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FEDERAL RESEARCH

The Small Business Technology Transfer Program

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Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss our review of the first-year implementation of the Small Business Technology Transfer (STTR) Pilot Program.¹ The Small Business Research and Development Enhancement Act of 1992 established the program and authorized it for 3 years, beginning in fiscal year 1994.² In the same 1992 legislation, the Congress also reauthorized the Small Business Innovation Research (SBIR) Program, which served as the model for the STTR 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 SBIR primarily in requiring a company to form a partnership with a nonprofit research institution. Our report in January 1996 on the STTR program discussed the (1) quality and commercial potential of research proposals, (2) steps taken to avoid the conflict of interest that would arise if a party both submitted and evaluated STTR proposals, and (3) effect of and need for the STTR Program. While we have not updated our work since 1996, our report provided a concise picture of basic issues about the program.

Our statement highlights the message of our 1996 report. In summary, Mr. Chairman:

- Federal agencies rated the quality and commercial potential of STTR research proposals favorably in the first year of the program. Technical experts generally concluded that the proposals called for high-quality research. As one example, the Department of Energy (DOE) rated the quality of the proposed research in all of its winning proposals as being among the top 10 percent of the research in the Department. At the time, however, the technical experts were somewhat cautious about the commercial potential.
- The five agencies participating in the program have taken steps to avoid the potential conflicts that might arise if a federally funded R&D 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. For example, the Department of Defense (DOD) approved only two R&D centers as research partners and planned to evaluate future proposals on a case-by-case basis to ensure that conflicts of interest would not occur.

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

²The program was subsequently extended through fiscal year 1997.

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- Agency officials expressed differing views on the effect of and need for the STTR Program. The agencies provided no evidence in the first year of the program to suggest that it 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 three questions about the need for the pilot program: (1) 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? (2) Is the mandatory collaboration between the small business and the research institution effective in transferring the technology to the market place? (3) Can the SBIR Program accomplish the same objective without the collaboration required by the STTR Program?

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 innovations derived from federal R&D.

Five agencies participate in the STTR Program, including DOD, DOE, the Department of Health and Human Services' National Institutes of Health (NIH), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF). Each agency manages its own program, while the Small Business Administration (SBA) plays a central administrative role, issuing policy directives and annual reports for the program.

The legislation authorized each agency having an external R&D budget in excess of \$1 billion to set aside not less than 0.05 percent of that budget for the STTR Program in fiscal year 1994, not less than 0.1 percent in fiscal year 1995, and not less than 0.15 percent in fiscal year 1996.³ In the STTR Program's first year, the agencies expended about \$19 million. Subsequent to our report, they expended about \$34 million in fiscal year 1995 and \$57 million in fiscal year 1996 for a cumulative total of about \$110 million in the first 3 years of the program.

The law established a three-phase structure for the program. The STTR Program provides funding for phase-I and phase-II awards. Work in phase I is intended to determine the scientific, technical, and commercial merit

³The percentage remained at 0.15 when the program was extended through fiscal year 1997.

and feasibility of ideas; the work is generally not to exceed 1 year. Work in phase II further develops the proposed ideas and is generally not to exceed 2 years. The statute generally limits the size of awards in phases I and II to \$100,000 and \$500,000, respectively. In its first 3 years, the program made 674 phase-I and 110 phase-II awards. A third phase for STTR projects, where appropriate, involves the continuation or commercial application of the R&D. Unlike phases I and II, phase III has no general time limits. Phase III cannot receive STTR funds, but it can receive federal non-STTR and private-sector funds.

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.

However, the two programs differ in one important respect. In order to be eligible for an STTR award, a small business must collaborate with a nonprofit research institution, such as a university, a federally funded R&D center, or other entity. This collaboration is permitted under the SBIR Program but is not mandatory. 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 its first 3 years, the program has made 613 awards involving universities, 112 involving federally funded R&D centers, and 69 awards involving other nonprofit R&D institutions.

The Congress has expressed concern about the potential conflicts of interest resulting from the role of R&D centers in the program. For example, a conflict might arise if a center and a small business submitted an STTR proposal as partners, and at the same time, the center helped the agency judge its own and other proposals. As a result, the Congress required agencies to take steps to avoid these potential conflicts of interest.

⁴H.R. Rep. No. 554, 102nd Cong., 2nd Sess., pt. 1 (1992). The report accompanied H.R. 4400, a predecessor to the bill (S. 2941) that was enacted.

Quality Research Proposals Characterized the STTR Program

The agencies' technical evaluations of STTR proposals, which served as the basis for the selection of the winning proposals, showed favorable views of the quality of proposed research. Evaluations of the commercial potential were also favorable but occasionally expressed concern about the cost of products and other potential problems.

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 characterized the research as among the top 10 percent of research in certain agencies and as "cutting edge." Many proposals were awarded perfect scores. Generally, the agencies 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 considered the quality of research for its winning proposals to be 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 cautious in view of the newness of the program and the innovation or risk associated with many of the proposed projects. In addition, in some cases there were concerns about the cost of the product that might result or the limited size of its potential market.

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

In our 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 R&D 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 were approved as 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 the

director of DOD's STTR Program, 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 when 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 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. 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 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, 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 the 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 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 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 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 but could now be developed with the additional years of program experience. 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 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 manager of Army's program 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 the STTR Program appeared favorable at the time of our report, although it was too early to make a conclusive judgment about the commercial potential of the research. In addition, the agencies took steps to address potential conflicts of interest. Overall, the indicators relating to STTR in its first year provided evidence of a potentially promising program. However, at the time of our report, we could not determine whether the program was 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.

Mr. Chairman, this concludes our statement. I would be happy to respond to any questions you or the members of the Subcommittee may have.

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