

GAO

Testimony

Before the Committee on Small Business
House of Representatives

For Release on Delivery
Expected at
10:00 a.m. EST
March 6, 1996

FEDERAL RESEARCH

Interim Assessment of the Small Business Innovation Research and Technology Transfer Programs

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Madam Chair and Members of the Committee:

We are pleased to be here today to discuss the results of our reviews of the Small Business Innovation Research (SBIR) Program¹ and the Small Business Technology Transfer (STTR) Pilot Program.² The Small Business Innovation Development Act of 1982, which authorized the SBIR Program, emphasized the benefits of technological innovation and the ability of small businesses to transform the results of research and development into new products. Reflecting its view of the program's success, the Congress reauthorized the program in 1992. In the same 1992 legislation, the Congress also established the STTR Program, which is closely modeled on the SBIR Program. The STTR Program differs from SBIR primarily in requiring a company to form a partnership with a non-profit research institution. We have issued two reports on these programs in which we discussed the (1) quality of research proposals in the SBIR and STTR Programs, (2) duplication of funding for SBIR projects, (3) steps being taken to avoid conflict of interest that would arise if a party both submitted and evaluated STTR proposals, and (4) effect of and need for the STTR Program. In addition, as directed by the 1992 legislation, we will provide a detailed study covering all of the major issues affecting the SBIR Program in 1997.

Our discussion today highlights the message of our two most recent reports. In summary, Madam Chair:

- The quality of SBIR and STTR research proposals appeared favorable when we issued our reports. For the SBIR Program, our view was based on the (1) high level of competition, (2) large numbers of proposals that agencies deemed worthy of funding but that received no award, and (3) views expressed by program officials that quality was being maintained. Nevertheless, it was too early to make a conclusive judgment about the long-term quality of SBIR research proposals because the major increases in program funding had not yet occurred. For STTR, technical experts generally concluded that the proposals called for high quality research. As one example, the Department of Energy (DOE) rated the quality of proposed research in all of its winning proposals as being among the top 10 percent of research in the Department. At this time, however, the actual

¹Federal Research: Interim Report on the Small Business Innovation Research Program (GAO/RCED-95-59, Mar. 8, 1995)

²Federal Research: Preliminary Information on the Small Business Technology Transfer Program (GAO/RCED-96-19, Jan. 24, 1996)

results of these awards cannot be assessed because of the newness of the program.

- In our SBIR report, we noted that there was duplicate funding of similar research, especially with the increasing numbers of research proposals submitted to the SBIR Program. We made several recommendations to reduce the possibility of duplicate funding in the future. The Small Business Administration (SBA) is preparing to implement our recommendations in this area.
- In our STTR report, we addressed congressional concerns about potential conflicts that might arise if a federally funded research and development center formed a partnership with a company submitting an STTR proposal and then helped a federal agency judge the merits of its own and other proposals. We found that the five agencies in the program have taken steps to avoid such problems.
- Views differed on the effect of and need for the STTR Program. The agencies provided no evidence at this early point in the program to suggest that the STTR Program was competing for quality proposals with the SBIR Program or reducing the quality of agency R&D in general. 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 an issue about the need for the pilot program. One way to assess the need for the program is to determine its effectiveness in transferring technology from research institutions to the marketplace. Such information will not be ascertainable for several years because of the time needed to turn an initial concept into a marketable technology.

Background

The Small Business Innovation Development Act of 1982, which authorized the SBIR Program, designated 4 major goals for the program: to stimulate technological innovation, to use small business to meet federal R&D needs, to foster and encourage participation by minority and disadvantaged persons in technological innovation, and to increase private sector commercialization of innovations derived from federal R&D. The Small Business Research and Development Enhancement Act of 1992 reauthorized the SBIR Program and established the STTR Program, closely modeled on the SBIR Program.

Eleven federal agencies participate in the SBIR Program. Five major agencies—the Department of Defense (DOD); National Aeronautics and Space Administration (NASA); Department of Health and Human Services and particularly its National Institutes of Health (NIH); DOE; and National

Science Foundation (NSF)—also participate in the STTR Program.³ Each agency manages its own program while the SBA plays a central administrative role and issues policy directives and annual reports for each program.

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 1992 reauthorization legislation increased program 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. This increase will effectively double the funding for the program to nearly \$1 billion in fiscal year 1997.

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. In the first year of the program, the agencies expended about \$20 million; they estimate that funding will triple to \$60 million in the third and last year of the pilot program.

SBIR and STTR 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 6 months for SBIR and 1 year for STTR. Phase II further develops the proposed ideas and generally lasts about 2 years. The 1992 reauthorization 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. It also set the general limits for STTR awards at \$100,000 and \$500,000, respectively. A third phase for SBIR and STTR projects, where appropriate, involves the continuation or commercial application of the R&D.

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.

³The other 6 SBIR agencies include the United States Department of Agriculture, Department of Commerce, Department of Education, Department of Transportation, Environmental Protection Agency, and Nuclear Regulatory Commission.

This special STTR requirement, according to a 1992 report,⁴ was to provide a more effective mechanism for transferring new knowledge from research institutions to industry.

In addition to the two reports we have already provided, the legislation directed GAO to report on SBIR in 1997; the upcoming report will be a detailed study covering all of the major issues affecting the program.

Quality Research Proposals Characterized Both Programs

The quality of the proposed research in both programs was one of the principal issues discussed in our reports. In general, we believe the quality of the winning SBIR and STTR proposals is favorable.

For the SBIR Program, the quality of research proposals appeared to have kept pace with the program's initial expansion. However, at the time of our March 1995 report, it was too early to make a conclusive judgment about the effect of the funding increases on the quality of SBIR research proposals receiving awards because only the first (and smallest) of the three slated increases had occurred at the time of our report.

In general, the level of competition for SBIR awards remained high following the initial increase in funding in fiscal year 1993. In all five major agencies during fiscal year 1993, the number of proposals rose between 9 and 30 percent. The increased numbers of proposals were important in maintaining the competitiveness of the program during the first year that the program's funding percentage grew to 1.5 percent. In addition, the ratio of awards to proposals within each agency remained fairly constant, ranging from 8 percent (for DOE) to 28 percent (for NIH). Among all five agencies, the data for fiscal year 1993 showed virtually no change in the ratio from the previous 2 years, suggesting that the funding increase exerted no adverse effect on the competitiveness of the program.

In addition, agencies deemed many more SBIR proposals worthy of award than they were able to fund. In some agencies, the large number of worthy but unfunded projects greatly exceeded the number of projects receiving awards; for example, the Air Force deemed 1,174 proposals worthy of award in fiscal year 1993 but funded only 470. In general, the data showed substantial reserves of projects deemed worthy of funding but receiving no award. In addition, SBIR program officials in the five major agencies stated that, in their view, the quality of research proposals was being

⁴H.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.

maintained or even improved. They cited the level of competitiveness and the large reserves of unfunded but worthy projects as the principal reasons for their view.

Technical evaluations of STTR proposals, which served as the basis for the selection of winning proposals, also showed favorable views of the quality of proposed research. Nevertheless, it was too early for us to make a conclusive judgment about the quality because of the newness of the program. We reviewed all of the evaluations for each of the 206 winning STTR proposals in fiscal year 1994, the first year in which awards were made. The evaluations (1) rated proposals among the top 10 percent of research in certain agencies, (2) awarded perfect scores to many proposals, (3) described some proposals as “cutting edge,” and (4) generally found the quality of proposed research to be excellent. For example, DOE rated the quality of research in all of its winning proposals as being among the top 10 percent of all research in the agency. Of the 48 winning proposals in NIH, 14 were judged outstanding, 31 excellent, 2 very good, and only 1 good. There were none in NIH’s “acceptable” (or lowest fundable) category. In general, DOD rated its 105 winning proposals highly. Of NASA’s 21 winning proposals, 11 were considered above average, and 8 were judged as being among the top 10 percent of all NASA proposals for comparable R&D. NSF regarded the quality of research for its winning proposals as excellent.

As part of our review of the quality of STTR research proposals, we also examined the technical evaluations of their commercial potential. These evaluations were generally favorable but somewhat more cautious. For example, in some cases there were concerns about the cost of the product that might result or the limited size of its potential market. Such reservations were understandable in view of the newness of the program and the innovation or risk associated with many of the proposed projects.

SBA Has Taken Steps to Address Duplicate Funding of SBIR Research Proposals

One of the issues we discussed in our SBIR report was the duplicate funding of research proposals. According to agency officials, a few SBIR companies received funding for the same proposals twice, three times, and even five times before agencies became aware of the duplication. Several factors were contributing to this problem, including (1) the evasion of certification procedures whereby companies fail to identify similar proposals to other agencies, (2) the lack of a consensus on what constitutes a duplicate proposal, and (3) the general lack of interagency

access to and exchange of current information about recent awards by other agencies.

Officials from several agencies told us that the duplicate funding problem should be viewed in the context of the 20,000 or more proposals being submitted annually. They agreed, however, that the problem should be addressed. Accordingly, we made several recommendations to the Administrator of SBA, who has taken steps to implement them. One important effort has involved the development of software to provide interagency access to current information regarding recent SBIR awards. SBA officials have recently told us that they expect to make the system operational in the near future.

Agencies Have Taken Steps to Avoid Potential Conflicts of Interest in the STTR Program

In our STTR report, we found that the five federal agencies with STTR Programs have taken steps to avoid potential problems relating to conflict of interest with federally funded research and development centers. Such conflicts could occur if a center formed a partnership with a company submitting an STTR proposal and then helped a federal agency judge the merits of its own and other proposals. DOD, DOE, and NIH have specific policies intended to prevent such conflicts while NASA and NSF have more general procedures to avoid them. Under DOD's policy, for example, only two R&D centers are currently approved research partners for its STTR awardees. In fact, the Air Force had to rescind some awards because the proposed research partners (certain DOD laboratories) were ineligible to participate. According to DOD's STTR Program director, future proposals will be evaluated on a case-by-case basis to ensure that conflicts of interest do not occur.

DOD and DOE, which accounted for 29 of the 32 awards involving centers during the first year of the program, have also taken steps to prevent centers from using privileged information in preparing STTR proposals. For example, DOE's policy prohibits agency staff members from requesting or receiving assistance from personnel in research institutions (that are eligible to participate in the STTR Program) in preparing technical topics for the STTR solicitation. This policy is intended to prevent research institutions from using their expertise to influence DOE's choice of STTR research topics. Otherwise, research institutions could acquire a significant advantage by designing topics to match their expertise and then preparing a proposal in the same area.

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

Agency officials expressed differing views regarding 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 present time. 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 Army's STTR Program manager said that STTR was influencing SBIR in a beneficial way. In his opinion, STTR is becoming known through national conferences and other means. Furthermore, 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 its worldwide leadership [in science and engineering] into technology and commercial applications that 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 commercialization of ideas that originate in universities, federal laboratories, and nonprofit research institutions.

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

First, is the technology originating primarily in the research institution as envisioned in the rationale for the program or is it originating in the small business? The technology may originate with the research institution, the small business, or a combination of the two. In 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 are not currently available. Neither SBA nor the agencies have 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 finding 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 finding 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 concerns whether their collaboration is effective in moving them 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 is working can be obtained in the near future. 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 STTR makes a small business/research institution collaboration mandatory, the question arises whether the SBIR Program could 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 Army's program manager 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 involvement 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.

In summary, the quality of both the SBIR and STTR Programs appeared favorable at the time of our reports, although it was too early in each case to make a conclusive judgment about the long-term quality of research. In addition, the agencies have taken steps to address other concerns such as

duplicate funding of SBIR projects and potential conflicts of interest in the STTR Program. Overall, the indicators relating to STTR in its first year provide evidence of a potentially promising program. More time will be needed, however, to determine whether the program is meeting a unique need or duplicating the accomplishments of the SBIR Program. Several key questions relating to the transfer of technology from research institutions to the marketplace are relevant in determining the need for the STTR Program.

This concludes my statement. I would be happy to respond to any questions you or the members of the Committee may have.

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