (1999-2001)
    - The share of Phase I awards to minority-owned firms at DoD has declined quite substantially since the mid 1990s and fell below 10 percent for the first time in 2004 and 2005. Data on Phase II awards suggest that the decline in Phase I award shares for minority-owned firms is reflected in Phase II.
    - Documenting and monitoring the participation by women and minorities is complex, given, *inter alia*, the variations in the demographics of the applicant pool. In some cases, agency efforts in this area have been inadequate. Agencies are encouraged to collect, analyze, and regularly report on this important element of the program.
  - **Support for Woman and Minority-Principal Investigators.** Beyond support for woman- and minority-owned firms, support for woman and minority principal investigators can be an important step, supporting the potential entrepreneurs of the future.

SUMMARY OF KEY RECOMMENDATIONS

The National Academies' recommendations for SBIR are intended to improve the operation of an already effective program. They seek to maintain, and reinforce, positive features of program management, such as the flexibility in approach by different agencies. They also identify pressing needs, e.g. for better data collection and analysis and opportunities for improvements in program operations in areas such as award size, cycle time, and outreach to minorities.

- **Retain Program Flexibility**

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- **SBA and SBIR**. The SBA has oversight responsibility for the eleven SBIR programs underway across the federal government. The agency is to be commended for its flexibility in exercising its oversight responsibilities, which allows the agencies to adapt the program to fit their needs and methods of operation. This flexibility has proven fundamental to the program's success, and should be preserved.

- **Encourage Program Innovation.** As noted above, it is essential to retain and encourage the flexibility that enables SBIR program management to innovate towards an even more effective multi-phase program.
- **Preserve the Basic Program Structure**. The three phase approach of the SBIR program should be maintained. Proposals to "bypass" Phase I are neither necessary nor appropriate. Permitting companies to apply directly to Phase II would have the potential to change the program, significantly reducing funds for Phase I. Such a shift does not seem necessary given the current flexibility in award size.

- **Conduct Regular Evaluations**. Regular, rigorous program evaluation is essential for quality program management and accountability, and improved program output. Accordingly, the SBIR program managers should give greater attention and resources to the systematic evaluation of the program supported by reliable data and should seek to make the program as responsive as possible to the needs of small company applicants.
  - **Annual Reports**. Top agency management should make a direct annual report to Congress on the state of the SBIR program at their agency. This report should include a statistical appendix, which would provide data on awards, processes, outcomes, and survey information.
  - **Internal Evaluation**. Agencies should be encouraged—and funded—to develop improved data collection technologies and evaluation procedures. Where possible, agencies should be encouraged to develop interoperable standards for data collection and dissemination.
  - **External Evaluation.** Agencies should be directed to commission an external evaluation of their SBIR programs on a regular basis.
- **Improve Program Processes**
  - **Topic Definition**. SBIR program managers should ensure that solicitation topics are broadly defined and that topics are defined from the "bottom-up" based on agency mission needs.
  - **Project Selection**. Agencies should also ensure that project selection procedures are transparent and flexible and are attuned to the needs of small businesses.
  - **Cycle Time**. The processing periods for awards vary substantially by agency, and appear to have significant effects on recipient companies. Agencies should closely monitor and report on cycle times for each element of the SBIR program: topic development and publication, solicitation, application review, contracting, Phase II application and selection, and Phase III contracting. Agencies should also specifically report on initiatives to shorten decision cycles.

- **Pilot Programs**. The agencies should be strongly encouraged to develop pilot programs to address possible improvements to the SBIR program. Agencies should equally ensure that such program modifications are designed, monitored and evaluated, so that positive and negative results can be effectively determined.

- **Readjust Award Sizes**
  - **One-time Adjustment**. The real value of SBIR awards, last increased in 1995, has eroded due to inflation. Given that Congress did not indicate that the real value of awards should be allowed to decline, this erosion in the value of awards needs to be addressed. In order to restore the program to the approximate initial levels, adjusted for inflation, the Congress should consider making a one-time adjustment that would give the agencies latitude to increase the standard size of Phase I awards to $150,000, and to increase the standard size of Phase II awards to approximately $1,000,000.
  - **Maintain Flexibility**. It should be stressed that recommendations are intended as guidance for standard award size. The SBA should continue to provide the maximum flexibility possible with regard to award size and the agencies should continue to exercise their judgment in applying the program standard. The diversity of agency and project needs does not permit a one-size-fits-all approach.

- **Continue to Focus on Increased Private-sector Commercialization**
  - **Encourage Continued Experimentation**. The agencies should be strongly encouraged to develop programs that seek to improve the commercialization outcomes of the SBIR program. Some agencies have sought, with the approval of SBA, to experiment with SBIR funding beyond Phase II in order to improve the commercialization potential of SBIR funded technologies. NIH has substantially increased its use of supplementary awards—additional funding provided largely at the discretion of the program manager to help meet unexpected research costs. The NSF Phase IIB initiative and the NIH Competing Continuation Awards are positive examples that might well be adapted elsewhere.
  - **Mission Agencies Create a Phase III Pull**. By working with prime contractors, create mechanisms (such as the Navy's Phase IIB SBIR or Phase III funding with program dollars) to help bridge the "Valley of Death" between Phase II and application funding.
  - **Multiple Winners Should be Judged on Output, Not Numbers of Awards**. In the case of multiple award winners who qualify in terms of the selection criteria, the acceptance/rejection decision should be based on their performance on past grants in terms of commercialization success and addressing agency needs, rather than on the number of grants received. Firms able to provide quality solutions to solicitations should not be excluded, *a priori*, from the program except on clear and transparent criteria (e.g., quality of research and/or commercialization performance).

- **Improve Participation and Success by Women and Minorities**

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- **Improve Data Collection and Analysis**. Agencies should arrange for an independent analysis of a sample of past proposals from woman- and minority-owned firms and from other firms (to serve as a control group). This will help identify specific factors accounting for the lower success rates of woman- and minority-owned firms, as compared with other firms, in having their Phase I proposals granted.
- **Extend Outreach to Younger Women and Minority Students**. Agencies should be encouraged to solicit women and underrepresented minorities working at small firms to apply as principal investigators and senior co-investigators for SBIR awards, and should track their success rates.
- **Encourage Participation**. Agencies should develop targeted outreach to improve the participation rates of woman- and minority-owned firms, and strategies to improve their success rates based on causal factors determined by analysis of past proposals and feedback from the affected groups.[4]

- **Increase Management Funding for SBIR**
  - **Enhance Program Utilization**. To enhance program utilization, management, and evaluation, consideration should be given to the provision of additional program funds for management and evaluation. Additional funds might be allocated internally within the existing agency budgets, drawn from the existing set-aside for the program, or by modestly increasing the set-aside for the program, currently at 2.5 percent of external research budgets.
  - **Optimize the Return on Investment**. The key point is that a modest addition to funds for program management and evaluation are necessary to optimize the nation's return on the substantial annual investment in the SBIR program.
  - **Additional Resources Could be Used Effectively**. In summary, the program is proving effective in meeting Congressional objectives. It is increasing innovation, encouraging participation by small companies in federal R&D, providing support for small firms owned by minorities and women, and resolving research questions for mission agencies in a cost-effective manner. Should the Congress wish to provide additional funds for the program in support of these objectives, those funds could be employed effectively by the nation's SBIR program.

[4]This recommendation should not be interpreted as lowering the bar for the acceptance of proposals from woman- and minority-owned companies, but rather as assisting them to become able to meet published criteria for grants at rates similar to other companies on the basis of merit, and to ensure that there are no negative evaluation factors in the review process that are biased against these groups.

Chair LANDRIEU. Thank you, Dr. Wessner. I really appreciate that direct and passionate testimony.

For the members that just came in, the books in front of the Dr. Wessner are those that he has written on this program in terms of the evaluation. So we have really got some good data to guide the work of our committee.

Dr. Jacobs.

STATEMENT OF IRWIN MARK JACOBS, PH.D., CO–FOUNDER, QUALCOMM

Dr. JACOBS. Good morning, Senator Landrieu, Senator Snowe, members of the committee. It is an honor to appear today to testify about the role that the Small Business Innovation Program has played in Qualcomm's success.

My name is Irwin Jacobs. I am Co-Founder of Qualcomm. I served as CEO and Chairman of the Board of Qualcomm until July of 2005, our 20th anniversary, and then as Chairman of the Board until March of 2009. Currently, I do serve on the Qualcomm Board of Directors. I also serve as Chair of the National Academy of Engineering and Chair of the Salk Institute for Biological Studies.

Let me begin by thanking the members of this committee for the work that you do in promoting policies that assist the growth of small businesses in this country. As I will discuss further in my testimony, the SBIR program was among the critical factors that contributed to Qualcomm's early success, those factors that took us from a small start-up a quarter of a century ago with a group of employees that fit in my den to over 17,500 employees in offices around the world, annual revenues of over $11.5 billion, and we are currently the world's largest fabless semiconductor company serving the solar industry. Earlier this week, Qualcomm was deeply honored to be inducted into the Small Business Innovation Research Hall of Fame.

We started small in July 1985 without a specific product in mind but with a determination to innovate in digital and wireless communications. Within a few months of our founding, while driving home to San Diego from a meeting in Los Angeles where we were consulting on a mobile satellite communications program, it struck me that codivision multiple access, or CDMA, which I will not try to explain, might provide a significant advantage for mobile communications over the more traditional digital technologies. Klein Gilhousen, one of our other founders, followed up and discovered additional compelling advantages.

In those early days, CDMA technology was widely perceived as possibly promising, but risky, technology. Companies around the world had studied it, but then dropped it after encountering technical difficulties that they felt may never be solvable for commercial equipment, or in any case, not for a timely deployment. But we were able in 1989 to demonstrate by building two base stations and a mobile phone that required a van to drive it around that we had, in fact, solved a number of the critical problems. CDMA offered a significant increase in spectrum efficiency, that is, in the number of subscribers that you can fit in a given allocation of spectrum. With projections of accelerating user growth and with limited spec-

trum, carriers offered support, and urged their manufacturers to work with us.

To cover our costs in developing application specific integrated circuits for commercial handsets and base stations, we negotiated with several manufacturers for a licensing approach that provided an up-front payment that would get applied to development and then a royalty on CDMA handsets they might manufacture, should CDMA ever prove successful. In return, we provided them with a steadily growing portfolio of patterns.

We were successful with the integrated circuits and then having CDMA accepted as a second generation standard, along with TDMA. The first CDMA network went commercial in Hong Kong in 1995. The next two networks, in South Korea in 1996 and then several networks here across the United States.

Qualcomm provided handsets, cell phones, manufactured in San Diego for all of those early systems. That is, we were shipping phones from San Diego to Hong Kong, from San Diego to South Korea. Unfortunately, that has changed a little bit since.

We have focused on advancing the technology, including, for example, high data rate wireless technology that has become the basis for third generation wireless, all base——

Chair LANDRIEU. Dr. Jacobs, I am sorry, but you have 45 seconds. Sorry.

Dr. JACOBS. Thank you—with over one billion users.

During its critical first five years, Qualcomm received several Phase 1 and Phase 2 SBIR grants that allowed us to pursue several innovative programs that otherwise would not have been possible. One involved bandwidth efficient coding techniques, another a method and hardware to test codes, both of which have proved useful in our development of CDMA. Another allowed us to develop an application specific integrated circuit, a first step in business that now brings in about two-thirds of our revenue.

So part of our ability to succeed as a young and vulnerable pioneering company was the funding that we received through the SBIR program. It did support us at a very critical time in our development. We urge you to continue the program, and indeed, increase the funding. Thank you.

[The prepared statement of Dr. Jacobs follows:]

Statement by

Dr. Irwin Mark Jacobs

Co-Founder

Qualcomm

Prepared for the hearing on

Reauthorization of the SBIR and STTR Programs

Before the

U.S. Senate Committee on

Small Business and Entrepreneurship

February 17, 2011

10:00 am

Introduction

Good morning Senator Landrieu, Senator Snowe, and Members of the Committee. It is an honor to appear before the Senate Committee on Small Business and Entrepreneurship today to testify about the role that the Small Business Innovation Research (SBIR), program has played in Qualcomm's success.

My name is Irwin Jacobs, and I am Co-Founder of Qualcomm. I served as CEO and Chairman of the Board of Qualcomm until July 2005 and as Chairman of the Board until March 2009. Currently, I serve on Qualcomm's Board of Directors.

Let me begin by thanking the Members of this Committee for the work that you do in promoting policies that assist the growth of small businesses in this country. You are to be commended for your role in pursuing successful policies that have strengthened innovation, created jobs, and fostered innovation in the U.S. The SBIR program is one such example. As I will discuss further in my testimony, the SBIR program was among the critical factors that contributed to Qualcomm's early success – those factors that took us from a small startup a quarter century ago with a group of employees that could fit in a den to the Qualcomm of today, the world's largest fabless semiconductor company with over 17,500 employees in offices around the world and annual revenues of $11 billion. Earlier this week, Qualcomm was deeply honored to be inducted into the Small Business Innovation Research Hall of Fame.

The SBIR program was important to our success. We applaud the Committee for holding this hearing today to learn about ways in which the SBIR program can be strengthened and renewed to ensure that other future success stories are possible for the benefit of the American people.

Qualcomm Overview Today

Qualcomm was founded in 1985 with a vision to innovate and develop advanced wireless services for commercial markets. Today, following through on that vision, Qualcomm is a world leader in developing innovative wireless technologies, including the Code Division Multiple Access ("CDMA") -based and Orthogonal Frequency Division Multiple Access ("OFDMA") cellular technologies that are used worldwide for wireless voice and broadband communications and are integral to hundreds of mobile phones, tablets, e-readers, mobile apps, and other wireless devices and services. Qualcomm technology powers 3G and 4G cellular networks operated by wireless carriers throughout the U.S. and around the world. These carriers' networks enable hundreds of millions of people, in rural, suburban, and urban areas alike, to enjoy ubiquitous and highly advanced mobile voice and broadband data services.

Since its inception, Qualcomm has invested more than $15.5 billion in R&D. In fiscal 2010 alone, Qualcomm spent twenty three cents out of every dollar in revenue, or a total of $2.55 billion on R&D. These enormous expenditures have enabled Qualcomm to invent many of the wireless technologies fueling unprecedented growth in mobile voice and broadband services.

In addition, Qualcomm has an extensive portfolio of U.S. and foreign patents relating to 3G and 4G digital wireless communications technologies, and the company continues to file for, and be awarded, patent applications in the U.S., Europe, China, Japan, South Korea, Brazil, India, Taiwan and other countries around the globe. Qualcomm broadly licenses its technology to more than 190 handset and infrastructure manufacturers worldwide that make network equipment, handsets and other consumer devices and develop applications for cellular networks based on 3G and 4G technologies.

Furthermore, Qualcomm's chipsets support all the major frequency bands, the full gamut of standardized, globally harmonized 3G and 4G wide area mobile broadband

and cellular technologies, Assisted GPS (A-GPS) location tools, Bluetooth, Wi-Fi, and many mobile device operating systems, such as Android, Windows Phone 7, and Qualcomm's own Brew Mobile Platform. We produce chips that the world's leading phone manufacturers integrate into their 3G devices. We're also producing chips based on the latest 4G Long Term Evolution (LTE) technology that remain compatible with existing 3G technologies to ensure wide coverage for multi-mode LTE/3G devices.

Qualcomm currently employs people in 141 locations in over thirty countries, but the vast majority of our 17,500 employees are located in the United States. Our headquarters are in San Diego, but over the years we've opened additional facilities across the U.S. including in Massachusetts, New Jersey, North Carolina, Texas, Colorado, Georgia and Silicon Valley. We are proud to have been included yet again on FORTUNE's "100 Best Companies to Work For," list for the 13th consecutive year.

Today, people the world over are interacting with each other in different ways because of the technologies we've created at Qualcomm. Of the 5 billion mobile subscribers worldwide, approximately 1 billion are using a 3G or 4G device. Mobile data usage, which Qualcomm's technologies were designed to enable, is growing rapidly. Last October, the FCC projected that mobile data usage would grow by more than 35 times from 2009 to 2014. Since our founding just over 25 years ago, the mobile phone used primarily for voice communication has become an extraordinarily powerful mobile computer -- the largest information platform in the history of humankind – one based on Qualcomm's innovative CDMA technology.

Qualcomm's Early Days

Qualcomm began with a meeting of our seven founders in my den in San Diego in July 1985. We started small and without any specific product in mind, but with the determination to innovate in digital wireless communications. Initially, we focused on contract research and development work. In the beginning, more than half of Qualcomm's business was derived from government contracts, and we spent a great

deal of time filling out proposals for military and space projects in the southern California region.[1]

Within a few months of our founding, while driving home to San Diego from a meeting in Los Angeles where we were consulting on a mobile satellite communications program, it struck me that CDMA might provide a significant advantage for mobile communications over the more traditional digital technologies, time division (TDMA), and frequency division (FDMA) multiple access. Klein Gilhousen, one of our other founders, followed up and discovered additional compelling advantages. Interestingly, CDMA utilizes spread spectrum signaling, with early origins in military applications dating to World War II. Perhaps the earliest patent was granted to actress and inventor Hedy Lamarr who, with her pianist friend George Antheil, conceived frequency-hopping spread spectrum by considering transmitting a random sequence of piano notes with the sequence known only to the transmitter and the intended receiver.

In Qualcomm's early days, CDMA was widely perceived as possibly promising but risky technology. Commercializing our vision for CDMA was a difficult and costly process, and by necessity, we sought funding from numerous sources, including from the SBIR, while we also searched for an application of digital satellite communications with commercial potential.

We determined that the transportation industry offered the best opportunity for a near-term commercial application. Between 1985 and 1988 the company developed a wireless, two-way messaging and positioning system that would enable trucking firms to closely track their drivers' progress while enabling drivers and dispatchers to send messages to each other. This effort resulted in a system named OmniTRACs. Since its commercial introduction in 1988, OmniTRACs, which also utilizes spread spectrum signaling, has grown to become the largest satellite-based commercial mobile system for the transportation industry today.

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[1] David Mock, *The Qualcomm Equation*, (New York: AMACOM, 2005), 32

Once we had revenues from OmniTRACs, we were able to turn our attention once again to commercializing CDMA. Companies around the world had studied it but then dropped it after encountering technical difficulties that they felt might never be solvable for commercial equipment and, in any case, not for a timely deployment. But in 1989 we were able to demonstrate by building two base stations and a van-size mobile that we had solved the critical technical problems. CDMA offered a significant increase in spectrum efficiency, that is in the number of subscribers a carrier could support in a given allocation of spectrum. With projections of accelerating user growth and with limited spectrum, carriers offered support and urged their manufacturers to work with us.

To cover our costs in developing application specific integrated circuits for commercial handsets and base stations, we negotiated with several manufacturers a licensing approach that provided an upfront payment that we could apply to development and then a royalty on CDMA handsets they might manufacture should CDMA ever prove successful. In return, we permitted them to use our steadily growing portfolio of patents. We were successful with the integrated circuits and then in having CDMA accepted as a second generation standard along with TDMA.

The first CDMA network went commercial in Hong Kong in 1995; next two networks became operational in South Korea in 1996; and finally several networks became operational across the United States. Qualcomm provided handsets manufactured in San Diego for all of these early systems. However, we then made a strategic decision to sell the handset and infrastructure divisions of Qualcomm and concentrate on developing integrated circuits and software that we could sell to many manufacturers. We also focused on advancing the technology, including, for example, high rate wireless data that has become the basis for 3G.

Qualcomm's fight to gain acceptance and deployment of CDMA was not easy. The established industry players did not want to take on a new technology, particularly one that would enable new competitive manufacturers. Even after Qualcomm built and

successfully demonstrated a small CDMA system incorporating its solutions, a Stanford University professor stated that we would not succeed because our technology "defied the laws of physics."

Qualcomm and the SBIR Program

During its critical first five years, Qualcomm received several Phase I and Phase II SBIR grants, in all totaling approximately $1.5 million. This funding allowed us to pursue several innovative programs that otherwise would not have been possible. One involved bandwidth efficient coding techniques and another involved a method and hardware to test error detecting codes, both of which proved to be useful in our development of CDMA. Another allowed us to develop an application specific integrated circuit, a first step in a business that now brings in about two-thirds of our revenue.

The value and importance of SBIR funding at a critical point in Qualcomm's earliest days should not be underestimated. Cutting-edge research leads to breakthrough discoveries, but in order for companies to attract private funding, they need support to prove the feasibility of new and often risky and unproven technologies. For Qualcomm, SBIR provided one source of that critical start-up funding. And while it was not the only source of funding for us at the time, it was one of the critical "stamps of approval" that allowed us to successfully pursue sources of private capital.

Furthermore, the work that we performed at the time was of interest to the Government, thus fulfilling one of the key goals of the SBIR program: to utilize small companies to perform critical research for the U.S. Government.

By any measure, those SBIR investments by the federal government have paid enormous dividends to the taxpayers. Qualcomm paid federal income tax of $1.4 billion in FY 2010 alone, and this does not include the personal federal income taxes paid by the thousands of Qualcomm employees.

Furthermore, as one of the largest employers in San Diego, Qualcomm plays a significant role in shaping and contributing to the dynamics of the San Diego regional economy. According to a San Diego Regional Chamber of Commerce study conducted in 2008, Qualcomm's total economic impact to the San Diego region was approximately $5.5 billion in 2007. Also from the same study, Qualcomm employed over 10,000 people directly in San Diego in 2007, and money spent by Qualcomm and its employees created and supported over 26,000 jobs touching a variety of goods and services in San Diego County. As of 2007, Qualcomm was responsible for economic output equal to approximately 3 percent of the Gross Regional Product of San Diego County and supported an estimated 2.4 percent of total jobs. And of course, all of these numbers are much higher today, given Qualcomm's continuous, rapid growth.

Today, the San Diego region hosts hundreds of telecommunications companies, from startups to leading research and development facilities of global telecom companies. This is in sharp contrast to what existed in 1985. Today, the telecom industry boosts the region's economy with thousands of high-paying jobs. Qualcomm has contributed to the creation of this industry cluster through both spin-offs and partnerships with other companies.

Qualcomm's Contributions to the Community

Investments from SBIR also lead to commercialization of technologies and growth of companies that contribute to social development. Qualcomm is no exception. Our corporate culture fosters a commitment to improving the communities in which we live and work -- a commitment we've had from our earliest days. Social responsibility is taken very seriously at Qualcomm, and we strive to better both our local and global communities through ethical business practices, socially empowering technology applications, educational and environmental programs, and employee diversity and volunteerism. By consistently fostering a community-oriented philanthropic culture,

Qualcomm has been recognized again and again as a responsible, globally oriented corporate citizen. Below, please find a few highlights of those efforts:

- *Community involvement.* We are dedicated to developing and strengthening communities worldwide and believe that involvement with community organizations is an important avenue for our employees to develop as professionals and as citizens. Since 2000, Qualcomm has donated over $165 million to education programs and institutions, health and environmental initiatives, and arts and cultural organizations. Qualcomm employees participate in hundreds of organizations and donate thousands of volunteer hours and energies to causes, programs and organizations that are important to them. Our employees also generously contribute personal financial donations to a wide variety of nonprofit organizations which are matched by the company. One hundred percent of our executive leadership team is active in the community.

- *Support for supplier diversity*: Mindful of our roots as a small business, Qualcomm strives to support small business today. Implemented in 2006, our supplier diversity program currently has 563 small and diverse businesses registered.

- *Corporate sustainability*: We are committed to energy efficiency, renewable energy and sustainable best practices to reduce our carbon footprint. Our investments in energy efficiency have yielded nearly $3 million in annual savings, and our conservation efforts have resulted in 18.08 million gallons of water saved each year.

- *Employee education and training*: With nearly 1,800 work/life balance programs, services and events available to our employees, along with close to 50,000 enrollments in training courses each year, we strive to create a supportive workplace for our employees.

- *Wireless Reach*. Qualcomm believes access to 3G and next-generation mobile broadband technologies can improve people's lives. Qualcomm's Wireless Reach™ initiative is a strategic program that brings wireless technology to underserved communities globally. By working with partners, Wireless Reach invests in projects that foster entrepreneurship, aid in public safety, enhance the delivery of health care, enrich teaching and learning and improve environmental sustainability. Wireless Reach creates sustainable 3G projects through partnerships with non-governmental organizations, universities, government institutions, development agencies and other private sector companies. Formalized in 2006, Wireless Reach now has collaborations with over 100 partners on 66 projects in various stages of development in 29 countries.

At this critical juncture for the SBIR, it's important to look back and evaluate whether the program has fulfilled its mission. Certainly in the case of Qualcomm, the answer would have to be a resounding "yes." SBIR provided the needed seed funding for a fledgling enterprise, a conduit so that Qualcomm's engineers could share their expertise with the Government on key research of national interest, and an unofficial "certification" that helped us to secure private capital. For all of these reasons, the SBIR/Qualcomm partnership was an unequivocal success.

Other Policies to Foster Innovation

Innovation & IP

Innovation provides America's chief competitive edge in our increasingly global economy. For our economic well-being and that of our children, grandchildren and generations to come, we must maintain – indeed, strengthen – the incentives that drive innovation.

A key driver of innovation is the American system of risk and reward. And while much of that resides in the private sector, government has a critical role to play as well. As

this testimony has described, from its inception, Qualcomm sought to challenge conventional thinking about wireless communications and break new ground – an inherently risky business. Later, after becoming a public company, Qualcomm's shareholders allowed us to continue to take risks based on their confidence that, if we innovated successfully, the strong U.S. patent system would enable us to protect our inventions and earn an appropriate return on the investment of time, sweat and money.

If we make the wrong policy choices regarding intellectual property, innovation can be quickly stifled. Of immediate concern are proposed legislative changes to our patent system that could significantly weaken rights of patent owners, undermining their incentive to innovate. The U.S. patent system is not perfect, but I believe it functions well. Legislative focus should be on strengthening the PTO, including ending the practice of diverting PTO user fees, securing adequate funding for the PTO, and ensuring sufficient resources to reduce the backlog of some 700,000 pending applications and cut the amount of time it takes for PTO to issue or deny a patent. From an SBIR perspective, a weakened patent system makes the startup journey even more perilous. SBIR-funded innovation that cannot later be reliably protected could be self defeating. Let's not overlook the reality that protectable innovation equals jobs.

Education & Access to Talent

Government support for U.S. research universities, blended with help from corporations and individual donors, has been another important part of our leadership in innovation.

Qualcomm has long had a close and symbiotic relationship with universities, which produce the next generation of innovators. Broadly-based, high-quality education at all levels is indeed central to our long-term growth and competitiveness. We should all be concerned by the declining performance and student interest in math and science. We need to do more to incentivize and support students with an interest in these subjects.

Mobile technology provides an opportunity to improve the educational experience and we are determined to help educators and policy makers better understand this potential. We have a variety of projects under the umbrella of our Wireless Reach initiative that are bringing mobile technology to the classroom in poor urban and rural districts from North Carolina to California, as well as in India, Vietnam, Guatemala, and elsewhere.

Finally, through our recruiting efforts at the college and especially the post graduate level, we find more and more that many of the talented engineers, programmers, scientists and managers are not U.S. citizens. Many foreign students would like to remain in the United States to work after finishing their studies, but current U.S. visa restrictions make that difficult. Qualcomm supports immigration reform that welcomes highly educated and talented professionals to our nation.

Conclusion

In conclusion, while it's a pleasure to outline for the Committee the technological, economic, and social benefits we believe Qualcomm has generated during its 25 years, I hope the Committee will appreciate the important role the SBIR played in our early beginnings. The SBIR has proven to be successful in fostering public/private partnerships, and providing an opportunity for entrepreneurs to continue doing what they love to do: innovate. Ultimately some of these recipients will evolve into Fortune 500 companies, as we did, and the modest federal investment through the SBIR will pay for itself several times over in the form of economic growth, enhanced competitiveness, job creation and technological advancement.

Such strategic investments by our government should not be allowed to expire. They should continue to be funded and, in my view, expanded. SBIR was created in the 1980s, in response to intense national concern about the position of the U.S. in the face of rising global economic competition. Today, such concerns are even more paramount. The U.S. Government must remain fully engaged in providing incentives to spur innovation, technologies and new products.

Along with a continued commitment to fund basic research, a strong patent system that rewards innovation, investment in education, and access to talent, such investments are at the heart of what government can do to assist the private sector and drive economic growth.

Thank you again for the opportunity to appear before this Committee. I look forward to answering your questions.

Chair LANDRIEU. Thank you so very much.

I see Senator Scott Brown is here, and he wanted to say a word about Dr. Silver. We have already generally introduced him, but Senator Brown?

OPENING STATEMENT OF HON. SCOTT P. BROWN, A U.S. SENATOR FROM MASSACHUSETTS

Senator BROWN. Well, first of all, Madam Chair, I want to thank you for your leadership on the committee and working with the Ranking Member.

Dr. Silver, it is good to see you here. Dr. Silver is a small business owner and the Co-Founder and President of Cambrian Innovation from Somerville, Massachusetts, and he is here as a witness today. As you know, Massachusetts has a strong biotech, high tech, pharma presence, and a lot of these companies were started, as Qualcomm does, as well, with the funds that we are talking about. So I just wanted to welcome you.

Dr. SILVER. Thank you.

Senator BROWN. Thanks for taking the time to come and testify. I am bouncing back and forth between Armed Services and here, so if I leave, it is not out of disrespect. So thank you for what you are doing, and I am excited to be here.

Chair LANDRIEU. Thank you, Senator.

Dr. Silver.

STATEMENT OF MATTHEW SILVER, PH.D., CO–FOUNDER AND CHIEF EXECUTIVE OFFICER, CAMBRIAN INNOVATION

Dr. SILVER. Well, thank you very much for that introduction. Chairwoman Landrieu, Ranking Member Snowe, members of the committee, it is really a tremendous honor to be able to discuss with you the critical role that the committee and the SBIR program, in particular, can play in ensuring that the United States maintains its global leadership position in innovation.

As a Ph.D. graduate from Massachusetts Institute of Technology, where I studied new models of innovation, and Co-Founder and CEO of Cambrian Innovation, an environmental product development firm located in Somerville, Massachusetts, I hope that my perspective provides a concrete example of how the SBIR program can help catalyze the development of an early stage firm.

In the five years since our founding, Cambrian Innovation, formerly called IntAct Labs, has been the fortunate recipient of multiple SBIR awards, enabling accomplishments unimaginable without the program. Most importantly, we have become a viable player in a global race to develop next generation water and energy systems based on newly discovered biocatalytic processes, and as a result, we are now valued by our private investors at several times the total SBIR investment.

In this testimony, I am going to briefly discuss our story, emphasizing three points. First, the government does have an important role to play in early stage innovation, particularly where there is high technical risk. Second, the SBIR program is a very effective vehicle for this role. And third, above all, the program really needs long-term stability, less bureaucracy, and faster decision making.

The SBIR–STTR Reauthorization Act accomplishes most of these needs, and I strongly support it.

Cambrian was founded in 2006 with the vision of improving the way our society processes basic natural resources, starting at the intersection of energy and water. Treating our nation's water currently consumes an estimated three percent of our electricity. We were, therefore, really inspired by recent scientific discoveries that suggested that some microbes could generate electricity directly while treating water, and we imagined a suite of products with the potential to change society's relationship to water, energy, and fuels.

The main trouble in 2006 was that the discovery alone was too immature for venture investment. Developing energy and water technology entails a lot of technical risk associated with scaling, testing, and iterating designs. Universities do not carry out this kind of scaling exercise. On the other hand, most venture firms and even angel investors shy away from taking on investments with very long lead times and high technical risk.

Our solution was, in no small part, the SBIR program. After receiving an initial NASA grant in 2006 to test the applied science, we were awarded a USDA SBIR in 2008 to apply our product to agricultural wastewater treatment. The first design was actually not satisfactory, but the effort did yield a number of applied discoveries and a better understanding of our marketbench. Building on this knowledge, we have been fortunate to receive SBIR awards from the NSF, the EPA, and NASA in 2010 and 2011.

Today, Cambrian is commercializing three potentially game-changing products associated with renewable biogas generation, nitrogen removal from wastewater, and surface water sensing, and we are actively selling feasibility research services. Our SBIR awards have helped us attract foreign direct investment as well as hire seven employees and achieve a host of other accomplishments with respect to intellectual policy and partnership that I list out in the written testimony.

Risks definitely remain for our firm, and we have some time to go before the technology is proven at the scale that we would like, but there is one thing that is clear. Without the SBIR program, we may not have even been able to take these risks in the first place. As a result, I venture to say that the U.S. would be further behind in a global race to commercialize one particular energy and water technology.

Our story is just one example out of thousands of how the SBIR program can help an early stage company. However, as I mentioned at the beginning and as I am sure the other panelists will mention, we do see some room for improvement.

First and most importantly, uncertainty about the future of the program makes it really difficult for small businesses to plan and attract outside investment. We need stability.

Second, the time scale for agency responses is just way too slow.

Third, all agencies should minimize bureaucracy, and I would suggest making immediate use of information technology to reduce paperwork. I am pleased that the reauthorization bill addresses many of these needs.

Finally, on the VC question, I must admit that I am a little bit concerned about opening the program to majority-owned VC firms. Recent statistics suggest that VC firms are beginning to scale back on seed stage investment, creating a gap between scientific discoveries and company formation. In this context, I do not believe that the government achieves its objectives by decreasing the risk of a downstream VC investment. To have the most impact, it should invest in high-risk, high-impact ideas where the VC firms have failed to invest.

This said, the VC community, of course, plays a really vital role in our nation's innovation ecosystem and the actual impact of opening the program is not yet known. I believe the 25 percent rule is a good compromise which I would support in the name of moving the bill forward.

There is much more to say, of course, but I would like to leave you with one thought. If there is one thing the government can do to help our economy, it is lowering the cost of commercializing new ideas and helping to foster an atmosphere of product-focused risk taking. Any act involving small business should, in my opinion, have this as the broader goal, as it will be the key to competing in the global marketplace in the 21st century for both companies and countries.

Thanks again for inviting me to contribute to this important hearing. I look forward to answering your questions.

[The prepared statement of Dr. Silver follows:]

Testimony of
Matthew R. Silver, PhD
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Before The
COMMITTEE ON SMALL BUSINESS AND ENTREPRENEURSHIP
UNITED STATES SENATE

Hearing Entitled
"Reauthorization of the SBIR and STTR Programs"

17 February, 2011

Founded by MIT Researchers in 2006, Cambrian Innovation™ is an environmental product development firm focused on solving basic resource problems using advanced technology and new models of innovation. As a world leader in the commercialization of bio-electrochemical systems, Cambrian is developing a technological platform with application to water sensing, wastewater treatment, renewable natural gas, and a range of other domains. Cambrian also performs market and technical feasibility analyses for corporate and government clients seeking to rapidly evaluate, scale, and market new ideas.

1 Introduction

Chairwoman Landrieu, Ranking Member Snowe, members of the committee, it is a tremendous honor to be able to discuss with you the critical role that the government, and the SBIR program in particular, can play in ensuring that the United States maintains its global leadership position in innovation.

As a recent PhD graduate from the Massachusetts Institute of Technology, where I studied new models of innovation, and founder and CEO of Cambrian Innovation™, an environmental product development firm located in Somerville, Massachusetts, I hope my perspective provides a concrete example of how the SBIR program can help catalyze small business development, create jobs, and build value. In the five years since our founding, Cambrian (formerly called IntAct Labs) has been the fortunate recipient of six SBIR awards from four agencies, enabling accomplishments unimaginable without the program. I will list some of these shortly, but most importantly, we have become a viable player in an increasingly global race to develop next generation water and energy systems based on newly discovered bio-catalytic processes. As a result, we are now valued by our private investors at several times the total SBIR investment.

In this testimony I will discuss our story, emphasizing three points: First, government has an important role to play in early stage innovation, particularly where there is high technical risk. Second, the SBIR/STTR program is a very effective vehicle for this role. Third, for SBIR/STTR to be even more effective it needs long-term stability, less bureaucracy, and faster decision-making. The SBIR/STTR re-authorization act accomplishes most of these needs.

2 The Role of SBIR in Cambrian Innovation's Story

Cambrian was founded in 2006 with the vision of using advanced bioengineering to disrupt the way our society processes basic natural resources, starting at the intersection of energy and water. Currently, the United States produces over 38 billion gallons of wastewater every day and treating this water using our aging infrastructure consumes an estimated 3% of national electricity use. In 1999 novel scientific discoveries suggested that microbes might be able to generate direct electric current while treating wastewater. We imagined a broad platform of solutions stemming from this basic innovation, with the potential to fundamentally affect society's relationship to water, energy, even fuels and chemicals.

The main trouble in 2006 was that the scientific discovery made in universities was too immature for venture investment. Developing energy and water technology entails a lot of technical risk. We needed to design a system for commercial use, prove that it would work on real industrial wastewater, scale it to pilot levels, build a demonstration plant, all while making engineering discoveries about basic process parameters that require iteration and time. Universities don't

carry out this kind of scaling exercise. On the other hand, most venture firms and even angel investors shy away from taking on an investment with high technical risk.

One might argue that large corporations can carry out these kinds of innovations. While true in theory, most of the literature on innovation suggests that they don't do so effectively for a host of reasons. Large corporations have structures that often stifle innovation, move too slowly, or even have incentives to stall innovation that will cannibalize existing products. In reality, most large corporations innovate by acquiring start-ups.

Cambrian's solution to this problem was, in no small part, the SBIR program. After receiving a grant from the NASA Institute for Advanced Concepts in 2006 to demonstrate that our concepts worked at all, we received funding from the USDA SBIR program in 2008 to prove feasibility for agricultural wastewater treatment. Our first design was not satisfactory, but the effort yielded a number of applied discoveries and a better understanding of our market niche. This resulted in new SBIR awards from the NSF and EPA in 2010, and the NSF and NASA in 2011, which have allowed us to attract investors and develop our current product line.

3 Benefits of SBIR for Companies and the Nation

Today, with the help of these SBIR investments and commercial partnerships, Cambrian Innovation™ is commercializing four potentially game-change products. Our Aquavolt™ product line uses electrical active bacteria in an enhanced anaerobic digester that converts dairy and brewery wastewater into useful gases, and we have developed a novel approach to de-nitrification that we estimate can save the Aquaculture industry up to 70% of the operations costs required to remove soluble nitrogen. We have invented and patented a new water sensor platform, and novel approach to aerospace life support. Six relatively small grants enabled us to:

- Attract angel and corporate foreign direct investment;
- Hire seven employees;
- File five provisional patents, two full Patent Cooperation Treaty (PCT) applications, with over thirteen independent claims between them;
- License outside IP;
- Develop relationships with MIT and Penn State for collaborative R&D; and
- Initiate corporate scale-up discussions with a number of firms.

These accomplishments were due to funding, but they also worked in concert with an ecosystem of innovation such as the MIT business plan awards, and collaboration with the Penn State Licensing Office. Risks certainly remain for our firm, and we have some time to go before the technology is proven at the scale we would like. But one thing is clear – without the SBIR program, we could not have even taken these risks. As a result, I venture to say that the US would be further behind in the global race to commercialize an important clean energy and water technology.

4 Areas For Improvement and the Need for the Reauthorization Bill

Our story is but one example, out of thousands, of how the SBIR program can help an early stage company. In Cambridge, I know of many other early stage ventures, such as Ginkgo Bioworks, Fusion Research Technologies, Saperix, and Levant Power that have leveraged the program to received substantial external benefits. I also know of innovation services such as the Drydock Incubator and the Fraunhofer Tech Bridge Initiative that can multiple the effect of such programs. However, as I mentioned in the beginning, there is room for improvement:

- First and foremost, uncertainty around the future of the program makes it very difficult for small businesses to plan projects and attract investment. Permanence will increase effectiveness, and the Act accomplishes this.

- Second, the time-scale for agency responses is too slow. In a perfect world, the allocations should be made based on results. If a faster result has been obtained and validated, Phase II awards should be administered quickly. At the very least, responses should be made in three months. Section 209 of the re-authorization act seems to address this.

- Third, all agencies should minimize bureaucracy and make immediate use of information technology to reduce paperwork. The NSF does a terrific job of this compared to other agencies that we have interacted with, and we would strongly advocate that all the other agencies adopt similarly low-paperwork contracting methods.

In addition, sections 204 and 205, which recognize the need to provide follow-on commercialization readiness funding for certain grant recipients, and section 106, which enables flexibility between funding agencies, are good ideas for improving success.

On the VC question, while I welcome the basic compromise as a way to bring stability to the program I must admit that I am somewhat concerned about opening the program to companies majority owned by VC firms. Recent data by the National Venture Capital Association indicates that in 2010 VC firms made 363 seed stage investments, versus 5,809 SBIR awards in 2009. VC firms are increasingly investing in late-stage innovation, and this suggests that the VC-backed firms which do apply will, on average, use the program to make incremental adjustments to a developed technologies. This is not, I believe, where the government can make the most impact. Rather, the government should invest where VC firms fail to invest – often in areas with high technical risk or with somewhat lower expected economic returns but high societal value. On the other hand, the program does need to emphasize viable commercialization, not just R&D. The 25% rule is a good comprise. It can be made even better if the evaluation criteria differ between VC-backed and non-VC backed companies, and reviews of this aspect of the program are rigorous.

5 Concluding Thoughts from a National Policy Perspective

There is much more to say, of course, both about Cambrian's experience with the program and the ways in which the government can best catalyze innovation. I would refer the committee to my full testimony for some broader thoughts about the program and particularly some distinctions that could be made to increase effectiveness. The follow are some high level distinctions to consider in this or follow-on legislation:

Infrastructure for Innovation: Most importantly, particularly for hardware innovations in energy, water, and fuels, there is a grey area where VCs will not likely invest, but universities no longer develop inventions. I believe that government should support small businesses taking risks in this grey-zone, with the eye towards creating an infrastructure for innovation. For example, we still might better leverage new models of innovation, prize funding, social networking, and other developments to get new solutions out faster. Lower cost innovation will be the key to competitive advantage for both companies and countries in the 21st century, and will ensure that the US continues to lead the world economically, and more generally.

Distinctions within the Program: In general, the program may benefit from distinguishing between:

- Early stage innovation
- Small businesses already selling products
- VC-backed firms

These kinds of small business all have different needs with respect to innovation, and would benefit from different evaluation criteria.

SBIR Shops: I've heard that companies can turn into SBIR shops focused on R&D as a service, and that some consider this a problem. An anecdotal observation in this regard is that such shops are more likely to persist where SBIR/STTR funding comes from an agency that will be a user of the technology in their operations (e.g. NASA, Military) rather than one that is more domain-agnostic (NSF, EPA). The former group can treat the program essentially as low-cost R&D. In this sense, the shops can be considered viable businesses, like other government contractors. In fact, the return on investment for the government is likely much higher given the efficiency of small businesses. Therefore, it may make sense to distinguish a market-commercialization focused SBIR program from an agency-focused technology development activity. Small businesses will have a role to play in both.

Thank you, again, for inviting me to contribute to this important hearing, and for supporting small businesses and entrepreneurs that can help re-build our country. I look forward to answering your questions.

Chair LANDRIEU. Thank you, Dr. Silver. That was excellent testimony.

I would like to recognize Senator Shaheen because she also is going back and forth between committees and wanted to say a word, and then we will get right to you, Mr. Hernandez.

OPENING STATEMENT OF HON. JEANNE SHAHEEN, A U.S. SENATOR FROM NEW HAMPSHIRE

Senator SHAHEEN. Thank you very much, Chair Landrieu and Ranking Member Snowe, and thank you for your leadership and all of the work on this legislation.

I really wanted to say a few words in support of SBIR and STTR because it has been so important to New Hampshire businesses. As you point out, like Senator Brown and Senator Ayotte, we are all trying to be at Armed Services while we are here. I spent my time in New Hampshire at the end of January visiting companies that were benefitting from this program, and what I heard were the kinds of success stories that Dr. Silver and Dr. Jacobs are talking about in your firms, that it was because of those early investments through the SBIR program that they have been able to develop new product lines, grow the companies, and add jobs.

Of course, I heard the big concern was about making the program long-term enough so that they could count on it, so I am sure every panelist is going to speak to that issue, but I think we have a winner here. It is important for us to get this reauthorized and let companies know that it is going to be there for the long term.

Again, I very much appreciate your leadership, Chair Landrieu and Ranking Member Snowe. Hopefully, we can get this through very quickly.

Chair LANDRIEU. Thank you, Senator.

Senator Ayotte.

OPENING STATEMENT OF HON. KELLY AYOTTE, A U.S. SENATOR FROM NEW HAMPSHIRE

Senator AYOTTE. Thank you very much, Chairwoman Landrieu and Ranking Member Snowe. I also want to join my colleague from New Hampshire. I think this really demonstrates what an important bipartisan issue this is for small businesses in this country, and particularly in our State of New Hampshire.

I came to Washington knowing that hard working American small business owners create the sustainable jobs that we need in this country. In fact, I come from a small business family, and so I think it is so critical that this is really the first hearing we have had and it shows the commitment of our leadership that this is very critical that we reauthorize this program.

I also look forward to working with my colleagues on the Small Business Committee towards not only reauthorizing SBIR, but also to look to reduce burdensome regulations that make it very difficult often—that come from Washington—for our businesses to succeed. So I hope that that is an issue that we will also address in addition to reauthorizing this important program.

Thank you so much for allowing me to make a statement, because we are going back and forth here.

Chair LANDRIEU. Thank you, and please feel free to slip out as we move forward.

As we stated in our organizational meeting, looking at regulations and how it dampens the opportunities for small business is another priority of this committee, so you can rest assured that we will be on that as soon as we can get this program reauthorized, which is our first priority.

Mr. Hernandez.

STATEMENT OF JOE HERNANDEZ, CHIEF EXECUTIVE OFFICER, SIGNAL GENETICS, ON BEHALF OF THE BIOTECHNOLOGY INDUSTRY ORGANIZATION

Mr. HERNANDEZ. Good morning, Chairman Landrieu and Ranking Member Snowe. I appreciate the invitation this morning to share a little bit of our story with all of you.

I am Joe Hernandez. I am Chief Executive Officer of Signal Genetics. I also am the Executive Board Member of the Maryland High Tech Council and reviewer for the National Science Foundation for the Engineering Resource Center that they fund on an annual basis.

I am privileged to be here today on behalf of the Biotechnology Industry Organization's more than 1,200 companies, academic institutions, state biotechnology centers, and related organizations in all 50 states. We are involved in the effort of developing and further advancing the technology in health care, agricultural, environmental, and industrial biotechnology.

In my career, I have had the privilege of being involved in some exciting cutting-edge technologies. I am a lot older than I look, I promise. I was involved early on in my career in Silicon Valley with the DNA microarray, which is technology that has revolutionized the way we look at genomics and genetics. I also was involved with a Maryland company by the name of Digene that commercialized the first molecular test for human papilloma virus, the causative agent of cervical cancer.

In my more recent career, I have founded a number of companies and have had the pleasure of licensing technologies from universities, raising venture capital, applying to SBIRs, and commercializing products, all of which have created hundreds of jobs in the companies I have been involved with.

I currently run a company that is focused in the area of personalized medicine for multiple myeloma. This new revolution in science will allow for individuals to get better therapeutic treatments as we know their genetics and the makeup of their genetics and how they ultimately respond to therapy. The advantages are better outcomes for the patients, but also, more importantly, better economics for our health care system.

It is with this background of experiences that I offer my comments today. The SBIR program, as has been mentioned here before, has played really a critical role in bringing amazing innovations to the American people and created great enterprises and employed a number of people. Unfortunately, the effectiveness of this program is really threatened if not modernized to address the current reality of the marketplace.

Congress created this program, as you know, in the early 1980s to help companies overcome the valley of death. The realities of the market and the economy is that this valley has become deeper, longer, and now we call it a canyon of death. It is really a very brutal place.

We need to support this high-risk, high-reward research. We want to take advantage of the basic research investments that we have made as a society in places like the NIH and academia. It is important that we leverage those investments.

It has an enormous benefit to patients and society at large, and I would argue that if you look at some of the great innovations, at least in biotechnology, a lot of them had this genesis within the SBIR program.

For 20 years, the small domestic biotech companies have competed for the SBIR programs, but in 2003, the Small Business Office of Hearings and Appeals ruled that a company did not meet the size standard because multiple venture capitalists owned more than 50 percent of the company. The reality is this case ignores the reality of these marketplaces. In the biotechnology industry, it takes us eight to 12 years to develop a product. It takes us $800 million to $1.2 billion. Those are real numbers. Obviously, that cannot be done with SBIR dollars alone. It requires the involvement of outside investors in the venture community.

The disturbing trends documented since the majority of VC-backed companies were excluded are actually quite alarming. The NIH notes that there has been a 40 percent decline in applications between 2004 and 2008. In 2009, there was the lowest number of small business participants in the SBIR program in a decade.

The impact of the recession and the financial crisis in the biotech industry has been enormous. According to the National Venture Capital Association, for these last four consecutive years, the VC funds in the U.S. are declining. There is less investment and less risk taking in the venture community at this point.

A Thomson Reuters study found the crisis caused 80 percent of biotech companies' investors to change their strategy. The number of public biotechs has fallen by 25 percent between 2008 and——

Chair LANDRIEU. You have 30 seconds, please.

Mr. HERNANDEZ. Thank you. The SBIR authorization must be reestablished, the eligibility for small VC-backed companies. It is imperative that we do that. And the award should provide to companies that provide the best science in their development.

The SBIR reauthorization must clarify the SBA affiliation rules so that small companies can reasonably ascertain if they are eligible for the program.

Lastly, BIO supports the SBIR authorization compromise reached at the end of Congress. We support the Senate passing this legislation. The bill improves access to SBIR at NIH, DOD, NSF, in particular. The bill clarifies SBIR affiliation rules in a way that gives peace of mind to small companies. We hope an SBIR authorization bill will be signed into law this year.

Thank you for your time.

[The prepared statement of Mr. Hernandez follows:]

HEARING TESTIMONY

JOE HERNANDEZ
CHIEF EXECUTIVE OFFICER
SIGNAL GENETICS

ON BEHALF OF THE

BIOTECHNOLOGY INDUSTRY ORGANIZATION

BEFORE THE U.S. SENATE COMMITTEE ON SMALL BUSINESS AND ENTREPRENEURSHIP

"REAUTHORIZATION OF THE SBIR AND STTR PROGRAMS"

February 17, 2011

Good morning Chairwoman Landrieu, Ranking Member Snowe, Members of the Committee, ladies and gentleman. I am Joseph Hernandez, Chief Executive Officer of Signal Genetics, Executive Board member of the Maryland High Tech Council and Reviewer for the National Science Foundation. I am privileged to be here on behalf of the Biotechnology Industry Organization's (BIO) more than 1,200 member companies, academic institutions, state biotechnology centers and related organizations in all 50 states involved in healthcare, agricultural, environmental and industrial biotechnology.

In my career, I have had the privilege of being involved early on in the development of cutting edge biotechnologies such as the DNA microarray, a tool which has revolutionize our knowledge of genetics and the role of our genes play in disease. I was also involved with Digene, a company that revolutionized cervical cancer diagnostics by developing the first molecular test for the Human Papilloma Virus (HPV), the causative agent in cervical cancer. I have licensed technologies from universities; built management teams, received SBIR awards, raised over $30 million in venture capital and launched many products. More recently, I have been involved in the establishment of early-stage companies and have firsthand experience of the challenges and difficulties of getting these companies off the ground. I currently run a personalized medicine company where we use a person's DNA to determine the degree of risk of their cancer and identify the best course of treatment. This approach offers better patient outcomes, but also serves an important role in managing treatment costs. We recently launched our first product in Multiple

Myeloma and look forward to bringing additional similar products to the market. It is with this background of experiences that I offer my comments today.

The role of the SBIR program in bringing breakthrough therapies to the American people is a matter of record. Awards have helped companies fund proof of concept studies which enabled them to attract the private-sector funding required to develop a new treatment or therapy that is ultimately made available to patients. Despite its noble past, the ability of the SBIR program to provide critical funding for medical research projects will remain hampered unless SBIR reauthorization modernizes the program to address the current realties facing small, innovative American biotechnology companies.

As you know, Congress created the SBIR program in the early 1980's because it recognized that promising early stage scientific research all too often failed to be funded through the markets because it was viewed as too high risk. This failure of the markets is often referred to as the "valley of death." As developers of the next-generation of treatments for diseases that would have been considered unapproachable just a decade ago, it is incumbent on our system to find ways to support these risky, yet transformational, therapies that could improve the lives of children and adults suffering from genetic disorders, infectious diseases, cancer, and autoimmune diseases, among others. We want to take advantage of the ground-breaking scientific discoveries in basic research that has been achieved in the last decade at NIH, in academic centers, and in industry and translate them into tangible treatments as rapidly as possible to improve the lives of patients. This holds enormous benefits for the individuals affected, the organizations and companies working on these initiatives, and our society in general.

For twenty years small, domestic biotechnology companies competed for SBIR grants. In addition to providing funding, these grants were a powerful signal to the private sector that a company's research was compelling and possessed scientific and technical merit. However, in 2003 the Small Business Administration's Office of Hearings and Appeals (OHA) ruled that a biotechnology company, Cognetix, did not meet the SBIR size standard because multiple venture capital investors, in the aggregate, owned more than 50% of the company's stock. The ruling, which is not based on the SBIR statutory language, ignores the realities of the marketplace where small biotechnology firms must raise tens of millions of dollars to conduct incredibly time and capital-intensive research. It is estimated that it takes between 8 and 12 years to bring a biotechnology therapy to market and costs between $800 million and $1.2 billion. These small biotech firms typically have fewer than 50 employees, no products on the market, and must raise considerable funds through a combination of angel investors and venture capital firms in order to make a new therapy available to patients.

Since the exclusion of small majority venture-backed companies, the National Institutes of Health (NIH) have documented disturbing trends. There was a 40% decline in the number of applications between 2004 and 2008 and in 2009 the number of new small businesses participating in the program decreased to the lowest proportion in a decade. Additionally, the impact of the recession on small biotechnology companies is still being felt. In fact, according to the National Venture Capital Association, venture capital

companies raised $12.3 billion in 2010 - the 4th consecutive year of decline and the slowest annual period since 2003. A 2009 joint study by BIO and Thompson Reuters found that the economic crisis forced 80% of biotech investors to change their investment approaches. They can no longer afford to invest in high-risk projects characteristic of early-stage biotechnology companies. This trend is expected to continue, making investment in early-stage cutting-edge research, even for a company's lead project, extremely difficult to obtain. In fact, the number of active public biotechnology companies fell 25% from January 2008-2010 and among those still in existence, 38% had less than one year of cash on hand.

SBIR can play a critical role in aiding small biotechnology companies in their early stage research to navigate through the "valley of death," helping small innovative U.S. companies advance, and ensuring that the U.S. maintains its global leadership in biomedical research. Unfortunately, the program's ability to help small innovative life science companies develop breakthrough treatments and therapies that offer hope to patients and potential solutions to our nation's most critical health care needs has been severely compromised by preventing the majority of small biotechnology companies from competing for awards based on scientific merit. To quote the National Research Council's 2009 report, *Venture Funding and the NIH SBIR Program*, "...restricting access to SBIR funding for firms that benefit from venture investments would thus appear to disproportionately affect some of the most commercially promising small innovative firms." The report goes on to note that the current SBA eligibility rules have "the potential to diminish the positive impact of the nation's investments in research and development in the biomedical area."

Eligibility for small biotechnology companies that are a majority-owned by multiple venture capital companies should be reinstated. This will ensure that awards are provided to small, U.S. biotechnology companies that have the best science and greatest potential to provide treatments and therapies that will improve public health.

It is equally important that the reauthorization clarify SBA affiliation regulations. Under current SBA regulations, when determining the size of a business, the SBA considers the number of direct employees at the business as well as affiliated businesses' employees. In the world of biotechnology venture capital investors, a single venture capital company often has investments in 5-10 other biotechnology companies. As such, a typical small biotechnology company has multiple venture capital company investors, each owning a minority share of the company but often collectively owning more than 50%. An SBIR applicant with 50 employees can be deemed affiliated not only with its venture capital companies who have minority ownership but with hundreds of employees from those venture capital companies' other portfolio companies. This occurs despite the fact that the SBIR applicant has no business relationship with those portfolio companies other than a shared investor.

Not only are these affiliation rules nonsensical, the manner in which they are applied is often a mystery to the small business applying for the SBIR grants. As a result, a small company may certify in good faith that it is eligible for an SBIR grant, only to later find

out that the SBA has affiliated it with a large number of employees at other unrelated companies, thus making the small business ineligible.

BIO believes that the reauthorization should create a more rational and effective affiliation process regarding determinations about an SBIR applicant's investor's portfolio companies. Specifically, affiliation should be based on criteria such as evidence of a mutually beneficial business relationship (contracts, shared profits, etc.) and not by virtue of a shared investor. This common-sense reform will protect the integrity of the program and provide clarity for small business entrepreneurs looking to participate in the program.

At the end of last Congress, the Senate passed a compromise reauthorization bill. BIO supported passage of that bill in the Senate and we still do. It included improvements to the current program in that it would allow majority-venture backed companies to compete for up to 25% of funds at NIH, NSF and DOE and up to 15% in other SBIR programs. The bill also provided language that would direct the SBA to promulgate rules for determining affiliation so as to ensure that such determinations are not based solely on one or more shared investors. It is our hope that the Senate passes a bill that includes these provisions and that the House and Senate will pass a bill that can be signed into law by the President this year.

Chair LANDRIEU. Thank you, and Dr. Silver, you have expressed one view on this. Mr. Hernandez expressed another. But the good news is there has been a compromise between both of you on it and we appreciate it, because this has been one of the issues that has held up this reauthorization. We really appreciate everybody leaning forward on the venture capital component of this.

Mr. Glover.

STATEMENT OF JERE GLOVER, EXECUTIVE DIRECTOR, SMALL BUSINESS TECHNOLOGY COUNCIL

Mr. GLOVER. Thank you, Chairwoman. It is an honor and a privilege to be here. I first testified before this committee over 30 years ago, and this committee has been a leader in small business and innovation during this entire period. There are a lot of pieces of legislation that had this committee not been in the forefront would never have happened—equal access to justice, the Regulatory Flexibility Act, and, of course, the SBIR legislation. You have got a proud tradition and your new members should welcome and honor that tradition. You have always had magnificent staffs, bipartisan staffs, and worked together, and I want to commend both of you on that.

Senator Snowe, you are one of the few people who have been fighting this fight longer than I have, and your leadership and support when you were a member of the House of Representatives and cosponsoring that was a courageous step then and you have remained courageous in your defense of small business.

And we could not ask for a better Chairwoman than we have right now. I want to thank both of you for that. It is an honor to be here.

First and foremost, reauthorize this program. Ten CRs is enough. We really need stability in the program. It is absolutely critical. Permanent would be better, but we will take as long as we can get. The more stability, the less uncertainty, the better it is for everyone. It really is working, and I do not think you should make major changes to this legislation.

The caps are important to prevent very large awards from crowding out other companies, other technologies, other opportunities, and I think that the bill has struck a good compromise in that regard. Without an authorization increase, it will reduce the number of awards given by 25 percent, and that is simply not acceptable for a program that is this good.

One of the questions that is always asked is do you need an allocation, and the answer to that was answered back in the 1982 hearings in which Congress basically said that others have the inside track—universities, large businesses. Without some direction from Congress, we are going to continue to see small business crowded out of where they can do the very best. Everyone knows they are the most efficient in innovation and research. We have seen a change in where scientists and engineers work. Thirty-eight percent now work for small business. We have seen a clear change in where key innovations come from, to now 25 percent come from small business. Large firms have virtually gotten out of the innovation business, and that is very clear from the study that has gone out there.

We are now faced with small businesses in a perfect storm of capital and credit shortages. As the Office of Advocacy's recent studies on bank lending show, we are seeing a tremendous shortage in bank lending for small business. We are seeing a shortage in venture capital, especially early in seed stage. Angel funding is down. And you do not even have equity in your homes to go out and borrow money to help grow your innovation and technology. So this is really the only steady, constant source of funding for small business, new ideas, new technology.

We are in an international competitive situation where knowledge developed in America is immediately transmitted around the world, and we are seeing jobs from our knowledge taken overseas. We need to make sure those stay, and the best way to do that is through small business.

Twice before, we have seen the President and Congress look at the situation where we were coming out of severe recessions and decided that the SBIR program was important. President Reagan in the early Congress in 1982 decided that this was an important thing to do to help create jobs, to help grow innovation and technology. Again in 1992, Congress doubled the SBIR program, with the support of President Bush.

So we have seen recognition in the past, when you were in a severe economic time, it was time to call on small business innovation. I would urge you to do that now.

Now, I have some questions for both the Congress and the Obama Administration. Why is small business still under five percent of research and funding expenditures by the Federal Government? They do 25 percent of the innovations. They do more patents. The SBIR companies alone do more patents than all the universities. They do 38 percent of all patents in America. Why is there no Phase 3 program in any agency except for DOE? DOE's accelerator program is a courageous, bold step forward. Why is it that there is not such a program at all the other agencies? They could voluntarily do that, and quite frankly, from the Obama Administration, why are they not supporting a significant increase in this program?

I think that when we look at this, we see that it is a great program. It has done what it was intended to do. We support the compromise legislation.

I will say one point on a comment that Mr. Hernandez said. He mentioned the 2009 numbers were down at NIH. I would be happy to submit to the committee the 2010 numbers. They are up dramatically. It is the second highest in ten years in terms of SBIR proposals being submitted. That is just a little outdated. It is a little cyclical over the years. We have said that. But now, it is back up to the second highest number in the last decade.

Thank you very much.

[The prepared statement of Mr. Glover follows:]

Testimony of

Jere W. Glover

Executive Director

Small Business Technology Council

1156 15th Street NW, Suite 1100

Washington, DC

Before The
COMMITTEE ON SMALL BUSINESS AND ENTREPRENEURSHIP
UNITED STATES SENATE

The Role of the SBIR and STTR Programs in Stimulating Innovation and Job Creation During Recession Times

17 February 2011

On behalf of

The Small Business Technology Council and **The National Small Business Association**
(202) 785-4300 *(202) 293-8830*
www.sbtc.org www.nsba.biz

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.

Founded in 1937, the National Small Business Association (NSBA) is the nation's oldest nonprofit advocacy organization for small business, serving more than 150,000 small companies throughout the United States.

Chairwoman Landrieu, Ranking Member Snowe, members of the Committee, thank you for the opportunity to appear here today to discuss the importance of technological innovation to the United States and the reauthorization of the SBIR and STTR Programs during our recovery from the worst recession since the Great Depression. I am Jere W. Glover, Executive Director of the Small Business Technology Council (SBTC) of the National Small Business Association in Washington, DC. I have been involved in federal science and technology innovation programs since 1978 when I staffed joint Senate/House hearings and the resulting report that showed severe under-utilization of small business high-tech companies in the Federal R&D programs.[1] The SBTC is an outgrowth of the White House Conference on Small Business in 1995, and is the nation's largest association of small, high-tech SBIR and STTR companies in diverse fields

I am pleased that the SBTC Board of Directors recently recognized both Chairwoman Landrieu and Ranking Member Snowe with the Milton Stewart Award for their outstanding work in brokering the compromise that led to last year's efforts for a potential SBIR reauthorization bill (S 4053). Both Senator Landrieu and Senator Snowe have been champions of the SBIR program, and our membership is very grateful for their dedication and hard work in promoting and preserving this important program, as well as the hard work of their staffers.

I. The SBIR Program, Recessions and Job Creation: The original SBIR program was sponsored by the conservative Senator Warren Rudman [best known for co-authoring the Gramm-Rudman-Hollings deficit reduction law] and was co-sponsored by the even more conservative Senator Barry Goldwater and 82 other bipartisan co-sponsors. From the PL-97-219 Senate Findings and Purpose [Appendix A] it was clear that the SBIR program was intended to maximize the return on taxpayers' dollars by forcing the Federal Agencies overseeing this research to utilize:

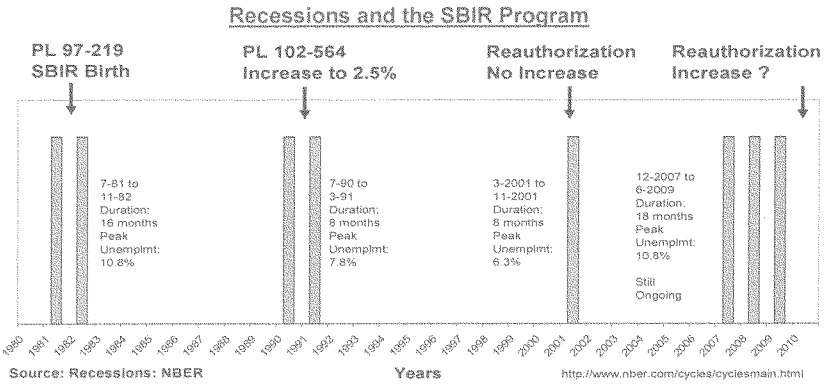
> ***"(3) small businesses [which] are among the most cost-effective performers of research and development and are particularly capable of developing research and development results into new products."***[2]

The Senate record clearly shows that the SBIR program was not an allocation to help needy small companies. Rather it was a strong signal to Federal Agencies to make more effective use of the innovative scientists and engineers employed by aggressive small companies that had the potential to convert R&D funds into new products and create new jobs. It was signed into law as PL-97-219 by the Republican iconic champion of Free Markets, President Reagan on July 22, 1982, in the midst of the recession lasting from July 1981 to November 1982.[3]

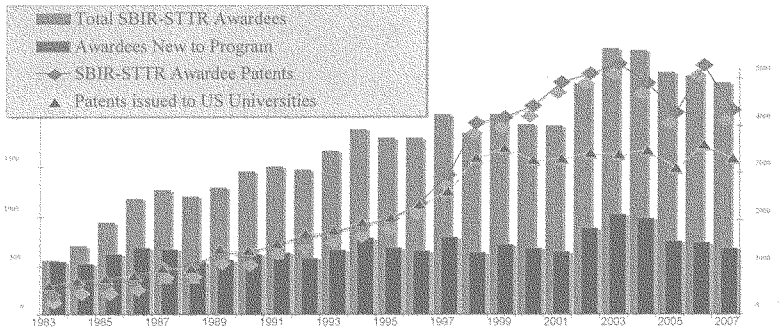
Senator Rudman also sponsored the 1992 SBIR reauthorization legislation (with 21 bi-partisan co-sponsors) which doubled the SBIR allocation rate to 2.5 percent and increased the STTR allocation rate to 0.3 percent. The Hearings were held shortly after the recession which dated from July 1990 to March 1991. PL-102-564 was signed into law by President George H. W. Bush on October 28, 1992. The Senate Findings for PL-102-564 show further Congressional support for the SBIR program and frustration that the Federal Agencies had not increased small business R&D contracting [Appendix B]:

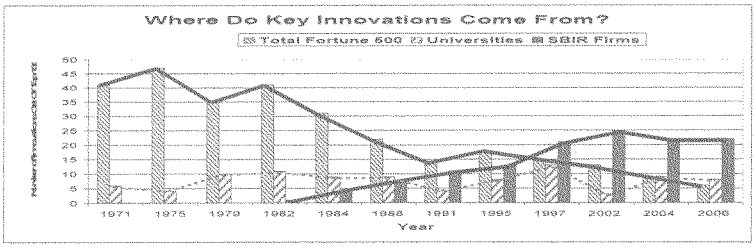
> ***"(3) small business innovation research program participants have provided high quality research and development in a cost-effective manner;***
> ***(6) . . . the small business innovation research program has created jobs, . . . and improved the competitiveness of the Nation's high technology industries; . . . increase[d] exports from small business concerns***
> ***(8) despite the general success of the small business innovation research program, the proportion of Federal research and development funds received by small business concerns has not increased over the life of the program, but has remained at 3 percent"***

Figure 1. Composite Picture of Changes From 1978 to 2011*



Percent of U.S. Scientists and Engineers Employed in Small Businesses (< 500 employees)		
Year 1978	Year 1993	Year 2005
6%	18%	38%
Percent of Federal R&D = 3.5%	Percent of Federal R&D = 3.8%**	Percent of Federal R&D = 4.3%**





* Charts explained in detail later in testimony. **Includes SBIR/STTR funding.

THE QUESTION

The question we ask today is whether this Congress and President Obama will take the same strong actions Presidents Ronald Reagan and George H. W. Bush and the 97th and 102nd Congresses took in similar times to help pull the economy out of the recession and create innovation and jobs by significantly increasing the percentage allocation for both the SBIR and STTR programs? We certainly hope they will. [Appendix C is our paper: SBIR–It Is Working!]

This testimony provides considerable detail on the highly efficient SBIR/STTR programs and their ability to convert Federal R&D funding into new commercial products and therefore, into new jobs, and new high-technology exports. Clearly these are critical to our Nation's ability to pull out of the longest and deepest recession since WWII. The reauthorization of the SBIR and STTR programs are very important to our Country, the small business community we represent and to the Federal Agencies tasked with managing these Federal research programs.

II. First, The VC Question. The current process to reauthorize the SBIR program has been going on for almost 5 years. Since the last reauthorization expired in 2008, there have been 10 continuing resolutions keeping this program going a few months at a time. The Federal Agencies and the small businesses that depend on this program need to know with certainty that this program is going to be around for the long term to plan their budgeting and staffing. By only extending the program a few months at a time, Federal Agencies and small businesses are forced to guess whether or not they will have funding for future projects. This is inefficient.

For most of this period, the issue holding up reauthorization has been whether or not to allow majority venture capital (VC) owned firms into the program. Late last year, the Small Business Technology Council, the Biotechnology Industry Organization (BIO), and others finally reached a compromise, brokered by the staff of the Senate Small Business Committee, which paved the way for last year's proposed legislation (S 4053). Among other things, the compromise allowed majority-VC owned businesses into the program, but limited their participation to ensure that small businesses not backed by large firms are not edged out of the program. SBTC members and Board of Directors supported the compromise legislation last Congress, and we continue to support the compromise legislation as long as it holds together in this Congress.

III. Next, Let's Counter the University Arguments Against Increasing the SBIR/STTR Allocations: There is a current saying around the Washington and the US that:

> **"Universities convert dollars into knowledge, and small companies convert knowledge into money and jobs."**

We don't know the author of this statement, but we thank whoever it is for a "bumper sticker" message that contains much truth.

SBTC believes strongly that SBIR companies and the universities should not be fighting over their pieces of the Federal Extra-mural R&D pie (SBIR receives 2.5% of Federal R&D funding, and universities have averaged about 28%).[4] In the introduction to Congressional testimony in 1999, I stated, "A proposal to create bridges, rather than walls, between these organizations is advanced to help ensure that the importance of the federal R&D funding of the entire continuum of the U.S. innovation process is communicated well to Congress and the public."[5]

As the NRC found in their study (See Appendix E) and as the New England Innovation Alliance survey found, there is already significant utilization of universities and university staffs by SBIR companies.

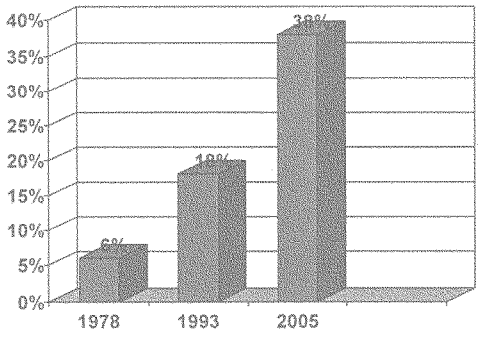
We know that the university lobbies and some universities will argue against increasing the allocation on the basis that this increase will come out of "their pot" of Federal R&D funding. We know this because:

1. During the initial SBIR Congressional deliberations and hearings for the legislation in 1982, the universities and their lobbyists testified against the program.[6]
2. During every SBIR and STTR Congressional hearing where universities and their lobbyists have had an opportunity to testify regarding increases in the program allocations, they have always opposed such increases.

So, let's look at the facts surrounding SBIR/STTR and University utilization of the Federal R&D funds:

1. **Both SBIR and STTR programs, and the universities are in competition for the same "Extra-mural" R&D funds from the Federal Government.** The SBIR/STTR legislation has very carefully defined what "Extra-mural R&D funds" mean and they essentially are the funds that Federal Agencies spend outside their own labs for Research and Development projects. The SBIR and STTR programs and universities must perform quality research projects that meet Federal Agencies' needs.
2. **A significant transformation in our innovation sector has occurred over the almost 30 years of the SBIR/STTR programs.** Strikingly, there are now more scientists and engineers working in smaller companies (38%) than in any other sector. Some 27% of U.S. scientists and engineers currently work for large companies, 16% for universities, 13% for government, and 6% for nonprofits.[7]

Figure 2. Percent of U.S. Scientists and Engineers Employed by Companies with Fewer than 500 Employees[8]



As found in the 1978 House and Senate Hearings referenced above, and in the Findings of the 102nd Congress hearings leading up to PL-102-564 of 1992, "**despite the general success of the small business innovation research program . . . funds received by small business concerns . . . has remained at 3 percent.**"

In short, although the proportion of quality scientists and engineers has grown over **six-fold** during the life of the SBIR program, the small company portion of the Federal R&D funds has remained almost the same over these past 30-plus years. And, as shown in Table 1, small businesses are the most productive of our technology sectors in converting dollars to patents. The market has recognized the efficiency and cost saving of using small business. Outside of the highly qualified SBIR staff, the Government Agencies have not.

Table 1. Comparison of Federal R&D Dollars Received and Patents Granted[9]

Organizations	Federal R&D Dollars	Patents Granted
Small Business	**4 percent**	**38 percent**
Large Business	**36 percent**	**55 percent**
Non-Profit Labs	**6 percent**	**2 percent**
Federal Research Labs	**26 percent**	**2 percent**
Universities	**28 percent**	**3 percent**

3. **Why can't small business obtain a larger share of the Federal R&D funds without an "allocation" program?** This is a great question that was answered in the 1978 Senate-House joint hearings referenced above and the Senate hearings of 1982. What Congress found were the following market structural problems that prohibited a "free-market" competition for Federal R&D funds:

    a. Small businesses were always at a disadvantage when competing with large companies or universities for research projects – because Federal Program Managers and Contracting Officers would always take the safe bet for their careers – the large companies or universities. Who could criticize a career civil servant for choosing MIT or IBM over "Jane and Joe Smith's 5-person R&D shop?"

    b. Universities had an "inside track" for almost all Federal R&D contracts because many of the decision makers and peer-review panels were staffed with university employees on loan to the agencies conducting the research. These individuals have a bias toward their fellow academics.

    c. Universities and large businesses have dedicated marketing organizations that are often larger than the entire technical staffs of the competing small companies and therefore are able to obtain "inside tracks" on procurements.

    For these reasons, Congress in 1982 and 1992, with a strong history of full and open hearings going back to 1978, and with great bipartisan support passed and enlarged the SBIR program to correct this distortion in the Federal R&D funding market.

4. **What about the productivity of the SBIR/STTR program versus universities in the effective use of taxpayer Federal R&D funds?**

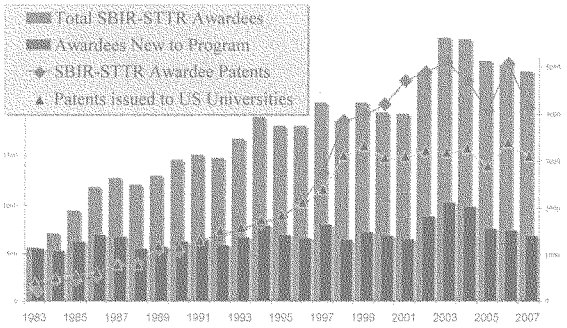
    a. SBTC believes it is helpful to compare the productivity of the SBIR companies versus universities in two key critical factors shown below in Table 2:

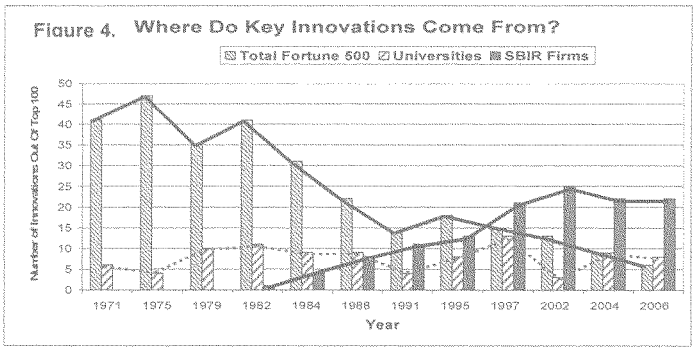
Table 2. SBIR vs Universities in Dollars per Patent, and Commercialization Returns	
Dollars of Federal Funding per Patents Issued:	
Universities (Average 2007 to 2009)[10]	$14, 940,401
SBIR Companies (Average 1982 to 2010)[11]	$ 421,975
Commercialization Returns:	
Universities 2009 Licensing = $2.3 B[12] (vs $53.0 B funding)	4.3 %
SBIR Companies (Average cash return per award)[13]	~ 50 %

On these two measures, the SBIR program is 35 times more effective in generating patents per dollar of Federal R&D funding, and at least 10 times more effective in creating cash returns on the Federal R&D investment. However, this is not surprising. The primary purposes of the small businesses are to bring new products to market and to create jobs – and they do this quite well, creating more than two-thirds of the net new jobs in the past 15 years.[14] The primary purpose of universities is to provide highly qualified graduates to enter the U.S. economy[15] – and they do this quite well as all SBIR companies will attest.

A further analysis of patents and where innovations come from is shown in Figure 3 from Innovation Development Institute and Figure 4 from ITIF.

Figure 3. Effectiveness of SBIR Companies vs Universities in Patents Issued[16]





From a different perspective, the Information Technology and Innovation Foundation recently analyzed the annual lists of the 100 most technologically-important innovations, as selected each year by a panel of judges for *R&D Magazine*.[17] In the chart above (Figure 4), the authors compared the performance of innovations from SBIR companies on these annual assessments, with those from Fortune 500 companies and universities.[18]

As the chart indicates, for the past decade, about one-fourth of the most important technological innovations in the nation have been coming from the SBIR Program – with only 2.5 percent of the Federal Extramural R&D funding, vs approximately 28+ percent for the universities. Or, as the authors themselves put it:

> "The results show that these SBIR-nurtured firms consistently account for a quarter of all R&D 100 award winners – a powerful indication that the SBIR Program has become a key force in the innovation economy of the United States."[19]

A rough calculation of dollars per innovation can be made by comparing the number of "Key Innovations" per Figure 4, the ITIF chart, with total funding provided over an average of two years to universities and the SBIR funding to SBIR companies (2005 to 2006). We have rounded up the university Key Innovations to 10 for the years 2004 to 2006, and have rounded down the SBIR Key Innovations to 20 for the same years. Based on the AUTM report for 2005 to 2006 the average university funding was $43.5 billion,[20] and according to the NSF SBIR web site, the 2006 SBIR funding was approximately $1.73 billion.[21] The approximate results are shown in Table 3 below and show a ~ 50:1 multiplier of SBIR firms vs universities:

Table 3. Key Innovations Per Dollar of R&D Funding – Approximate Average 2005 to 2006

Organization	Avg. Funding – Billions	Key Innovations-Average	$/Key Innovation
Universities	~ $43.5	~ 10	~ $4.35 Billion
SBIR Companies	~ $1.73	~ 20	~ $86.5 Million

5. **What about the quality of SBIR/STTR projects versus university-conducted research?** This has been studied by both GAO and the National Research Council and they both found that the quality of the SBIR/STTR research is comparable to university research.

    a. **GAO Observations**: From: *Observations on the Small Business Innovation Research Program*, Statement for the Record of Anu K. Mittal, Director Natural Resources and Environment Team, GAO-05-861T, June 2005. See Appendix D.

        i. "Between July 1985 and June 1999, GAO. . . . found that SBIR is achieving its goals . . . to stimulate commercialization of research results . . . Participating agencies and companies . . . generally rated the program highly."

        ii. *"High-quality research. . .* **more than three-quarters of the research conducted with SBIR funding was as good as or better than other agency-funded research.** Agency officials also rated the research as more likely than other research they oversaw to result in the invention and commercialization of new products. . ."

iii. *"Widespread competition.* . . . had a high level of competition, and consistently has had a high number of first-time participants. . . .We also found that the agencies deemed many more proposals worthy of awards than they were able to fund. For example, the Air Force deemed 1,174 proposals worthy of awards in fiscal year 1993 but funded only 470.

iv. *"Successful commercialization.* SBIR successfully fosters commercialization of research results.

v. *"Helping to serve mission needs.* SBIR has helped serve agencies' missions and R&D needs.

b. **National Research Council Study.** This 2008 study was mandated by Congress and involved a 6-year assessment of the entire SBIR program at all agencies.[22] The report has been presented to Congress and some of the findings are presented here. See Appendix E for details.

i. **NATIONAL RESEARCH COUNCIL (NRC) STUDY FINDINGS:**

ii. **"The Small Business Innovation Research (SBIR) Program Is Making Significant Progress in Achieving the Congressional Goals for the Program.**

iii. **Overall, the Program Has Made Significant Progress in Achieving its Congressional Objectives by: Stimulating Technical Innovation**

iv. **Using Small Businesses to Meet Federal Research and Development Needs.**

v. **Increasing Private Sector Commercialization of Innovation Derived from Federal Research and Development..**

vi. **SBIR Is Meeting Federal R&D.** The NRC survey revealed that 56 percent of surveyed projects were successful in attracting additional funding from a variety of sources.

vii. **Linking Universities to the Public and Private Markets. . . .**a third of all NRC Phase II and Firm Survey respondents indicated that there had been involvement by university faculty, graduate students, and/or a university itself ..."

IV. Proposed Dramatic Increase in the STTR Allocation: We appreciate the great contribution that universities make to advancing knowledge. As stated in my 1999 testimony we believe in a cooperative relationship between universities and small businesses such as envisioned by Congress in establishing the STTR program. In this economic time with the need to allocate the federal funds to the most efficient use, we think it is better for the knowledge sector and the jobs/money sector to work together. For this reason, we have proposed a dramatic increase in the STTR program. This program forces the universities and small businesses to work together to the mutual benefit of all – especially the taxpayers. A detailed discussion by SBTC of expanding the STTR program is included in this testimony as Appendix F.

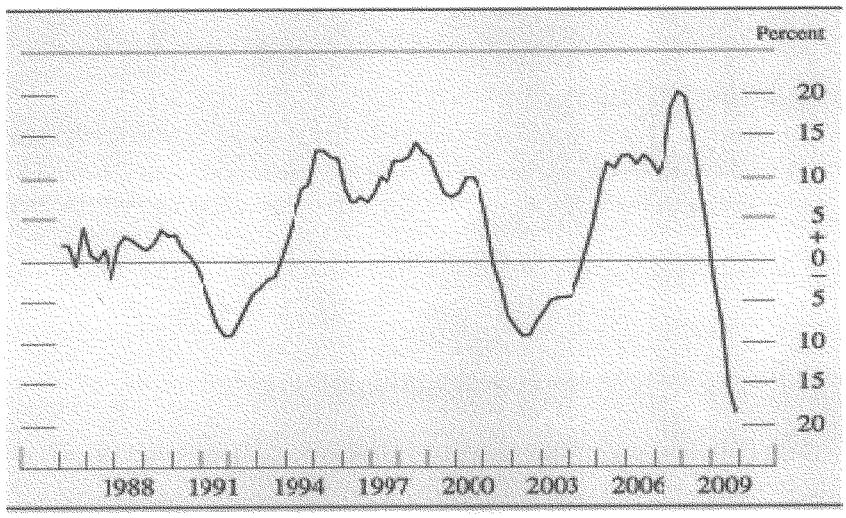
V. Increases in Award Size Without a Commensurate Increase In Allocation: The SBTC members and Board asked me to bring to your attention that the increases in award size contemplated in S-4053 would actually reduce the number of awards unless the allocation is also increased. We support S-4053 and ask for consideration of this issue. Table 4 below shows this problem – almost a 25% reduction in number of awards.

Table 4. Impact of Award Size Increase without Commensurate Allocation Increase ~ $2 Billion Program[23]		
Award Size = Phase I/Phase II	Current program = $100/$750 K	S-4053 = $150/$1,000 K
Phase I Awards	5,000 Awards	3,636 Awards
Phase II Awards	2,000 Awards	1,545 Awards

VI. The Important Financing Challenges All Small Businesses, Including SBIR/STTR Companies, Face in Today's Recession. In a recession, small businesses are hit the hardest during the ensuing credit crunch. In the 1991 recession, banks had a net negative lending to businesses – meaning they pulled more loans than they made.[24] This is also true in the current recession as shown in Figure 5 of the Federal Reserve Bulletin below.

Figure 5. Federal Reserve Bank Report on All Commercial and Industrial Loans

5. Change in commercial and industrial loans, 1986–2009



NOTE: The data are quarterly; changes are from four quarters earlier.

This credit crunch is also hitting small businesses as shown in Figure 6 and Figure 7 below.[25] These charts are from the Office of Advocacy, US Small Business Administration research: *The Economy During the 1990s,* and were presented at the *Innovations in Economic Development Forum* in Atlanta on February 2, 2010.

Figure 6. Small Business Bank Lending 1991 to 2010.

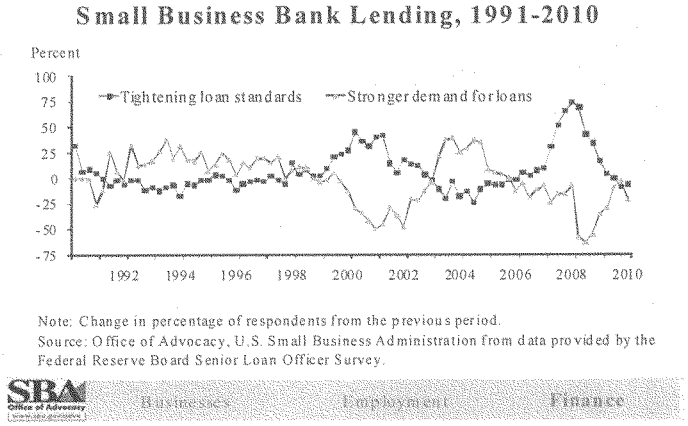
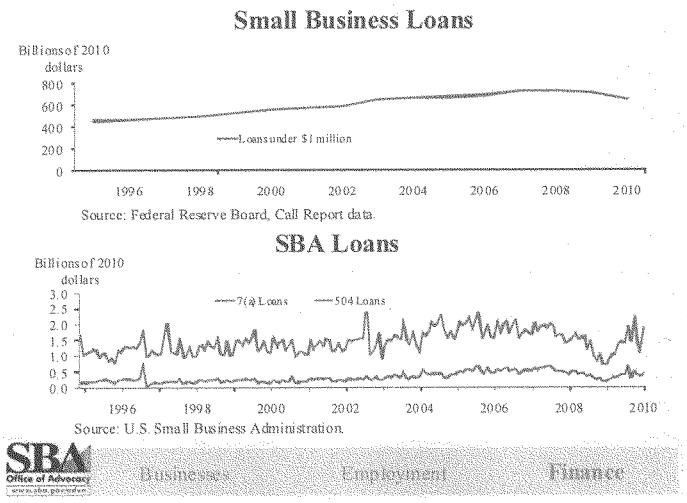


Figure 7. Small Business Loans (under $ 1 million) and SBA Loans



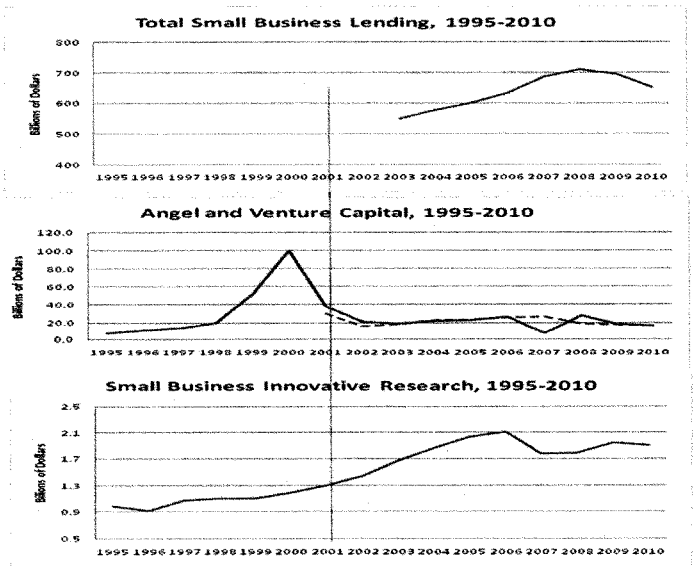
The Office of Advocacy, US Small Business Administration, just released on February 11, 2011, their annual banking study, *Small Business Lending in the United States, 2009-2010.*[26] The report summary states:

> "U.S. gross domestic product has increased since second quarter 2009; however, small business lending by depository institutions continues to decline. This decline reflects the challenges posed by an uncertain economy in which small business owners are reluctant to acquire more debt, lenders are cautious about extending more debt, and regulators are carefully watching the performance of all out-standing debt. The aggregate value of small business loans held by depository institutions declined by 6.2 percent from $695.2 billion in 2009 to $652.2 billion in 2010."

A further Office of Advocacy release on February 13, 2011 by the Chief Counsel are the Small Business Financing[27] charts below which show the reduction of the most important financing affecting the SBIR/STTR programs: (all in $ Billions)

1. Total Small Business Lending (1995) 2003 to 2010 showing the steep drop in banking and related lending after 2008.
2. Angel (Blue-dashed line) and Venture Capital Financing (Red line) 1995 to 2010 showing the declines after the dot-com bust of 2000.
3. SBIR funding showing the drop after 2006.

Figure 8. Small Business Financing 1995 to 2010



What these charts show is that SBIR companies are facing the same very discouraging credit market that all small businesses have. This Committee is well familiar with this problem and we applaud your efforts to draft policies that can help turn this problem around.

VII. Finally, Let's Look at the Importance of the SBIR Program in Financing Small High-Tech Companies – And, How They Leverage Federal R&D Funds to Bring Products to Market. What I'd like to discuss in closing today is that SBIR and STTR companies can and do provide financial leverage to the Federal R&D dollars they receive – something that is not possible on most university projects. The SBIR and STTR programs can provide a very important stimulus to jump start the commercialization of the technologies of the companies awarded contracts. The SBIR and STTR grants/awards are non-dilutive to the shareholders' equity, and are not loans that detract from a company's balance sheet. In fact they are looked on with considerable favor by:

1. Equity investors because the SBIR/STTR program has "vetted" the company's technology through the peer review competitive selection, and because the company has shown an ability to meet the contract/financial/management reporting systems imposed by the programs regulations. In addition, the Commercialization Plans legislated by Congress and required by all of the SBIR/STTR agencies provide the potential investors with the company's strategies for creating a market for the product.
2. Banks and other financial institutions for lending because of the "solid customer" caliber of the contract with the Federal government, and because of the vetting and reporting requirements and commercialization plans favored by equity investors. In addition, lenders see these contracts as "operations loans" with very low risk since the delivery requirements are research reports and items.
3. Lenders and equity investors when the SBIR/STTR program reaches the Phase III stage because the company is now in commercial production of a product that the lenders and investors have known through the approximate two plus years of Phases I and II. At this stage the Commercialization Plans are particularly useful because the companies have real customers and market opportunities.

This leverage permits the SBIR/STTR companies to employ more staff than the universities can for the same Federal R&D dollar because universities produce only research reports/items. By their very nature, they do not have marketing and production organizations; therefore, there is no Phase III for their research. The high rate of commercialization reported by GAO and NRC referenced above provides for a direct multiplier on the Federal R&D funds expended on the SBIR and STTR program.

Lastly, this Committee well knows that the small businesses are the most important sector of our economy in creating net new jobs. From Office of Advocacy data we know that small businesses, particularly those the size of SBIR/STTR program, created more than two-thirds of the net new jobs over the past 15 years.[28]

VIII. The SBIR and STTR programs deserve to be reauthorized quickly – perhaps permanently — and their allocation significantly increased. On behalf of the members and Board of SBTC and NSBA we thank you for holding this very timely hearing.

[1] As Counsel to the House Small Business Committee, I helped convene the first joint House-Senate Small Business Committee hearings on the subject in 1978. These hearings showed that, despite their demonstrated superior efficiencies at innovating, small companies received only 3.5% of federal R&D contract dollars. Today, with far more science and engineering talent at their disposal, and a far more widely acknowledged record of innovations, small companies still receive only 4.3% of those R&D contract dollars. And SBIR/STTR accounts for more than half of that. I subsequently testified before Congress regarding small business and innovation on numerous occasions, as Deputy Chief Counsel for Advocacy at SBA during the Carter Administration, as Chief Counsel during the Clinton Administration, and as Executive Director of SBTC during the George W. Bush and the Barack Obama Administrations. SBTC represents more companies that are active in the federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program than any other organization. SBTC also serves as the Technology Council of the National Small Business Association, the nation's oldest nonprofit advocacy organization for small business, which represents over 150,000 small companies across the United States. I appear here today on behalf of both organizations.

[2] See Appendix A for Findings and Purpose of PL-97-219

[3] Recession source: NBER Recessions of the Twentieth Century.

[4] http://www.nsf.gov/statistics/seind10/append/c4/at04-07.pdf

[5] *A New View of Government, University, and Industry Partnerships,* Jere Glover, then Chief Counsel of the Office of Advocacy, at the Senate Committee on Small Business Roundtable Discussion on the SBIR program on August 4, 1999.

[6] One of the first examples was the March 10, 1982 hearing by the R&D Subcommittee of the House Armed Services Committee on HR-4326, where Stanford University and the American Electronics Association (AEA) both testified against the program, and the Electronic Association of California (a small-business trade association spin-off from AEA) testified in favor of the SBIR program.

[7] Testimony by Jere W. Glover before the Subcommittee on Technology and Innovation, Committee on Science and Technology, United States House of Representatives, 23 April 2009.

[8] National Science Foundation, *Science and Engineering Indicators*, 2007.

[9] Ibid

[10] Press releases for the Association of University Technology Managers (AUTM) U.S. Licensing Activity Survey Summary: FY-2007 to 2009, average annual funding is $51.4 billion; average number of patents issued is 3440. See:
http://www.autm.net/AM/Template.cfm?Section=Licensing_Surveys_AUTM&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=6&ContentID=2409

[11] Data from www.inknowvation.com the web site for Ann Eskesen, 2011, the best source of SBIR data. From the program inception in 1982 to date total funding is $31.8 billion; total number of patents issued is 75,265.

[12] AUTM, Op Cit, 2009; R&D funding to universities was $53.9 billion, and licensing income was $2.3 billion for 2009.

[13] *An Assessment of the Small Business Innovation Research Program*, National Research Council, National Academies Press; Charles W. Wessner, *Editor*, Committee on Capitalizing on Science, Technology, and Innovation; 2008; see: http://www.nap.edu/catalog.php?record_id=11989 Page 122, which states: "On average, SBIR projects received almost $800,000 from non-SBIR sources, with over half of respondents (51.6 percent) reporting some additional funds for the project from a non-SBIR source." [Since only one-half of the respondents reported receiving additional funds, we have discounted the $800,000 number in the NRC report to $400,000. Per the NRC report, the average Phase I plus Phase II funding was approximately $100,000 plus $675,000 or $775,000 during the period of the study.]

[14] Office of Advocacy, U.S. Small Business Administration, See: http://www.sba.gov/advocacy/7495/8420

[15] *Managing University Intellectual Property in the Public Interest*, 2010, Committee on Management of University Intellectual Property: Lessons from a Generation of Experience, Research, and Dialogue; Stephen A. Merrill and Anne-Marie Mazza, Editors; National Research Council, http://www.nap.edu/catalog/13001.html Page 68, "Finding 2: The transition of knowledge into practice takes place through a variety of mechanisms, including but not limited to: 1. movement of highly skilled students (with technical and business skills) from training to private and public employment; 2. publication of research results in the open academic literature that is read by scientists, engineers, and researchers in all sectors; . . . 8. licensing of IP to established firms or to new start-up companies."

[16] Innovation Development Institute, 2009, from U.S. Patent and Trademark Office data.

[17] 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.
[18] These charts were included in the testimony by Jere W. Glover, 2009, Op Cit
[19] Ibid., p. 15
[20] AUTM, Op Cit, In 2005 and 2006, the reported R&D funding to universities was $42 billion and $45 billion respectively.
[21] http://www.nsf.gov/statistics/seind10/c8/c8s6o49.htm For 2005 and 2006 NSF reports that the SBIR funding was approximately $1.73 billion average per year. It is clear that a "Key Innovation" may take years from the time of research to market impact, but it is proposed that by treating both organizations the same, and since the funding levels were relatively comparably stable over the previous 2 years, the information shown is a reasonable approximation.
[22] *An Assessment of the SBIR Program,* Op Cit.
[23] Assumes 40% of Phase I awards go to Phase II.
[24] Federal Reserve Bulletin: Profits and Balance Sheet Developments at U.S. Commercial Banks in 2009, Last update: September 2, 2010.
See: http://www.federalreserve.gov/Pubs/Bulletin/2010/articles/profit/default.htm#fig3
[25] Innovations in Economic Development Forum, Co-sponsored by the Georgia Tech School of Public Policy and the Georgia Tech Enterprise Innovation Institute, Atlanta, GA. Wednesday February 2, 2010. Speaker: Brian Headd, Economist, Office of Advocacy, U.S. Small Business Administration *The Economy During the 1990s.*
[26] *Small Business Lending in the United States, 2009-2010,* Office of Advocacy, US Small Business Administration, released on Feb 11, 2011, by Chief Counsel for Advocacy, Dr. Winslow Sargeant. See: http://www.sba.gov/sites/default/files/files/sbl_10study.pdf
[27] *Small Business Financing, 1995 to 2010*, Office of Advocacy, US Small Business Administration, released on February 14, 2011, by Chief Counsel, Dr. Winslow Sargeant.
[28] Office of Advocacy, US Small Business Administration, See: http://www.sba.gov/advocacy/7495/8420

APPENDIX A

PUBLIC LAW 97-219 Signed JULY 22, 1982

Public Law 97-219, 97th Congress
An Act
To amend the Small Business Act to strengthen the role of the small, innovative firms in federally funded research and development, and to utilize Federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the Nation's economy.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. This Act may be cited as the "Small Business Innovation Development Act of 1982".

SEC. 2. **(a)** The Congress **finds** that-
(1) technological innovation creates jobs, increases productivity, competition, and economic growth, and is a valuable counterforce to inflation and the United States balance-of-payments deficit;
(2) while small business is the principal source of significant innovations in the Nation, the vast majority of federally funded research and development is conducted by large businesses, universities, and Government laboratories; and
(3) small businesses are among the most cost-effective performers of research and development and are particularly capable of developing research and development results into new products.

(b) Therefore, the **purposes** of the Act are-
(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 innovations derived from Federal research and development.

APPENDIX B

Public Law No: **102-564,** Signed on 10/28/1992

Small Business Research and Development Enhancement Act of 1992 (Enrolled Bill [Final as Passed Both House and Senate] - ENR)

SEC. 102. FINDINGS AND PURPOSES.

(a) FINDINGS- The Congress **finds** that--

(1) the small business innovation research program established under the Small Business Innovation Development Act of 1982 (hereafter in this Act referred to as the `SBIR' program) has been a successful method of involving small business concerns in Federal research and development;

(2) the small business innovation research program has been an effective catalyst for the development of technological innovations by small business concerns;

(3) small business innovation research program participants have provided high quality research and development in a cost-effective manner;

(4) the innovative products and services developed by small business concerns participating in the small business innovation research program have been important to the national defense, as well as to the missions of the other participating Federal agencies;

(5) the small business innovation research program has effectively stimulated the commercialization of technology developed through Federal research and development, benefiting both the public and private sectors of the Nation;

(6) by encouraging the development and commercialization of technological innovations, the small business innovation research program has created jobs, expanded business opportunities for small firms, stimulated the development of new products and services, and improved the competitiveness of the Nation's high technology industries;

(7) the small business innovation research program has also helped to increase exports from small business concerns;

(8) despite the general success of the small business innovation research program, the proportion of Federal research and development funds received by small business concerns has not increased over the life of the program, but has remained at 3 percent; and

(9) although the participating Federal agencies have successfully implemented most aspects of the small business innovation research program, additional outreach efforts are necessary to stimulate increased participation of socially and economically disadvantaged small business concerns.

(b) PURPOSES- The **purposes** of this title are--

(1) to expand and improve the small business innovation research program;

(2) to emphasize the program's goal of increasing private sector commercialization of technology developed through Federal research and development;

(3) to increase small business participation in Federal research and development; and

(4) to improve the Federal Government's dissemination of information concerning the small business innovation research program, particularly with regard to program participation by women-owned small business concerns and by socially and economically disadvantaged small business concerns.

Appendix C

Small Business Technology Council of the National Small Business Association
1156 15th Street NW, Suite 1100, Washington, DC 20005

The SBIR Program – It Is Working!

The SBIR program is now 28 years old, with tens of thousands of awards and many studies. What are the conclusions? How is it being used by the SBIR agencies? Is it successful in the commercialization of advanced technology? Is it being copied anywhere else in the world? Is it relevant in today's economy?

- The most recent and most intensive study was a six-year analysis by the prestigious National Research Council of the National Academies published in 2008 by National Academies Press,[i] which concluded:

  "By strengthening the SBIR program, the Committee believes that the capacity of the United States to develop innovative solutions to government needs and promising products for the commercial market will be enhanced." (Paragraph 1.6, page 53)

- SBIR companies have produced approximately 25% of key innovations in the past 10 years– with only 2.5% of the Federal R&D extra-mural budget.[ii] The 11 agencies participating in the SBIR program have adapted the SBIR program to their particular missions with considerable success. (A Google search of "SBIR Success Stories" provides over 30,000 returns.) See SBIR Success Stories at www.sbtc.org.

- The commercialization success of the SBIR program is unparalleled in Federal R&D programs with its focus on the Phase III production outcome. According to the NAP study, ". . . approximately 30-40 percent of projects generate products that do reach the marketplace." (Page 129) This is further exemplified by the very high rate of patents generated by SBIR firms compared to universities and large businesses – 38% of U.S. patents for small business (with < 4% of the Federal R&D budget); 3% for universities (with 28% of the budget); and 55% for large businesses (with 36% of the budget).[iii] For universities, it is "publish or perish." For small businesses, it is "patent and produce products or perish." These commercialization efforts produce products, jobs and tax revenue to help pay for our universities.

- The NAP study also found that the following countries have adopted an SBIR-type program – Sweden, Russia, The United Kingdom, The Netherlands, Japan, Korea, Taiwan and other Asia countries (Page 54). A European Union policy paper has a goal of 15% of EU R&D funding to SMEs.[iv]

- Further, the NAP study found that the SBIR program builds meaningful bridges to universities:

  ". . . about a third of all NRC Phase II and Firm Survey respondents indicated that there had been involvement by university faculty, graduate students, and/or a university itself in developed technologies. (Page 64) . . . These data underscore the significant level of involvement by universities in the program and highlight the program's contribution to the transition of university research to the marketplace." (Page 65)

- SBTC believes that this partnership between universities and small business is an important economic multiplier that is unique to the U.S. innovation strategy. We have always strongly supported this partnership throughout the entire 28-year history of the program.[v] We see the important successes that these strong university/small business partnerships have created in Silicon Valley, Route 128, San Diego, Research Triangle Park, Ann Arbor, and others across the country. The U.S. needs more such programs.

- The importance of these partnerships is reinforced by the NAP study of 2002, wherein they state:

  "Public-private partnerships, involving cooperative research and development activities among industry, government laboratories, and universities, can play an instrumental role in accelerating the development of new technologies from idea to market."[vi]

- U.S. universities have produced 119 Nobel Laureates in the past 25 years, and they graduate the brilliant scientists and engineers that our innovative companies need. Small companies introduce the innovative products to the marketplace that keeps the U.S. in the forefront of technology. We need this partnership.

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[i] *An Assessment of the Small Business Innovation Research Program*, National Research Council, National Academies Press; Charles W. Wessner, *Editor*, Committee on Capitalizing on Science, Technology, and Innovation; 2008; http://www.nap.edu/catalog.php?record_id=11989

[ii] *Where Do Innovations Come From? Transformations in the U.S. National Innovation System*, 1970-2006, published by THE INFORMATION TECHNOLOGY & INNOVATION FOUNDATION, Washington, DC July 2008.

[iii] *A New View of Government, University, and Industry Partnerships,* This paper was submitted by Jere Glover, Chief Counsel of the Office of Advocacy, at the Senate Committee on Small Business Roundtable Discussion on the SBIR program on August 4, 1999.

[iv] http://cordis.europa.eu/fp7/home_en.html

[v] *A New View of Government, University, and Industry Partnerships,* op. cit.

[vi] *Government-Industry Partnerships for the Development of New Technologies*, National Research Council, National Academies Press: Charles W. Wessner, Editor; 2002, page 23; http://www.nap.edu/catalog/10584.html

Appendix D

Observations on the Small Business Innovation Research Program, Statement for the Record of Anu K. Mittal, Director Natural Resources and Environment Team, GAO-05-861T; June 28, 2005.

1. "Between July 1985 and June 1999, GAO reviewed, reported, and testified on the SBIR program many times at the request of the Congress. While GAO's work focused on many different aspects of the program, it generally found that SBIR is achieving its goals to enhance the role of small businesses in federal R&D, stimulate commercialization of research results, and support the participation of small businesses owned by women and/or disadvantaged persons. Participating agencies and companies that GAO surveyed during the course of its reviews generally rated the program highly." [Page 1]

2. *"High-quality research.* Throughout the life of the program, awards have been based on technical merit and are generally of good quality. For example, in 1989 we reported that according to agency officials, more than three-quarters of the research conducted with SBIR funding was as good as or better than other agency-funded research. Agency officials also rated the research as more likely than other research they oversaw to result in the invention and commercialization of new products. When we again looked at the quality of research proposals in 1995, we found that while it was too early to make a conclusive judgment about the long-term quality of the research, the quality of proposals remained good, according to agency officials." [Page 5]

3. *"Widespread competition.* The SBIR program successfully attracts many qualified companies, has had a high level of competition, and consistently has had a high number of first-time participants. Specifically, we reported that the number of proposals that agencies received each year had been increasing. In addition, as we reported in 1998, agencies rarely received only a single proposal in response to a solicitation, indicating a sustained level of competition for the awards. We also found that the agencies deemed many more proposals worthy of awards than they were able to fund. For example, the Air Force deemed 1,174 proposals worthy of awards in fiscal year 1993 but funded only 470. Moreover, from fiscal years 1993 through 1997, one third of the companies that received awards were first-time participants. This suggests that the program attracts hundreds of new companies annually." [Page 5]

4. *"Successful commercialization.* SBIR successfully fosters commercialization of research results. At various points in the life of the program we have reported that SBIR has been successful in increasing private sector commercialization of innovations. For example, past GAO and DOD surveys of companies that received SBIR Phase II funding have determined that approximately 35 percent of the projects resulted in the sales of products or services, and approximately 45 percent of the projects received additional developmental funding. We have also reported that agencies were using various techniques to foster commercialization. For example, in an attempt to get those companies with the greatest potential for commercial success to the marketplace sooner, DOD instituted a Fast Track Program, whereby companies that are able to attract outside commitments/capital for their research during phase I are given higher priority in receiving a phase II award." [Pages 5 & 6]

5. *"Helping to serve mission needs.* SBIR has helped serve agencies' missions and R&D needs. Agencies differ in the emphasis they place on funding research to support their mission and to support more generalized research. Specifically, we found that DOD links its projects more closely to its mission. In comparison, other agencies emphasize research that will be commercialized by the private sector. Many of the projects DOD funded have specialized military applications while NIH projects have access to the biomedical market in the private sector. Moreover, we found that SBIR promotes research on the critical technologies identified in lists developed by DOD and/or the National Critical Technologies Panel." [Page 6]

Appendix E

An Assessment of the Small Business Innovation Research Program,
National Research Council, National Academies Press; Charles W. Wessner, *Editor*, Committee on Capitalizing on Science, Technology, and Innovation; 2008; see: http://www.nap.edu/catalog.php?record_id=11989

NATIONAL RESEARCH COUNCIL (NRC) STUDY FINDINGS:

1. **"The Small Business Innovation Research (SBIR) Program Is Making Significant Progress in Achieving the Congressional Goals for the Program.** The SBIR program is sound in concept and effective in practice. With the programmatic changes recommended here, the SBIR program should be even more effective in achieving its legislative goals.
2. **Overall, the Program Has Made Significant Progress in Achieving its Congressional Objectives by: Stimulating Technical Innovation.** By a variety of metrics, the program is contributing to the nation's stock of new scientific and technical knowledge.
3. **Using Small Businesses to Meet Federal Research and Development Needs.** SBIR program objectives are aligned with, and contribute significantly to fulfilling the mission of each studied agency. In some cases, closer alignment and greater integration should be possible.
4. **Increasing Private Sector Commercialization of Innovation Derived from Federal Research and Development.** The program enables small businesses to contribute to the commercialization of the nation's R&D investments, both through private commercial sales, as well as through government acquisition, thereby enhancing American health, welfare, and security through the introduction of new products and processes.
5. **SBIR Is Meeting Federal R&D Needs.** SBIR plays an important role in introducing innovative, science-based solutions that address the diverse mission needs of the federal agencies.
6. **SBIR Projects Attract Significant Additional Funding.** SBIR funded research projects enable small businesses to develop the technical know-how needed to attract third-party interest from a variety of public and private sources, including other federal R&D funds, angel investors, and venture funds. The NRC survey revealed that 56 percent of surveyed projects were successful in attracting additional funding from a variety of sources.
7. **Linking Universities to the Public and Private Markets.** The SBIR program supports the transfer of research into the marketplace, as well as the general expansion of scientific and technical knowledge, through a wide variety of mechanisms. With regard to SBIR's role in linking universities to the market, about a third of all NRC Phase II and Firm Survey respondents indicated that there had been involvement by university faculty, graduate students, and/or a university itself in

developed technologies. This involvement took a number of forms.41 Among the responding companies—

a. More than two-thirds had at least one academic founder, and more than a quarter had more than one;

b. b. About one-third of founders were most recently employed in an academic environment before founding the new company;

c. c. In some 27 percent of projects, university faculty were involved as principal investigators or consultants on the project;

d. d. 17 percent of Phase II projects involved universities as subcontractors; and

e. e. 15 percent of Phase II projects employed graduate students.

These data underscore the significant level of involvement by universities in the program and highlight the program's contribution to the transition of university research to the marketplace."

Appendix F

Small Business Technology Council of the National Small Business Association
1156 15th Street NW, Suite 1100, Washington, DC 20005

How Expanding the STTR Program Can Instantly Create Jobs and Technology Clusters

By memorandum or Executive Order, President Obama can dramatically create more jobs and encourage technology clusters by simply increasing the STTR (Small Business Technology Transfer program) program from the current 0.3 percent of the federal extramural R&D budget to 2.5 percent. This will not impact the budget deficit now or in the future.

This expansion will force the most innovative sector of the U.S. economy, small businesses, to cooperate more closely with the best basic research institutions in the world, American universities. The STTR is a very successful federal R&D procurement program specifically created by Congress in the *Small Business Research and Development Enhancement Act of 1992 (P.L. 102-564, S. 2941, Oct. 28, 1992)* to build bridges between universities who perform advanced research and small businesses who bring innovative products to market.

The commercialization success of the STTR program has been significant – with commercial sales dollars by the successful companies that are considerably greater than the initial federal funding. The 2001 GAO report,[1] which looked at the early results of the program, showed that for the 101 companies responding to their survey, 51 had successful Phase III projects, with sales totals of $132 million – compared to the cumulative federal investment in these STTR companies of approximately $44 million – a 3:1 return on taxpayer funds.

Technology clusters (with cooperating research universities and innovative businesses) have been demonstrated to create explosive centers of job growth, innovation and venture capital support – such as Silicon Valley, Boston's Route 128, San Diego's communications and biotech communities, Research Triangle Park in North Carolina, and Ann Arbor/WARF, MI. Numerous studies (from David Birch in 1980s through Office of Advocacy, 2008) have demonstrated the job creation and economic multiplier effect of these collaborations between research universities and technology companies with their development, commercialization and marketing skills.

The funds for the expansion of the STTR program will come from already budgeted federal extramural R&D funds – and at least 30% of the STTR funds *MUST* be spent with universities or similar research organizations. Since much of the extramural funds go to large companies, this will be a net increase for universities. Further, the STTR program has already developed model agreements for the management of the small company/ university intellectual property rights so these programs are "shovel ready" and meet the important research needs of the federal agencies. (See:
http://grants1.nih.gov/grants/funding/sbirsttr1/STTRModelAgreement.doc)

The most significant new innovations in the marketplace have been demonstrated to come from small businesses – especially from STTR and SBIR firms. An important new study, *Where Do Innovations Come From? Transformations in the U.S. National Innovation System, 1970-2006*[2] reports:

> "The results show that these SBIR-nurtured firms consistently account for a quarter of all U.S. R&D 100 Award winners—a powerful indication that the SBIR program has become a key force in the innovation economy of the United States."

[Note: the SBIR and STTR budgets combined are only 2.8 percent of the federal extramural budget – the rest goes mostly to large businesses and then to universities.]

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[1] GAO-01-867T, FEDERAL RESEARCH AND DEVELOPMENT, *Contributions to and Results of the Small Business Technology Transfer Program*, Testimony before the Senate Small Business and Entrepreneurship Committee, June 21, 2001

[2] THE INFORMATION TECHNOLOGY & INNOVATION FOUNDATION, July 2008, Washington, DC. See: http://www.itif.org/publications/where-do-innovations-come-transformations-us-national-innovation-system-1970-2006

Chair LANDRIEU. Two-thousand-and-nine was a tough year for everybody.

Mr. GLOVER. It was a very tough year for everybody. Two-thousand-and-ten, you saw——

Chair LANDRIEU. A better year.

Mr. GLOVER [continuing]. Applications went up dramatically.

Chair LANDRIEU. Thank you. I do have a couple of questions, and let me start with, actually, Mr. Glover. I agree with you. When my staff brought this reauthorization to me and said we were only basically allocating 2.5 percent, and, of course, our bill takes that up to 3.5 percent, but over ten years. That was my same comment. Why are we only doing 3.5 percent for this small business set-aside, not set-aside but allocation, in this bill when there is a general understanding, and I think verified by the testimony this morning, that in terms of the number of patents, the innovation is all happening at the small business level. The backing out of large corporations from their own in-house research because they have figured out what we should have figured out—you can buy better technology for cheaper on the street, if you will, or from entrepreneurs out there who do not have the constraints of large businesses, than sometimes developing your own.

So I am doing this—only increasing the allocation to 3.5%—in the spirit of compromise, but I am going to mention to the President personally that I think that the allocation should be higher. Because of the compromises, and where it is, I do not want to jeopardize our opportunity to get this moving forward. But I am going to be pursuing that.

My question, Dr. Wessner, is to you. Although we have come to a great compromise here with many different viewpoints for this reauthorization, and I am very, very pleased and I thank Senator Snowe for her help in negotiating much of this with me, but we are still getting some push-back from universities that basically see small business as a threat. They say to me, Senator, we are the ones that do all the research. We do not think small business should be taking more federal research and developmental funds, even though this is a very small portion.

And in my experience, I have been trying to explain to them, and this comes from Roy Keller who runs our technology transfer in Louisiana, he says between 50 to 60 percent of all Louisiana's SBIR have university involvement, and we are not one of the higher states. We are more modestly engaged in the program. I would like us to be more, and I intend to see that happen. But he says, we work with the universities and the small businesses in our state. About 50 to 60 percent of our proposals have some type of university connection. So I am confused about why some universities see this as universities versus small business as opposed to partnerships, which I think are the most important.

So my question is, from your experience, how do you see the connection between small business and universities, and in your own experience, do you not find that there is some real common ground here?

Dr. WESSNER. The short answer, ma'am, is yes. There is common ground. I think we have to remember that old adage, what you see depends on where you sit. When you ask the head of, or the vice

provost, for research in a major university, he will explain that SBIR takes his money from his programs. But then walk down the hall to the vice provost for commercialization, and he will explain to you that SBIR is one of the most valuable tools we have to convert our research into products for the marketplace.

I think the universities are misguided in opposing this. I have often told them, sometimes in heated discussions, because we are from the Academy of Sciences and we do favor higher research budgets for universities. In fact, let me repeat that. The best way to calm some of this is to actually push our research budgets up. That has a double beneficial effect for this program, first, because you increase the amounts available, but also it provides the space for everyone to participate.

So the universities are a little bit schizophrenic. On the one hand, they value it for the commercialization. On the other hand, they obviously want more funds for their research.

What I would suggest you point out to them, what is the most compelling story to a Senator or to a Congressman, that there is a brand new publication in a peer-reviewed journal or that there are 25 people working in a new company called Qualcomm in their district? I think that latter story is the most effective. It shows how we convert research into jobs and into growth and into technological capacity and, indeed, into national security.

Chair LANDRIEU. My second question is, there was some concern, I think that we have tried to address it in our reauthorization, but some that looked at this program, and it has been alluded to in some of the testimony, there was a practice some people called mill riding, which is that some companies or some start-ups were getting grant after grant after grant and not ever reaching commercialization. However, I thought what I heard from Dr. Silver was that his enterprise has received multiple grants from a variety of different Federal agencies. He has found it to be very beneficial.

So how do we ensure accountability to the taxpayer by allowing these innovators to be exactly that—innovative, searching, getting different grants from different Federal agencies—but making sure that we are giving value to the taxpayer. At some point, that effort is either shut down because it is not going to be successful or encouraged to be another Qualcomm?

Dr. WESSNER. We have an article I would be happy to submit, both from the text of our reports—it talks about the myth of the mills. Basically, this is an urban myth. There are a very limited number of high-volume multiple awardees. Keep in mind, as a program goes past 25 years, it should not be a real surprise that there are more and more companies with more and more awards.

[The information follows:]

AN ASSESSMENT OF THE SBIR PROGRAM

Committee for
Capitalizing on Science, Technology, and Innovation:
An Assessment of the Small Business Innovation Research Program

Policy and Global Affairs

Charles W. Wessner, Editor

NATIONAL RESEARCH COUNCIL
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the question of whether the size of awards should be increased. But this is not a simple question. Related questions include: by what amount? One-time only or possibly tied to inflation? Both Phases? At all agencies?

The primary justification for raising the nominal limits is that the cost of research has increased with inflation, and hence that these limits do not buy the agencies the same amount of research results that the Congress intended when this guidance on award size was first introduced.

Agency staff have offered a range of additional justifications for larger awards. At NIH, which has been most active in experimenting with larger awards, justifications include the need to focus on the highest quality research, the likelihood that more funding will lead to more commercial success, the impact of inflation, the need to support companies through regulatory hurdles, and the possibility that higher funding levels will expand the applicant pool by attracting, in particular, high-quality applicants who currently believe SBIR is too small to justify the effort to apply. Finally, and not insignificantly, there is a relatively higher overhead cost of administering more, smaller awards.

The latter is tied to the minimal administrative funding for SBIR, discussed below. The other NIH-specific points are discussed in the NIH volume.

Awardees in interviews have also favored larger awards—until they are asked to make an explicit trade-off between the size of awards and the number of awards. At that point, awardees often become less supportive of larger awards.

There are also arguments against larger (and fewer) awards. Because it is extremely difficult to predict which awards will generate large returns (commercial or otherwise), it may be wise to spread the awards as widely as possible. SBIR awards also play a critical role (described in Chapter 4: SBIR Program Outputs) in supporting the transition of research from the academy to the market place. This kind of motivation may not require more than the existing level of support. There is as yet also no evidence to support the assertion that larger awards generate larger returns, although further analysis at NIH might test that connection.

If we conclude—as we do—that the SBIR programs at the agencies do work as intended by Congress, and do generate significant benefits, we should recommend change only with caution. It therefore seems that while there is a case to increase award size, there are risks involved, and it would be prudent for agencies taking this step to increase the awards incrementally over, perhaps, three years to avoid a sharp contraction of the program and to allow hope for increases in R&D funding to mitigate the impact on applicant success rates of increasing award sizes.

5.9.6 Multiple-Award Winners

Multiple-award winners do not appear to constitute a problem for the SBIR program at any agency. At all agencies except DoD, only a limited number of companies win a sufficiently large number of awards to meet even the loosest definition of a "mill."

Even at DoD, we find arguments aimed at limiting a company's participation in SBIR to be unconvincing, for a number of reasons:

(1) **Successful Commercialization.** Aggregate data from the DoD commercialization database indicates that the basic charge against "mills," i.e., no commercialization, is simply incorrect. Companies winning the most awards are on average more successful commercializers than those winning fewer awards.
   - While data from this source are not comprehensive, they do cover the vast majority of MAWs—and the data indicate that on average, firms with the largest number of awards commercialize as much or more than all other groups of awardees; that in the aggregate, there is no MAW problem of companies living off SBIR awards.

(2) For some multiple winners, at least, even though they continue to win a considerable number of awards, the contribution of SBIR to overall revenues has declined.[46]

(3) Case studies show that some of the most prolific award winners have successfully commercialized, and have also in other ways met the needs of sponsoring agencies.

(4) **Graduation.** Some of the biggest Phase II winners have graduated from the program either by growing beyond the 500-employee limit or by being acquired—in the case of Foster-Miller, for example, by a foreign-owned firm. Legislating to solve a problem with companies that are in any event no longer eligible seems inappropriate.

(5) **Contract Research.** This can be valuable in and of itself. Agency staff indicate that SBIR fills multiple needs, many of which do not show up in sales data. For example, efficient probes of the technological frontier, conducted on time, on budget, to effectively test technical hypotheses, may save extensive time and resources later, according to agency staff.

(6) **Spin-offs** Some MAWs spin off companies—like Optical Sciences, Creare, and Luna. Creating new firms can be a valuable contribution.

(7) **Valuable Outputs.** Some MAWs have provided the highly efficient and flexible capabilities needed to solve pressing problems rapidly.

(8) **Compared to What?** Agency programs do not impose limits. It is hard to see why small businesses should be subjected to limits on the number of awards annually when successful universities and prime contractors are not subject to such limits.

[46] At Radiation Monitoring, for example, SBIR has fallen steadily and is now only 16 percent of total firm revenues.

All these points suggest that while there have been companies that depend on SBIR as their primary source of revenue for a considerable period to time, and there are some who fail to develop commercial results, the evidence strongly supports the conclusion that there is no multiple winner problem. Moreover, those who advocate a limit on the annual number of awards to a given company should explain how this limit is to be addressed across multiple agencies, and why technologies that may be important and unique to a given company should be excluded on this basis.

Given that SBIR awards meet multiple agency needs and multiple congressional objectives, it is difficult to see how the program might be enhanced by the imposition of an arbitrary limit on the number of applications per year, as is currently the case at NSF. However, if agencies continue to see issues in this area, they should consider adopting some version of the DoD "enhanced surveillance" model, in which multiple winners are subject to enhanced scrutiny in the context of the award process.

5.9.7 Information Flows

The shift toward Web-based information delivery has occurred unevenly at the different agencies. DoD has perhaps moved farthest; along with NASA, it was the first agency to require electronic submission of applications, and the online support for applicants is strong. It is, moreover, well integrated with non-electronic information sources, with two innovations in particular being well-received by awardees:

- **The Pre-release Period**, during which topics are released on the Web along with contact information for the topic authors. This enables potential applicants to directly determine how well their proposed research will fit with the agency's needs, and provides opportunities for tuning applications, so they are a better fit. This innovation also connects applicants specifically to the technical officers running a particular topic, who will, in the end, also make finding decisions.
- **The Help Desk**, which is staffed by contractors and is designed to divert non-technical questions (for example about contracts and contracting) to staff with relevant experience in the SBIR program, who may well know these materials better than topic authors for example. Program managers at NIH and NASA have complained in interviews that SBIR applicants require much more help than academic applicants for other kinds of awards. Some of that burden might be alleviated with a better resourced help desk function.[47]

[47]This is a correction of the text in the prepublication version released on July 27, 2007.

Overall, the growing size of the program, the clear interest exhibited by state economic development staff, and the increasingly positive view of SBIR at many universities, suggest that knowledge about the program is increasingly being diffused to potential applicants. The rise of the Internet—and the high quality Web sites developed by the agencies—mean that general interest can be translated into specifics quickly and inexpensively for both applicants and agencies. This conclusion is buttressed by the continuing flow of new companies into the program; these new companies account for more than 30 percent of all Phase I awards at every agency every year.

Thus it appears that the general outreach function historically fulfilled by the SBIR Agency Coordinators/Program Managers may now be changing toward a more nuanced and targeted role, focused on enhancing opportunities for underserved groups and underserved states, or on specific aspects of the SBIR program (e.g., the July 2005 DoD Phase III meeting in San Diego)—while relying on the Web and other mechanisms to meet the general demand for information. This seems entirely appropriate.

5.9.8 Commercialization Support

While some agencies have been working to support the commercialization activities of their companies for a number of years, this has clearly become a higher priority at most agencies in the recent past. Congress has always permitted agencies to spend a small amount per award ($4,000) on commercialization support, and most agencies have done so.

Commercialization support appears likely to have a significant pay-off for the agencies, partly because many SBIR firms have limited commercial experience. They are often founded by scientists and engineers who are focused on the technology, and interviews with awardees, agency staff, and commercialization contractors all indicate that the business side of commercial activities is often where companies experience the most difficulty.

Important recent initiatives include the extensive set of services provided at Navy through the TAP, and the NIH commitment to roll out the CAP program. These add to the long-running program at DoE.

It is important to understand that the character of commercialization differs quite fundamentally between DoD, NASA, and the remaining nonprocurement agencies respectively (DoE is partly a procurement agency, but for our purposes here, it purchases such a small amount of SBIR outputs for internal consumption, that it is best grouped with the nonprocurement agencies).

At DoD, where the agency provides a substantial market *if* companies can find a connection to the acquisitions programs, the critical focus of commercialization is on bridging the gaps to adequate Technology Readiness Levels and on finding ways to align companies with potential downstream acquisition programs.

When MIT gets a large number of awards, this is good, just, and right, and indeed, it probably is. When Lockheed Martin gets lots of major contracts, this is good, just, and right. When a small company gets a number of $100,000 awards——

Chair LANDRIEU. There is something wrong.

Dr. WESSNER [continuing]. There is something wrong, and I very much am in tune with Jere Glover on this point. I think it is just a question of bias. But the facts are, there are not. Many of them, they graduate, they are acquired, and by the way, when you have a problem that the Hubble Telescope is not working, actually, you want to go to Creare and ask them if they can figure that out for you, given the capacity they have built up by these multiple awards, and they do that job.

Some of them grow. Some of them are effective contract research organizations. But the question you have to ask the critics is, compared to what? Where else is the government going to get the benefits of the innovation that small companies bring? Where else are we going to have small companies that work so closely with universities, often are directly from the university working with the graduate students? This is, quite literally, one of the great strengths of the American system, our ability to pull from the public sector into the private sector and solve social problems, solve security problems, and help our companies grow.

It is a myth, Madam Chairman, that the mills are a problem.

Chair LANDRIEU. Thank you.

Dr. Jacobs, did you want to add something, and then I am going to turn it over to the Ranking Member for her questions.

Dr. JACOBS. I would like to just note that Qualcomm, back in the mid-1980s, did receive several Phase 1 and then several went on to Phase 2. So we did have a number of different SBIR awards. Some did not lead to ongoing job creation and new technology, but some did and had a major impact. And so taking that risk, allowing it to happen, not officially constraining the number of awards being given to a given company, I think, is beneficial.

Chair LANDRIEU. I might add that this is one of our tremendous success stories. Qualcomm, I understand, paid more than $1 billion in taxes in 2010 alone. That completely funds the SBA for a whole year, the entire SBA for the country. So, Senator, all we need is one big success in this program, and it returns all the money we potentially could have lost.

Senator Snowe.

Senator SNOWE. Well, I am sure Dr. Jacobs would agree with that.

[Laughter.]

You have unanimously, I think, given strong confirmation and affirmation of why these programs are irrefutably successful and have grown over the years and have contributed so much to our nation's economy. I wish all of our colleagues could hear your testimony here today because it is so important in making distinctions from one program to another. Clearly, these are distinctions that everyone would embrace. Irrespective of what side of the political aisle you are on or what your views are about Federal spending, these programs work, as you said. And I certainly want to make sure that we impart that to our colleagues, but I think that the

data that you have given here today and the evidence is clearly substantial and we will have to make sure we impart that to our Senate colleagues when we are debating this legislation.

There are several issues that are facing us as a nation. One, of course, the paramount issue is job creation, and unfortunately, we are at a point where it is just simply stagnating for all practical purposes. We only created a net 70,000 jobs between June of 2009 and December 2010. So when I look at, for example, the SBIR program, making connections with these programs with job creation, one of the startling figures is that we know that small businesses create about two-thirds of all the net new jobs in America, but 90 percent of that job growth comes from four to five percent of the firms, and that is what SBIR, for example, really does target. It is really targeted towards those types of companies that are willing to take the next step in research and innovation.

Is there any way for us to estimate what you think might be the amount of job creation from these programs over the next eight years? Mr. Glover, could you?

Mr. GLOVER. One of the sad things about data analysis is we always look at the last issues. We were concerned about commercialization so we tracked very carefully commercialization on the SBIR program. Roughly 50 percent of all of the technologies coming through Phase 2 get commercialized. But nobody thought about jobs, so we do not have clear records. We did survey the accelerator program, DOE's participants, and found that they were going to increase jobs dramatically. Now, that is a prospective study. We are going to go back and do that in a year or two.

When you innovate and you expand and you have sales and commercialization, you have job creation, but we do not have good, clear documentation of that and that is something we ought to be capturing.

Senator SNOWE. Dr. Wessner and Dr. Jacobs, as well.

Dr. JACOBS. Yes. One of the things I would like to point out is that often you are constrained on how fast you can add jobs because a number of the people are not properly trained. I think that the emphasis also on improving our educational system and allowing more—and encouraging more students to go into the subjects, in particular engineering technology, science, is very critical. And so I know during our early years, we were constrained because of finances and also because of ability to attract new people.

Senator SNOWE. Dr. Wessner.

Dr. WESSNER. The program does create jobs and our research supports that. I think your initial emphasis on the role of small companies, per se, there are many factors that come to play. If you have people with enormous competence like the gentleman to my right here, sometimes the SBIR awards are a surrogate for effective management because it is that management, it is that conception of the technology, it is the research investments we have made. It is the whole innovation ecosystem which deeply involves the research and the training function.

So I find it a little hard at times to say, well, you see, they got this award so that explains why Qualcomm has 17,000 jobs. There are some, needless to say, some other factors at play. But do they

support companies at a critical phase and do those companies add jobs? Yes.

Senator SNOWE. Yes, Dr. Silver and Mr. Hernandez.

Dr. SILVER. I just anecdotally want to make a quick point, is that dollar for dollar, I would say that the SBIR program likely produces, and the others might have better statistics, but likely produces far more jobs than the average program. If I take our company as an example, a lot of us are really passionate about what we are doing. We are not necessarily spending all the money on market-rate salaries, let us put it that way. We are spending the money on what it is going to take to get the products out, and I think that is going to be the case across the board with SBIR recipients.

So if I would look at a way to get the biggest bang for the buck, it would be putting the money towards small businesses if you are looking for job creation.

Senator SNOWE. Thank you.

Mr. Hernandez.

Mr. HERNANDEZ. I would actually echo those sentiments in the fact that when, in our experience, the way we have approached the SBIR program is that when we put a grant together, we usually put a new head count on that grant. In other words, we will allocate a percentage of salary to a potential new hire. These are usually projects that we do not currently—are invested in the company. These are usually higher-risk projects. So we would like to bring in new head count to address those projects. If they move beyond the de-risking stage, then we invest additional capital, either from our venture pile of capital or from other additional sources. So there is no statistics, but I would argue that in my experience, at least in the biotech industry, this is the way it is done.

So I would argue that if you had a one-for-one new job created opportunity with these programs, I think would be immense success. That has been my experience.

I want to just mention a little bit, the comment earlier about mill riding and—it is really interesting, because when we first started the company, we looked under every rock for dollars, and oftentimes it required us to write multiple SBIR grants, many of which were not awarded for I do not know what reasons, but they were not awarded. So the notion that multiple grants need to be written is really part of the process for us, for new company creation and new technology risk taking.

The reality is that the portfolio theory applies here. You are going to write ten grants. You perhaps are going to get a couple of those, if you are lucky. Some of those products will die on the—they will just die on the vine. That is just the way the business is. But it is that one success that moves beyond that early stage that allows us to then convince the venture capitalists that there is a real merit here to what we are doing, and that is an important one.

So I would not be biased by the notion that companies apply to multiple grants. I do not think that is viable. The market corrects this. If the company is not viable, the company will not survive. So I would not be biased by that position. Thanks.

Senator SNOWE. Thank you.

Chair LANDRIEU. Senator Cardin.

Senator CARDIN. Thank you, Madam Chair, and I thank all of our witnesses. We are very interested in this area for many reasons. The work that you do makes us safer, healthier, more economically competitive, but it is all about jobs, also, creating jobs, and I could not agree with you more. I think one of the reasons why Maryland has a lower unemployment rate than the rest of the nation is that we are heavily endowed in technology firms. It is not just the triangle between Baltimore, Washington, and Frederick, but in the Western part of our State, the Northern part, Southern part, Eastern part, we are finding technology firms that are developing.

But I just really want to underscore the point that our Chairman made, and I think the accomplishment we got last year in getting the SBIR bill through the Senate, we were able to find the sweet spot between the different interest groups that have been very heavily engaged on this bill. And if you do not think the universities and large technology firms have some sway here, take a look at the Recovery Act and see the exemption that was put in for the SBIR programs. That was a major disappointment and it came out—we are still wondering to this day how that came about.

But I think the point that you mentioned, Mr. Wessner, about the universities, I am puzzled as to why. I mean, I look at our two great academic centers, the University of Maryland and Johns Hopkins. Both are expanding in Montgomery County because of the technology firms that are there, and they are the small technology firms. Mr. Hernandez, you pointed out that you not only have a good relationship, I think you license technology from the universities in order to get your work done. So that collaborative effort is clearly feeding on each other. The university structure is stronger because of the innovative small companies that are willing to take risks.

And I am going to get around to a question to you, Mr. Hernandez, because at the end you said you supported the compromise that we reached last year and I want to make sure you still feel that way, because we reached a compromise that truly was a compromise. It was not as much as I think some of the smaller companies would have liked to have seen, but it at least put you in the ballgame. You were able to use venture capital as part of your ownership.

I was just impressed by your typical example of a small technology firm of less than 50 employees, has no product on the market and needs to deal in hundreds of millions of dollars, that needs to find angel investors and venture capitalists if they are going to be able to have any chance of succeeding and obviously need multiple sources of financing and the SBIR can be critically important to the success of that venture. Are you still satisfied with the compromise we reached last year in the Senate?

Mr. HERNANDEZ. I am assuming that question is directed at myself.

Senator CARDIN. Yes. Yes.

Mr. HERNANDEZ. Okay.

Senator CARDIN. I always pick on Marylanders.

[Laughter.]

Mr. HERNANDEZ. We obviously have a great appreciation for the State of Maryland. They have been utterly supportive to the biotech industry. We are very, very honored to have amazing relationships with Johns Hopkins and the University of Maryland. I actually serve as Entrepreneur in Residence for the University of Maryland-College Park and that entity is one of the most supportive entities I have dealt with in my career. MIT has been another entity where I spun out a company out of and actually housed it in College Park. They have a great incubator there.

So this fight that exists in this—I do not experience it. I do not see that. I think it is really a collaborative effort. And maybe that is a byproduct of where we are located.

You know, with regards to the compromise, you know, we support the Senate passing this bill. The work that you guys do is magic to us. We let you guys do that work. We really—we just want to build, done, right. I think it is imperative that we do that. We will let you guys do the work that you do.

You know, this other comment about the venture community is really an important one that we have to understand here. The venture community has been on the sidelines for a couple of years. The market has really shook them up quite a bit. It is imperative that we bring them back to the table, if you would.

One way to do that, in my humble opinion, is to make sure that you provide technologies that have been somewhat de-risked, and here is what I mean by that. It turns out that in a due diligence process of a company, when you are an investor, and I have been an investor in companies, as well, oftentimes, if a company has an SBIR, we view that as a merit. It is an important due diligence process that exists.

So creating and allowing companies to compete in the SBIR program in collaboration with universities brings capital to the table, and I think that that is an important relationship that needs to be highlighted further, and maybe this is not the right forum in terms of an SBIR, but the corporate academic relationship is critical to success. It has been critical to successes of our companies. So it is really imperative that we get a bill done.

Senator CARDIN. We feel the same way. Thank you.

Thank you, Madam Chairman.

Chair LANDRIEU. Thank you.

Dr. Wessner, let me ask you this, since you have done most of the studies on how the program operates. It occurs to me that for the program to be as effective as it could possibly be, that the expertise and quality at each agency and at the SBA to run a quality program, whether it is within NASA or NIH. Comment to us, and I am sure it is included in your testimony, but for the record, just to reiterate, what is your assessment of how the individual agencies or departments actually run their programs and identify some of the quality grants that come in. I realize that you have all testified that the time is too long in terms of decision making, so we are trying to shorten that up. But the overall leadership, I guess I am asking you, of the program currently, how would you define that, Doctor?

Dr. WESSNER. How well are the people who are dealing with it every day doing?

Chair LANDRIEU. Yes, doing it and identifying, you know——

Dr. WESSNER. Well, I——

Chair LANDRIEU [continuing]. And how is the Federal Government doing at actually hiring the right people in those positions?

Dr. WESSNER. Well, I think the administration deserves a lot of credit for a revitalized SBA. Karen Mills and the Associate Director, Sean Greene, have brought intelligent policy attention to this area and I think they have been a great credit to the program.

I honestly think, in general, that the quality of the people involved with the SBIR program is among the highest in the government. They have some really good people. Now, that does not mean that the whole team is perfect, but we are talking about human endeavor here. But overall, I would give them very high marks.

I think, if you would appreciate the humor, I think they do very well and I think they need to do better, and the way they need to do better is by having less—more incentives. One of my colleagues from the Defense Department remarked to me the other day that there are only—I think there are only two people who have SBIR in their performance evaluation in the Department of the Army. The question is, who is actually responsible for making the program work?

I would urge, particularly those from your membership who are going to the Armed Services Committee, to vigorously remind the leadership of the importance and the value that Congress attaches to the program.

So are we running the program well? Yes. We have 37 pages of recommendations of how to run it better, many of which appear in this bill and many of which have already been adopted by the agencies. And I would stress, that consultative process of having an evaluation in process has proven very helpful to the innovation and the management of the program. But cutting the paperwork, reducing the cycle times is probably the most valuable thing—as valuable as increasing the overall size of the program. I would stress that.

Chair LANDRIEU. I am going to ask all of you this and then I will be finished with my questions and turn it back to Senator Snowe. We have a vote at 11:50, I believe. But as I look at the awards across the country, there are obviously clusters of awards, most notably in California, Massachusetts, and several other States. Unfortunately, Louisiana is not in one of those clusters. And I realize that this is highly competitive and we want there to be the flexibility for the money to follow the best science and best innovation. But some of you have alluded in your testimony to sort of the lack of awareness or that there are either areas of the country or enterprises in the country that are not as aware as others about this program.

So my question, and we could start with you Jere and go this way across the panel, if there were one or two—first of all, do you think that this program is well understood and well known uniformly throughout the country? If not, how could we do a better job, either this committee, Congress, or organizations, states, local governments, business organizations, telling people about it? So I am sort of searching for best practices, and you can all take just maybe 40 seconds to say what you would suggest to us.

Mr. GLOVER. There is clear record that where money is spent, matching with the States to get outreach and education, the number of awards in States goes up. There is a clear correlation between that, and we have gone back and looked at it. When we dropped the FAST and rural outreach, we have seen the have-not States, as I refer to them, numbers decline. So that is number one.

Number two, there is going to be some administrative money. I certainly expect and hope the agencies will use part of that to do outreach, training, and working around the have-not States, including national conferences in have-not States that cannot afford to run a whole conference, to make sure that gets done.

And the number one priority for the agencies should be, as it used to be, to get outreach into those have-not States and make sure. There is just as bright, just as competent, just as good technology in the rest of the country as there is in California and Massachusetts. The fact that there is not an infrastructure does not mean that the people are not as bright and the technology is not as bright. So I would encourage that and make sure that some of that administrative money gets spent to do outreach and training and education.

Chair LANDRIEU. Thank you, Jere.

Joe.

Mr. HERNANDEZ. Yes. I do not know that it is an issue of the lack of knowledge of the program. I really believe that it is an issue of process and the challenge involved in putting these applications together. The size of the awards is another, I think, driver. It turns out oftentimes you spend more money on consultants putting this thing together when you need supporting documents than the award itself is worth it.

The other thing I think is really important and would really increase the quality of applicants, and, I would argue, the number of applicants, is really this issue of providing access to the VC-backed companies. It is really an important angle that I think needs to be addressed in whatever compromise comes out of this. It is really imperative that we increase the quality and the number of applicants.

But in terms of marketing the program, I think it is a great program. The market knows about it. I would just encourage that we need to make it a simpler, more inclusive process.

Chair LANDRIEU. Dr. Silver.

Dr. SILVER. Thank you. Yes, from my perspective, I can say that I learned about the program because I was consulting for another firm that received funding under the program, and I do not know that I would have known about it otherwise. So that suggests that at least there is sort of a feedback loop there and things can start concentrating in certain areas.

I would say that one of the points that I want to make is that with respect to innovation more generally, it really does not happen just because of funding. It happens—Mr. Glover pointed out the concept of an infrastructure. It happens because there is an ecosystem of people that are interested in starting new companies that hear about things, and what I would urge is that the program think of a way or find a way to be part of that broader ecosystem.

And some concrete specific examples are there are a lot of business plan competitions that are starting around universities. That is something that could be tapped into. There are a number of other competitions that are nationwide. We were able to win a nationwide competition out of MIT, but there are some at Rice University in Texas. There are a number of others.

So my point would be that think about the broader ecosystem and get the program associated with universities or places where there are going to be people that are excited about early stage firms. I think it could really have a big impact.

Chair LANDRIEU. Dr. Jacobs.

Dr. JACOBS. Yes, I think you will find that a lot of these clusters, or certainly a lot of the small businesses in the high tech area, biotech area, start up around good research universities, and so this issue of there being a separation between the universities or a fight between the universities and the SBA on these SBIRs, that should not be the case. It seems to me that going in and working with the universities, making sure that these days the students that are, in fact, very interested in entrepreneurial futures, that they are aware of this program when they do go out.

As far as being able to spread it further, again, I think that it is important to provide more funding into the universities because that just, again, has a very large multiple.

And so where there is a good university, I think you will find a number of companies. It is important to let those companies know that these programs exist. The other is to spread it further, I think you just have to get better education.

Chair LANDRIEU. Dr. Wessner.

Dr. WESSNER. Could I just concur with that. It is very important to train the cohorts if we do not do the university investment. But once you are doing that, outreach to women and minorities is really important and we are trying to develop some work on that in the Academies right now.

Your FAST program needs to be not only in the law, but it needs to be funded. I mean, a few million dollars just does not do it, and I would urge that you make that a substantial program. We have not been able to research that, but everyone we talk to disproportionately stressed how important that was.

So I think, and particularly for the disadvantaged States, although I would remind you, Madam Chairman, that one of the key variables is applying. So talking to the universities, reaching out to them with prizes and with a culture—you might want to explore, could you offer small funding to the universities to advocate for the program? One of the key things is changing the culture inside the institution so that they understand they can do this. It does not have to just be football.

Chair LANDRIEU. Senator Snowe, anything?

Senator SNOWE. Just one question. On flexibility, do you think we have incorporated enough in here? I know, Dr. Wessner, your report indicated that is one of the strengths of the program, so do you think our legislation does enough in that regard, to give the agencies flexibility in how they administer it?

Dr. WESSNER. Well, Senator, that is—it is important to reauthorize the program, and this is good legislation and it has got a good compromise. And if you can pass this bill, that would be good.

Senator SNOWE. Okay.

Dr. WESSNER. Do we think that—I would urge, in general, to both of you, Ranking Member and Chairwoman, that you need to instruct the program managers, whether you are talking about mills or whether you are talking about caps. I mean, I would ask and challenge your committee. If the scientists at NIH really think a cervical cancer product should have a large award to do it now, does the committee in its wisdom really believe that they are wrong and that you should tell them how much they are allowed to give?

And could I point out that what happens when you do that? Well, they will just give multiple awards. I mean, you know, it squeezes out on the sides. You cannot—but the scientific opportunity, we would argue, should dominate with a required clear statement of what the justification is and with the SBA checking up. What did you do? What happened? So making them justify and making them evaluate, to our argument, is better than fixed amounts.

Senator SNOWE. Well, I suppose you could have a waiver in some instances.

Dr. WESSNER. If you can have an active waiver, then I would withdraw the concern.

Senator SNOWE. Yes.

Dr. WESSNER. As long as it is in a——

Senator SNOWE. No, because you are right. If there is an instance where there is X-amount of money and there is a rationale and data to document that X-amount of money could make the difference in producing a result——

Dr. WESSNER. But our report which addressed this did not argue that they should just be able to give $3 or $4 million to a company and just do it.

Senator SNOWE. Right. Well, we ought to look at that. That is an interesting point, actually. I understand what you are saying. It is compelling.

Any other—Dr. Silver, I know you dealt with multiple agencies for different departments, did you not, four or five?

Dr. SILVER. Yes, I did.

Senator SNOWE. Yes. So is there any one that does a better job than the other, or am I putting you on the spot?

[Laughter.]

Dr. SILVER. There are sponsors here.

Dr. WESSNER. You are on the record here.

Senator SNOWE. Okay.

[Laughter.]

Dr. SILVER. No, I do want to say that one agency that we have enjoyed working with a lot is the NSF, that they have reduced paperwork enormously and they have got sort of approaches to overhead that for a small business is very useful, particularly having a safe rate for a small business, those kinds of things.

Our goal is really to get products out as quickly as possible. We do not want to be doing a lot of bureaucratic work. And so I think

that something in the legislation that focuses on that would be very helpful for a lot of businesses.

Chair LANDRIEU. And can you repeat that? Do you mind if I ask about they are sensitive to the overhead rate, go into a little detail about that?

Dr. SILVER. Sure. There is what is called a safe rate. I believe for the NSF, it is 50 percent, below which—if you have an overhead rate of that or below in your application, you are okay. They are not going to go back and ask you for detailed multi-year background of how you calculated that overhead rate. And those kinds of approaches—in fact, that is a really good deal, I would argue, for the government because our overhead rate is probably higher than that, but we would rather just use a safe rate. So——

Chair LANDRIEU. Oh. I see what you are saying.

Dr. SILVER. That is just an example of particularly—and I am speaking from the perspective of early stage innovation. I would really urge a distinction between very early stage and maybe a running company that has 400 people and it is selling products and needs a little extra capital.

Chair LANDRIEU. Right, because in the front part, it is mostly salaries, right? It is mostly going to be salaries for the one or two, just, you know——

Dr. SILVER. Yes. Yes.

Chair LANDRIEU [continuing]. Paying your light bills and your food bills, not to cut into your time——

Dr. SILVER. Exactly.

Chair LANDRIEU [continuing]. But until you can get something going. That is a very good point.

Joe, do you want to add anything?

Mr. HERNANDEZ. Yes, let me just—I mean, I think making the process as efficient as possible is really the goal here. You know—this is not BIO's official opinion, by the way. This is Joe's opinion, and I am biased because I am a reviewer for NSF. But I would argue that NSF has really created a really good model to streamline the process, and I think, again, it is this question of it is $100,000. Do you really want your people spending all this energy and writing grants, getting consultants to support your data, doing additional research? When you really look at the grand scheme, if you do not get a Phase 2 program, it is really—there is really an expensive endeavor.

So to the extent that that process can be made shorter, to the extent the process can be quicker in terms of providing peer-reviewed objective feedback on the work, and that is a challenge because these—oftentimes, when you do not get a grant, the feedback that comes back sometimes is counterintuitive and there are even dissenting opinions amongst the opinions that you get back. So there has got to be a better process, of course. But I would argue that making the size of the award significant and making the process faster would really be an important piece of it.

And again, coming back to this, you know, how do you increase the quality of the applicants, you have got to let venture-backed companies into the process. It is imperative. That is how you are going to increase and create more value out of the effort.

Chair LANDRIEU. Jere.

Mr. GLOVER. You mentioned agencies. I would point out, too, Navy and Defense Department does a much better job of follow-on and transmitting technology. I know the other departments are working on that and trying, but Navy clearly is the model of excellence, and DOE has done more in the past year than anybody else. They created a Phase 3 accelerator program. They took their Recovery Act money, put out a whole new solicitation, got it out on the street, did it in record time, record efficiency. I would point out those two agencies, to answer your question.

Senator SNOWE. Jere, can I just ask you one question about SBA. What do you think they could be doing to promote these programs? Is there anything?

Mr. GLOVER. I think SBA has taken more leadership. It is still not where it was years ago. There is a lot of role models and leadership. They are making great strides. They are getting back. But under Maury Swinton when he was head of the Office of Innovation Technology, they basically did a lot of real guidance and leadership and I think that is going to be important, and we are seeing that happening now.

Senator SNOWE. Okay, great. Thank you all. Oh, yes, Dr. Jacobs? I am sorry.

Dr. JACOBS. On that point, there was another San Diego company as well as Qualcomm that was inducted into the Hall of Fame for the SBIR program and I think that, in fact, it was an SBA Administrator that made us aware of the program at the time. It was a very active Administrator, did make sure that we all understood these programs existed. He watched out for companies that were kind of in a start-up phase.

And I might mention one other thing. It sounds like there has been some requirement creep over the years, because I remember this being a very straightforward, very simple process to get a proposal in and very quickly get an answer back and it sounds like that has changed dramatically.

Senator SNOWE. Okay. That is a good point, a very good point and observation. Thank you.

Chair LANDRIEU. Jere, I want to ask you. As you know, we have raised the limits from $100,000 to $150,000, and then from, what is it, up to a million, from $750,000 to a million. I understand that you all are concerned if we raise those award amounts even higher because you want to make sure that this SBIR funding gets spread to really small businesses and start ups. But given the testimony here, how would you comment about that—sometimes it takes more money to put an application for $150,000 together than the $150,000 award?

Mr. GLOVER. I think we need to make sure the application process is simple and clean and consistent across the agencies. It should not cost more. But when you increase the size of the awards, you crowd out other opportunities, other technologies, and other people. To do that, you must do it very carefully. This program was designed to meet the early market niche where no money is available.

Venture capitalists do not look at technologies that are basically being funded under the SBIR program. Once you get through the program, they may look at it, but the first SBIR you win or the

first Phase 2 you win, no venture capitalist is going to be looking at that technology. This is money that no one else offers. And when Roland Tibbetts set this program up, he was very specific that we needed to fill that early stage niche, and that niche is worse and deeper now than it has ever been. Venture capitalists have pulled out of the early and seed stage business. Look at the numbers. They are way down. There is nobody playing in this niche except SBIR. You raise the side of awards, you crowd out other companies and opportunities and you crowd out the have-not States.

Chair LANDRIEU. And what do you think? I'm pressing you a little on this. What do you think about the waiver idea, though, if it is very limited, targeted, but available?

Mr. GLOVER. It was in the law, and SBA gave NIH a blanket waiver and you saw the award size shoot up. So only if it is really careful and really monitored. I would limit it to one or two awards per agency per year. Let the head of the agency pick what is really important to him, what he thinks is best. Make it a competition. Do not allow it just to be one, I am sorry, bureaucrat at SBA who has a bad moment and grants a blanket waiver and then you see ten years of increased awards and you see the number of applicants go down because the chance of winning went down.

Chair LANDRIEU. Dr. Silver.

Dr. SILVER. A very quick point to make. I would agree, for the most part. I would just make one point, is that there is a difference between different kinds of technologies and what the funding is going to get. And if you have got funding, $150,000 for a software project, you can get pretty far along. For a biotech project, if you are a completely new company, you are not going to even be able to start. So if there is concern of crowding out with the blanket higher level, I would say look at the different technologies, figure out what is actually needed to prove feasibility for a given technology.

Chair LANDRIEU. Jere, what do you say about that?

Mr. GLOVER. I think you still come down to the situation where the SBIR program is not going to be—it never intended to fund the entire drug development process for a drug. Five, six hundred million dollars necessary to get a drug approved. The whole SBIR budget at NIH would not do one. So it just cannot do it. We want to get as many technologies as far along as we can. It is just that simple. We cannot simply pick a few winners. The government is not real good at that.

Chair LANDRIEU. Okay.

Mr. GLOVER. We pick 100 winners, we will get a few really successes.

Chair LANDRIEU. Dr. Wessner.

Dr. WESSNER. Well, I was—initially, I wanted to agree. I think the standard award size at $150,000 and $1 million makes a lot of sense and it simply restores it closely to where it was at the origin, discounting for 20 years of inflation. So that is a good place to be.

But we would argue strongly for the flexibility that we discussed earlier. I do not think—well, I do not think any of us in this room can make those judgments. That is what program managers and the selection committees are for. I do think they should justify it if they make it harder. I think we should allow, as we do, to make

much smaller awards. The Department of Agriculture and EPA make really small awards, and they are comfortable doing that. That—remember my original testimony. That is why this program works, is because we do not try and tell them what to do. It is not a French program that is centrally directed from this room. It works because it works differently everywhere.

They should be held accountable. We do want to know what they are doing and why, and they should be able to justify that. But the decision should stay out there or I think we are in trouble.

And I would also respectfully say, I do not think the problem is as big as it has been painted sometimes. I mean, NIH has made some larger awards. No one complains when the Navy is adding SBIR funds and they are getting procurement funds to actually deliver something to a warfighter. We do not want to tie their hands on that. So I would ask them to report, ask them to defend and justify it, but let them do what they think they need to do.

Chair LANDRIEU. Well, this has been excellent. I am sorry I have to bring this hearing to a close, but it really has been an excellent discussion of one of the most exciting and innovative programs of the Federal Government. As Chair of this committee, I intend to do everything I can to push for its passage, literally in the next few weeks on the Senate side, and then get it over to the House and try to get it to the President before summertime. That is our goal and we are going to see what we can do to get it done.

Thank you very much. The record will stay open for two weeks, as usual practice.

The hearing is adjourned.

[Whereupon, at 11:47 a.m., the committee was adjourned.]

APPENDIX MATERIAL SUBMITTED

February 17, 2011

Senator Kelly A. Ayotte: Statement for the Record
Senate Small Business and Entrepreneurship Committee Hearing
"The Reauthorization of the SBIR and STTR Programs"

I would like to thank Chairwoman Landrieu and Ranking Member Snowe for addressing issues important to our nation's entrepreneurs and small businesses. I am excited to get to work with my colleagues on the Senate Small Business and Entrepreneurship Committee where I will continue to advocate for entrepreneurs and small business owners who play a vital role in ensuring that New Hampshire has a vibrant economy.

I came to Washington knowing that hard-working American small business owners create sustainable jobs and stimulate the economy. I understand that because I come from a small business family. My husband Joe, an Iraq veteran, started a snow plowing and landscaping business in southern New Hampshire. We took our savings and relied on credit to get his business off the ground. My husband worked hard to launch his business, and I know how proud he is to have grown it from two employees to 20 workers.

I am pleased that the first hearing in the Small Business Committee in the 112th Congress is on the reauthorization of the Small Business Innovation Research (SBIR) Program. A Former New Hampshire Senator, Warren Rudman, created the SBIR program through legislation in 1982, bringing commonsense Granite State ingenuity to generate small businesses growth.

The SBIR program seeks to increase participation of small innovative technology companies in federally funded research and development. SBIR is a tremendous boost to New Hampshire small technology firms on the cutting edge of technological and scientific innovation. Since its inception, New Hampshire firms have received over 900 awards totaling $325 million in research grants through the SBIR program, and over the last two years, New Hampshire firms received 75 awards totaling $26 million in grants through SBIR.

I look forward to working with my colleagues on the Small Business Committee toward reauthorization of the SBIR program, and to lower taxes of small business owners and reduce burdensome regulations that make it difficult for small business to succeed.

Opening Statement of Senator Scott Brown
February 17, 2011
Small Business Committee
"Reauthorization of the SBIR and STTR Programs"

***

Thank you Chairwoman Landrieu and Ranking Member Snowe for scheduling this morning's hearing on a program that I believe is crucially important to the health of small businesses. I would also like to thank Dr. Matt Silver, Co-Founder and President of Cambrian Innovation from Somerville, Massachusetts, for serving as a witness in our proceedings today, as well as Chairwoman Landrieu and Ranking Member Snowe for generously providing the opportunity for a voice from the small business community in Massachusetts. As a new member of the Small Business Committee, I am proud to be a part of these proceedings. I look forward to participating in future discussions with my fellow Committee members on an issue that I find to be central to our ability to move forward in this economic climate—protecting and promoting small business.

As a small business owner myself for many years and a long-standing member of many local Chambers of Commerce, I believe that Massachusetts' small businesses are the economic engine of our state, and have an extraordinary potential to grow, expand, and hire. The SBIR and STTR programs help promote the small and growing businesses that take risks, providing the building blocks to economic recovery. The compromise reauthorization has been under development and negotiation for many years and I applaud the Chair and Ranking member on their efforts.

Massachusetts is widely regarded as one of the most successful incubators for innovation in biotechnology, and one such success story is here with us today. With over ten years of experience in innovation strategy and technology commercialization, Dr. Matt Silver co-founded Intelligent Action Inc. and worked as a consultant to industry on early-stage innovation prior to co-founding his present firm, Cambrian Innovation. Dr. Silver's testimony today serves as a reminder that government can and must play a limited, but unique role in supporting small business—rather than looking for the fast dollar, we should be looking for sustainability, long-term job creation, and lasting innovation. Thanks to the SBIR program, we have done just that with Cambrian Innovation.

As I continue to visit and tour businesses in Massachusetts, I am struck by the genuine plea to be a guardian for small business owners and protect jobs. I believe that the SBIR and STTR programs act as that incubator for innovative businesses across the country, and I am enthusiastic to see a full reauthorization of these programs in this Congress.

BIO
BIOTECHNOLOGY
INDUSTRY ORGANIZATION

December 16, 2010

The Honorable Harry Reid
Majority Leader
U.S. Senate
S-221, The Capitol
Washington, D.C. 20510

The Honorable Mitch McConnell
Republican Leader
U.S. Senate
S-321, The Capitol
Washington, D.C. 20510

Dear Majority Leader Reid and Republican Leader McConnell:

On behalf of the Biotechnology Industry Organization (BIO) and our more than 1,100 biotechnology companies, academic institutions, state biotechnology centers and related organizations, I am writing in support of compromise legislation by Small Business Committee Chair Mary Landrieu (D-LA) and Ranking Member Olympia Snowe (R-ME) to reauthorize the Small Business Innovation Research (SBIR) and Small Business Technology Transfer Program (STTR) programs. The *SBIR/STTR Reauthorization Act of 2010* represents a balanced approach to ensure that America's most innovative small businesses can once again access existing incentives to grow jobs by commercializing new discoveries. As such, I urge you to support timely passage of this important legislation by the Senate prior to adjournment this year.

In particular, I am writing in support of the bill's provisions allowing greater access to SBIR funds for small businesses reliant upon venture capital financing. Small biotechnology, medical device and other life sciences firms increasingly rely on venture capital investments to fund research and development. The legislation will correct a regulatory interpretation made by SBA in 2003 which revoked the eligibility of many venture capital-reliant small companies from participating in the SBIR and STTR programs over the last several years. This provision will ensure that many of America's most innovative small businesses are not excluded simply because of how they raise capital and can once again compete in the SBIR and STTR programs based on scientific merit. The legislation will help to ensure that small, U.S. biotech companies have increased access to capital for meritorious cutting-edge, early-stage research.

Small biotechnology companies face the constant challenge of raising sufficient capital to fund biomedical research. This funding shortage is most acute for research projects at the earliest stages, exactly the point at which SBIR funds can be most productive in fostering science and innovation. By filling this market gap, SBIR funds have helped small biotechnology companies continue lines of medical research that might otherwise go unfunded. The legislation will increase access to critical, early-stage sources of funding for small businesses, including small biotechnology firms, thus facilitating economic growth, job creation, new breakthrough therapies for

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patients in need, and American economic competitiveness in the global economy. This is exactly the intent of the SBIR program, as created in 1982.

The SBIR/STTR reauthorization represents a compromise between competing approaches to ensure America's small businesses remain at the forefront of global innovation. The bill recognizes that the Small Business Innovation Research (SBIR) Program - last reauthorized in 2000 - plays an important role in the development of new breakthrough therapies to improve human health, and must be updated to reflect the new realities facing America's small businesses in the 21st Century.

For these reasons, I hope the Senate will pass the *SBIR/STTR Reauthorization Act of 2010* prior to adjouring.

Sincerely,

James C. Greenwood
President and CEO
Biotechnology Industry Organization

cc: Senator Mary Landrieu
Chair, Senate Committee on Small Business and Entrepreneurship

Senator Olympia Snowe
Ranking Member, Senate Committee on Small Business and Entrepreneurship

December 16, 2010

Senator Mary Landrieu
United States Senate
328 Hart SOB
Washington, D.C. 20515

Subject: Prompt passage of SBIR Reauthorization Compromise

Dear Chairwoman Landrieu:

As the nation's largest tech-oriented small business organization from diverse industries, the Small Business Technology Council appreciates your continued and long-time support of the Small Business Innovation Research (SBIR). You understand how important this program is in providing advanced new technologies. The SBIR is a well established innovation program for small business and the country. While it has worked well, SBIR has been operating under seven continuing resolutions since 2008. It is scheduled to expire on January 31, 2011. This uncertainty has adversely affected small business and the SBIR program. The SBIR Program needs to be reauthorized immediately.

We are writing to express our support for the Landrieu/Snowe compromise as agreed to by SBTC and Biotechnology Industry Organization. The compromise we reached with yourself, Senator Snowe, and BIO blends S 1233 and HR 2965, and brings us together on many issues. With this agreement between our two industry trade organizations, SBTC strongly supports the revised Senate version of the proposed SBIR legislation and urge its prompt passage.

We would like to thank you on behalf of our member organizations for the hard work and commitment you and your staff have shown in getting this compromise language done. We hope that this bill can be successfully passed before the end of the Congress, so that small businesses in America can continue to benefit from this important program.

Sincerely,

Jere W. Glover, Executive Director

Small Business Technology Council

December 16, 2010

Senator Olympia Snowe
United States Senate
154 Russell SOB
Washington, D.C. 20515

Subject: Prompt passage of SBIR Reauthorization Compromise

Dear Senator Snowe:

As the nation's largest tech-oriented small business organization from diverse industries, the Small Business Technology Council appreciates your continued and long-time support of the Small Business Innovation Research (SBIR). You understand how important this program is in providing advanced new technologies. The SBIR is a well established innovation program for small business and the country. While it has worked well, SBIR has been operating under seven continuing resolutions since 2008. It is scheduled to expire on January 31, 2011. This uncertainty has adversely affected small business and the SBIR program. The SBIR Program needs to be reauthorized immediately.

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Sincerely,

Jere W. Glover, Executive Director

Small Business Technology Council

LOUISIANA STATE UNIVERSITY

E. J. Ourso College of Business
Stephenson Entrepreneurship Institute
Louisiana Business & Technology Center

The Honorable Mary Landrieu
United States Senate
Washington, D.C. 20510

Dear Chairwoman Landrieu:

As the State director of the SBIR program in Louisiana I would like to thank you for your continued and long time support of the Small Business Innovation Research program. This program is a real life line of funding for our state's small high tech companies. While it has worked well, SBIR has been operating under seven continuing resolutions since 2008. It is scheduled to expire on January 31, 2011. This uncertainty has adversely affected small business and the SBIR program. The SBIR Program needs to be reauthorized immediately.

Thankfully, a compromise reauthorization package has been forged which blends *H.R. 2965* and *S. 1233* and allows for increased venture-capital participation but retains the small business integrity of the program. This compromise has been endorsed by the Biotechnology Industry Organization and the Small Business Technology Council, the nation's largest tech-oriented small business organization from diverse industries.

As the main point of contact for the SBIR program in Louisiana, I and numerous other Economic Development Organizations have spoken and we strongly support the passage of this compromise legislation in THIS session of congress.

With Kind Regards,

Roy Keller, Associate Director
LA Business & Technology Center
Director, Louisiana Technology Transfer Office

NSBA
National Small Business Association®

December 16, 2010

The Honorable Mary Landrieu
United States Senate
Washington, D.C. 20510

Dear Chairwoman Landrieu:

The National Small Business Association is pleased to support your compromise Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs reauthorization legislation. Reaching 150,000 small-business owners across the nation, NSBA is the country's oldest small-business advocacy organization and a longtime supporter of the SBIR program.

As you know, SBIR is the nation's largest source of early-stage research and development funding. Providing more than 50,000 patents since its inception, SBIR has successfully harnessed the proven innovative power of small, technology-based businesses to meet the nation's technology needs. On average, SBIR generates seven new patents per day—which is far more than all U.S. universities combined, at less than one-twelfth their level of federal research and development funding.

Unfortunately, the reauthorization of this demonstrably-effective program has been beset by various tribulations. This has lead to nine short-term reauthorizations since 2008. These repeated, temporary extensions have wreaked havoc on agencies' ability to make strategic decisions in regard to the programs. The uncertain future of the program also has deterred potential participants and investors.

Thankfully, a compromise reauthorization package—which blends *H.R. 2965* and *S. 1233* and allows for increased venture-capital participation but retains the small-business integrity of the program—has been forged. This compromise has been endorsed by the Biotechnology Industry Organization and the Small Business Technology Council, the nation's largest tech-oriented small business organization from diverse industries.

NSBA also fully supports the compromise and urges its swift adoption. NSBA thanks you for your unflagging and indispensable efforts to protect the small-business focus of the SBIR and STTR programs and achieve this balanced and fair compromise reauthorization package.

Sincerely,

Todd O. McCracken
President

National Small Business Association • 1156 15th St. N.W., • Suite 1100 • Washington, D.C. 20005 • (202) 293-8830
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National Venture Capital Association

December 17, 2010

The Honorable Mary L. Landrieu
Chairwoman
Senate Small Business Committee
United States Senate
SR-428 Russell Senate Office Building
Washington, D.C. 20510

The Honorable Olympia J. Snowe
Ranking Minority Member
Senate Small Business Committee
United States Senate
SR-428 Russell Senate Office Building
Washington, D.C. 20510

Dear Senators Landrieu and Snowe:

On behalf of the National Venture Capital Association (NVCA) and its members, I am writing in support of your recent compromise legislation, the *SBIR/STTR Reauthorization Act of 2010*, which reauthorizes the Small Business Innovation Research (SBIR) and Small Business Technology Transfer Program (STTR) programs. This legislation represents a fair compromise to ensure that America's most innovative small business can once again have access to existing government incentives to grow jobs by commercializing new discoveries.

In particular, NVCA supports the bill's provisions will allow greater access to SBIR funds for majority owned venture-backed small businesses and will fix the affiliation rules to ensure these companies will be able to participate in the program. Many small businesses that are developing truly disruptive innovations rely on venture capital investment to help build promising companies that will bring breakthrough products to market and grow U.S. jobs. The legislation will correct a regulatory interpretation made by SBA in 2003 which revoked the eligibility of many venture-backed companies from participating in the program over the last several years. This compromise will help to ensure that small U.S. venture-backed companies have increased access to capital for meritorious cutting-edge early-stage research.

At a time when our country needs to build new businesses, the venture capital industry is committed to working with the government to bring a steady stream of innovation and economic value to market.

For these reasons, I hope the Senate will pass the *SBIR/STTR Reauthorization Act of 2010* prior to adjourning.

Sincerely,

Mark G. Heesen
President

Technology Business Development Center

Louisiana Tech University

Technology Business Development Center
P.O. Box 3145, Ruston, LA 71272
Phone (318) 257-3537 Fax (318) 257-4442

December 17, 2010

The Honorable Mary Landrieu
328 Hart Senate Building
United States Senate
Washington, DC 20510

Dear Senator Landrieu,

Your efforts to support economic development, small business growth, and technology commercialization within north Louisiana and throughout the United States are appreciated. Reauthorization of the SBIR/STTR program is a vitally important component of this country's economic vitality and security. After struggling to survive on a series of continuing resolutions for over 2 years, it is encouraging to learn that a compromise on SBIR/STTR reauthorization may soon be achieved.

As Director of Louisiana Tech's Technology Business Development Center, I can attest to the value of this program. Several of our new and growing firms received the initial funding and extended research opportunities which have proven essential for further refinement and commercialization of their technologies through SBIR awards.

Since the summer of 2009 I have been dismayed by failed attempts to reach a compromise between S. 1233 and H.R. 2965. To finally have a proposal available that represents a reasonable compromise between these bills is commendable and the opportunity for meaningful reauthorization of the SBIR/STTR program needs to be seized immediately!

I support reauthorization of the SBIR/STTR program as described in the reauthorization bill supported by the SBTC and BIO. I urge you to press forward with the opportunity to reinstate this country's most successful innovation commercialization program by advocating for prompt passage of this legislation.

Please continue your valiant efforts on behalf of small and innovative businesses by pushing for reauthorization of the SBIR/STTR program right away.

Sincerely,

Kathy Wyatt, Director

December 18, 2010

The Honorable Harry Reid
Office of the Majority Leader
Washington, D.C. 20515

The Honorable Mitch McConnell
Office of the Senate Republican Leader
Washington, D.C. 20515

The Honorable Nancy Pelosi
Office of the Speaker
Washington, D.C. 20515

The Honorable John Boehner
Office of the House Republican Leader
Washington, D.C. 20515

Dear Senate and House leaders,

I write today to introduce you to CONNECT and to encourage your support of S. 1233—the SBIR/STTR Reauthorization Act of 2010—because of the critical impact the bill will play in the formation of start-up technology companies and the jobs they will create, which can help rejuvenate the American economy.

CONNECT is an innovation accelerator with the mission to assist entrepreneurs in their efforts to propel creative ideas and emerging technologies to the marketplace. As a regional innovation development organization, our commercialization efforts in Southern California span the spectrum of technologies from IT, wireless health, software, clean energy, environmental, life sciences/biotech, defense and security, and sports/action technologies. Over the last 25 years, CONNECT's commercialization capacity-building model has helped over 2,000 start-ups and has been replicated in numerous U.S. cities, states and regions, as well as overseas.

From our experience, CONNECT knows that the Small Business Innovation Research and Small Business Technology Transfer programs can be advantageous to start-up formation, thus CONNECT's interest in S. 1233 is profound. Because acquiring funding through traditional lending sources is difficult in today's tight credit market, SBIR/STTR grants provide tech start-up companies another chance to compete for early-stage funding. Although certain provisions of the bill could be more inclusive, we recognize the practical and substantive benefits the bill presents. Chief among those benefits is the certainty the bill will give start-up applicants, ending the program inefficiency that numerous temporary extensions engenders.

One of the other key benefits of the bill is that companies that have already successfully attracted venture capital support will no longer be excluded from grant competition solely because they are venture backed. Given that venture firms conduct extensive due diligence reviews before investing, such companies provide extra value to the taxpayer because the companies have already proven they have a strong business plan and market opportunity. Additionally, the provisions aimed at preventing and catching waste, fraud and abuse will give added protection to the taxpayer and ensure the programs stay on their job-creating mission.

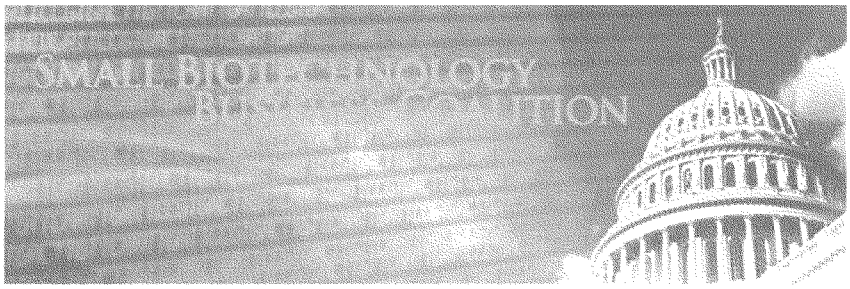
We recognize that many issues are crowding Congress' agenda in the session's closing hours. However, S. 1233 provides a true opportunity to spark small business formation and job creation. We urge Congress to swiftly pass S. 1233 before adjournment.

Best wishes,

Timothy Tardibono

Timothy Tardibono
Director of Public Policy

1608 Rhode Island Avenue, NW • Office 245 • Washington • DC • 20036



December 20, 2010

The Honorable Mary Landrieu, Chair
The Honorable Olympia Snow, Ranking Member
Committee on Small Business and Entrepreneurship
United States Senate
Washington, D.C. 20510

Dear Senators Landrieu and Snowe:

The Small Biotechnology Business Coalition (SBBC) is pleased to offer our support for your compromise on the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs reauthorization legislation.

Our organization advocates on behalf of the over 2,000 independently owned small, innovative biotechnology and medical device companies nationwide. Most of our members have been recipients of highly competitive, peer-reviewed SBIR grants, largely through the National Institutes of Health. The critical early stage support through SBIR leads directly to greater innovation, improved research outcomes, and better treatments for patients. The SBIR program is critical to maintaining America's global leadership in technology and innovation, and creating much-needed knowledge industry job growth.

The SBBC supports, in particular, provisions in the compromise bill that protect independently owned companies from being crowded out of the NIH SBIR program by better financed VC owned firms. Moreover, it is very important that reauthorization include an increase in the SBIR/STTR allocation to account for the pressure created on small businesses from the expanded access and increased competition created by this legislation and ensure small businesses continue to be the driving force of innovation.

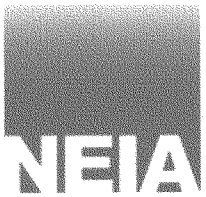
The SBBC thanks you for your continued and unwavering leadership to protect the small-business focus of the SBIR and STTR programs and achieve this balanced and fair compromise reauthorization package.

Sincerely,

Jonathan Cohen

Jonathan Cohen
Chairman

Small Biotechnology Business Coalition • 9710 Traville Gateway Drive, #325 • Rockville, MD 20850
(301) 917-6538 • www.smallbiotech.org



December 17, 2010

Hon Nancy Pelosi
Speaker of the House of Representatives
H-232, US Capitol
Washington, D.C. 20515
Subject: Prompt passage of SBIR Reauthorization Compromise

Dear Madame Speaker:

The New England Innovation Alliance represents scores of small high technology businesses with a vital interest in the SBIR and STTR programs. We know that you understand how important this program is in creating advanced technologies, products and jobs. However, SBIR and STTR have been operating under seven continuing resolutions since 2008. It is scheduled to expire on January 31, 2011. This uncertainty has adversely affected small business and the SBIR/STTR program, and it needs to be reauthorized immediately.

It should be noted that NEIA companies have worked closely with university researchers across the country, providing over $50M in subcontracts to more than 60 universities over the past five years. We believe that small high tech companies and the SBIR/STTR program provide the ideal bridge from academia to the marketplace, while providing future employment to tens of thousands of science and engineering graduates.

Please reauthorize the SBIR/STTR program in this session.

Respectfully,

Robert F. Weiss, Chairman

New England Innovation Alliance

December 17, 2010

Honorable Nancy Pelosi
Speaker of the House
235 Cannon House Office Building
District of Columbia 20515-0508

Re: Prompt Passage of SBIR Reauthorization Compromise

Dear Madam Speaker:

Small Business California is a proactive, non-partisan business advocacy organization whose only agenda is the well being of California small businesses. In the past we have worked together with the Small Business Technology Council (SBTC) and the National Small Business Association (NSBA) to support issues directly related to tech-oriented small businesses.

The Small Business Innovation Research (SBIR) program has been a successful catalyst for innovation in the United States. While it has worked well, SBIR has been operating under seven continuing resolutions since 2008. It is scheduled to expire on January 31, 2011 and this uncertainty has adversely affected small business and the SBIR program. The SBIR Program needs to be reauthorized immediately.

The SBTC and Biotech Industry Organization (BIO) have reached agreement on the degree of inclusion of Venture Capital companies in the SBIR program and both organizations support Senators Landrieu and Snowe's revised Reauthorization Bill for the SBIR.

Small Business California joins with SBTC and BIO to support the Landrieu/Snowe compromise of the proposed SBIR legislation and urges its prompt passage.

Scott Hauge
President
Small Business California

Small Business California
2311 Taraval Street, San Francisco, CA 94116
415-680-2188

December 20, 2010

The Honorable Mary Landrieu
Chair, Senate Committee on Small Business and Entrepreneurship
United States Senate
Washington, D.C. 20510

Dear Chairwoman Landrieu:

BioDistrict New Orleans is pleased to support your compromise Small Business Innovation Research (SBIR) and Small Business Technology Transfer (*STTR*) programs reauthorization legislation. Rebuilding the New Orleans economy around the biotech, digital media and other knowledge - based industries is our #1 priority.

As you know, SBIR is the nation's largest source of early-stage research and development funding. Providing more than 50,000+ patents since its inception, SBIR has successfully harnessed the proven innovative power of small, technology-based businesses to meet the nation's technology needs, and New Orleans needs to become a center of such activity.

Unfortunately, the reauthorization of this demonstrably effective program has been beset by various tribulations, court interpretations and special interests. This has lead to nine short-term reauthorizations since 2008. These repeated, temporary extensions have wreaked havoc on agencies' ability to make strategic decisions in regard to the programs. The uncertain future of the program has also deterred potential participants and investors.

Thankfully, a compromise reauthorization package—which blends *H.R. 2965* and *S. 1233* and allows for increased venture-capital participation but retains the small-business integrity of the program—has been forged. This compromise has been endorsed by the Biotechnology Industry Organization and the Small Business Technology Council, the nation's largest tech-oriented small business organization from diverse industries.

The BioDistrict also fully supports the compromise and urges its swift adoption. We wish to thank you for your unflagging and indispensable efforts to protect the small-business focus of the SBIR and STTR programs and achieve this balanced and fair compromise reauthorization package.

Sincerely,
BioDistrict New Orleans

James P. McNamara
President and CEO

cc: James C. Greenwood President and CEO Biotechnology Industry Organization

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