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Interim Report on the Small Business Innovation Research Program

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Resources, Community, and
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The Honorable Christopher S. Bond
Chairman
The Honorable Dale Bumpers
Ranking Minority Member
Committee on Small Business
United States Senate

The Honorable Jan Meyers
Chairman
The Honorable John J. LaFalce
Ranking Minority Member
Committee on Small Business
House of Representatives

This report was authorized by the Small Business Research and Development Enhancement Act of 1992. It focuses on the quality of small businesses' research proposals for technological innovation, the implementation of a provision for technical assistance by agencies participating in the program, and duplicate funding of similar research by more than one agency. The report contains three recommendations to the Small Business Administration to reduce the risk of duplicate funding of similar research by small businesses.

Please call me at (202) 512-3841 if you or your staff have any questions. Major contributors to this report are listed in appendix I.

Victor S. Rezendes
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Science Issues

Executive Summary

Purpose

As a nation competing in a global economy, the United States depends heavily on technological innovation through research and development (R&D). Because small business has been identified as a principal source of significant innovation, the Small Business Innovation Research (SBIR) program was established in 1982 to strengthen the R&D role of small, innovative companies. Reflecting its view of the program's success, the Congress reauthorized the program in 1992 and provided for doubling the program's funding by fiscal year 1997. Following the program's reauthorization, GAO conducted an interim review that (1) determined whether the quality of research proposals has kept pace with the program's expansion, (2) assessed the implementation of a provision for technical assistance to agencies, and (3) assessed the duplicate funding of similar research.

Background

The Congress established the SBIR program in 1982 to stimulate technological innovation, use small business to meet federal R&D needs, foster and encourage minority and disadvantaged persons' participation in technological innovation, and increase the private sector's commercialization of innovations derived from federal R&D.

Eleven federal agencies participate in the SBIR program. Five of them—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)—provide over 90 percent of SBIR's funds.[1] SBIR funding agreements include any contract, grant, or cooperative agreement entered into between a federal agency and any small business for the performance of experimental, developmental, or research work funded in whole or in part by the federal government. Each agency manages its own program, while the Small Business Administration (SBA) plays a central administrative role, including the issuing of policy directives and annual reports for the program.

The legislation establishing the program required each agency with a budget for extramural (external) R&D 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 for each participating agency in 1986. The reauthorization legislation (P.L. 102-564, Oct. 28,

[1]The six other agencies are the U.S. Department of Agriculture, the Department of Commerce, the Department of Education, the Department of Transportation, the Environmental Protection Agency, and the Nuclear Regulatory Commission.

1992) increased the program's funding percentage 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. The program's total funding increased from $508.4 million in fiscal year 1992 to $698 million in fiscal year 1993 and is projected to increase to about $900 million when the funding percentage rises to 2 percent in fiscal year 1995.

The SBIR program provides funding for phase I and phase II awards. (Work in phase I is intended to determine the scientific and technical merit and feasibility of ideas; it generally lasts about 6 months. Work in phase II further develops the proposed ideas and generally lasts about 2 years.) The size of awards in phases I and II was generally limited under an SBA directive to $50,000 and $500,000, respectively. However, the 1992 reauthorization directed SBA to raise the general limits on the size of phase I and II awards to $100,000 and $750,000, respectively, although awards may be for less than these amounts. The 1992 reauthorization also included a discretionary provision for technical assistance that authorized the use of SBIR's money to assist award recipients in achieving the technical and commercial goals of SBIR projects.

Results in Brief

To date, it appears that the quality of research proposals has kept pace with the program's expansion. GAO's view is 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 SBIR officials that quality is being maintained. However, it is too early to make a conclusive judgment about the long-term quality of research proposals because the major increases in the program's funding have not yet occurred.

None of the five major agencies have taken steps to implement the discretionary provision for technical assistance to agencies, and future implementation remains uncertain. SBIR officials saw no need for technical assistance because projects are selected primarily for their technical merit. However, they have taken steps, independent of the provision, to provide assistance with the commercialization of research results.

The duplicate funding of similar research has become a problem, especially with the increasing numbers of research proposals submitted to the SBIR program. According to agency officials, a few companies received funding for the same proposals twice, three times, and even five times

before agencies became aware of the duplication. Several factors contribute to this problem, including (1) the evasion of certification procedures, so that companies fail to identify similar proposals submitted 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.

Principal Findings

Quality Research Proposals Kept Pace With Program's Initial Expansion

Although it is too early to make a conclusive judgment about the effect of funding increases on the quality of the SBIR research proposals that receive awards, several factors suggest that quality research proposals have kept pace with the program's initial expansion. First, the level of competition for awards remained high following the initial increase in funding in fiscal year 1993. During fiscal year 1993, the number of proposals rose from 9 to 30 percent for all five major agencies, and the ratio of awards to proposals within each agency remained fairly constant, ranging from 8 percent (for DOE) to 28 percent (for NIH). Second, agencies deemed many more proposals worthy of awards than they were able to fund. At 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 awards in fiscal year 1993 but funded only 470. Third, SBIR officials at the five major agencies stated that in their view, the quality of research proposals is being maintained.

The Technical Assistance Option Is Not Being Implemented

No agency has implemented the technical assistance provision, and future implementation remains uncertain. SBIR officials were critical of the provision because (1) it calls for the use of SBIR funds, thereby reducing the number of awards the officials can make, (2) they see little need for technical assistance when projects are selected primarily for their technical merit, (3) they believe that implementation would impose a significant administrative burden arising from case-by-case considerations of companies' requests for support, and (4) they feel that specific proposed technical assistance requirements, such as a single vendor for technical assistance for each agency, are unrealistic because one vendor could not respond adequately to potentially hundreds of requests. SBIR officials, however, have taken steps, independent of the provision, to provide assistance with commercialization. For example, DOE has provided

special training sessions and conferences on commercialization for its awardees.

Duplicate Funding Has Become a Problem

Duplicate funding of similar or even identical proposals submitted to more than one agency has occurred at NSF, NASA, and DOD. Several factors are contributing to this problem. First, companies proposing projects have failed to identify identical proposals that they have made to other agencies, thereby fraudulently evading the certification procedure that requires them to provide such information. In response to this problem, officials in NSF's Office of Inspector General recommended that NSF's certification form be revised and strengthened. NSF has implemented this recommendation. Second, the lack of definitions and guidelines regarding key terms such as "similar" research has resulted in disagreement about what constitutes duplicate research. Third, agencies have lacked interagency access to and exchange of current information about recent awards, which might help to prevent or detect duplicate awards. Basic changes in the SBIR program, particularly the increasing number of proposals and awards, may make the program more vulnerable to this kind of abuse. The number of proposals to the five major agencies rose from 17,562 in fiscal year 1992 to 20,014 in fiscal year 1993—an increase of 2,452 during the first year that the new funding percentage was in effect.

Recommendations to the Administrator, SBA

To improve interagency coordination and to reduce the risk of funding duplicate research, GAO recommends that the Administrator, SBA, take steps to (1) determine whether the certification form that accompanies SBIR proposals needs to be improved and, if so, take the necessary steps to revise it; (2) develop substantive definitions and guidelines for agencies and companies regarding "duplicate" research; and (3) provide interagency access to current information regarding recent SBIR awards.

Agency Comments

Officials from DOD, NASA, NIH, DOE, NSF, and SBA reviewed the report and provided oral comments. In general, these officials regarded the report as accurate and balanced. Officials from several agencies stated that the duplicate funding problem should be viewed in the context of the 20,000 or more proposals now being submitted annually. In this context, officials believe that the problem is limited to relatively few cases of blatant fraud, whereas the instances of genuine confusion about what constitutes duplication may be somewhat more frequent. They agreed that the problem should be addressed and that the recommendations to SBA would

be helpful. Agency officials also provided minor technical corrections that have been incorporated in the report. Brief, additional comments are presented at the end of chapters 3 and 4. As requested by staff on the House and Senate Small Business Committees, GAO did not obtain written comments on a draft of this report.

Contents

Abbreviations

DOD	Department of Defense
DOE	Department of Energy
GAO	General Accounting Office
HHS	Department of Health and Human Services
IG	Inspector General
NASA	National Aeronautics and Space Administration
NCI	National Cancer Institute
NIH	National Institutes of Health
NSF	National Science Foundation
R&D	research and development
SBA	Small Business Administration
SBIR	Small Business Innovation Research (program)

Introduction

The Small Business Innovation Development Act of 1982, which authorized the Small Business Innovation Research (SBIR) program, emphasizes 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 act designated four major goals for the program:

- Stimulating technological innovation.
- Using small business to meet federal R&D needs.
- Fostering and encouraging participation by minorities and disadvantaged persons in technological innovation.
- Increasing private-sector commercialization of innovations derived from federal R&D.

Under the Small Business Research and Development Enhancement Act of 1992 (P.L. 102-564, Oct. 28, 1992), important changes were made to the program, including greater funding because of its success and greater emphasis on the goal of commercializing technical innovations developed under the program. The program also added a provision for discretionary technical assistance, which authorized agencies to help companies with the technical and commercial aspects of their SBIR projects.

The Administration of the SBIR Program

In addition to establishing goals, the original legislation determined agencies' participation in and funding for the program. Agencies spending more than $100 million annually for external R&D were required to set aside not less than 1.25 percent of their total R&D funds for the SBIR program. The 1992 reauthorization directed agencies to increase the set-aside to not less than 1.5 percent in fiscal years 1993 and 1994, not less than 2 percent in fiscal years 1995 and 1996, and not less than 2.5 percent in fiscal year 1997 and thereafter. This requirement will effectively double the annual funding for the program to about $1 billion. At present, 11 agencies participate in the program. The five largest, accounting for over 90 percent of all SBIR awards, include the Department of Defense (DOD); the Department of Energy (DOE); the Department of Health and Human Services (HHS) and its National Institutes of Health (NIH), in particular; the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF).

The original legislation required agencies to issue a solicitation for proposals that sets the SBIR process in motion. The solicitation, a formal document issued by each agency, lists and describes the topics to be

addressed by each company's proposals and invites companies to submit proposals for consideration. Each agency with an SBIR program is responsible for targeting research areas and administering its own SBIR funding agreements. Such agreements include any contract, grant, or cooperative agreement entered into between a federal agency and any small business for the performance of experimental, developmental, or research work funded in whole or in part by the federal government.

The original legislation also required the Small Business Administration (SBA) to issue policy directives for the general conduct of the SBIR programs within the federal government. The directives were to include such features as simplified, standardized, and timely SBIR solicitations; a simplified, standardized funding process; and minimization of the regulatory burden for small businesses participating in the program. Issued in January 1993, the current policy directive incorporated changes made by the 1992 legislation. Federal agencies were also required to report key data to SBA, which in turn has published annual reports on the progress of the program.

SBA's SBIR policy directive states that to be eligible for an SBIR award, small businesses must be

- independently owned and operated,
- other than the dominant firms in the field in which they are proposing to carry out SBIR projects,
- organized and operated for profit,
- the employer of 500 or fewer employees (including employees of subsidiaries and affiliates),
- the primary source of employment for the project's principal investigator at the time of award and during the period when the research is conducted, and
- at least 51-percent owned by U.S. citizens or lawfully admitted permanent resident aliens.

The law established a three-phase structure for the program. The first phase, not to exceed 6 months, is designed to determine the scientific and technical merit and feasibility of a proposed idea. The second phase, not to exceed 2 years, is designed to further develop the idea. The SBA policy directives established $50,000 and $500,000 as the general limits for phase I and II awards, respectively. The 1992 reauthorization directed SBA to raise these figures to $100,000 and $750,000, respectively, with an adjustment every 5 years to reflect economic and programmatic considerations.

The third phase is somewhat more flexible and difficult to define. In general, it is expected to result in commercialization or further continuation of R&D. Unlike phases I and II, phase III has no general limits in time or dollar amounts. In addition, it can include not only federal, non-SBIR funds but private-sector funds.

Regarding the selection of phase I proposals for SBIR awards, SBA's 1993 policy directive states that an agency's criteria shall give primary consideration to scientific and technical merit along with the potential for commercialization. According to the directive, funding for phase II shall be based upon the results of phase I and the scientific and technical merit and commercial potential of the phase II proposal.

In reauthorizing the SBIR program, the Congress added a new feature to the program. Section 301 of the Small Business Research and Development Enhancement Act of 1992 provides for supplying discretionary technical assistance to SBIR awardees. The provision authorizes SBIR agencies to enter into an agreement with a vendor to provide small business concerns engaged in SBIR projects with technical assistance services, such as access to a network of scientists and engineers engaged in a wide range of technologies, or access to technical and business literature available through databases. The purpose of this agreement is to assist SBIR awardees in (1) making better technical decisions regarding such projects, (2) solving technical problems that arise during the conduct of such projects, (3) minimizing technical risks associated with such projects, and (4) developing and commercializing new products and processes that might result from such projects.

In funding this assistance, the provision authorizes not more than $4,000 for phase I award recipients and $4,000 annually for phase II award recipients. The source of the funding, however, is somewhat different for each of the phases. For phase I, the legislation specifies that the money shall be given in addition to the amount of the recipient's award. For phase II, a recipient may purchase, with funds available from SBIR awards, services in an amount not more than $4,000 per year.

We have issued several reports on the SBIR program.[2] The 1992 report dealt with the program's accomplishments in phase III.

[2]Federal Research: Assessment of Small Business Innovation Research Programs (GAO/RCED-89-39, Jan. 23, 1989), Small Business: Proposed Amendments to the Small Business Innovation Research Program (GAO/RCED-89-173, June 30, 1989), and Federal Research: Small Business Innovation Research Shows Success but Can Be Strengthened (GAO/RCED-92-37, Mar. 30, 1992).

Objectives, Scope, and Methodology

The Small Business Research and Development Enhancement Act of 1992 directed us to submit an interim report that would include an assessment of the quality of the research performed under the SBIR program's funding agreements entered into by each agency that has participated in the SBIR program beginning in fiscal year 1993. More specifically, the legislation required us to address, with respect to each agency, whether a demonstrable reduction occurred in the quality of research and, in the case of such reduction, whether an increase in the agency's SBIR participation would adversely affect the performance of the agency's research programs. The legislation also required us to address the implementation of the Discretionary Technical Assistance program. In contrast to the first two objectives, which provided specific guidance for our work, the third objective gave us greater latitude in selecting and investigating additional issues that we deemed appropriate. We focused on the issue of duplicate funding of similar proposals because of several recent occurrences.

At the start of our review, the House Committee on Small Business directed us to focus our work on SBA as the main administrative agency for the program and on the five major funding agencies (DOD, HHS, NASA, NSF, and DOE) that accounted for more than 90 percent of the total expenditures for SBIR projects. Within HHS, our review focused on NIH, which accounted for almost all of the SBIR program at HHS.

In responding to the first objective, we began by reviewing our earlier report that also addressed the issue of research quality in the SBIR program.[3] In that report, we identified two ways of approaching the concern about quality. One involved an extensive questionnaire survey of project managers responsible for overseeing both SBIR and non-SBIR research; the other involved the use of a key indicator, the SBIR proposal selection rate, to show the level of competitiveness in the program.

We decided that a questionnaire survey would be inappropriate for this interim report because very little time has elapsed since the reauthorization of the program. In fact, only the first (and smallest) of the three scheduled increases in funding had occurred at the time of our review. Consequently, we made use of the SBIR proposal selection rate as a key indicator of the quality of research proposals. We obtained data from the five major agencies for fiscal years 1991-93 regarding the number of proposals and awards. These years were selected because they provided an overview of the program just before and just after the reauthorization.

[3]GAO/RCED-89-39.

These data enabled us to evaluate the effects of increased funding in fiscal year 1993 and compare them with the ratios in the previous 2 years. Where available, we also obtained the number of proposals that agencies deemed worthy of funding but that received no award. These data provided additional evidence of the quality of research proposals and competitiveness of the program. We further interviewed SBIR officials, mainly SBIR directors and managers, in the major agencies to obtain their views on factors affecting quality.

In responding to the second objective, we interviewed SBA officials and SBIR officials in the major agencies regarding discretionary technical assistance and any further assistance that they may have provided. We also attended a meeting of SBIR agency officials, convened by staff of the House Committee on Small Business, that addressed agencies' concerns about implementing the technical assistance provision.

In responding to the third objective, we focused on the problem of duplicate funding. We met with officials in NSF's Office of Inspector General (IG), who have investigated this matter. We obtained documents from NSF, NASA, and Department of the Army officials regarding the problem. We also met with computer specialists from NSF, NASA, and SBA regarding their efforts to resolve this problem.

We conducted our audit work between February 1994 and January 1995 in accordance with generally accepted government auditing standards. Our work was focused on the Washington, D.C., area.

Quality Research Proposals Kept Pace With Initial Program Expansion

Although it is too early to make a conclusive judgment about the effect of funding increases on the quality of SBIR research proposals that received awards, the high level of competition and the large numbers of worthy but unfunded projects suggest that quality research proposals kept pace with the program's initial expansion. In addition, SBIR officials in the five major agencies stated that in their view, the quality of research proposals is being maintained.

Competitiveness Remained High

Preliminary information suggests that the level of competitiveness remained high following the initial increase in funding (from 1.25 to 1.5 percent) in fiscal year 1993. At all five major agencies during fiscal year 1993, the number of proposals rose from 9 to 30 percent, and the ratio of awards to proposals remained fairly constant, ranging from 8 to 28 percent.

One of the best indicators of the continuing quality of research proposals is the ratio of funded to unfunded proposals in the SBIR program. We used this ratio as a key indicator in our January 1989 report on SBIR.[4] The report noted that the SBIR proposal selection process was highly competitive because a large "pool" of proposals was available for agencies to consider in selecting proposals that meet standards of technical quality. During fiscal years 1983-87, the percentage of phase I proposals winning phase I awards ranged from 8 to 16 percent.

As a continuation of the results of this earlier study, we found a generally large pool of unfunded proposals evident for each of the major agencies during the last 3 fiscal years (fiscal years 1991-93). The data show that the ratio of awards to proposals by four of the five major agencies fits within the 8-to-16-percent range that we found in our previous study of the program. (The one exception, NIH, is discussed in detail later in this chapter.) In addition, among all five agencies, the data for fiscal year 1993 show virtually no change in the ratio from the previous 2 years, suggesting that the funding increase in fiscal year 1993 exerted no adverse effect on the competitiveness of the program.

Table 2.1 shows the number of phase I proposals submitted in fiscal years 1991-93 to the five major SBIR agencies, the number of proposals funded, and the percentage of proposals funded.

[4]GAO/RCED-89-39.

Table 2.1: Percentage of Phase I SBIR Proposals Funded, Fiscal Years 1991-93

Agency	Fiscal year	Proposals submitted	Proposals funded	Percentage of proposals funded
DOD	1991	11,681	1,364	12
	1992	9,911	1,176	12
	1993	10,802	1,226	11
NIH	1991	1,788	468	26
	1992	1,842	541	29
	1993	2,132	588	28
NASA	1991	2,583	280	11
	1992	2,535	301	12
	1993	2,880	346	12
NSF	1991	1,498	177	12
	1992	1,740	231	13
	1993	2,201	284	13
DOE	1991	1,401	173	12
	1992	1,534	198	13
	1993	1,999	168	8

The number of proposals submitted to all five agencies increased from fiscal year 1992 to 1993. The increases ranged from a low of 9 percent at DOD to a high of more than 30 percent at DOE from fiscal year 1992 to fiscal year 1993. The increases in fiscal year 1993 were important in maintaining the competitiveness of the program during the first year that the program's funding percentage increased to 1.5 percent. SBIR officials believe that there is further room for growth in the number of proposals.

Among the five major agencies, DOD was the only one that experienced a slight decrease in proposals submitted over the 3-year interval. DOD's program director told us that the number of proposals received annually has leveled off for about the last 3 or 4 years. He did not know why the number of proposals had "plateaued." He noted, however, that at national SBIR conferences sponsored by DOD and NSF, it was typical for 30 to 60 percent of the attending companies never to have participated in the program. DOD feels that this indicates that the program has not yet run out of potential sources of proposals. DOD's 9-percent increase in proposals from fiscal year 1992 to 1993 may indicate some movement beyond the plateau that the program director noted.

Agencies Deemed More Proposals Worthy of Award Than They Were Able to Fund

SBIR officials told us that the large numbers of worthy but unfunded projects indicated a continuing pool of quality proposals. DOD, NASA, NSF, and NIH supplied specific information on this point.[5] In general, the data showed substantial reserves of projects deemed worthy of funding but receiving no awards.

For example, the Air Force funded 470 projects in fiscal year 1993, but it deemed 1,174 worthy of award. NASA funded only 346 of at least 789 projects that were considered competitive. NSF made 284 awards among 642 that were recommended for funding. The number of worthy but unfunded projects was smaller at NIH. SBIR officials cited the projects in this category in support of their view that the quality of research proposals has remained high. Additional details are provided in the next section.

Individual Agencies Stated That Quality Was Being Maintained

Officials at individual agencies stated that the quality of research proposals was being maintained or even improved. The one exception involved NIH's National Cancer Institute (NCI), which we explored in greater detail because of a potential shortage of qualified proposals for funding in fiscal year 1993.

DOD

DOD's SBIR director does not believe that a decline in the quality of research proposals has occurred as a result of SBIR's expansion. He said that DOD aims for about a 1-to-10 ratio of awards to proposals and that the program has maintained this ratio despite the changes in funding.

The Air Force's SBIR program gave us a special opportunity to examine the effects of a sharp increase in funding on the quality of proposals selected for awards. The Air Force's SBIR manager noted that the program experienced a 1-year "spike" in funding from $70 million in fiscal year 1992 to $134 million in fiscal year 1993. According to the Air Force's SBIR manager, the data provided by the four Air Force laboratories and the Air Force Office of Scientific Research, which make the awards, indicated that the Air Force was able to absorb this increase without lessening the competitiveness of the program. The Air Force received 3,010 proposals in fiscal year 1993, deemed 1,174 worthy of award, and funded 470 projects (or 16 percent). A very large increase in the number of proposals helped

[5]Two agencies within DOD (the Department of the Navy and the Ballistic Missile Defense Organization) do not have a separate category for projects deemed worthy of funding. Also, DOE does not have a separate category for projects deemed worthy of funding. Because of these limitations in DOD's and DOE's data, we did not develop a more detailed table on projects "deemed worthy," but we do discuss the available information for individual agencies below.

maintain quality and create a sizable reserve of projects deemed worthy but unfunded. The number of proposals grew from 2,119 in fiscal year 1992 to the 3,010 previously mentioned, an increase of about 42 percent.

Data provided by the individual agencies within DOD showed a consistently large reserve of projects deemed worthy of funding but receiving no award. This pool of projects was evident, for example, not only in the Air Force, but in the Army and the Advanced Research Projects Agency. Among the Army's 2,840 proposals received in fiscal year 1993, the agency found 750 worthy of funding and made 162 awards (or 6 percent of submissions). In a similar vein, the Advanced Research Projects Agency received 1,224 proposals in fiscal year 1993, deemed 563 worthy, and funded 151 (or 12 percent of submissions).

NIH

Among the five major agencies, NIH was the only one in which we found some cause for concern about the expansion of the program in fiscal year 1993. The problem occurred primarily in NCI, the largest of the 20 institutes. NCI accounted for about 18 percent of the program at NIH. Further information obtained for fiscal year 1994 suggests that the difficulty experienced in fiscal year 1993 is being overcome.

Concerns about NIH's ability to absorb a funding increase have surfaced before. During our work for our June 1989 report on SBIR,[6] which dealt in part with the advisability of a proposed increase in the funding percentage, NIH's SBIR manager analyzed the program's ability to expand. At that time, the manager concluded that a decline in quality might result from the funding of any additional projects because the number of unequivocally meritorious SBIR applications was not large enough to absorb such an increase.

During fiscal years 1991-93, NIH's ratio of awards to proposals, at about 28 percent, was more than twice as high as that of the other agencies. Within NIH, NCI is the largest single institute, and its SBIR funding ratio in fiscal year 1993 reached almost 50 percent. In addition, NCI nearly exhausted all of the projects deemed worthy of funding during fiscal year 1993. Because of this recurrence of a concern about the quality of SBIR research proposals within NIH, we looked more closely at NIH and at NCI, in particular.

[6]GAO/RCED-89-173.

In evaluating proposals, NIH officials group them into three basic categories: not recommended for further consideration, eligible but not funded, and actually funded. Each proposal is reviewed by a peer review panel assembled by the Division of Research Grants. The panel identifies the proposals that require no further consideration and then rates the remainder on a scale from 100 to 500, with 100 being the best score and 500 the worst. All of the projects on this scale are considered worthy of funding, even if they have received one of the less favorable ratings. The level of quality is defined in terms of the following scores:

- 100 to 150: Outstanding.
- 150 to 200: Excellent.
- 200 to 250: Very good.
- 250 to 350: Good.
- 350 to 500: Acceptable.

The funding of projects with less favorable evaluations was especially evident at NCI, although all of the projects fell into the broad general category "considered worthy of funding." For phase I awards by NCI in fiscal year 1993, the worst score receiving an award was 399; the worst for phase II was 289. In contrast, the worst score for phase I at the National Institute on Deafness and Other Communication Disorders was 186; the worst for phase II was 167. In other words, NCI funded projects in all five categories of quality, whereas awards made by the National Institute on Deafness and Other Communication Disorders were concentrated in the "outstanding" and "excellent" categories. In addition, as shown by NIH's data, NCI left only 29 of the 182 projects recommended for funding without an award. NCI funded 40 of 42 proposals in the 301-to-350 range and 7 of 18 proposals in the 351-400 range. Fifteen proposals with scores between 401 and 500 were left unfunded.

The Chief of NCI's Extramural Financial Data Branch discussed this problem with us. He said that top NCI officials had expressed concern about the quality of research proposals in relation to the funds available in fiscal year 1993. Therefore, NCI staff conducted an assessment to assure themselves that all of the projects selected for awards were in fact worthy of funding. As a result of the review, they concluded that all of the projects selected should have been funded.

Further information provided by the Chief indicated that the fiscal year 1993 problem was not recurring in fiscal year 1994. Of a total of 568 proposals in fiscal year 1994, 308 were not recommended for funding, 147

were considered worthy but not selected for an award, and 112 received awards. Thus, according to these data, NCI selected only about 20 percent of its proposals for awards and funded considerably less than 50 percent of the projects considered worthy of support. In addition, the data showed that the NCI phase I award with the least favorable rating (298) in fiscal year 1994 represented an improvement of 101 points over the least favorable rating for a phase I award in fiscal year 1993.

NIH's director told us that in his view, the quality of R&D is being maintained because of the increased number of proposals. A nearly 40-percent boost has occurred in the number of proposals received by NIH as a result of the program's increased funding in the last year alone.

The SBIR director believes that the increase in the size of the individual awards will be especially important at NIH because it will attract more proposals from somewhat larger small businesses. He noted that NIH has three proposal receipt dates each calendar year, which result in awards in the following fiscal year. Proposals received during calendar year 1992 were awarded in fiscal year 1993 at a maximum level of $50,000 for phase I and $500,000 for phase II. Therefore, although the program's expansion occurred in fiscal year 1993, proposals received for awards in that fiscal year were restricted to the previous levels of $50,000 and $500,000, respectively. The award level for phase I was increased to $75,000 (a 50-percent increase) for proposals received in calendar year 1993 and awarded in fiscal year 1994, while the size of phase II awards—at $500,000—remained the same (except for unique and costly projects involving special factors such as clinical trials). However, proposals received during calendar year 1994 are being solicited at the current levels of $100,000 for phase I and $750,000 for phase II. Thus, in fiscal year 1995, NIH will be making more awards at substantially higher dollar values per award, a combination that the SBIR director believes will encourage even more companies to compete, including larger small business concerns.

NASA

The SBIR director at NASA was optimistic that the expansion of the program was not jeopardizing the quality of research proposals. Several factors accounted for his optimism. He noted that the number of applications for phase I awards has increased and that the ratio of phase I awards made to proposals received has remained about the same as in the past. He attributed the increased number of proposals to various factors, including a more general awareness of the program after 10 years and more money for the program.

The SBIR director also pointed out that a large pool of phase I proposals was evaluated as being in the "competitive range"[7] during fiscal years 1991-93 but received no award. In fiscal year 1993, for example, of the 2,880 proposals submitted, at least 789 were considered to be in the "competitive range," but the number may have been as high as 952.[8] However, only 346 (or 12 percent) received an award. Using the minimum figure of 789, slightly less than half (49 percent) of the proposals in the competitive range were actually selected for awards. Thus, although the number of awards has grown, the SBIR director believed that the level of competitiveness has remained high and the quality of research proposals may well have improved.

NSF

SBIR managers at NSF told us that NSF divides SBIR proposals into three categories on the basis of quality—declined or not recommended for funding, recommended if funding is available, and highly recommended. In general, they said that about twice as many projects are recommended or highly recommended as are actually funded. They noted, however, that they were not even able to fund all of those that were highly recommended.

They pointed out that NSF's SBIR program is seeing a continuing increase in the number of proposals; hence, the competitive ratio of awards to proposals is being maintained. In addition, data for fiscal years 1991-93 indicated that a consistently large pool of proposals was received and recommended for funding. In fiscal year 1993, 2,201 proposals were received, 642 were recommended for funding, and 284 (or 13 percent) received awards. Less than half (44 percent) of the recommended proposals went on to win awards. In general, NSF's SBIR managers indicated that even with a substantial increase in the number of awards, they foresee no shortage of projects worthy of funding.

DOE

The SBIR manager for DOE noted several factors that contributed to the continuing quality of SBIR research proposals. He pointed out that in fiscal year 1993, a temporary reduction in the number of awards occurred

[7]NASA interprets "competitive range" to mean those proposals that have received the minimum acceptable or better scores. Typically, according to SBIR officials, the proposals recommended for funding are a subset of those in the competitive range and amount to about 30 percent more than the proposals that are actually funded.

[8]According to the SBIR manager, incomplete records accounted for NASA's uncertainty about the exact number of proposals in the "competitive range." He added that steps to correct this problem were taken in mid-1994.

because the additional funds went into making larger individual awards rather than more awards in the aggregate. Thus, DOE made 198 phase I awards in fiscal year 1992 and only 168 phase I awards in fiscal year 1993. As shown in table 2.1, the percentage of proposals receiving awards declined from 13 percent in fiscal year 1992 to only 8 percent in fiscal year 1993, thus making the program even more competitive.

The SBIR manager also stated that when the major funding increase occurs in fiscal year 1995, he anticipates that DOE would make about the same number of awards (198) as in fiscal year 1992. In fiscal year 1994, the size of DOE's phase II awards increased to $600,000, and in 1995 it is expected to rise to $750,000. Once again, the growth in the size of the individual awards will consume most, if not all, of the additional funds.

At the same time, according to DOE's SBIR manager, the increase in funding will probably lead to a rise in quality because more proposals, drawn by the increased dollar amounts per award, would be competing for the same number of awards. He noted that somewhat larger small businesses would be more likely to participate as a result of the larger awards; they would be more apt to add their own funds to supplement the phase I awards in the hope of receiving phase II awards. In general, he said that DOE is already rejecting very good proposals and that the competitiveness of the program is expected to continue to increase in the next several years.

Conclusions

Although it is somewhat early to draw conclusions because the major funding increases will not occur until fiscal years 1995 and 1997, several factors suggest that quality research proposals have kept pace with the SBIR program's initial expansion. These factors included the general increase in the number of proposals, the large number of worthy but unfunded proposals, and the view of SBIR officials that the quality of SBIR proposals is being maintained.

Agencies Have Not Implemented the Provision for Discretionary Technical Assistance but Have Taken Other Steps to Foster Commercialization

None of the five major agencies have implemented the 1992 discretionary technical assistance provision, and future implementation remains uncertain. SBA and SBIR officials were critical of the provision because (1) it calls for the use of SBIR funds, thereby reducing the number of awards the officials can make, (2) there is little need for technical assistance when projects are selected primarily for their technical merit, (3) implementation would impose a significant administrative burden arising from case-by-case considerations of companies' requests for support, and (4) specific requirements, such as selecting a single vendor of technical assistance for each agency, are unrealistic. However, some SBIR officials have taken steps, independent of the provision, to provide assistance with commercialization of research conducted by SBIR companies.

SBIR Officials Were Critical of the Provision

SBIR officials at all five of the major SBIR agencies as well as SBA officials involved in the program were critical of the technical assistance provision. Officials at several agencies, including SBA, NASA, NIH, and NSF, questioned the use of SBIR funds for technical assistance. SBA's Assistant Administrator of the Office of Innovation, Research, and Technology pointed out that money for phase I awardees would be drawn from the program, which would place the need for technical assistance in competition with the need for SBIR funds for other potential awardees. NASA's SBIR director told us that NASA was reluctant to use money from the program itself because it would reduce the funds available for additional awards. NSF's SBIR managers shared this concern. NIH's SBIR manager noted that certain other agencies have been able to provide assistance from non-SBIR funds, which he considered preferable to using SBIR funds.

SBIR officials also expressed reservations about the appropriateness of the technical (as contrasted with commercial) assistance for SBIR awardees and emphasized the need among SBIR awardees for assistance with commercialization. NASA's SBIR director told us that SBIR firms in general do not need technical assistance. He pointed out that among all SBIR agencies, the largest single portion (40 percent) of a company's score in the selection process is based on technical merit at the outset. A company would be eliminated from the competition if any indications of technical inadequacies appeared. He added that if a specific need for such assistance did arise after an award was granted, an SBIR company would be able to obtain assistance on its own without the need for special funding to seek such help. He also indicated that in his view, commercial

assistance was more appropriate to the needs of awardees, who frequently require help in finding ways to commercialize their research.

SBIR officials further indicated that implementation of the provision for either technical or commercial purposes would impose a significant administrative burden. SBA's Assistant Administrator told us that implementation would lead to difficulties because there would be a need for review and approval of each small award ($4,000 or less) to each awardee that requested funding under the provision. Officials at DOD and NSF expressed similar concerns about the potentially large number of requests and approvals that would be involved.

Among other reasons preventing implementation, SBIR officials pointed to unrealistic requirements in the provision. One example that they cited is the clause limiting each agency to the selection of only one vendor for meeting all technical and commercial needs. SBA's Assistant Administrator described this arrangement as a virtual impossibility. DOD's SBIR director told us that the only way one vendor could succeed would be as a broker for a host of other companies under subcontract. According to the DOD director, the concept of one small company providing all of the services for potentially hundreds of SBIR winners was otherwise impossible.

A second problem is the clause that requires an annual selection of the vendor using competitive criteria. Several SBIR officials noted this requirement and told us that this time frame was unrealistically short. In their view, the process of issuing a request for proposal and selecting a vendor would consume much of the time if it was required annually.

Efforts to Overcome Problems May Not Be Successful

A staff person with the House Committee on Small Business convened a meeting in March 1994 to discuss these concerns and potential solutions. Officials from two of the five major SBIR agencies—DOD and NIH—attended the meeting along with officials from three of the smaller SBIR agencies. The meeting explored various ways to implement the provision, including a "team approach" that would allow agencies to combine their efforts as well as specific technical amendments, such as elimination of the requirement for selecting a vendor annually. However, no firm plans or conclusions resulted from the meeting.

In follow-up discussions, DOD's SBIR director and NSF officials told us that a workable approach for implementing the provision would be to permit companies to include the need for technical assistance directly in their

proposals as an allowable cost for phases I and II. According to DOD's SBIR director, this approach could eliminate the administrative problems that would result from attempting to make a large number of small awards on a case-by-case basis. NSF's SBIR managers agreed with this suggestion. They said that technical assistance should be an allowable cost identified by a company in its proposal and approved "up front" as part of the award. As of October 1994, no agency had explored the feasibility of this approach.

In October 1994, the Small Business Administration Reauthorization and Amendments Act of 1994 (P.L. 103-403, sec. 607, Oct. 1994) amended the discretionary technical assistance provision. The amendment allowed the selection of a vendor to provide services for 3 years at a time. In our view, this technical amendment addressed one specific problem but did not deal with the broad range of difficulties that have made SBIR officials reluctant to implement the provision.

Agencies Have Taken Other Steps to Foster Commercialization

Independent of the technical assistance provision, agencies have taken other steps to foster commercialization of research results. Some of these efforts, such as a special training course conducted by DOE for its phase II awardees and supported by non-SBIR funds, were underway before the technical assistance provision was enacted. Other efforts such as a new Navy initiative that makes the final 20 percent of phase II funding contingent on a company's development of a commercialization plan were undertaken after the provision's enactment.

For example, as discussed in our March 1992 report,[9] DOE has sponsored a Commercialization Assistance Project for its phase II awardees to enhance commercialization of research results by the private sector. DOE began the project in 1989. As of September 1994, DOE had supported four special training sessions intended to help its awardees market their SBIR-developed products. All sessions were conducted by Dawnbreaker, a private firm from Rochester, New York, that assisted individual phase II awardees in preparing a business plan for potential sponsors and presenting it at a conference to several dozen decisionmakers from large corporations and venture capital firms.

DOE's SBIR manager has tracked the results of the project. He told us that the second session, conducted in 1991, has proven very successful. He noted that 43 percent of the companies participating in the session have received phase III funding, which has totaled $14 million as of July 1994

[9]GAO/RCED-92-37.

and that an extra $24 million is expected over the next 3 to 5 years. He also believes that the sessions in 1993 and 1994 will eventually prove successful but indicated that more time is needed for results to emerge.

In DOD's commercialization efforts, we found several new initiatives. The most striking was the special strategy adopted by the Navy's SBIR manager. The Navy is emphasizing the importance of commercialization by making a plan for such commercialization (both within DOD and in the private sector) a requirement for receiving the last 20 percent of each phase II award. This requirement went into effect in 1994. Since funding for the Navy's SBIR phase II awards is set at about $750,000, this figure amounts to $150,000 and is having a significant effect on motivating companies to take commercialization seriously. The Navy's SBIR manager said that the Navy retains the money until the company develops a testing and evaluation plan or an R&D plan as it relates to commercialization.

Conclusions

SBA and agencies' SBIR officials cited a wide variety of reasons for not implementing the technical assistance provision. These reasons, in conjunction with the optional nature of the provision, make its future implementation uncertain. Independent of the technical assistance provision, however, agencies have taken other steps to foster commercialization of research results.

Agency Comments

SBIR officials at DOD, NSF, and NASA told us that they are still considering steps to implement the technical assistance option. However, they noted the difficulties involved in implementing it and remain uncertain whether the problems can be overcome.

Officials at DOD and NSF stated that among other steps taken by agencies to foster commercialization, the joint DOD-NSF national commercialization conferences have played an important role in helping SBIR companies market their products. DOD and NSF sponsored two of these conferences in 1993-94 and are planning another major conference to be held in Anaheim, California, during March 1995.

Duplicate Funding of Research Has Become a Problem

Duplicate funding of similar proposals submitted to more than one agency has become a problem. Several factors have contributed to this concern: (1) the fraudulent evasion of the proposal certification procedure, whereby companies fail to identify identical proposals to other agencies; (2) the vagueness of key terms such as "similar research" and the difficulty of defining them more effectively, the result of which is that there can be disagreement about what constitutes duplicate research; and (3) the lack of interagency access to and exchange of current information about recent awards. Basic changes in the SBIR program, particularly the increasing number of proposals (about 20,000 in fiscal year 1993) and awards, may make the program more vulnerable to this problem.

Duplicate Funding Has Occurred

Agency officials informed us that they have investigations of SBIR companies underway involving the duplicate funding of substantially identical proposals by multiple federal agencies. A few cases are under review by the Department of Justice for possible criminal and civil prosecution. In one case, the Department of Justice filed an action for trebled damages of $4.2 million under the False Claims Act. According to that complaint, the SBIR company had fraudulently obtained approximately $1.4 million in duplicate funding from NSF, NASA, and various DOD agencies. The complaint alleges that the company "recycled" 11 research ideas 40 times in duplicate submissions.

During 1994, further work on this problem by agency officials found evidence that other companies received duplicate funding. According to agency officials, a few companies received funding for the same proposals twice, three times, and even five times before agencies became aware of the duplication. In these cases, the companies also submitted equivalent reports at the end of their Phase I work without informing agencies of the duplicative research.

Evasion of the Certification Process Contributes to the Problem

According to SBA's 1993 policy directive, it can be anticipated that SBIR participants will submit duplicate or similar proposals to more than one soliciting agency when the work projects appear to involve similar topics or requirements. The guidelines in solicitations issued by individual agencies for SBIR proposals also recognize the potential for duplicate funding.

SBA's 1993 policy directive further states that the standardized SBIR solicitation will require the proposers to indicate the name and address of

the agencies to which duplicate or similar proposals were made and to identify by subject the projects for which the proposal was submitted and the dates submitted. Agencies' individual solicitations also include this requirement, although the language varies somewhat from agency to agency. For example, NSF's solicitation includes a brief section entitled "Equivalent Proposals to Other Federal Agencies." NSF states that a firm may elect to submit proposals to any other federal agency that are similar or overlapping in technical content. It requires the firm to submit a statement that includes the name and address of the agencies and several other items of information. NASA's solicitation discusses the issue under "Related Proposals to and Awards From Other Agencies." NASA requires much the same information as NSF does. DOD's SBIR director noted that DOD's solicitation refers to "substantially similar" proposals and requires that the company identify them in its response to the DOD solicitation.

In spite of these requirements, individual companies have submitted similar proposals to more than one agency and then certified that they had no similar proposals under consideration. In response to this evasion of the certification requirement, NSF's IG officials told us that they were concerned about the need for more complete certification procedures. Such procedures would compel the applicants in their proposals to certify, under criminal penalties for perjury, exactly what, if any, applications for similar research were pending at other agencies.

The view of NSF's IG was that the physical format of the certification form may interfere with achieving this objective. The signature of the applicant on the cover page of the NSF proposal was placed in such a way that it was not clear whether the applicant was actually certifying the statement about other proposals or was merely providing further information. As one result of this confusion, NSF's IG officials were concerned about the IG office's ability to develop criminal prosecutions against companies that received duplicate funding. The IG recommended that NSF's SBIR forms be revised to clarify the applicability of the certification. NSF agreed and implemented this recommendation. SBA's Assistant Administrator told us that the forms in use in other agencies could also be reviewed and, if necessary, revised and strengthened to address potential problems with certification.

Vagueness of Key Terms and Difficulty of Defining Them Contribute to the Problem

SBA's policy directive and individual agency solicitations do not define key terms and thus provide no guidance in avoiding the risk of duplicate funding. According to an SBA official, certain key terms—such as "duplicate," "similar," "equivalent," "overlapping," "substantially similar," and "proposals of similar content"—occur in the solicitations. However, little effort has been made to bring them into the context of scientific research and give them a more specific meaning.

One exception was the recommendation by NSF's IG that NSF include a definition of the term "overlapping work" in its SBIR solicitation. NSF's IG suggested that the term means "any steps in the performance of work on one proposal which would not need to be repeated to perform the work on the second proposal." The agency agreed to implement this recommendation. NSF's SBIR director noted that the scope and funding of some SBIR awards in 1994 were reduced to eliminate overlapping work.

NASA's program manager discussed with us the problem of duplicate research and the difficulty of defining key terms. He said that the problem had come up often enough to be a concern even though, in his estimate, it may have involved only 1 to 2 percent of the proposals. He said that, in those cases, he has frequently heard a reviewer comment that in essence, the proposal was only an extension of work done for other agencies and represents nothing innovative. In some cases, however, he said that the conclusion may have been a subjective judgment; what one reviewer called duplicative or noninnovative might impress another reviewer differently.

In fact, the vagueness of key terms can lead to differences of opinion in their interpretation by federal and company officials. In one case, SBIR officials became concerned about potential duplication, while a company contended that no duplication had occurred. This example was furnished by a company that had won phase I awards from NASA and the Army. The same company's proposals were also selected for phase II awards by both agencies, but NASA rescinded the selection in April 1994 after becoming aware of the company's phase I and proposed phase II work for the Army. The Army, however, provided a phase II award in June 1994.

The potential similarity is evident from the title of the respective phase II proposals. The proposal to NASA involved "An Optical Instrument to Measure Cloud Liquid Water Content and Droplet Spectra." The proposal to the Army involved "A New Instrument for Automatic Measurement of Cloud Liquid Water Content and Droplet Size." According to an April 1994

letter from NASA's SBIR director to the company, each agency awarded phase I contracts and selected phase II proposals for contract negotiations without prior knowledge of the work proposed to or funded by the other agency.

In the same letter, NASA's SBIR director stated to the company that "The proposed [Army] project is a terrestrial instrument while the proposed NASA project is an airborne instrument . . . [B]oth instruments are based on the same technological innovation and should have substantially the same characteristics and capabilities."

The SBIR director also stated that

> "Self-certification by SBIR offerors on specific requirements is basic to the SBIR process, and accuracy and completeness are essential to program integrity. The omissions and inaccurate certifications . . . resulted in our not knowing the potential for duplication of similar work funded by another agency. The existence of the [Army] contract was never disclosed by your company to NASA; it was discovered accidentally by the NASA project manager after phase I had been completed."

The letter concluded that "Based on our findings and concerns, NASA will not fund the phase II project."

The company responded with a detailed letter that explained the technical differences between the two proposals and commented on the problem of definition. In its letter, the company said, "We are having difficulty understanding your definition of 'innovative,' particularly as it is interpreted by different agencies and different centers/laboratories within the agencies." The company added, "Our opinion is that the airborne and terrestrial instrument each requires separate innovative technology and that the instruments are not the same technology in two different embodiments."

In response to the program director's concern about "inaccurate certifications," the company stated, "We did not interpret the NASA and [Army] phase II proposals as being similar proposals . . . or that we had received funds for substantially similar work. The focus and thrust of the two phase I projects were substantially different." The company concluded that "There were no omissions or inaccurate certifications."

An Army official—a physical research scientist who had served as the technical manager for the Army's phase II award—agreed with NASA's

views about the certification problems. She said that the company should have identified a similar proposal for NASA. (She noted that the company cited other SBIR work but did not refer to the concurrent SBIR work for NASA.) Although she criticized the company in this regard, she concluded that its work was of value to the Army and that the certification problems were not a sufficient reason to reject the phase II proposal.

In general, the absence of substantive definitions for terms such as "innovative" or "similar" research places the burden of judgment on the company. The company must then certify its proposals as original or duplicative without guidance. In cases such as the one described involving two different instruments with a possibly similar technology, the appropriate certification may be difficult to determine and can lead to conflicts of opinion that may harm the SBIR program as well as the individual company.[10]

Lack of Current Information Contributes to the Problem

The lack of interagency access to and exchange of current information about SBIR awards contributes to the problem of duplicate funding. At present, SBA maintains a database for the SBIR program that it uses primarily to produce its annual report to the Congress regarding the program. The information has a "time lag" of about 9 months because it is first processed by each agency and then forwarded to SBA. SBA requires further time to review and "clean up" the data for its own use. Individual agencies maintain records of recent awards, but this information is generally not available to other agencies. If an official in one agency wants to obtain information from another agency about a specific proposal or company, such information is available only through personal contacts and conversations.

DOD's SBIR director discussed with us the existing methods of coordination within DOD and among other agencies to prevent duplicate funding problems. He said that where there is a potential overlap, such as between DOD and NASA, SBIR officials coordinate their reviews and thus attempt to avoid duplicate funding. As another example, the Air Force's SBIR manager regularly sends information on environmentally oriented awards to the Environmental Protection Agency to identify potential overlaps.

[10]During our meeting with NSF officials in January 1995 to discuss our draft report, NSF's SBIR director noted that NSF had also made a phase II award to the same company for an airborne instrument designed to measure the sizes of cloud droplets. The SBIR director has referred the matter to NSF's IG for review.

Some SBIR officials believe that the present methods may not be adequate for detecting duplication when dealing with 20,000 proposals annually. Officials at NASA and SBA have led the initial efforts to improve interagency access to and exchange of current information. A Senior Research Computer Scientist at NASA helped to develop software for NASA's SBIR program that would facilitate the handling and review of proposals, but other SBIR officials expressed the view that the NASA software may not be easily adaptable to other agencies' programs. As a result, SBA's Technology Transfer and Commercialization Specialist, who manages SBA's SBIR database, met in March 1994 with technical officials in the larger SBIR agencies to discuss an alternative approach that would meet the needs of SBIR agencies in general. He also convened a second meeting in September 1994 to assemble what he described as a definitive list of features in the new approach.

SBA's specialist emphasized that the effort now underway will not change SBA's existing SBIR database but will supplement it with a list of all current awards. He said that the data may be made available on Internet—each agency would maintain its own database and provide access to other agencies—rather than on a centralized database at SBA. However, he has not yet finalized this plan. SBA's specialist told us that the new approach will overcome the time lag regarding information on current awards and help in avoiding duplicate funding.

The effort to provide interagency access to this information, however, has raised a question about the protection of proprietary information. DOD's SBIR director was especially concerned about this problem. SBA's specialist said that he was aware of DOD's concern but that steps to ensure the protection of proprietary information would be taken.

In general, efforts to provide interagency access to current information are at an early stage of planning. Currently, minimal documentation exists to describe the proposed approach.

Expansion May Make the SBIR Program More Vulnerable to the Problem

The increasing number of proposals and awards is likely to enhance SBIR's vulnerability to duplicate funding. The five major SBIR agencies experienced an increase from 17,562 phase I proposals in fiscal year 1992 to 20,014 in fiscal year 1993. SBIR officials also believe that there will be further growth in the number of proposals. While this increase would help maintain the competitiveness of the program, it would also heighten

agencies' likelihood of receiving duplicate proposals and their difficulty in identifying duplicate proposals if companies do not report the proposals.

Conclusions

At present, the SBIR program is at a growing risk of willful or accidental financial abuse. The certification process can be evaded and, as noted by NSF's IG, the certification form may not be sufficiently well designed to support a criminal prosecution. The absence of definitions of key terms such as "innovative" or "similar" research places the burden of judgment on companies at the same time that it leaves them without effective guidance in determining duplicate research proposals. In addition, the lack of interagency access to and exchange of current information about awards leaves SBIR officials with only an informal means of coordinating their work and identifying potential duplication. Further increases in funding and the number of proposals put the program at even greater risk in the future.

Recommendations to the Administrator, SBA

To improve interagency coordination and to reduce the risk of duplicate funding of similar research, we recommend that the Administrator, SBA, take steps to (1) determine whether the certification form that accompanies SBIR proposals needs to be improved and, if so, take the necessary steps to revise it; (2) develop substantive definitions and guidelines for agencies and companies regarding "duplicate" research; and (3) provide interagency access to current information regarding SBIR awards.

Agency Comments

The concern of officials in several agencies, including SBA, NASA, NSF, and DOD, was that the duplicate funding problem be kept in perspective. They believe that the problem is limited to relatively few cases of blatant fraud, while the instances of genuine confusion about what constitutes duplication may be somewhat more frequent. DOD's SBIR director noted that during the final week before a DOD SBIR solicitation closed in January 1995, he received calls from about a dozen companies. Each company requested guidance in responding to DOD's certification requirement because the company was uncertain of whether its proposals were duplicative. DOD's SBIR director told the companies that if they thought there was a chance of duplication, they should indicate it on the certification form. In general, agency officials agreed that the problem of duplicate funding should be addressed and that the recommendations to SBA would be helpful.

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