

Office of Advocacy

TESTIMONY OF
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Madame Chair and members of the Committee: It is a particular pleasure for me to submit testimony to the Committee on Small Business on the subject of the Small Business Innovation Research program (SBIR). Small business innovation is a topic that has been of high interest to me from my earliest days in Washington. In 1978 I staffed Joint House and Senate Hearings on Small Business Innovation that focused on the exclusion of small business innovators from many federal research programs. At that time, the Committee saw many structural impediments to the use of small technology companies by our federal research community.

From those early investigations, a bipartisan effort was initiated to ensure that the creative talents and entrepreneurial spirit of America's small businesses were better utilized in our national research agenda. The SBIR program was established by the Small Business Innovation Development Act of 1982 (Public Law 97- 219) with broad bipartisan support in Congress and was signed into law by President Reagan. The delegates to all three White House Conferences on Small Business (1980, 1986 and 1995) have voted for recommendations that strongly support the SBIR program. Clearly, we have strong bipartisan and solid grass-roots support for this program.

Today I will focus my testimony on three major SBIR elements:

- 1) Success of the SBIR program
- 2) Commercialization
- 3) Capital needs generated by the SBIR program success.

SUCCESS OF THE SBIR PROGRAM

As presented in the testimony from Daniel Hill, Assistant Administrator of the Office of Technology at the U.S. Small Business Administration, the SBIR program is viewed as a highly successful program by the Administration, the funding agencies, the General Accounting Office, and by the many companies that participate in it. It is one of the best examples of a well constructed federal program because it provides:

1. High quality research to the funding agencies. The responses from SBIR program managers to the GAO questionnaires indicated that 50 percent of the SBIR projects were rated as having "About the same" quality of research as other agency research, with 29 percent rated as "Much better" or "Somewhat better." As reported by GAO in 1995, "the quality of research proposals has kept pace with the program's expansion."
2. Solid contribution to the R&D goals of the funding agencies. Sixty-four percent of the responses to GAO queries indicated that the SBIR had "Very Great", "Great" or "Moderate" contribution to the agency R&D goals.
3. Low proposal costs for the participating companies and low review costs for the funding agencies due to the 25-page limitation on proposals.
4. A highly competitive program with more good proposals than can be funded--typically by a ten-to-one ratio. The initial concerns about the ability of small businesses to provide a sufficient number of quality proposals to continue the high caliber of research, and the concerns that the quality could be maintained as the SBIR program grew have been demonstrated to be unfounded. As reported by GAO, "...the large numbers of worthy but unfunded projects suggest the quality research proposals kept pace with the program's initial expansion."
5. High commercialization rates. As reported by GAO in 1992 (on 1991 results):

"Even though many SBIR projects have not yet had sufficient time to achieve their full commercial potential, the program is showing success in Phase III [commercial] activity. As of July 1991, the program had generated about \$1.1 billion in Phase III sales and additional funding for technical development--two key indicators of the program's commercial trends. In addition, up to \$3 billion more is expected by the end of 1993. The majority of this activity occurred in the private sector, showing a trend toward one of the program's goals- -increasing private-sector commercialization."

A 1991 SBA commercialization report concluded that "more than one in every four awardees (27 percent) either would have achieved commercialization or were likely to achieve commercialization six years after receiving their Phase II funding." As reported in the testimony of the U.S. Small Business Administration to this Committee today, "The [commercialization] percentage is close to 40 percent when we consider products that are the result of more than one contributory SBIR project."

6. An opportunity for small companies to bring new products to market that would not otherwise receive the funding support necessary for their development. As reported by the SBA, "More than 60 percent of the respondents attributed nearly all of their project's success to SBIR. And 84 percent said their technology development would not have been pursued without SBIR assistance." The GAO analysis reported, "Only 16 percent said they would have definitely or probably done the research without the SBIR program, 20 percent were uncertain, and 64 percent said they definitely or probably would not have proceeded."

The preliminary reports on the Small Business Technology Transfer (STTR) program indicate that it is also achieving the goals established by Congress. As reported by GAO, "Agencies generally rated the quality of the proposed research and commercial potential

in STTR proposals highly. For example, DOE rated the quality of research in all 21 of its winning proposals as being among the top 10 percent of all research in the agency."

COMMERCIALIZATION

The commercialization successes of the SBIR program reported by GAO and SBA deserve special attention. At first, the report of a 27-percent, or even a 40-percent, commercialization rate may seem to be a low number--a legitimate question is, "What happened to the other 60-percent or 73-percent?" In addressing this question, I will cover three elements:

1. The research and development process;
2. Timelines of technology transfer from the laboratory to the marketplace; and
3. Comparison between the commercialization rates of the SBIR program and projects involving industry and federal laboratory partnerships, and industry by itself.

1. The Research and Development Process. The SBIR program is fundamentally driven by the research goals of the funding agencies, and its basic purpose is to further the research efforts of the United States. Research by its nature requires scientists to try a variety of approaches to find the solutions that work best. In university and federal laboratory research, and in the SBIR program, it is expected that some of the research effort will go into discovering what doesn't work. The fact that the SBIR programs are rated as high-quality research by the funding agencies means that by the very nature of the program, some projects will not result in commercial success. They will expand our knowledge, but not provide products. In fact, the general rule of thumb for the funding agencies is that through a rigorous technical peer review of all programs, they select only about half of the initial Phase I programs for Phase II funding. The 40-percent commercialization rate described above by Mr. Hill for multiple SBIR awards supports the value of the incremental process of the SBIR program. Rather than funding a company on a long-term effort, regardless of progress, the rigorous process of requiring companies to submit new competitive proposals, utilizing the experience gained from past programs, ensures a balanced focus on quality research and commercialization.

2. Timelines of Technology Transfer. The second element of the answer of commercialization is the time required to move products from the laboratory to the marketplace. The process of commercializing a new technology is one that takes a number of years and GAO properly notes that even the relatively mature SBIR program is still in the adolescent years from the standpoint of product maturation. For example, in the health sciences, clinical trials may involve three to ten years before a product is declared safe and efficacious. In the defense community, technical evaluations and operational evaluations may involve four to seven years before production authorization is provided. Even in the commercial or consumer marketplace, three to ten years for product acceptance is a common time line for new technologies. The data from the SBA commercialization study indicates a typical product maturation schedule of seven to ten years.

3. Comparison of SBIR commercialization rates with other technology centers. The data from most commercialization studies of other technology centers are generally gathered in a somewhat different manner than that collected by SBA and GAO for the SBIR program, so caution must be exercised in developing direct comparisons. In particular, because of the higher rate of innovation by small firms, care must be taken in comparing commercialization rates. However, with caveats, some perspective can be provided.

A study by Professor Barry Bozeman, et al., from the Georgia Institute of Technology, provides a comparison of the commercial interactions of industry with federal laboratories. The data from this study "include 229 federal laboratory-industry interactions for 219 firms [median company size is 450 full-time personnel]. The projects are from 27 federal government laboratories, including most of the leaders in federal laboratory-industry commercial activity." The only projects studied were those where industry specifically sought assistance from the federal laboratories because the laboratories had technologies in hand that could be of commercial value to the company. Therefore, it would be reasonable to expect higher commercialization rates than from the research-driven goals of the SBIR program. The results of the Bozeman study indicated that:

"22 percent have already led to a new product, process or service being marketed--a high rate given the fact that most of the projects began after 1990. This rate compares favorably to [commercialization] rates from R&D performed exclusively by firms."

The fact that these commercialization rates are similar to those of the SBIR program, and that the federal laboratory technology had already been developed before being approached by the company, speaks well for the SBIR program. Bozeman notes that the 22-percent rate "compares favorably" with the experience of company-funded product research, further supporting the SBIR program. (Note that the SBIR commercialization rate, beginning with the requirement to first meet the research needs of the funding agency, is on the order of 27 percent to 40 percent.)

CAPITAL NEEDS GENERATED BY THE SBIR PROGRAM SUCCESS

I would like to add a perspective on the implications of the success of the SBIR and STTR programs for our national research, innovation and global competitiveness agendas. From the above citations it is clear that:

1. Small business owners submit proposals to the SBIR program even when they know that they only have one chance in ten of receiving an award.
2. Many worthy proposals remain unfunded.
3. Companies are not able to pursue many of their interesting programs if they do not receive SBIR funding.
4. Phase III commercialization efforts usually require outside financing to support the transition from the laboratory to the marketplace. (In fact, the use of third-party financing in the company's Phase II proposal is ranked highly in the commercialization evaluations by funding agencies.

The inescapable conclusion of these statements is that the SBIR program is filling a vital need in the research and innovation process in the United States. If companies could find other sources of easily available investment capital for the development of new products, they would not continue to aggressively submit Phase I proposals knowing they are facing a ten-to-one rejection rate.

As shown in the most recent SBA annual report on the SBIR program, in fiscal year 1993, the funding agencies received 23,640 Phase I proposals and awarded 2,898 Phase I projects. They also received 2,532 Phase II proposals and funded 1,141 Phase II projects. Thus, the total number of proposals in 1993 was 26,172 and the total number of awards was 4,039. The SBIR funding percentage increased from 1.5 percent in 1993 and 1994 to 2.0 percent in 1995 and 1996, and increases further to 2.5 percent for 1997 to 2000. Therefore, the number of proposals is now on the order of 30,000 per year, and the number of awards is on the order of 5,000.

The Office of Advocacy investigated the sources of capital for supporting the commercialization efforts of these small companies. Clearly, short-term bank loans are not a good source of the high-risk capital needed to support the long product and market development programs needed to bring these products to market. Companies are usually cash-starved during this phase of their growth, and interest payments on short-term loans are counterproductive. Equity, or long-term convertible debt, is required for these high-risk, lengthy, commercialization programs. The typical investment requirement is on the order of \$250,000 to \$1,500,000.

The traditional strategy for years has been to recommend that SBIR and STTR companies seek investments from the venture capital community. However, when we investigated this avenue of support, we found a severe shortage of venture capital for these types of companies. There is a considerable amount of capital from institutional venture firms--over \$40 billion. But, it is just not going to small start-up SBIR-type companies. According to the National Venture Capital Association's latest report, the venture companies are investing about \$4 billion to \$5 billion per year in approximately 1,000 growth companies--at an average investment on the order of \$4 million. Unfortunately, typically less than 10 percent of these investments are in seed and start-up companies, and of those, only about half are in the technology fields. This means only about 50 technology seed and start-up companies are funded by institutional venture companies per year. That doesn't begin to address the SBIR companies' needs, let alone other small technology companies.

It is clear that the SBIR program is filling not only the research goals of the funding agencies, but also the need for high-risk seed and start-up capital for small companies. The approximately \$1 billion of SBIR/STTR funding each year is more than ten times the funding provided by the institutional venture capital organizations to these small technology companies. It is also clear from the SBIR/STTR program information that many good programs do not receive funding. Providing additional funding mechanisms from the private sector is required if a significant number of these programs are to reach maturity.

What our investigations uncovered is that the primary source of equity investments for the SBIR-type company are the "angels," the wealthy, business-sophisticated individuals who invest in and mentor small companies. From a study that we awarded to the Center for Venture Research, University of New Hampshire, we discovered that "Conservative estimates suggest that annually about 250,000 business angels invest \$10 billion to \$20 billion in over 30,000 ventures." These angels are attracted to SBIR/STTR companies because the strong peer review in the highly competitive Phase I proposal process provides confirmation that the technology is sound. The SBIR/STTR funding also reduces the risk of their investment. And, the institutional venture investors are later attracted to the successful angel-funded companies, because they have usually had professional mentoring by the angel. In fact, we found that many seasoned angels attracted a following of large venture capitalists.

We also determined that this angel market is currently not operating efficiently, primarily because of barriers to the free flow of information and high transaction costs. The Office of Advocacy has conducted a series of focus groups across the country to ensure that we are developing information that can help us improve the efficiency and effectiveness of this market. In particular, we investigated the factors that are contributing to the successes of California's Silicon Valley, and the Massachusetts Route 128 region. The goal of the project is to encourage similar development of technology centers in the remainder of the nation.

Our primary recommendation is to establish strong networking via a password-controlled electronic link between university-based, nonprofit organizations that are currently connecting angels and entrepreneurs on a local basis. We also are developing model terms of sale to minimize the cost of transactions and standardized disclosure requirements using the U-7 form developed for the Small Corporate Offerings Registration (which has been adopted by 42 states). Finally, we are recommending that states develop reciprocal agreements on the filings of securities for sale to this angel market.

With these improvements, we believe that the angel marketplace can accommodate a significant increase in new angels and entrepreneurs. Expansion of this "farm league" of angels and entrepreneurs will result in more, and better, investment opportunities for the institutional venture companies, pensions, and the public market via initial public offerings. These improvements are vital if the commercialization rates of the SBIR/STTR programs are to continue improving. Of course, they apply equally well to the needs of private entrepreneurs working without SBIR or STTR awards. We are pleased to report the improved integration of the SBIR program within the SBA. Mr. Hill, with the strong support of the SBA Administrator, Philip Lader, has dramatically improved the visibility and cooperation between the SBIR program and the traditional SBA loan programs, licensed Small Business Investment Corporations (SBIC), and mentoring activities of the Small Business Development Centers (SBDC) and Service Core of Retired Executives (SCORE).

We would be pleased to provide any additional information on the SBIR program or any other items covered in our testimony.

LIST OF GAO REPORTS ON THE SBIR AND STTR PROGRAMS

RCED-86-13, Implementing The Small Business Innovation Development Act--The First 2 Years, October 25, 1985

RCED-86-113FS, A Profile of Selected Firms Awarded Small Business Innovation Research Funds, March 1986

RCED-87-63, Effectiveness of Small Business Innovation Research Program Procedures, June 1987

RCED-89-39, Assessment of Small Business Innovation Research Programs, January 1989

RCED-89-173, Proposed Amendments to SBIR Program, June 30, 1989

RCED-92-37, Small Business Innovation Research Shows Success but Can Be Strengthened, March 1992

RCED-95-59, Interim Report on the Small Business Innovation Research Program, March 1995

RCED-96-19, Preliminary Information on the Small Business

Technology Transfer Program, January 1996

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