Madam Chair and Members of the Subcommittee:

We are pleased to be here today to discuss the results of our review of the first-year of the Small Business Technology Transfer (STTR) Program's implementation.[1] In addition, we will be discussing our work in response to the Subcommittee's recent request for information on companies that have received multiple awards under the STTR Program and the Small Business Innovation Research (SBIR) Program. The two programs share similar goals, which emphasize the benefits of technological innovation and the ability of small businesses to transform the results of research and development (R&D) into new products. The STTR Program differs from the SBIR Program primarily in requiring a company to form a partnership with a nonprofit research institution. The Small Business Research and Development Enhancement Act of 1992 established the STTR Program and authorized it for 3 years, beginning in fiscal year 1994. The program was subsequently extended through fiscal year 1997. Under the same 1992 legislation, the Congress also reauthorized the SBIR Program, which was authorized in 1982 and served as the model for the STTR Program.

In our report on the STTR program, we discussed, among other issues, the effect of STTR on SBIR and other agency R&D and the need for the STTR Program. While we have not updated our work since 1996, our report provided a concise picture of the program's basic issues. For our work on multiple awardees, we obtained information on the profiles of companies that had received STTR and/or SBIR awards since fiscal year 1990. We obtained this information from the Small Business Administration (SBA) and the agencies participating in both the STTR and SBIR programs.

Our discussion today highlights the message of our 1996 report and information on the multiple awardees. In summary, Madam Chair:

- We reported that while agency officials expressed differing views on the effect of and the need for the STTR Program, all of the officials felt that the program was not competing for quality proposals with the SBIR Program or reducing the quality of the agencies' R&D in general in the first year of the program. Furthermore, some officials noted potentially beneficial effects, such as greater collaboration between small businesses and research institutions in the SBIR Program. The similarity of the two programs, however, raises three questions that are relevant in evaluating the need for the STTR Program: (1) Is the technology originating primarily in the

[1]Federal Research: Preliminary Information on the Small Business Technology Transfer Program (GAO/RCED-96-19, Jan. 24, 1996)

research institution as envisioned in the rationale for the program or is it originating in the small business? (2) Is the mandatory collaboration between the small business and the research institution effective in transferring the technology to the marketplace? (3) Can the SBIR Program accomplish the same objective without the collaboration required by the STTR Program?

- Since fiscal year 1990, approximately 6,500 companies have received STTR and/or SBIR awards from the five agencies that participate in both programs. Of these companies, 383 companies, or about 6 percent, have received a total of 10 or more STTR and/or SBIR awards. While two companies have received over 300 STTR and/or SBIR awards each, agency officials reported that many other recent SBIR awardees had never received an award from their agencies. However, all of the companies that have received 3 or more STTR awards have also received 5 or more SBIR awards. Generally, the agencies have not collected information on the number of employees and the annual revenue of the companies that receive awards and have limited information on the commercialization resulting from these programs. It is important to note, however, that it may be too early for companies that have received STTR awards to have achieved success in commercializing the results of the STTR work.

Background

The objectives of the STTR Program are to (1) stimulate technological innovation, (2) use small businesses to meet federal R&D needs, and (3) increase the private sector's commercialization of innovation derived from federal R&D. The STTR Program is closely modeled on the SBIR Program, which was established in 1982. The two programs share similar goals and other basic features, including participation by many of the same agencies, the use of a percentage of the external budget for funding, and a three-phase approach. To be eligible for an STTR or SBIR award, SBA's policy directives state that a small business must employ 500 or fewer employees (including employees of subsidiaries and affiliates).

Five agencies—the Department of Defense (DOD); the National Aeronautics and Space Administration (NASA); the Department of Health and Human Services and, particularly, its National Institutes of Health (NIH); the Department of Energy (DOE); and the National Science Foundation (NSF)—participate in the STTR Program. These five agencies also participate in the SBIR Program.[2] Each agency manages its own

[2]The other five SBIR agencies are the United States Department of Agriculture, Department of Commerce, Department of Education, Department of Transportation, and Environmental Protection Agency.

programs, while SBA plays a central administrative role and issues policy directives and annual reports for each program.

In establishing the STTR Program, the legislation required each agency with an external R&D budget in excess of $1 billion to set aside not less than 0.05 percent of that budget in fiscal year 1994, not less than 0.1 percent in fiscal year 1995, and not less than 0.15 percent in fiscal year 1996 for the STTR Program. The percentage remained at 0.15 when the program was extended through fiscal year 1997. These agencies expended about $34 million in fiscal year 1995 and $62 million in fiscal year 1996 and plan to spend about $62 million again in fiscal year 1997.

The legislation establishing the SBIR Program required each agency with an external R&D budget in excess of $100 million to set aside a certain percentage of this amount for the program. The percentage was increased incrementally until it reached 1.25 percent in 1986. The program's 1992 reauthorization legislation increased funding to not less than 1.5 percent for fiscal years 1993 and 1994, not less than 2 percent for fiscal years 1995 and 1996, and not less than 2.5 percent for fiscal year 1997 and thereafter. Funding for fiscal year 1997 will be nearly $1 billion.

STTR and SBIR funding is provided in two phases. Phase I is intended to determine the scientific and technical merit and feasibility of ideas; it generally lasts about 1 year for STTR and 6 months for SBIR. Phase II further develops the proposed ideas and generally lasts about 2 years. The 1992 reauthorization set the general limits for STTR awards at $100,000 and $500,000, respectively. It also directed SBA to set the general limits on the size of SBIR phase I and II awards at $100,000 and $750,000, respectively, although awards may be for less than these amounts. A third phase for STTR and SBIR projects, where appropriate, involves the continuation or commercial application of the R&D without STTR or SBIR funds.

Although the two programs have many points in common, they differ in one important respect. To be eligible for an STTR award, a small business must collaborate with a nonprofit research institution such as a university, a federally funded research and development center, or other entity. This collaboration is permitted under the SBIR program but is not mandatory. This special STTR requirement, according to a 1992 House of Representatives report,[3] was to provide a more effective mechanism for transferring new knowledge from research institutions to industry.

[3]H.R. Rep. No. 554, 102d Cong., 2d Sess., pt. 1 (1992). The report accompanied H.R. 4400, a predecessor to the bill (S. 2941) that was enacted.

Agencies' Views Differed on the Effect of and Need for the STTR Program

Agency officials expressed differing views on the effect of STTR on SBIR and other agency R&D. For example, SBA officials contended that STTR was too small and too new a program to have any real effect on SBIR or on the broader range of agency research at the time of our report. At the time of our review, the officials pointed out that the program represented only 0.05 percent of each agency's external R&D budget during its first year and that it was only 1 year old.

In contrast to the view that STTR's effect was very limited, the manager of the Army's STTR Program said that STTR was influencing SBIR in a beneficial way. In his opinion, STTR is becoming known through national conferences and other means. Furthermore, he said that small businesses are realizing that they have more credibility and chance of winning an award by collaborating with a university or other research institution. He believes that the STTR Program has also led to more collaboration in SBIR. In general, according to the Program Manager, STTR is a promising program that may be as successful as the SBIR Program.

The similarity of the two programs, however, raises a broader issue about the need for the STTR Program. In the 1992 House report, the Committee on Small Business provided two basic arguments in favor of the program. First, the report stated that the program addresses a core problem in U.S. economic competitiveness—the inability to translate the nation's worldwide leadership in science and engineering into technology and commercial applications that will benefit the economy. Second, the report stated that, although SBIR has turned out to be remarkably effective at commercializing ideas in the small business community, it is less effective at fostering the commercialization of ideas that originate in universities, federal laboratories, and nonprofit research institutions—a goal of STTR.

The rationale for the STTR Program, which points to certain weaknesses in SBIR and potential strengths in STTR, suggests three questions that are relevant in evaluating the need for the program.

First, is the technology originating in the research institution as envisioned in the rationale for the program or is it originating in the small business? The technology may originate in the research institution, the small business, or a combination of the two. Under the STTR Program, the assumption is that the research institution will be the primary originator of the new concept. However, data to determine the extent to which research institutions are providing the technologies were not available. Neither SBA nor the agencies had collected this information. The relative roles of the

research institution and the small business as the source of the technology bear directly on the need for the STTR Program. If a high percentage of the ideas are originating with small businesses rather than with research institutions, this would raise questions about the need for the program. On the other hand, if a high percentage of ideas are originating with research institutions, this would suggest that the program was achieving the first step in moving ideas from research institutions to small businesses.

Second, if the program is effective in moving ideas from research institutions to small businesses, then the next logical question is whether their collaboration is effective in moving the ideas to the marketplace. This question can be approached from two directions: (1) short-term views of how well the collaboration is working in general and (2) long-term data on actual commercialization. Information on how well the collaboration was working was not available at the time of our report. Information on actual commercial outcomes will require a greater amount of time before it can be obtained. Generally, 5 to 9 years are needed to turn an initial concept into a marketable product.

Third, because one important difference between the two programs is that the STTR Program makes a small business/research institution collaboration mandatory, the following question arises: Can the SBIR Program accomplish the objective of transferring technology from research institutions to the private sector without mandatory collaboration? The rationale for the STTR Program tends to assume that such collaborations were relatively rare in the SBIR Program. However, NIH's Program Manager told us that, in an SBIR survey undertaken by NIH several years ago, collaboration between small businesses and universities was already evident in well over half of NIH's SBIR projects. By contrast, the manager of Army's programs believed that STTR's impact will be greater in the Army than in agencies such as NIH because the Army has had a lesser degree of collaboration with universities and other research institutions in the past. Given the apparent variation from one agency to another and the lack of current data, no definite conclusion can be drawn at present concerning the need for STTR in forging new collaborations.

Profile Data on Companies That Have Received Multiple STTR and/or SBIR Awards

Since fiscal year 1990, 383 companies have received a total of 10 or more STTR and/or SBIR awards from the five agencies that participate in both of the award programs. Two companies have received over 300 STTR and/or SBIR awards each, and another eight companies have received over 100 awards each from both of the programs. Approximately one-third of the companies that have received STTR awards have also received SBIR awards since fiscal year 1990. In addition, all of the companies that have received three or more STTR awards have also received five or more SBIR awards.

On the other hand, many companies have received only a few awards. For example, DOD reported that from 1983 through 1995, 61 percent of its phase II SBIR awardees received only one phase II award from DOD, and 92 percent of its phase II SBIR awardees received five or fewer phase II awards from DOD. NSF and DOE reported that almost 25 percent of recent SBIR awardees had never received an award from these agencies before. The Program Manager for the SBIR and STTR programs at NASA reported that multiple awardees have been a small proportion of the overall set of award winners.

Generally, the agencies have not collected information on the number of employees or the annual revenue of the companies that have received STTR and/or SBIR awards. However, in a survey of the companies that have received DOD phase II SBIR awards prior to fiscal year 1993, DOD obtained this information from some of the respondents who received the most phase II awards. Of the 29 companies responding to a question on the company's size, the range was from as few as 7 employees to over 500 employees.[4] Annual revenues also varied for the 17 companies that reported their annual revenue for 1996. Of these, 11 companies reported revenues of between $5 million and $19.99 million. Four companies reported annual revenues of over $20 million, and the remainder reported revenues of under $5 million.

Limited information is available on the commercialization success of the companies that have received STTR and/or SBIR awards. For one thing, it may be too early for companies that have received STTR awards to have achieved success in commercializing the results of the STTR work because it can take many years for a research project to achieve results. However, various studies have reported mixed results on the commercialization success of companies that have received multiple SBIR awards. In 1992, we reported that a comparison of frequent winners—those receiving five or

[4]Three companies reported that they currently have over 500 employees; however, at the time they received phase II SBIR awards from DOD, these companies had 500 or fewer employees.

more SBIR phase II awards—with less frequent winners showed that, in general, frequent winners were achieving lower levels of total sales per project.[5] In addition, frequent winners had obtained substantially less additional developmental funding per project from the private sector than companies with one to four awards. A recent analysis by DOD confirms our finding. Specifically, survey results indicate that companies that had received nine or more phase II awards were less successful in commercializing the results of their research than companies that had received fewer than five awards. The reasons for this remain unclear. DOD has noted, however, that there are some individual exceptions. A few frequent award winners have been successful in commercializing the results of their research.

DOE, on the other hand, stated that there does not appear to be a relationship between the number of DOE phase II SBIR awards received by a company and the company's success in commercializing the results of its research. DOE's approach for evaluating commercialization success is to query companies about the products that they have developed. DOE asks SBIR awardees which SBIR projects contributed to the development of a particular product. Using this measure of commercialization success, DOE has found that companies that have received more than ten phase II SBIR awards from DOE have received approximately the same amount of phase III funding on the average as companies that have received less than five awards. NASA reported that it has incomplete information on companies' commercialization success but stated that available data indicate that commercialization rates are about the same for multiple awardees as they are for companies that have received fewer awards.

This concludes my statement. I would be happy to respond to any questions that you or the Members of the Subcommittee may have.

[5]Federal Research: Small Business Innovation Research Shows Success but Can Be Strengthened (GAO/RCED-92-37, March 30, 1992).