



Testimony of

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*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**  
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[www.sbtc.org](http://www.sbtc.org)

and

**The National Small Business Association**  
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*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.<sup>1</sup> 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.”<sup>2</sup>*

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.<sup>3</sup>

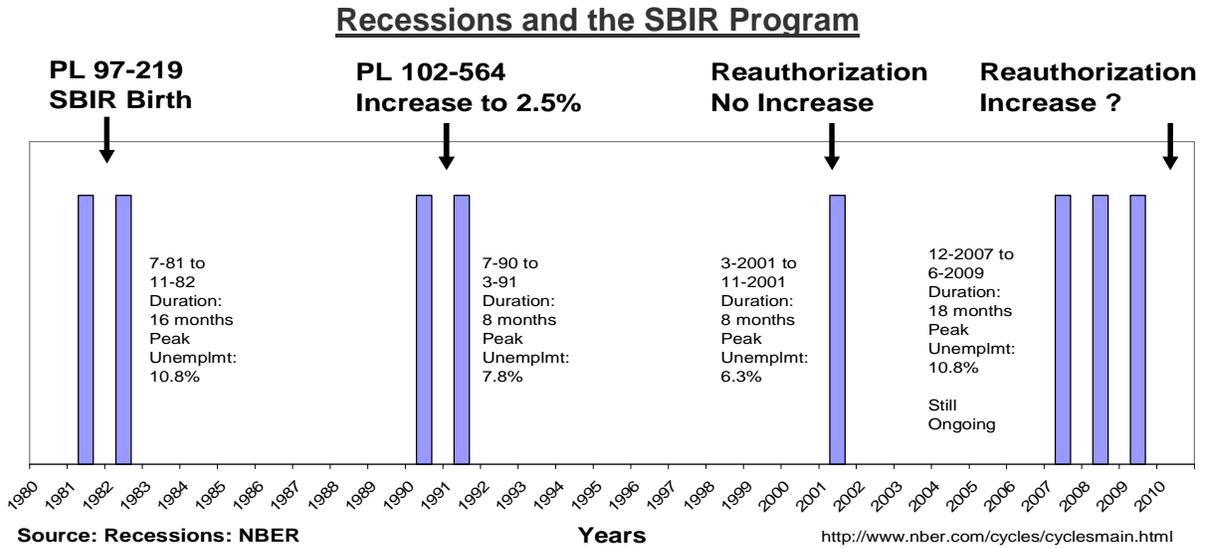
Senator Rudman also sponsored the 1992 SBIR reauthorization legislation (with 21 bi-partisan co-sponsors) which doubled the SBIR allocation rate to 2.5 percent and increased the STTR allocation rate to 0.3 percent. The Hearings were held shortly after the recession which dated from July 1990 to March 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;*

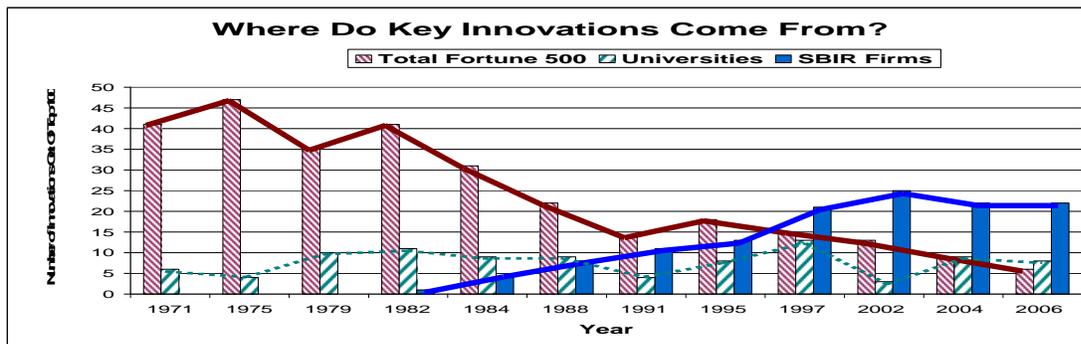
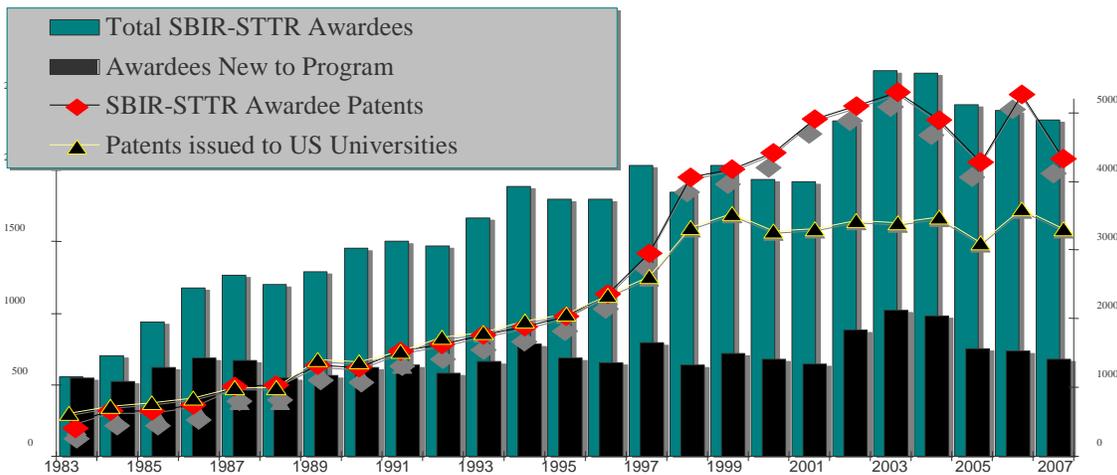
*(6) . . . the small business innovation research program has created jobs, . . . and improved the competitiveness of the Nation's high technology industries; . . . increase[d] exports from small business concerns*

*(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 97<sup>th</sup> and 102<sup>nd</sup> 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%).<sup>4</sup> 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.”<sup>5</sup>

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.

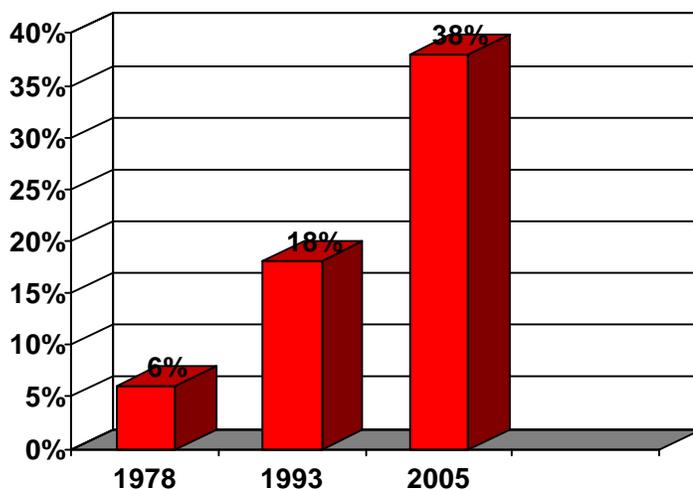
We know that the university lobbies and some universities will argue against increasing the allocation on the basis that this increase will come out of “their pot” of Federal R&D funding. We know this because:

1. During the initial SBIR Congressional deliberations and hearings for the legislation in 1982, the universities and their lobbyists testified against the program.<sup>6</sup>
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.<sup>7</sup>

**Figure 2. Percent of U.S. Scientists and Engineers Employed by Companies with Fewer than 500 Employees<sup>8</sup>**



As found in the 1978 House and Senate Hearings referenced above, and in the Findings of the 102<sup>nd</sup> 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.

<b>Organizations</b>	<b>Federal R&amp;D Dollars</b>	<b>Patents Granted</b>
<b>Small Business</b>	<b>4 percent</b>	<b>38 percent</b>
<b>Large Business</b>	<b>36 percent</b>	<b>55 percent</b>
<b>Non-Profit Labs</b>	<b>6 percent</b>	<b>2 percent</b>
<b>Federal Research Labs</b>	<b>26 percent</b>	<b>2 percent</b>
<b>Universities</b>	<b>28 percent</b>	<b>3 percent</b>

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?**

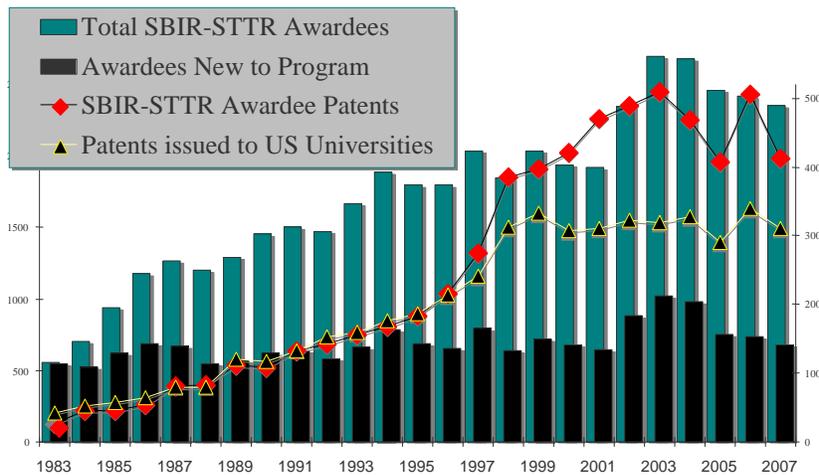
- a. SBTC believes it is helpful to compare the productivity of the SBIR companies versus universities in two key critical factors shown below in Table 2:

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

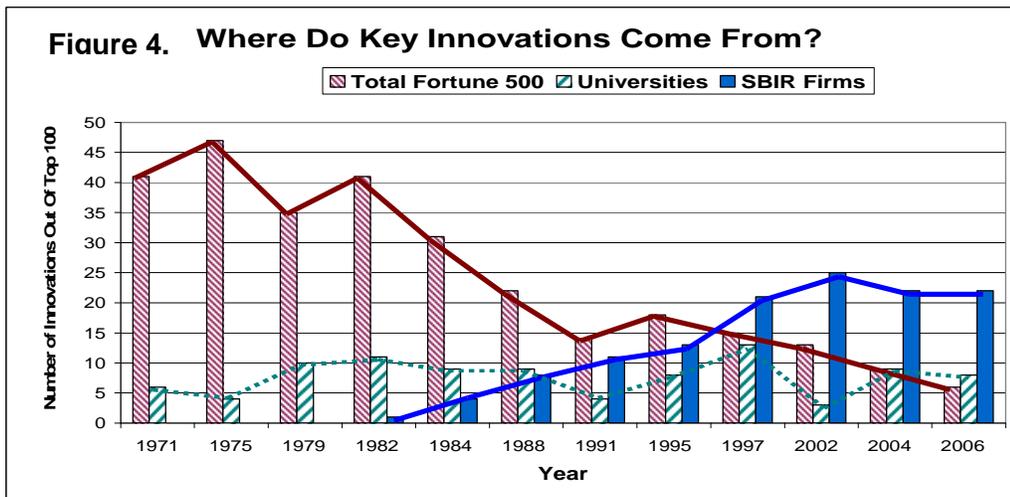
On these two measures, the SBIR program is 35 times more effective in generating patents per dollar of Federal R&D funding, and at least 10 times more effective in creating cash returns on the Federal R&D investment. However, this is not surprising. The primary purposes of the small businesses are to 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.<sup>14</sup> The primary purpose of universities is to provide highly qualified graduates to enter the U.S. economy<sup>15</sup> – 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<sup>16</sup>**



**Figure 4. Where Do Key Innovations Come From?**



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*.<sup>17</sup> 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.<sup>18</sup>

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.”<sup>19</sup>

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,<sup>20</sup> and according to the NSF SBIR web site, the 2006 SBIR funding was approximately \$1.73 billion.<sup>21</sup> The approximate results are shown in Table 3 below and show a ~ 50:1 multiplier of SBIR firms vs universities:

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.<sup>22</sup> 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.

<b>Table 4. Impact of Award Size Increase without Commensurate Allocation Increase ~ \$2 Billion Program<sup>23</sup></b>		
<b>Award Size = Phase I/Phase II</b>	<b>Current program = \$100/\$750 K</b>	<b>S-4053 = \$150/\$1,000 K</b>
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.<sup>24</sup> 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**

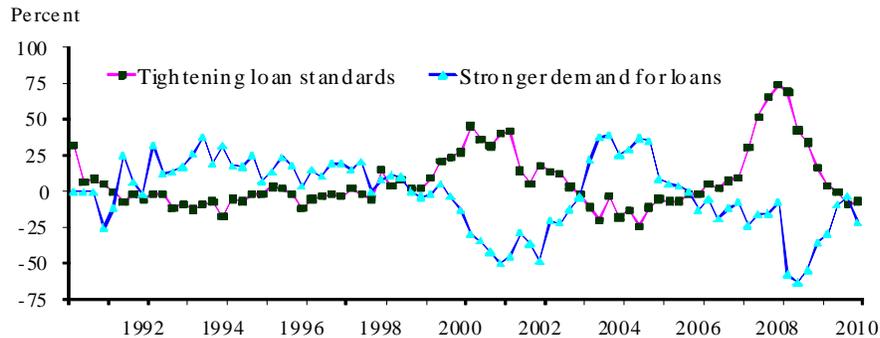


**NOTE:** The data are quarterly; changes are from four quarters earlier.

This credit crunch is also hitting small businesses as shown in Figure 6 and Figure 7 below.<sup>25</sup> 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.**

### Small Business Bank Lending, 1991-2010



Note: Change in percentage of respondents from the previous period.

Source: Office of Advocacy, U.S. Small Business Administration from data provided by the Federal Reserve Board Senior Loan Officer Survey.



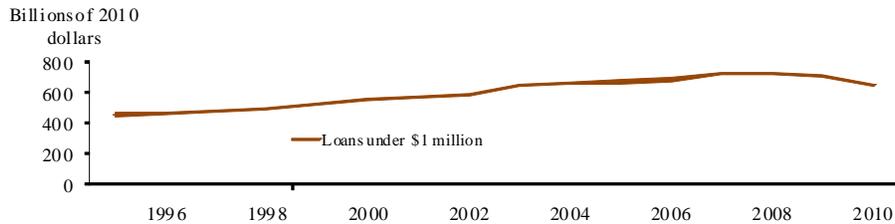
Businesses

Employment

Finance

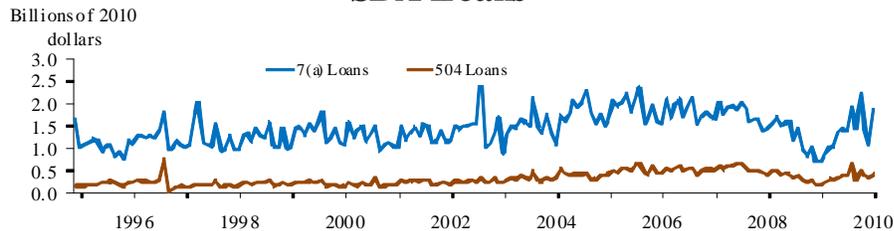
**Figure 7. Small Business Loans (under \$ 1 million) and SBA Loans**

### Small Business Loans



Source: Federal Reserve Board, Call Report data.

### SBA Loans



Source: U.S. Small Business Administration.



Businesses

Employment

Finance

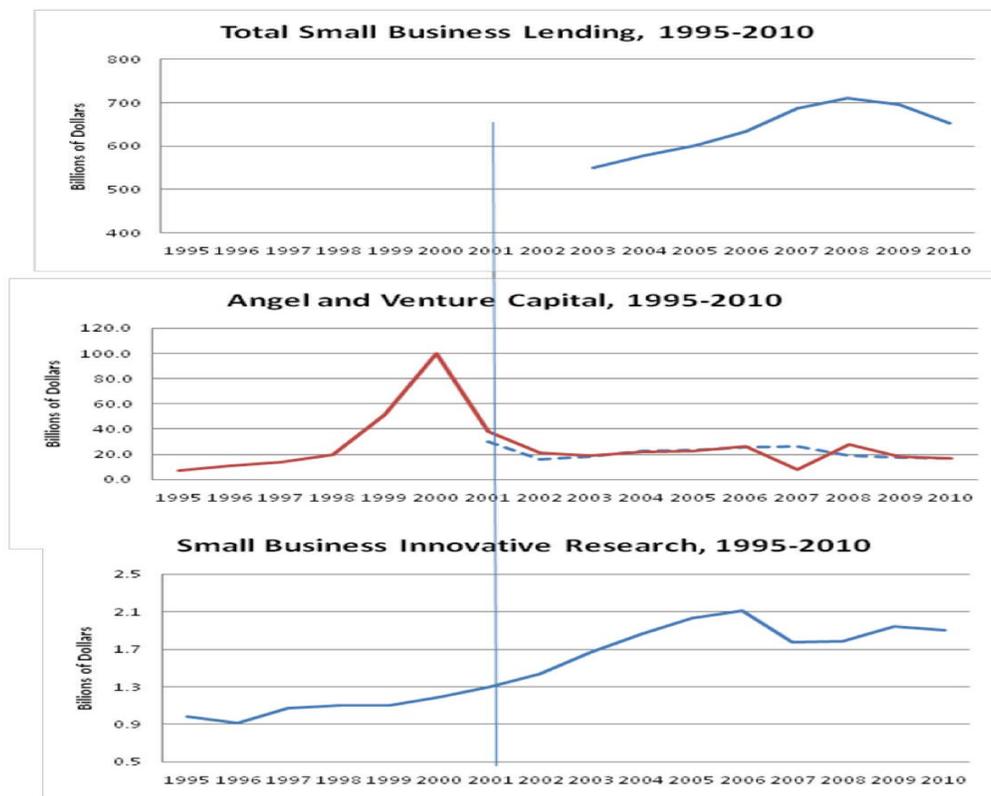
The Office of Advocacy, US Small Business Administration, just released on February 11, 2011, their annual banking study, *Small Business Lending in the United States, 2009-2010*.<sup>26</sup> The report summary states:

“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<sup>27</sup> 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.<sup>28</sup>

**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.

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<sup>1</sup> 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.

<sup>2</sup> See Appendix A for Findings and Purpose of PL-97-219

<sup>3</sup> Recession source: NBER Recessions of the Twentieth Century.

<sup>4</sup> <http://www.nsf.gov/statistics/seind10/append/c4/at04-07.pdf>

<sup>5</sup> *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.

<sup>6</sup> 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.

<sup>7</sup> 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.

<sup>8</sup> National Science Foundation, *Science and Engineering Indicators*, 2007.

<sup>9</sup> Ibid

<sup>10</sup> 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](http://www.autm.net/AM/Template.cfm?Section=Licensing_Surveys_AUTM&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=6&ContentID=2409)

<sup>11</sup> Data from [www.inknovation.com](http://www.inknovation.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.

<sup>12</sup> AUTM, Op Cit, 2009; R&D funding to universities was \$53.9 billion, and licensing income was \$2.3 billion for 2009.

<sup>13</sup> *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](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.]

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

<sup>15</sup> *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."

<sup>16</sup> Innovation Development Institute, 2009, from U.S. Patent and Trademark Office data.

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<sup>17</sup> 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.

<sup>18</sup> These charts were included in the testimony by Jere W. Glover, 2009, Op Cit

<sup>19</sup> Ibid., p. 15

<sup>20</sup> AUTM, Op Cit, In 2005 and 2006, the reported R&D funding to universities was \$42 billion and \$45 billion respectively.

<sup>21</sup> <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.

<sup>22</sup> *An Assessment of the SBIR Program*, Op Cit.

<sup>23</sup> Assumes 40% of Phase I awards go to Phase II.

<sup>24</sup> 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>

<sup>25</sup> 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*.

<sup>26</sup> *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](http://www.sba.gov/sites/default/files/files/sbl_10study.pdf)

<sup>27</sup> *Small Business Financing, 1995 to 2010*, Office of Advocacy, US Small Business Administration, released on February 14, 2011, by Chief Counsel, Dr. Winslow Sargeant.

<sup>28</sup> 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)**

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#### **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,<sup>i</sup> 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.<sup>ii</sup> 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](http://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).<sup>iii</sup> 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.<sup>iv</sup>
- 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.<sup>v</sup> 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.”<sup>vi</sup>
- 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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<sup>i</sup> *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](http://www.nap.edu/catalog.php?record_id=11989)

<sup>ii</sup> *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.

<sup>iii</sup> *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.

<sup>iv</sup> [http://cordis.europa.eu/fp7/home\\_en.html](http://cordis.europa.eu/fp7/home_en.html)

<sup>v</sup> *A New View of Government, University, and Industry Partnerships*, op. cit.

<sup>vi</sup> *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](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.<sup>41</sup> 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. About one-third of founders were most recently employed in an academic environment before founding the new company;
- c. In some 27 percent of projects, university faculty were involved as principal investigators or consultants on the project;
- d. 17 percent of Phase II projects involved universities as subcontractors; and
- 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,<sup>1</sup> 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*<sup>2</sup> 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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<sup>1</sup> 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

<sup>2</sup> 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>