Small Business Innovation Research and Small Business Technology Transfer Programs

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Summary

The Small Business Innovation Research (SBIR) program was established in 1982 by the Small Business Innovation Development Act (P.L. 97-219) to increase the participation of small innovative companies in federally funded R&D. The act requires federal agencies with extramural R&D budgets of $100 million or more to set aside a portion of these funds to finance an agency-run SBIR program. As of 2014, 11 federal agencies operate SBIR programs. A complementary program, the Small Business Technology Transfer (STTR) program, was created by the Small Business Research and Development Enhancement Act of 1992 (P.L. 102-564) to facilitate the commercialization of university and federal R&D by small companies. Agencies with extramural R&D budgets of $1 billion or more are required to set aside a portion of these funds to finance an agency-run STTR program. As of 2014, five federal agencies operate STTR programs.

Both the SBIR and STTR programs have three phases. Phase I funds feasibility-related research and development (R&D) related to agency requirements. Phase II supports further R&D efforts initiated in Phase I that meet particular program needs and that exhibit potential for commercial application. Phase III is focused on commercialization of the results of Phase I and Phase II grants, however the SBIR and STTR programs do not provide funding in Phase III.

The SBIR and STTR programs have been extended and reauthorized several times since their initial enactments. Most recently, the programs were reauthorized through September 30, 2017 under the SBIR/STTR Reauthorization Act of 2011 which was enacted as Division E of the National Defense Authorization Act for Fiscal Year 2012 (P.L. 112-81). Among its provisions, the act incrementally increases the set-aside for the SBIR effort to 3.2% by FY2017 and beyond; incrementally expands the set-aside for the STTR activity to 0.45% in FY2016 and beyond; increases the amount of Phase I and Phase II awards; allows recipients of a Phase I award from one federal agency to apply for a Phase II award from another agency to pursue the original work; allows the National Institutes of Health, the Department of Energy, and the National Science Foundation to award up to 25% of SBIR funds to small businesses that are majority-owned by venture capital companies, hedge funds, or private equity firms, and allows other agencies to award up to 15% of SBIR funds to such firms; creates commercialization pilot programs; and expands oversight activities, among other things.

Through FY2011, federal agencies had made more than 133,000 awards totaling $33.7 billion under the SBIR and STTR programs. In FY2011, agencies awarded $2.224 billion in SBIR funding. The Department of Defense (DOD) and Department of Health and Human Services (HHS) accounted for more than three-fourths of SBIR funding in FY2011. While more than two-thirds of SBIR grants made in FY2011 were Phase I awards, more than three-fourths of SBIR funding went to Phase II awards. In FY2011, agencies awarded $251.2 million in STTR funding. DOD and HHS accounted for nearly four-fifths of STTR funding. Like the SBIR program, most STTR grants (76%) were for Phase I awards, while most funding (76%) went to Phase II awards.

In exercising its oversight authorities for the SBIR and STTR programs, Congress has placed a strong emphasis on monitoring the implementation and effects of changes made by the 2011 reauthorization act. In particular, Congress has expressed continuing interest in the participation of majority-owned venture capital firms in the SBIR program, the effectiveness of efforts seeking to improve commercialization outcomes, the share of awards and funding received by women-owned and minority and disadvantaged firms, and the SBA's agency coordination, policy guidance, data collection, and dissemination responsibilities.

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Overview

The Small Business Innovation Research (SBIR) program was established by Congress in 1982 to expand the role of small businesses in federal research and development (R&D). In establishing the program, Congress found that technological innovation plays an important role in job creation, productivity improvements, and U.S. competitiveness; that small businesses are among the most cost-effective performers of R&D and particularly capable of bringing R&D results to market in the form of new products; and that despite the role of small businesses as "the principal source of significant innovations in the Nation," the vast majority of federally funded R&D is performed by large businesses, universities, and federal laboratories.[1] With this in mind, Congress established the SBIR program to advance four objectives:

- to stimulate innovation,
- to use small businesses to meet federal R&D needs,
- to foster and encourage the participation of minority and disadvantaged persons in technological innovation, and
- to increase private sector commercialization of innovations derived from federally-funded R&D.[2]

In 1992, Congress established the Small Business Technology Transfer (STTR) program.[3] Similar in design to the SBIR program, STTR was created to facilitate the commercialization of university and federal R&D by small companies.

The SBIR and STTR programs have been reauthorized on multiple occasions, most recently by the SBIR/STTR Reauthorization Act of 2011 (P.L. 112-81), which authorizes both programs through FY2017.[4] Highlights of this law are provided in "SBIR/STTR Reauthorization Act of 2011" later in this report.

Execution of the SBIR and STTR programs is decentralized. Both the SBIR and STTR statutes require that federal agencies with extramural R&D budgets in excess of specified amounts set aside a percentage of such funds to conduct their own SBIR and STTR programs.[5] Currently, 11 federal departments and agencies operate SBIR programs and 5 operate STTR programs. The Small Business Administration (SBA) helps to coordinate the SBIR and STTR programs, establishes overall policy guidance, reviews agencies' progress, and reports annually to Congress on the operation of the programs.

Through FY2011, federal agencies had made more than 133,000 SBIR and STTR awards to small businesses to develop and commercialize innovative technologies. The total amount awarded was $33.7 billion. **Figure 1** shows SBIR and STTR funding for FY2000-FY2011.

[1] Small Business Innovation Development Act of 1982 (P.L. 97-219).

[2] Ibid.

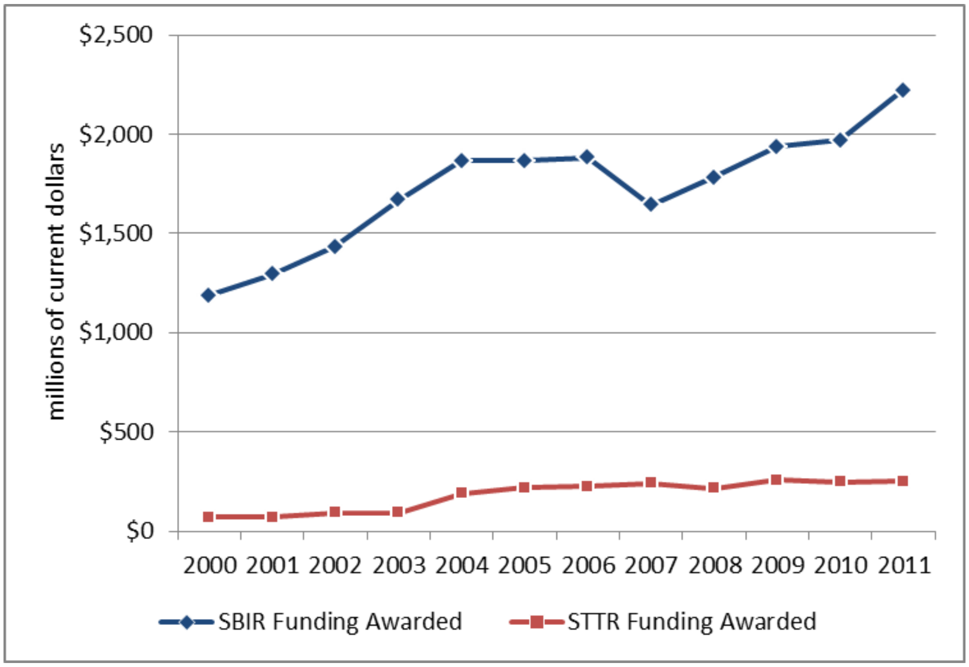
[3] Small Business Research and Development Enhancement Act of 1992 (P.L. 102-564).

[4] The SBIR/STTR Reauthorization Act of 2011 was enacted as Division E of the National Defense Authorization Act for Fiscal Year 2012.

[5] The percentages identified in law that must be set aside for SBIR and STTR are minimums; agencies may opt to set aside more than these percentages.

Figure 1. SBIR and STTR Funding, FY2000-FY2011

Total of Phase I and Phase II Awards for SBIR and STTR programs



Source: CRS analysis of SBIR.gov annual report data (FY2000-2010) and *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011* (FY2011).

This report provides information on the legislative foundations, structure, operation, and current and historical funding levels of the SBIR and STTR programs; summarizes the most recent legislative changes to the programs; provides highlights of external reviews of the program; and identifies and discusses selected policy issues.

Data Sources and Limitations

The SBA, through its SBIR.gov website, makes available certain data on SBIR and STTR awards through FY2013 (and some awards data for FY2014). However, the SBA has communicated to CRS that the data for FY2012 and later years have not been cleared by the Office of Management and Budget. For this report, CRS has relied on the SBIR.gov website for data from the inception of the SBIR and STTR programs through FY2010. For FY2011, this report relies on data provided directly to CRS by the SBA.[6] However, the FY2011 data set has some inconsistencies; in several cases, the sum of individual agency amounts does not correspond to the stated total. The SBA informed CRS that some agency numbers were modified prior to publication of the FY2011 figures, but that the totals for each row were inadvertently not recalculated.[7] Accordingly, for this report CRS uses the sum of the individual agency amounts rather than the totals provided by the SBA.

[6] Email communication between SBA and CRS on March 26, 2014. The same FY2011 data are included as a table in the SBA's *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

[7] Telephone communication between SBA and CRS on July 18, 2014.

Small Business Innovation Research

SBIR Overview

The Small Business Innovation Research program was established under the Small Business Innovation Development Act of 1982 (P.L. 97-219) and subsequently reauthorized or extended multiple times, most recently in 2011 when the program was reauthorized through September 30, 2017.[8] Under the program, each federal agency with an extramural R&D budget greater than $100 million is required to allocate a portion of that funding to conduct a multi-phase R&D grant program for small businesses. The objectives of the SBIR program include stimulating technological innovation; increasing the use of the small business community to meet federal R&D needs; fostering and encouraging participation in innovation and entrepreneurship by socially and economically disadvantaged individuals; and expanding private-sector commercialization of innovations resulting from federally funded R&D.

Currently, 11 federal agencies participate in the SBIR program: the Departments of Agriculture (USDA), Commerce (DOC), Defense (DOD), Education (ED), Energy (DOE), Health and Human Services (HHS), Homeland Security (DHS), and Transportation (DOT); the Environmental Protection Agency (EPA); the National Aeronautics and Space Administration (NASA); and the National Science Foundation (NSF).

Under the 2011 reauthorization, the minimum percentage of extramural R&D funds that agencies are required to set aside for the SBIR program increases 0.1% per year for five years, from 2.5% in FY2011 to 3.0% in FY2016, then increases to 3.2% for FY2017 and each fiscal year thereafter. Agencies may opt to exceed these minimum percentages. In FY2011, the aggregate level of SBIR funding for all federal agencies was $2.119 billion, approximately 2.6% of the participating agencies' aggregate extramural R&D funding. However, a recent report by the Government Accountability Office (GAO) found that some agencies did not comply with the SBIR and STTR spending requirements.[9] This issue is addressed in greater detail in "Agency Compliance with Mandatory Minimum Expenditure Levels."

Each participating agency operates its own SBIR program under the provisions of the law and regulations, as well as with the policy directive issued by the U.S. Small Business Administration (SBA) in its *Small Business Innovation Research Program Policy Directive* (referred to hereinafter as the *SBIR Program Policy Directive*).[10] According to some analysts, this approach allows for general consistency across SBIR programs, while allowing each agency a substantial degree of control and flexibility in the execution of its program in alignment with its overall mission and priorities.[11] (See "Improving Technology Commercialization, Trade-Offs Among Program Objectives" for related discussion.)

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[8] SBIR/STTR Reauthorization Act of 2011, enacted as Division E of the National Defense Authorization Act for Fiscal Year 2012 (P.L. 112-81).

[9] U.S. Government Accountability Office, *Small Business Research Programs: More Guidance and Oversight Needed to Comply with Spending and Reporting Requirements*, GAO-14-431, June 2014.

[10] The SBA directive is required under Section 9(j) of the Small Business Act (15 U.S.C. §638). The directive was updated on February 24, 2014. The directive is available at http://sbir.gov/sites/default/files/sbir_sttr_program_overview_tips_for_applicants.pdf.

[11] See, for example, U.S. Government Accountability Office, *Small Business Research Programs: Agencies Are Implementing New Fraud, Waste, and Abuse Requirements*, GAO-13-70R, November 15, 2012, p. 1, http://gao.gov/assets/660/650129.pdf.

SBIR Phases

The SBIR program is a three-phase program. The purposes and parameters of each phase are discussed below.

Phase I

In Phase I, an agency solicits contract proposals or grant applications to conduct feasibility-related experimental or theoretical research or research and development (R/R&D) related to agency requirements. The scope of the topic(s) in the solicitation may be broad or narrow, depending on the needs of the agency. Phase I grants are intended to determine "the scientific and technical merit and feasibility of ideas that appear to have commercial potential."[12] Generally, SBIR Phase I awards are not to exceed $150,000, though the law provides agencies with the authority to issue awards that exceed this amount (the Phase I award guideline) by as much as 50%. In addition, agencies may request a waiver from the SBA to exceed the award guideline by more than 50% for a specific topic. In general, the period of performance for Phase I awards is up to six months, though agencies may allow for a longer performance period for a particular project.

Phase II

Phase II grants are intended to further R/R&D efforts initiated in Phase I that meet particular program needs and that exhibit potential for commercial application. In general, only Phase I grant recipients are eligible for Phase II grants. There are two exceptions to this guideline: (1) a federal agency may issue an SBIR Phase II award to a Small Business Technology Transfer (STTR) Phase I awardee to further develop the work performed under the STTR Phase I award;[13] and (2) through FY2017, the National Institutes of Health (NIH), DOD, and ED are authorized to make Phase II grants to small businesses that did not receive Phase I awards. Exercise of this authority requires a written determination from the agency head that the small business has demonstrated the scientific and technical merit and feasibility of the ideas and that the ideas appear to have commercial potential.[14]

Phase II awards are to be based on the results achieved in Phase I (when applicable) and the scientific and technical merit and commercial potential of the project proposed in Phase II as evidenced by: the small business concern's record of successfully commercializing SBIR or other research; the existence of second phase funding commitments from private sector or non-SBIR funding sources; the existence of third phase, follow-on commitments for the subject of the research; and the presence of other indicators of the commercial potential of the idea.[15]

The *SBIR Program Policy Directive* generally limits SBIR Phase II awards to $1 million (the Phase II award guideline), though the directive provides agencies with the authority to issue an award that exceeds this amount by as much as 50% (for an amount up to $1.5 million). As with Phase I grants, agencies may request a waiver from the SBA to exceed the Phase II award guideline by more than 50% for a specific topic. In general, the period of performance for Phase II awards is not to exceed two years, though agencies may allow for a longer performance period for a particular project. Agencies may make a sequential Phase II award to continue the work of

[12] 15 U.S.C. §638.

[13] The STTR program is discussed in more detail later in this report.

[14] Small Business Administration, *Small Business Innovative Research Program Policy Directive*, February 24, 2014.

[15] 15 U.S.C. §638(e)(4)(b).

an initial Phase II award. This sequential Phase II award is also subject to the $1 million Phase II guideline and agencies' authority to exceed the guideline by up to 50%. Thus, agencies may award up to $3 million in Phase II awards for a particular project to a single recipient at the agency's discretion, and potentially more if the agency requests and receives a waiver from the SBA. For sequential Phase II awards, some agencies require third party matching of the SBIR funds.

Phase III

Phase III of the SBIR program is focused on the commercialization of the results achieved with Phase I and Phase II SBIR funding. The SBIR program **does not** provide funding in Phase III. Phase III funding is expected, generally, to be generated in the private sector. However, some agencies may use non-SBIR funds for Phase III funding to support additional R&D or contracts for products, processes, or services intended for use by the federal government. In addition, the 2011 reauthorization act directs agencies and prime contractors "to the greatest extent practicable," to facilitate the commercialization of SBIR and STTR through the use of Phase III awards, including sole source awards.[16]

Technical Assistance

In addition to funding provided in Phases I-III, the 2011 reauthorization act also allows agencies to award SBIR Phase I and Phase II award recipients up to $5,000 per year for technical assistance, in addition to the amount of the award, or to provide such assistance through an agency-selected vendor.[17] This funding is intended to provide SBIR recipients 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 online databases. These services are provided to help SBIR awardees make better technical decisions, solve technical problems, minimize technical risks, and develop and commercialize new commercial products and processes.[18]

SBIR Eligibility

A small business' eligibility for the SBIR program is contingent on its location, number of employees, ownership characteristics, and other factors. Eligibility to participate in the SBIR program is limited to for-profit U.S. businesses with a location in the United States. Eligible companies must have 500 or fewer employees, including employees of affiliates. The small business must be:

> (1) more than 50% directly owned and controlled by one or more citizens or permanent resident aliens of the United States, other small business concerns (each of which is more than 50% directly owned and controlled by individuals who are citizens or permanent resident aliens of the United States), or any combination of these; or

[16] P.L. 112-81, §5108.

[17] P.L. 112-81, §5121.

[18] 15 U.S.C. §638(q)(1).

(2) more than 50% owned by multiple venture capital operating companies, hedge funds, private equity firms,[19] or any combination of these, with no single such firm owning more than 50% of the small business;[20] or

(3) a joint venture in which each entity to the joint venture meets the requirements in paragraphs (1) and (2) above.[21]

Agencies are restricted on how much of their SBIR funds they can make available for awards to small businesses that are more than 50% owned by venture capital operating companies, hedge funds, or private equity firms. The NIH, DOE, and NSF may award no more than 25% of the agency's SBIR funds to such small businesses; all other SBIR agency programs are limited to using 15% of their SBIR funds for such awards.

Small businesses that have received multiple prior SBIR/STTR awards must meet certain benchmark requirements for progress toward commercialization to be eligible for a new Phase I award. For both Phase I and Phase II, the principal investigator's primary employment must be with the small business applicant at the time of award and during the conduct of the proposed project.

Generally, R/R&D work under the STTR must be performed in the United States, though agencies may allow a portion of the work to be performed or obtained outside of the United States under "rare and unique" circumstances.[22]

Current and Historical SBIR Awards Data[23]

In FY2011, the latest year for which the SBA has published data on SBIR awards, agencies made awards for $2.222 billion, including 3,739 Phase I awards totaling $525.4 million and 1,759 Phase II awards totaling $1.696 billion. The success rate[24] was 15% for Phase I SBIR proposers and 49% for Phase II proposers.

While more than two-thirds of SBIR grants made in FY2011 were Phase I awards (68.0%), more than three-fourths of SBIR funding went to Phase II awards (76.4%).[25] Between FY2000 and FY2011, funding for both Phase I and Phase II has generally increased. See **Figure 2**.

[19] See 13 C.F.R. §121.701.

[20] According to SBA, "The exception to this is if the VC is itself more than 50% directly owned and controlled by one or more individuals who are citizens or permanent resident aliens of the United States. In such a case, that VC is allowed to have majority ownership and control of the awardee. In that case, the VC and the awardee, and all other affiliates, must have a total of 500 employees or less." Source: SBIR/STTR website, http://sbir.gov/faq/vc-participation.

[21] 13 C.F.R. §121.702.

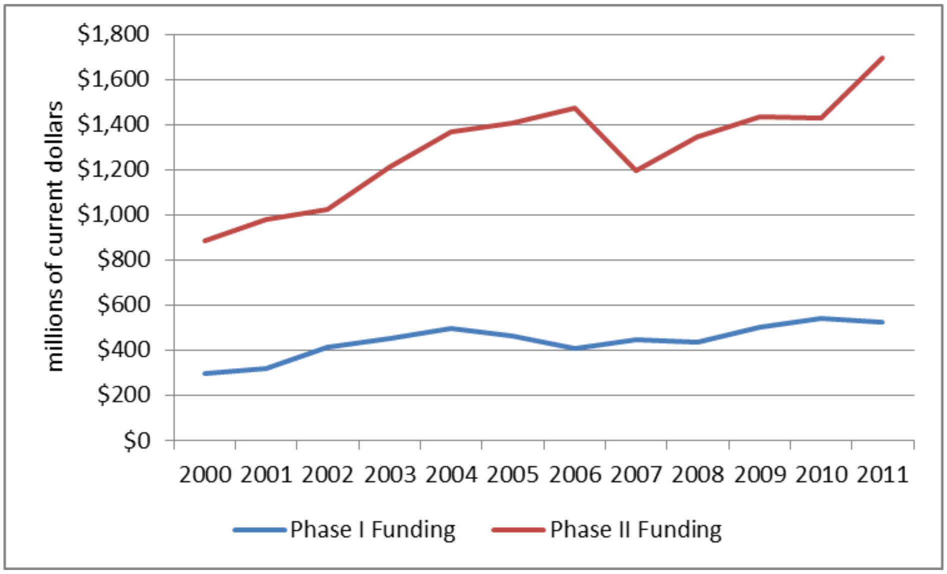
[22] Small Business Administration, *Small Business Innovation Research Program Policy Directive*, February 24, 2014.

[23] See "Data Sources and Limitations" above.

[24] The success rate is the number of successful proposals divided by total proposals submitted, expressed as a percentage.

[25] Phase II funding includes original and subsequent Phase II award funding, as well as modifications.

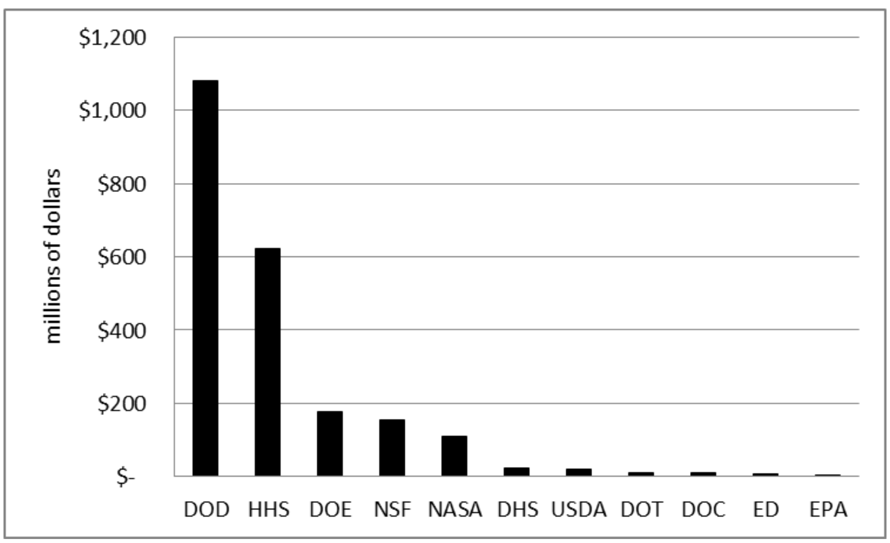
Figure 2. SBIR Phase I and Phase II Funding, FY2000-FY2011



Source: CRS analysis of SBIR.gov annual report data (FY2000-2010) and *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011* (FY2011).

Two agencies accounted for more than three-fourths of total SBIR funding in FY2011: DOD ($1,080.8 million, 49%) and HHS ($623.8 million, 28%). The next three highest SBIR funding agencies (NASA, DOE, NSF) together accounted for 20%. The remaining agencies accounted for less than 4% of the total. See **Figure 3**.

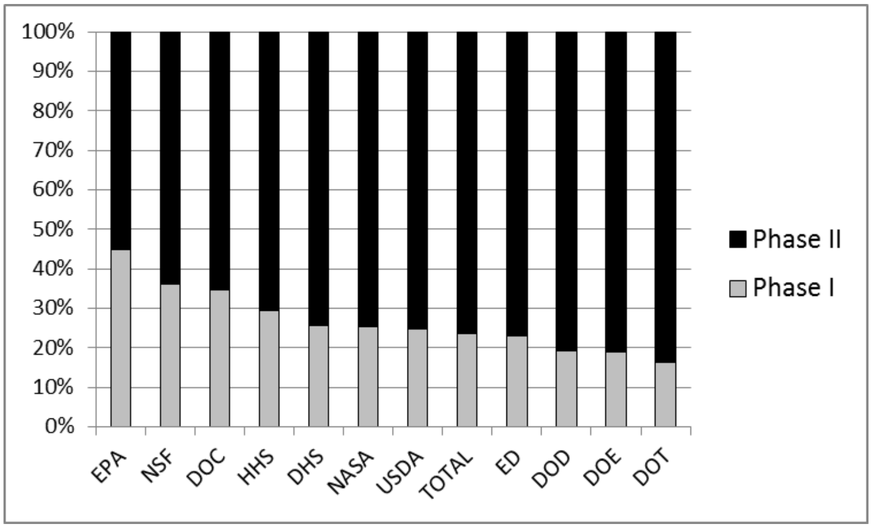
Figure 3. SBIR Funding by Agency, FY2011



Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

The allocation of SBIR funding between Phase I and Phase II awards varies among agencies. Agencies that allocated the largest share of their SBIR funding to Phase I awards in FY2011 were EPA (45%), NSF (36%), and DOC (35%). Agencies that allocated the largest share of their SBIR funding to Phase II awards in FY2011 were DOT (84%), DOD (81%), and DOE (81%). **Figure 4** illustrates each SBIR agency's FY2011 distribution of SBIR funding between phases.

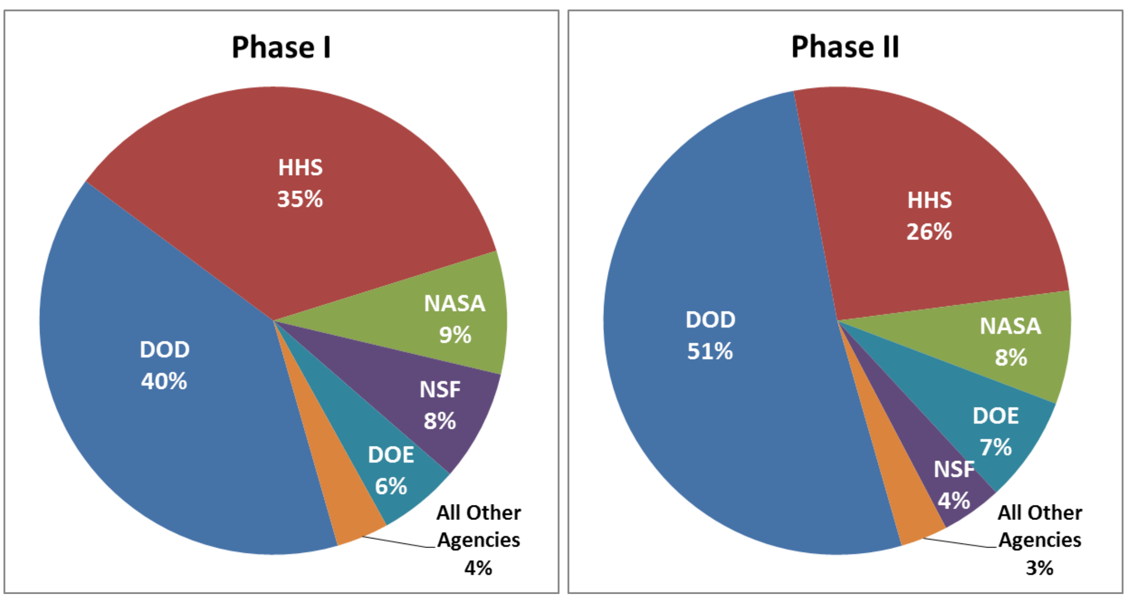
Figure 4. Agency Allocation of SBIR Funding Between Phase I and Phase II, FY2011



Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

Agency shares of aggregate Phase I and Phase II SBIR funding are as shown in **Figure 5**. The agencies with the highest share of total Phase I funding in FY2011 were DOD (40%), HHS (35%), and NASA (9%). The agencies with the highest share of total Phase II funding in FY2011 were also DOD (51%), HHS (26%), and NASA (8%).

Figure 5. Share of Phase I and Phase II SBIR Funding, by Agency, FY2011



Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

In FY2011, minority or disadvantaged businesses[26] received 238 Phase I awards (about 6.4% of all Phase I SBIR awards) totaling $31.3 million (about 6.0% of total Phase I funding), and 107 Phase II SBIR awards (6.1%) totaling $90.8 million (8.5%). Companies in Historically Underutilized Business Zones (HUBZones)[27] received 87 Phase I awards (about 2.3% of all Phase I awards) totaling $11.5 million (about 2.2% of total Phase I funding) and 45 Phase II awards (2.6%) totaling $29.8 million (2.8%).

Figure 6 shows the aggregate funding level and number of SBIR awards by state for FY2006-2010 (the latest five-year period for which award data by state are available). Although every state, the District of Columbia, and Puerto Rico received awards during this period, SBIR funding was concentrated among certain states. The four states that received the largest number and amount of SBIR awards during this period—California (5,467 awards totaling $1.826 billion), Massachusetts (3,570 awards totaling $1.235 billion), Virginia (1,786 awards totaling $561.8 million), and Maryland (1,404 awards totaling $492.8 million)—accounted for 38% of the total number of SBIR awards and 43% of the total funding for this period. These four states also received the largest overall amounts of federal R&D funding in FY2010, accounting for a total of 44%.[28]

The top ten states accounted for more than two-thirds of SBIR awards and funding. This concentration mirrors overall federal R&D funding as well. Nine of the top 10 states in SBIR funding are also among the top 10 states in overall federal R&D funding (which account for 66% of total federal R&D funding). In contrast, the ten states with the fewest number of SBIR awards and lowest aggregate award amounts accounted for about 1% of awards and total funding during this period. The ten states with the least federal R&D funding in FY2010 also accounted for about 1% of total federal R&D funding.

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[26] According to the SBA,

> Some minority groups are presumed to be socially and economically disadvantaged and can qualify for the 8(a) program. [See description of the SBA 8(a) Business Development Program below.] These groups include: African Americans, Hispanic Americans, Native Americans, Asian Pacific Americans and Subcontinent Asian Americans. Individuals who are not members of one or more of these groups can be considered for the 8(a) program, but they must provide substantial evidence and documentation that demonstrates that they have been subjected to bias or discrimination and are economically disadvantaged. Firms owned by Alaska Native Corporations, Indian Tribes, Native Hawaiian Organizations and Community Development Corporations can also apply to the program.

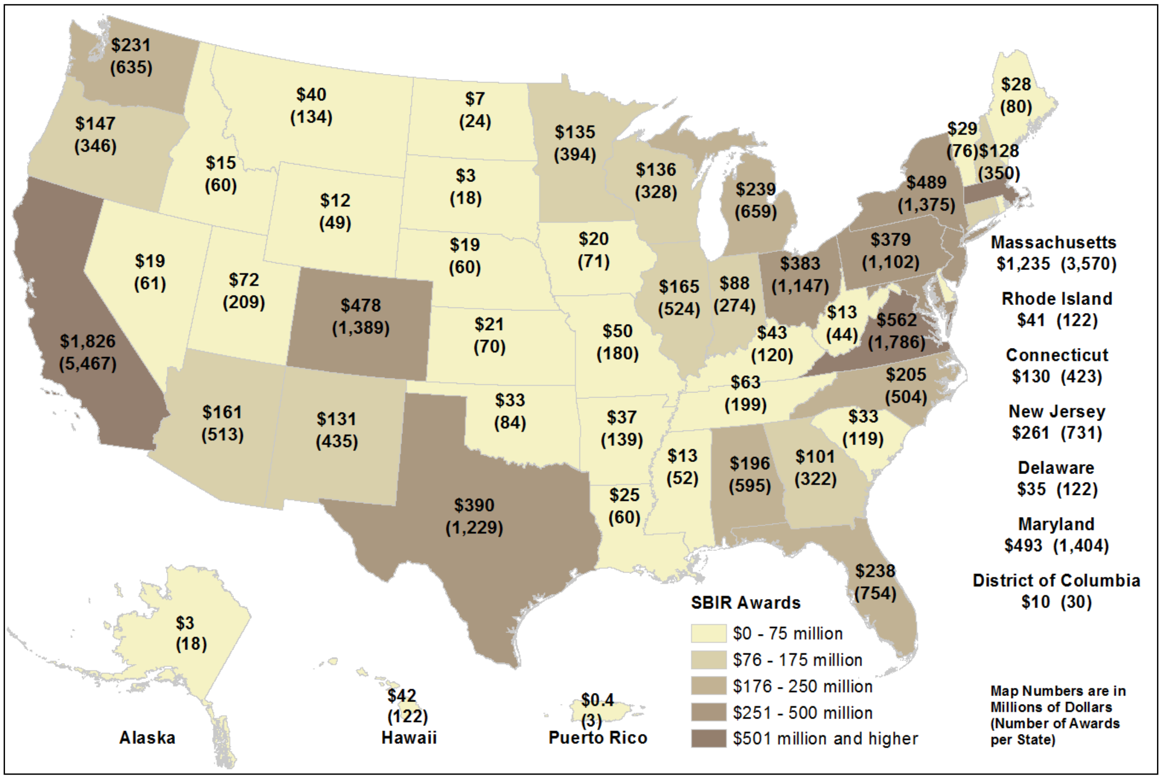
For additional information on minority and disadvantaged businesses, see the "Minority-Owned Businesses" webpage on the SBA's website at http://www.sba.gov/content/minority-owned-businesses.

The SBA's 8(a) Business Development Program is "a business assistance program for small disadvantaged businesses. The 8(a) Program offers a broad scope of assistance to firms that are owned and controlled at least 51% by socially and economically disadvantaged individuals." For additional information, see the "8(a) Business Development Program" webpage on the SBA's website at http://www.sba.gov/content/about-8a-business-development-program.

[27] According to the SBA, HUBZones are designated by statute and draw upon determinations and information obtained by other agencies. A HUBZone may be one of the following: a qualified Census Tract, a qualified Nonmetropolitan County, a qualified Indian reservation, a qualified Base Closure Area, or a redesignated area. For more information, see the SBA's Understanding HUBZone Designations webpage at http://www.sba.gov/tools/sba-learning-center/training/hubzone-mini-primer-understanding-hubzone-designations.

[28] National Science Foundation, *Federal Funds for Research and Development: Fiscal Years 2010–12*, NSF 13-326, 2013, Table 122, http://www.nsf.gov/statistics/nsf13326/content.cfm?pub_id=4243&id=2.

Figure 6. SBIR Aggregate Funding Level and Number of Awards by State, FY2006-2010



Source: CRS analysis of FY2006-2010 state data from SBIR.gov.

Table 1 provides information on overall agency SBIR obligations for FY2011, as well as the number and aggregate amounts of Phase I and Phase II SBIR awards.

Table 1. Number and Amount of SBIR Awards by Agency, FY2011

(dollars in millions)

Department/Agency	Total Awarded, Phase I and Phase II[a]	Phase I Number of Awards	Phase I Total Awarded	Phase II Number of Awards	Phase II Total Awarded[b]
Department of Agriculture	$ 22.4	56	$ 5.5	37	$ 16.9
Department of Commerce	6.1	23	2.1	12	4.0
Department of Defense	1,080.8	1,816	208.1	938	872.7
Department of Education	11.1	25	2.5	12	8.6
Department of Energy	154.0	198	29.3	114	124.7
Dept. of Health and Human Services	623.8	813	183.8	292	440.0
Department of Homeland Security	19.3	44	5.0	18	14.3
Department of Transportation	10.5	15	1.7	12	8.8
Environmental Protection Agency	4.6	27	2.1	11	2.5
Nat'l Aeronautics and Space Admin.	177.6	450	44.8	215	132.8
National Science Foundation	111.5	272	40.4	98	71.1
Total, All Agencies[a]	**2,221.9**	**3,739**	**525.4**	**1,759**	**1,696.5**

Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

a. Components many not sum to totals due to rounding.

b. Includes Phase II initial awards, subsequent Phase II awards, and modifications to Phase II awards.

Table 2 provides historical data on the number and amount of Phase I and Phase II SBIR awards from the program's inception through FY2011.

Table 2. Number and Amount of SBIR Awards by Year, FY1983-FY2011

Fiscal Year	Total Dollars Awarded (in millions)	Number of Awards		
		Phase I	Phase II	Total
FY1983	$ 44.5	686	74	760
FY1984	108.4	999	338	1,337
FY1985	199.1	1,397	407	1,804
FY1986	297.9	1,945	564	2,509
FY1987	350.5	2,189	768	2,957
FY1988	389.1	2,013	711	2,724
FY1989	431.9	2,137	749	2,886
FY1990	460.7	2,346	837	3,183
FY1991	483.1	2,553	788	3,341
FY1992	508.4	2,559	916	3,475
FY1993	698.0	2,898	1,141	4,039
FY1994	717.6	3,102	928	4,030
FY1995	981.7	3,085	1,263	4,348
FY1996	916.3	2,841	1,191	4,032
FY1997	1,066.7	3,371	1,404	4,775
FY1998	1,100.0	3,022	1,320	4,342
FY1999	1,096.5	3,334	1,256	4,590
FY2000	1,190.2	3,172	1,335	4,507
FY2001	1,294.4	3,215	1,533	4,748
FY2002	1,434.8	4,243	1,577	5,820
FY2003	1,670.1	4,465	1,759	6,224
FY2004	1,867.4	4,638	2,013	6,651
FY2005	2,029.8	4,300	1,871	6,171
FY2006	2,113.9	3,836	2,026	5,862
FY2007	1,777.6	3,909	1,615	5,356
FY2008	1,785.7	3,832	1,851	5,683
FY2009	1,937.7	4,008	1,801	5,809
FY2010	1,970.5	4,146	1,845	5,991
FY2011	2,221.9	3,739	1,759	5,498

Source: U.S. Small Business Administration, *The Small Business Economy 2010, A Report to the President*, http://www.sba.gov/sites/default/files/sb_econ2010.pdf; SBIR.gov website; and *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

Small Business Technology Transfer

STTR Overview

The Small Business Technology Transfer (STTR) program was created by the Small Business Research and Development Enhancement Act of 1992 (P.L. 102-564) and has been reauthorized several times, most recently by the SBIR/STTR Reauthorization Act of 2011 (P.L. 112-81) which reauthorized the program through September 30, 2017. Modeled largely after the SBIR program, the STTR program seeks to facilitate the commercialization of university and federal R&D by small companies. Under the program, each federal agency with extramural R&D budgets of $1 billion or more is required to allocate a portion of its R&D funding to conduct a multi-phase R&D grant program for small businesses. The STTR program provides funding for research proposals that are developed and executed cooperatively between a small firm and a scientist in an eligible research institution[29] and that are aligned with the mission requirements of the federal funding agency.

Currently, five agencies participate in the STTR program: DOD, DOE, HHS, NASA, and NSF. Under the 2011 reauthorization act, the minimum percentage of funds to be set aside for the program is to increase from 0.30% in FY2011 to 0.35% in FY2012 and FY2013; to 0.40% in FY2014 and FY2015; and to 0.45% in FY2016 and beyond. In FY2011, total STTR award funding among all STTR-participating federal agencies was $238.1 million, accounting for 0.31% of the agencies' aggregate extramural R&D funding.

The SBA emphasizes three principal differences between the STTR and SBIR programs:

- Under STTR, the small business and its partnering research institution must establish an intellectual property agreement detailing the allocation of intellectual property rights and rights to carry out follow-on research, development or commercialization activities.
- Under STTR, the small business partner must perform at least 40% of the R&D and the research institution partner must perform at least 30% of the R&D.
- The STTR program does not require the principal investigator to be primarily employed by the small business, a requirement of the SBIR program.[30]

As with the SBIR program, each participating agency operates its own STTR program under the provisions of the law and regulations, as well as with the policy directive issued by the U.S. Small

[29] According to the SBA, an eligible "research institution" is defined, for purposes of the STTR, as

> one that has a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor, and is: (1) A non-profit institution as defined in section 4(5) of the Stevenson-Wydler Technology Innovation Act of 1980 (that is, an organization that is owned and operated exclusively for scientific or educational purposes, no part of the net earnings of which inures to the benefit of any private shareholder or individual) and includes non-profit medical and surgical hospitals; or (2) A federally-funded R&D center as identified by the National Science Foundation in accordance with the Government-wide Federal Acquisition Regulation issued in accordance with section 35(c)(1) of the Office of Federal Procurement Policy Act (or any successor regulation thereto).

Source: Small Business Administration, *Small Business Technology Transfer Policy Directive* (Updated February 24, 2014).

[30] Small Business Administration, SBIR/STTR website, "About STTR," http://www.sbir.gov/about/about-sttr.

Business Administration (SBA) in its *Small Business Technology Transfer Program Policy Directive* (referred to hereinafter as the *STTR Program Policy Directive*).[31] According to some analysts, this approach allows for general consistency across STTR programs, while allowing each agency a substantial degree of control and flexibility in the execution of its program in alignment with its overall mission and priorities.[32] (See "Improving Technology Commercialization, Trade-Offs Among Program Objectives" for related discussion.)

STTR Phases

Like the SBIR program, the STTR program has three phases. The purposes and parameters of each phase are discussed below.

Phase I

In Phase I, an agency solicits contract proposals or grant applications to conduct feasibility-related experimental or theoretical research or research and development (R/R&D) related to agency requirements. The scope of the topic(s) in the solicitation may be broad or narrow, depending on the needs of the agency. Phase I grants are intended to determine "the scientific and technical merit and feasibility of the proposed effort and the quality of performance of the [small business] with a relatively small agency investment before consideration of further Federal support in Phase II."[33] Generally, STTR Phase I awards are limited to $150,000 (the Phase I award guideline), though law provides agencies with the authority to issue awards that exceed this guideline by as much as 50%. In addition, agencies may request a waiver from the SBA to exceed the award guideline by more than 50% for a specific topic. In general, the period of performance for Phase I awards is not to exceed one year, though agencies may allow for a longer performance period for a particular project.

Phase II

Phase II grants are intended to further R/R&D efforts initiated in Phase I that meet particular program needs and that exhibit potential for commercial application. In general, only Phase I grant recipients are eligible for Phase II grants.[34] Awards are to be based on the results achieved in Phase I and the scientific and technical merit and commercial potential of the project proposed in Phase II. The *STTR Program Policy Directive* generally limits STTR Phase II awards to $1 million (the Phase II award guideline), though the directive provides agencies with the authority to issue awards that exceed this guideline by as much as 50% (for an amount up to $1.5 million).

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[31] The SBA directive is required under Section 9(j) of the Small Business Act (15 U.S.C. §638). The directive was updated on February 24, 2014. The directive is available at http://sbir.gov/sites/default/files/sbir_sttr_program_overview_tips_for_applicants.pdf.

[32] See, for example, U.S. Government Accountability Office, *Small Business Research Programs: Agencies Are Implementing New Fraud, Waste, and Abuse Requirements*, GAO-13-70R, November 15, 2012, p. 1, http://gao.gov/assets/660/650129.pdf.

[33] Small Business Administration, *Small Business Technology Transfer Program Policy Directive*, February 24, 2014.

[34] A federal agency may, however, issue an STTR Phase II award to an SBIR Phase I awardee to further develop the work performed under the SBIR Phase I award. An agency

> must base its decision upon the results of the work performed under the Phase I award and the scientific and technical merit, and commercial potential of the Phase II proposal. The SBIR Phase I awardee must meet the eligibility and program requirements of the STTR Program in order to receive the STTR Phase II award.

Source: Small Business Administration, *Small Business Technology Transfer Program Policy Directive*, February 24, 2014, p.11.

As with Phase I grants, agencies may request a waiver from the SBA to exceed the Phase II award guideline by more than 50% for a specific topic. In general, the period of performance for Phase II awards is not to exceed two years, though agencies may allow for a longer performance period for a particular project. Agencies may make a sequential Phase II award to continue the work of an initial Phase II award. This sequential Phase II award is also subject to the $1 million Phase II guideline and agencies' authority to exceed the guideline by up to 50%. Thus, agencies may award up to $3 million in Phase II awards for a particular project to a single recipient at the agency's discretion, and potentially more if the agency requests and receives a waiver from the SBA. For sequential Phase II awards, some agencies require third-party matching of the STTR funds.

Phase III

Phase III of the STTR program is focused on the commercialization of the results achieved through Phase I and Phase II STTR funding. The STTR program **does not** provide funding in Phase III. Phase III funding is expected, generally, to be generated in the private sector. However, some agencies may use non-STTR funds for Phase III funding to support additional R&D or contracts for products, processes, or services intended for use by the federal government. In addition, the 2011 reauthorization act directs agencies and prime contractors "to the greatest extent practicable," to facilitate the commercialization of SBIR and STTR through the use of Phase III awards, including sole source awards.[35]

Technical Assistance

The 2011 reauthorization act also allows agencies to award STTR Phase I and Phase II award recipients up to $5,000 per year for technical assistance, in addition to the amount of the award, or to provide such assistance through a vendor.[36] This funding is intended to provide STTR recipients 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 online databases. These services are provided to help STTR awardees make better technical decisions, solve technical problems, minimize technical risks, and develop and commercialize new commercial products and processes.[37]

STTR Eligibility

A small business' eligibility for the STTR program is contingent on its location, number of employees, ownership characteristics, and other factors. The partnering research institution must meet eligibility qualifications as well. Eligibility to participate in the STTR program is limited to for-profit U.S. businesses with a location in the United States. Eligible companies must have 500 or fewer employees, including employees of affiliates.

The small business must be:

(1) more than 50% directly owned and controlled by one or more citizens or permanent resident aliens of the United States, other small business concerns (each of which is more

[35] P.L. 112-81, §5108.

[36] P.L. 112-81 §5121.

[37] 15 U.S.C. §638(q)(1).

> than 50% directly owned and controlled by individuals who are citizens or permanent resident aliens of the United States), or any combination of these; or
>
> (2) a joint venture in which each entity to the joint venture meets the requirements in paragraph (1) above.[38]

Unlike the SBIR program, the STTR does not have authority to make awards to small businesses that are more than 50% owned by multiple venture capital operating companies, hedge funds, private equity firms, or any combination of these. However, as with SBIR, the STTR program may make awards to companies that are majority-venture capital backed if the VC firm is itself more than 50% directly owned and controlled by one or more individuals who are citizens or permanent resident aliens of the United States. In such a case, that VC is allowed to have majority ownership and control of the awardee; however, the VC and the awardee, and all other affiliates, must have a total of 500 employees or less.[39]

In addition, small businesses that have received multiple prior SBIR/STTR awards must meet certain benchmark requirements for progress toward commercialization to be eligible for a new Phase I award. For both Phase I and Phase II, the principal investigator's primary employment must be with either the small business or the partnering research institution at the time of award and during the conduct of the proposed project. Generally, R/R&D work under the STTR must be performed in the United States, though agencies may allow a portion of the work to be performed or obtained outside of the United States under "rare and unique" circumstances.[40]

The partnering research institution must be located in the United States, and be either a nonprofit college or university, a domestic nonprofit research organization,[41] or a federally funded research and development center (FFRDC).[42]

For both Phase I and Phase II, not less than 40% of the R/R&D work must be performed by the small business, and not less than 30% of the R/R&D work must be performed by the single, partnering research institution. Agencies can choose whether to determine these percentages using either contract dollars or labor hours, but must explain this in the solicitation.

Current and Historical STTR Awards Data[43]

In FY2011, the most recent year for which the SBA has published data on STTR awards, agencies made awards for $251.2 million, including 482 Phase I STTR awards totaling $59.6 million and

[38] 13 C.F.R. §121.702.

[39] SBIR/STTR website, Frequently Asked Questions—VC Participation, http://sbir.gov/faq/vc-participation.

[40] Small Business Administration, *Small Business Technology Transfer Program Policy Directive*, February 24, 2014, p.15.

[41] As defined in 15 U.S.C. §3703(3) a nonprofit institution is "an organization owned and operated exclusively for scientific or educational purposes, no part of the net earnings of which inures to the benefit of any private shareholder or individual."

[42] Chapter 35 of the Federal Acquisition Regulation provides the following explanation and purposes of FFRDCs:

> An FFRDC meets some special long-term research or development need which cannot be met as effectively by existing in-house or contractor resources. FFRDC's enable agencies to use private sector resources to accomplish tasks that are integral to the mission and operation of the sponsoring agency.... FFRDC's are operated, managed, and/or administered by either a university or consortium of universities, other not-for-profit or nonprofit organization, or an industrial firm, as an autonomous organization or as an identifiable separate operating unit of a parent organization.

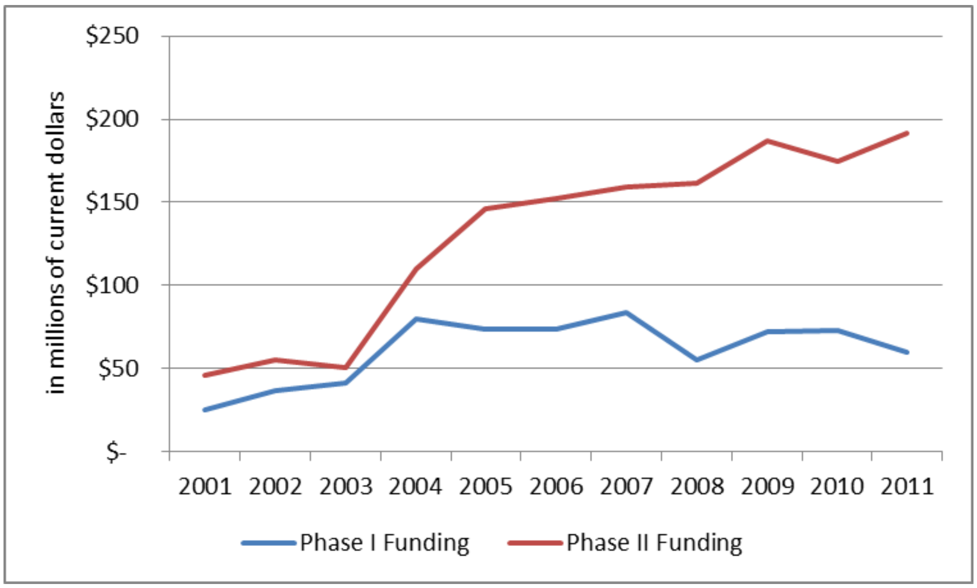
A list of FFRDCs is maintained by the National Science Foundation. See http://www.nsf.gov/statistics/ffrdclist/.

[43] See "Data Sources and Limitations," above.

238 Phase II STTR awards totaling $191.6 million. The success rate for Phase I STTR proposers was 22% and for Phase II proposers was 44%.

While 67% of STTR grants made in FY2011 were for Phase I awards, more than 76% of STTR funding went to Phase II awards. In FY2004, the STTR set-aside doubled from 0.15% to 0.30%. In the first year (FY2004), aggregate funding for Phase I and aggregate funding for Phase II approximately doubled. However, from FY2004 to FY2011, Phase I aggregate funding fell by about 25% while Phase II aggregate funding increased by about 74%. The proportional change in funding between the phases may reflect an increased focus on commercialization by the STTR agencies. See **Figure 7** for Phase I and Phase II STTR funding for FY2000-2011.

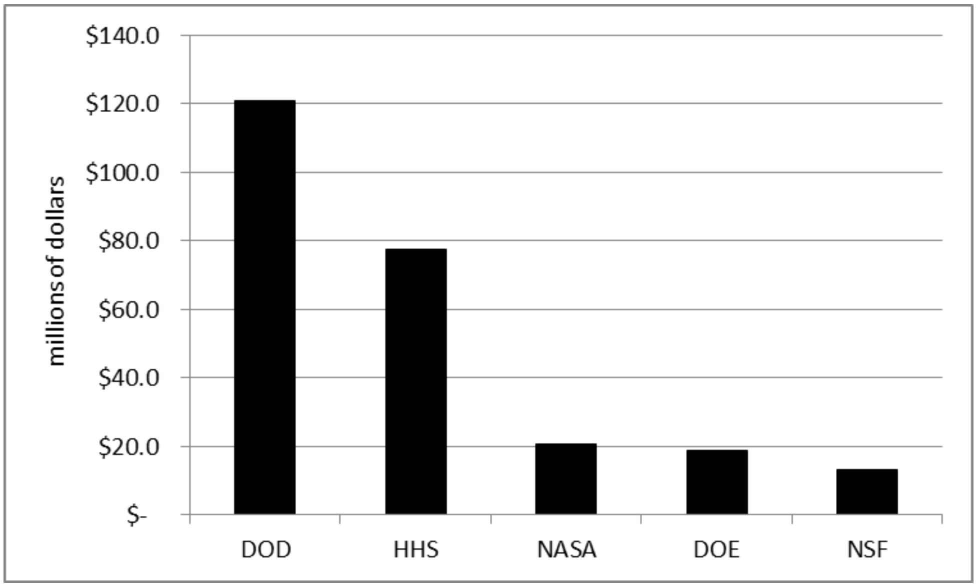
Figure 7. STTR Phase I and Phase II Funding, FY2000-FY2011



Source: CRS analysis of SBIR.gov annual report data (FY2000-2010) and *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011* (FY2011).

Like SBIR funding, STTR funding is highly concentrated. Two agencies—DOD ($120.9 million, 48%) and HHS ($77.5 million, 31%)—accounted for nearly four-fifths of STTR funding in FY2011. NASA accounted for 8%, DOE for 7%, and NSF for 5%. See **Figure 8**.

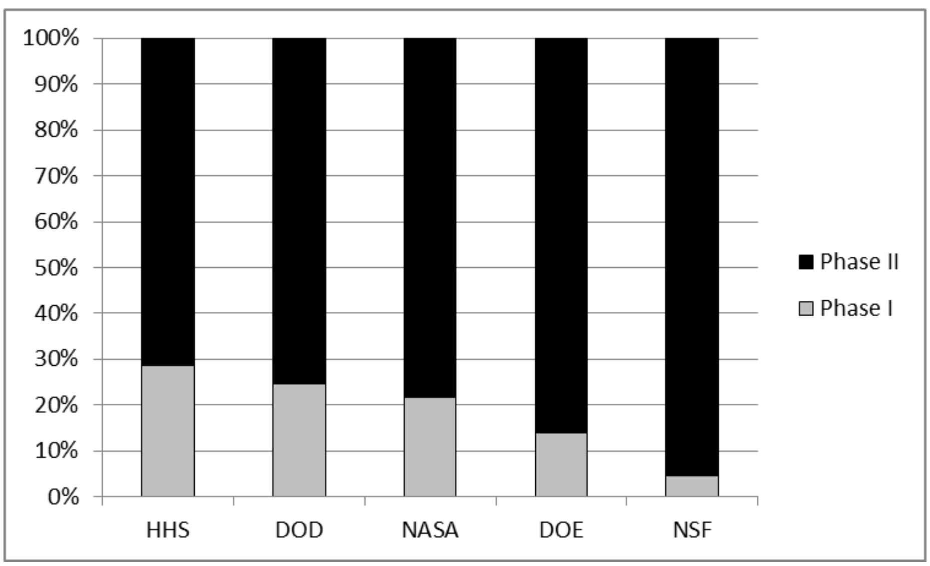
Figure 8. STTR Funding by Agency, FY2011



Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

The allocation of STTR funding to Phase I and Phase II awards varies among agencies, but the differences are smaller than for SBIR funding. Among STTR agencies, HHS allocated the largest share (29%) of its STTR funding to Phase I awards in FY2011; NSF allocated the largest share (95%) to Phase II awards. See **Figure 9**.

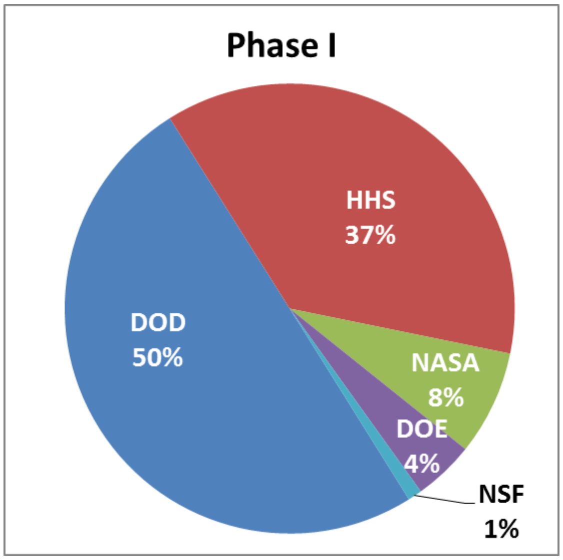
Figure 9. Agency Allocation of STTR Funding Between Phase I and Phase II, FY2011

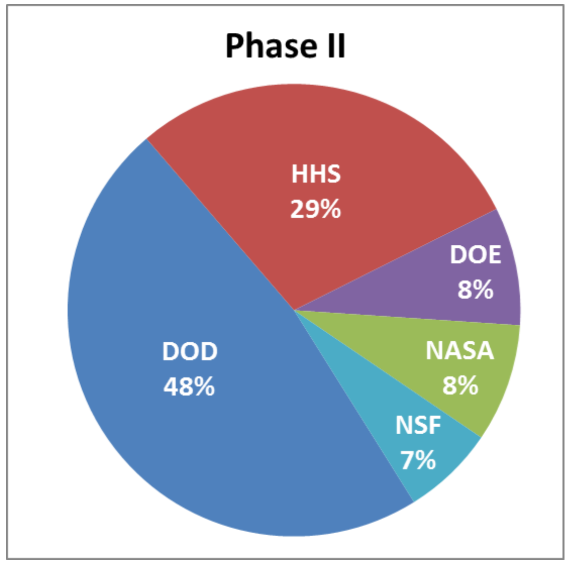


Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

The agencies with the highest share of total Phase I funding in FY2011 were DOD (50%) and HHS (37%). The agencies with the highest share of total Phase II funding in FY2011 were also DOD (48%) and HHS (29%). See **Figure 10**.

Figure 10. Share of Phase I and Phase II STTR Funding, by Agency, FY2011





Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

Minority or disadvantaged businesses[44] received 31 Phase I STTR awards (6% of all Phase I STTR awards) totaling $3.1 million (5% of total Phase I STTR funding) in FY2011, and 14 Phase II STTR awards (6%) totaling $7.9 million (4%).

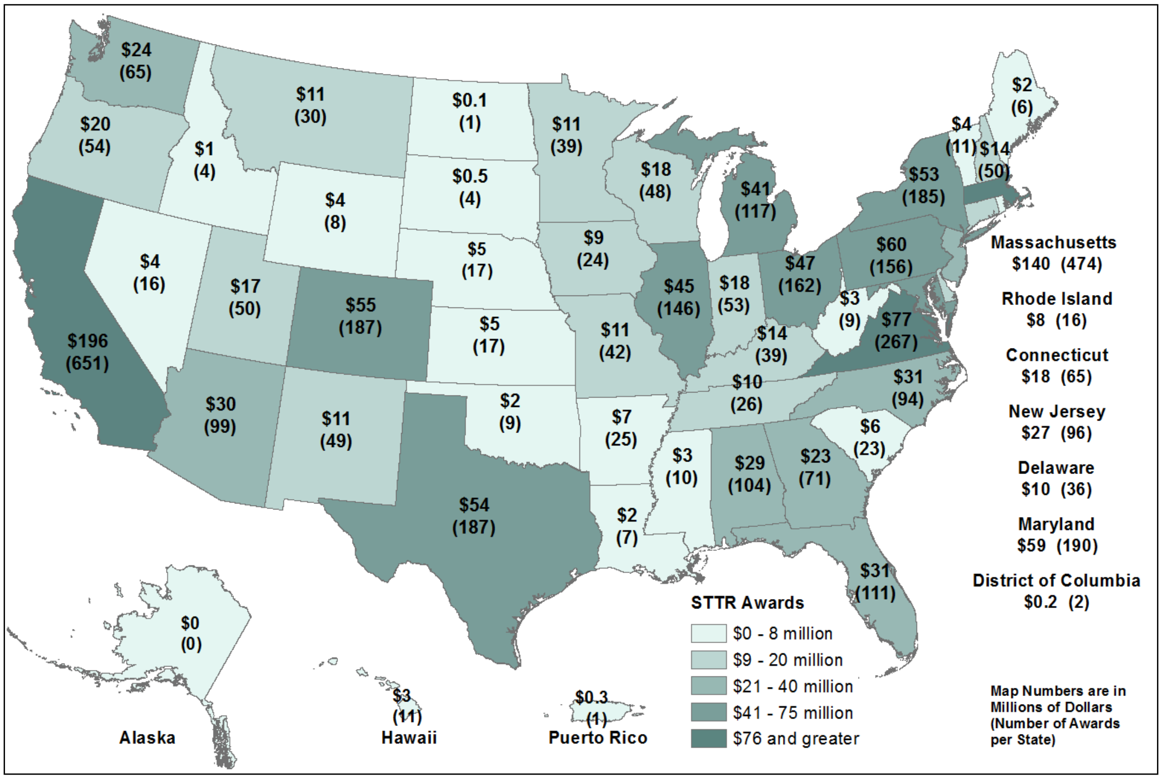
Companies from Historically Underutilized Business Zones (HUBZones)[45] received 16 Phase I STTR awards (3% of all Phase I awards) totaling $1.5 million (3% of total Phase I STTR funding) in FY2011, and 6 Phase II STTR awards (3%) totaling $2.6 million (1%).

Figure 11 shows the aggregate funding level and number of STTR awards by state for FY2006-FY2010 (the latest five-year period for which award data by state are available). STTR funding was concentrated in certain states. The three states that received the largest number and amount of STTR awards during this period—California (651 awards totaling $195.8 million), Massachusetts (474 awards totaling $139.9 million), and Virginia (267 awards totaling $77.2 million)—accounted for 33% of the total number of SBIR awards and 32% of the total funding for this period. The top ten states accounted for more than 60% of awards and funding. In contrast, the ten states with the fewest awards and lowest aggregate award amounts accounted for about 1% of awards and total funding during this period.

[44] See footnote 26 for a description of the SBA 8(a) Business Development Program and additional information on minority and disadvantaged businesses.

[45] According to the SBA, HUBZones are designated by statute and draw upon determinations and information obtained by other agencies. A HUBZone may be one of the following: a qualified Census Tract, a qualified Nonmetropolitan County, a qualified Indian Reservation, a Qualified Base Closure Area, or a Redesignated Area. For more information, see the SBA's Understanding HUBZone Designations webpage at http://www.sba.gov/tools/sba-learning-center/training/hubzone-mini-primer-understanding-hubzone-designations.

Figure 11. STTR Aggregate Funding Level and Number of Awards by State, FY2006-2010



Source: CRS analysis of FY2006-2010 state data from SBIR.gov.

Table 3 provides information on overall agency STTR obligations for FY2011, as well as the number and aggregate amounts of Phase I and Phase II awards.

Table 3. Number and Amount of STTR Awards by Agency, FY2011

(in millions of dollars)

		Phase I		Phase II	
Department/Agency	**Total Amount Awarded, Phase I and Phase II[a]**	**Number of Awards**	**Total Amount Awarded**	**Number of Awards**	**Total Amount Awarded**
Department of Defense	$ 121.0	309	$ 29.8	127	$ 91.2
Department of Energy	18.8	26	2.6	22	16.2
Dept. of Health and Human	77.5	98	22.1	44	55.4
Nat'l Aeronautics and Space Admin.	20.7	45	4.5	27	16.2
National Science Foundation	13.2	4	0.6	18	12.6
Total, All Agencies[a]	**251.2**	**482**	**59.6**	**238**	**191.6**

Source: CRS analysis of FY2011 data from *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

a. Components many not sum to totals due to rounding.

Table 4 provides historical information on the number of Phase I and Phase II STTR awards and total annual STTR funding from the program's inception through FY2011.

Table 4. Number and Amount of STTR Awards by Year, FY1994-FY2011

	Dollars Awarded (in millions)			Number of Awards		
Fiscal Year	**Phase I**	**Phase II**	**Total**	**Phase I**	**Phase II**	**Total**
FY1994	$18.9	$—	$ 18.9	198	—	198
FY1995	23	10.7	33.7	238	22	260
FY1996	22.7	41.8	64.5	238	88	326
FY1997	24.2	44.9	69.1	260	89	349
FY1998	19.7	45.1	64.8	208	109	317
FY1999	24.3	40.6	64.9	251	78	329
FY2000	23.9	45.9	69.8	233	95	328
FY2001	24.2	53.2	77.4	224	113	337
FY2002	36.4	55.4	91.8	356	114	470
FY2003	41.1	50.7	91.8	397	111	508
FY2004	79.7	110.3	190.0	674	195	869
FY2005	73.9	146.4	220.3	611	221	832
FY2006	74.0	152.3	226.3	644	234	878
FY2007	83.5	159.4	242.9	634	213	847
FY2008	61.2	178.4	239.6	483	251	734
FY2009	72.1	186.9	259.0	592	251	843
FY2010	73.1	174.3	247.4	625	256	881
FY2011	59.6	191.6	251.2	482	238	720

Source: U.S. Small Business Administration, *The Small Business Economy 2010, A Report to the President*, http://www.sba.gov/sites/default/files/sb_econ2010.pdf; SBIR.gov website; and *Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Annual Report FY2009-FY2011*.

SBIR/STTR Reauthorization Act of 2011 Provisions

The SBIR/STTR Reauthorization Act of 2011 (enacted as Division E of the National Defense Authorization Act for Fiscal Year 2012, P.L. 112-81) authorizes the SBIR and STTR programs through September 30, 2017. The act also changes certain aspects of the programs. This section provides an overview of these changes.

Participation of Small Businesses That Are Majority-Owned by Venture Capital Companies

Perhaps the most widely debated issue of the reauthorization was whether to permit small companies that are majority-owned by venture capital operating companies, hedge funds, or private equity firms to receive grants under the SBIR and STTR programs. In what might be considered a compromise position, the act permits NIH, DOE, and NSF to award not more than 25% of SBIR funds to small businesses "that are owned in majority part by multiple venture capital operating companies, hedge funds, or private equity firms through competitive, merit-based procedures that are open to all eligible small business concerns."[46] Other federal agencies may not award more than 15% of SBIR funds to such firms. The act directs the GAO to conduct triennial studies on venture capital operating company, hedge fund, and private equity firm involvement in the program. The first report is due in December 2014. For further discussion of this issue, see "Eligibility of Venture Capital-Backed Small Businesses."

Agency Set-Aside Percentages and Award Limitations

The act increases the percentages of extramural R&D funding that agencies must set aside for the SBIR and STTR programs, introducing the changes over multiple years. See **Table 5**.

Table 5. SBIR and STTR Set-Aside Percentages by Year

	SBIR Set-Aside Percentage	STTR Set-Aside Percentage
FY2011	2.5%	0.30%
FY2012	2.6%	0.35%
FY2013	2.7%	0.35%
FY2014	2.8%	0.40%
FY2015	2.9%	0.40%
FY2016	3.0%	0.45%
FY2017 and later fiscal years	3.2%	0.45%

Source: P.L. 112-81.

Additionally, the law increases the award guidelines on Phase I SBIR/STTR awards from $100,000 to $150,000 and on Phase II SBIR/STTR awards from $750,000 to $1,000,000. Agencies cannot exceed these guidelines by more than 50% without a waiver from the SBA. The act also provides express authority to agencies to make a sequential Phase II award to continue the work of an initial Phase II award. Sequential Phase II awards are also subject to the $1 million guideline/$1.5 million limit. Upon agency request, the SBA Administrator may grant a waiver allowing an agency to exceed the limits with respect to a specific topic for a fiscal year if the limitations will interfere with the ability of the agency to fulfill its research mission through the SBIR program or the STTR program. The agency must agree to minimize the number of awards that exceed the award guidelines.

[46] P.L. 112-81 §5107.

GAO Audit of Agencies' Extramural R&D Budget Calculations

The act directs the GAO to audit and report on agency calculation of their extramural R&D budgets. GAO has reported that agencies have been inconsistent and late in reporting to the SBA their explanations of how they calculate their extramural R&D budgets, which are the basis used to calculate the minimum SBIR and STTR set-aside amounts.[47] For further discussion of this issue, see "Calculation of Extramural Research Funding and Set-Aside."

Company Flexibility in Pursuit of Phase II Grants

The act gives small businesses more flexibility in applying for Phase II awards. Recipients of a Phase I award from one federal agency may now apply for a Phase II award from another agency to pursue the original work (e.g., a company that received a Phase I award from the Department of Energy may apply for a Phase II award from the Department of Defense to build on its Phase I work). In addition, a small business may switch between the SBIR and STTR programs for Phase I and Phase II awards (e.g., a small business that wins an SBIR Phase I award may now compete for a Phase II STTR award). The act requires agency heads to verify that any activity to be performed with respect to a project with a Phase I or Phase II SBIR or STTR award has not been funded under the SBIR program or STTR program of another Federal agency to prevent the duplication of funded work.[48]

In addition, the act establishes a pilot program that allows the Department of Defense, Department of Education, and National Institutes of Health to award Phase II grants to small businesses that did not first receive a Phase I grant.

Commercialization Focus

The 2011 reauthorization act includes a number of provisions seeking to increase the programs' effectiveness in technology commercialization. The act requires each SBIR/STTR agency to establish a system to measure the success of small businesses that received Phase I awards in securing Phase II awards. Agencies are also required to establish minimum performance standards for small businesses in advancing from a Phase I award to a Phase II award, and to evaluate each recipient's compliance with the standard. Small firms that fail to meet this standard are barred from competing for additional Phase I SBIR or STTR awards from that agency for a one year. Similarly, the act requires each agency to: establish systems to measure the success of SBIR and STTR awardees in securing Phase III SBIR or STTR awards, establish a minimum performance standard in this regard, evaluate each recipient's compliance with the standard, and bar firms that fail to meet this standard from competing for additional Phase I (and in some cases, Phase II) SBIR or STTR awards for one year. Agencies are required to report their tracking systems and minimum performance standards to the SBA Administrator for approval.

The act also authorized agencies to establish commercialization readiness pilot programs. This authority allows each agency to use up to 10% of its SBIR and STTR funds to make awards of up to three times the dollar amounts established for Phase II awards. These awards may be used to support technology development, testing, evaluation, and commercialization assistance for SBIR and STTR Phase II technologies, or to support the progress of R/R&D and commercialization

[47] U.S. Government Accountability Office, *Small Business Research Programs: Actions Needed to Improve Compliance with Spending and Reporting Requirements*, GAO-13-421, September 9, 2013, http://gao.gov/assets/660/657489.pdf.

[48] P.L. 112-81 §5111.

conducted under the SBIR or STTR programs to Phase III. To establish a commercialization readiness pilot program, agencies must first make a written application to the SBA Administrator for approval describing

> a compelling reason that additional investment in SBIR or STTR technologies is necessary, including unusually high regulatory, systems integration, or other costs relating to development or manufacturing of identifiable, highly promising small business technologies or a class of such technologies expected to substantially advance the mission of the agency.[49]

In making such awards, agency heads are directed to consider whether the technology to be supported by the award is likely to be manufactured in the United States.

The act encourages agencies to award SBIR and STTR grants to small businesses that work with federal laboratories or that are involved in cooperative research and development agreements (also known as CRADAs).

In addition, the act allows agencies to contract with a vendor to provide SBIR/STTR awardees with technical assistance services. Such services could include access to a network of scientists and engineers engaged in a wide range of technologies or access to technical and business literature available through online databases. Funding of these services is intended to help the small businesses make better technical decisions, solve technical problems which arise during the conduct of their SBIR/STTR projects, minimize technical risks associated with such projects, and develop and commercialize new commercial products and processes resulting from such projects. Alternatively, an agency may authorize SBIR/STTR awardees to purchase such services up to $5,000 per year, in addition to the amount of the recipient's award.

The act also establishes a "Phase 0 Proof of Concept Partnership Pilot Program" at NIH to accelerate the creation of small businesses and the commercialization of research innovations from universities or other research institutions that participate in the NIH STTR program. Under this pilot, NIH may make awards of up to $1 million per year for up to three years. These funds may be used to support technical validations, for market research, to clarify intellectual property rights position and strategy, or to investigate commercial or business opportunities. These funds may not be used for basic research activities or for the acquisition of research equipment or supplies unrelated to commercialization activities.

Another commercialization-focused provision of the act provides a special acquisition preference to SBIR and STTR award recipients. The act directs agencies and prime contractors, to the greatest extent practicable, to issue Phase III awards relating to technology, including sole source awards, to the SBIR and STTR award recipients that developed the technology.

Annual Reporting of Agencies' Advanced Manufacturing Activities

The act requires each agency that makes total SBIR and STTR awards in excess of $50 million to report annually to the SBA Administrator on efforts to improve U.S. manufacturing activities and to make recommendations for further improvements. The SBA is required to incorporate the agency reports into its mandatory annual report to Congress.

Data Rights Protection

The act includes a provision to protect the rights of small businesses to data generated in the performance of an SBIR award for a period of not less than four years. In addition, the act directs

[49] P.L. 112-81 §5123.

GAO to report to Congress on the implementation and effectiveness of data rights protection. Specifically, the act directs GAO to assess whether federal agencies comply with data rights protections for SBIR awardees and their technologies;[50] whether the laws and policy directives intended to clarify the scope of data rights are sufficient to protect SBIR awardees; and whether there is an effective grievance tracking process for SBIR awardees who have grievances against a federal agency regarding data rights and a process for resolving those grievances. The act required a report within 18 months of its enactment (approximately June/July 2013). GAO issued a letter in November 2013 stating that it was awaiting SBA's revision of the policy directive as it "has a bearing on the issue of whether laws and policy directives are sufficient to protect SBIR awardees."[51] SBA subsequently published its updated policy directive on February 24, 2014. GAO has not published a report on this matter as of August 2014.

Provisions to Reduce Waste, Fraud, and Abuse

Congress has expressed continuing concerns about waste, fraud, and abuse in the SBIR and STTR programs. The 2011 reauthorization act includes a number of provisions to identify and eliminate waste, fraud, and abuse. To this end, the act:

- requires the SBA administrator to amend the SBIR Policy Directive and the STTR Policy Directive to include measures to prevent fraud, waste, and abuse;
- directs that the amendments to the policy directives include definitions or descriptions of fraud, waste, and abuse; guidelines for the monitoring and oversight of applicants to, and recipients of, awards; and a requirement that each SBIR/STTR agency provide information on the method established by each agency inspector general to report fraud, waste, and abuse on its website and in any SBIR/STTR solicitation;
- requires SBIR and STTR applicants and award recipients to certify its compliance with the laws relating to the programs and the conduct guidelines established under the policy directives;
- directs inspectors general in SBIR and STTR agencies to establish fraud detection indicators; review regulations and operating procedures; coordinate information sharing between agencies, to the extent otherwise permitted under federal law; and improve the education and training of and outreach to program administrators, applicants, and recipients; and
- requires the GAO to publish an initial report within one year from the date of enactment and every four years thereafter.

For further discussion of this issue, see "Concerns About Duplicative Awards and Other Types of Waste, Fraud, and Abuse."

Management and Administrative Improvements

The act requires the Director of the Office of Science and Technology Policy to establish an Interagency SBIR/STTR Policy Committee that includes representatives of the SBA and all agencies with an SBIR or STTR program. The law directs the committee to develop policy recommendations on ways to improve program effectiveness and efficiency, including issues

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[50] 15 U.S.C. §638.

[51] U.S. Government Accountability Office, *Small Business Innovation Research: Data Rights Protections*, GAO-14-116R, November 4, 2013, http://gao.gov/assets/660/658721.pdf.

related to development of the SBIR and STTR awards databases; agency flexibility in establishing Phase I and II award sizes; best practices in technology commercialization and mechanisms for addressing company funding gaps after Phase II but prior to commercialization; a framework for a systematic assessment of SBIR and STTR programs, including tracking awards and outcomes; and outreach and technical assistance activities that increase the participation of small businesses underrepresented in the SBIR and STTR programs. Following initial one-year and 18-month reports, the committee is to report to selected committees of Congress every two years.

The act also establishes a pilot program that allows agencies to use no more than 3% of SBIR program funds for administrative activities, oversight, and contract processing. Among the authorized uses of these funds are: to support the administration of the SBIR and STTR programs; to support outreach and technical assistance relating to the SBIR and STTR programs, including technical assistance site visits, personnel interviews, and national conferences; to increase outreach activities to increase the participation of women-owned and socially and economically disadvantaged small business concerns; to support the implementation of commercialization and outreach initiatives of P.L. 112-81; to increase participation of states that have traditionally received low levels of SBIR awards; to support activities related to congressional oversight, including the prevention of waste, fraud, and abuse; to carry out the laws authorizing participation by majority venture capital-owned small businesses; to pay for contract processing costs relating to the SBIR and STTR programs; and to pay for additional personnel and assistance with application reviews.

The act further required the SBA to publish revised SBIR and STTR policy directives incorporating the act's changes in the programs mandated by the act within 180 days of the passage of the legislation. SBA published revised policy directives for comment in the *Federal Register* on August 6, 2012; the comment period closed on October 5th; and final action occurred in December 2013. The policy directives were updated on February 24, 2014. The final rule for venture capital participation was finalized and published in the *Federal Register* on December 27, 2012.[52]

Issues for Consideration

As it has since establishing the SBIR and STTR programs, Congress seeks to better understand and address challenges to the programs' effectiveness. The following section provides an overview of selected ongoing issues that Congress may opt to consider.

Eligibility of Venture Capital-Backed Small Businesses

Much of the debate over the reauthorization of the SBIR and STTR programs in 2011 revolved around a regulation that required at least 51% ownership by an individual or individuals. Some experts argued that participation by small firms that are majority-owned by venture capital companies, hedge funds, and private equity firms should be permitted. Proponents of this change maintained that, particularly in the biotechnology sector, the most innovative companies were not able to use the SBIR program because they did not meet these ownership criteria. Opponents of altering the eligibility requirements argued that the program is designed to provide financial assistance where venture capital is not available. They asserted that the program's objective is to bring new concepts to the point where private sector investment is feasible. While the new law

[52] Small Business Administration, "Small Business Size Regulations, Small Business Innovation Research (SBIR) Program and Small Business Technology Transfer (STTR) Program," 72 *Federal Register* 76215, December 27, 2012.

permits limited participation by majority venture capital owned companies, it remains to be seen how this will affect the outcomes of the two programs.

Agency Compliance with Mandatory Minimum Expenditure Levels

A continuing issue for the SBIR and STTR programs is agency compliance with expending the statutory minimum percentage of extramural research funding annually. In a September 2013 report, GAO found that 8 of the 11 agencies participating in the SBIR program and 4 of the 5 agencies participating in the STTR program failed to consistently comply with spending requirements for FY2006-FY2011.[53] In June 2014, GAO reported that three agencies failed to comply with the SBIR requirement and three failed to comply with the STTR requirement in FY2012. GAO reported that program managers at two of the non-compliant agencies asserted that their agencies would be in compliance if the agencies spent the total amount reserved or budgeted for their programs, regardless of what year the funding was spent. GAO asserted that the law requires agencies to "expend" a certain amount of funding each year and attributes the agencies' misinterpretation, in part, to the SBA's SBIR and STTR policy directives which "inaccurately state that the authorizing legislation requires agencies to 'reserve' the minimum amount each year."[54]

Among the factors affecting agencies' failure to comply with meeting the mandatory minimum expenditure levels are challenges in calculating the amount to be set aside; the enactment of appropriations after the start of the fiscal year; and differing agency interpretations of the statutory requirement for "expended."

Calculation of Extramural Research Funding and Set-Aside

The SBIR and STTR set-asides are based on an agency's extramural budget for research or research and development.[55] The calculation of the amount of this budget can be complex for some agencies. For example, several agencies support extramural R/R&D funding through multiple subunits.[56] In addition, agency extramural R/R&D funding can come from more than one appropriations account, and such accounts can include activities and programs that are not extramural R/R&D.[57] Accordingly, each agency must determine its extramural R/R&D budgets using a methodology that identifies extramural R/R&D funding as well as what is to be excluded from this amount.[58]

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[53] U.S. Government Accountability Office, *Small Business Research Programs: Actions Needed to Improve Compliance with Spending and Reporting Requirements*, GAO-13-421, September 9, 2013, http://gao.gov/assets/660/657489.pdf.

[54] U.S. Government Accountability Office, *Small Business Research Programs: More Guidance Needed to Comply with Spending and Reporting Requirements*, GAO-14-431, summary page, June 2014, http://gao.gov/assets/670/663909.pdf.

[55] "Extramural budget" is defined as "the sum of the total obligations for R/R&D minus amounts obligated for R/R&D activities by employees of a federal agency in or through government-owned, government-operated facilities. See *SBIR Program Policy Directive,* p. 6.

[56] For example, the Department of Energy extramural R/R&D budget includes funding in the Office of Science, Office of Nuclear Energy, Office of Electricity Delivery and Energy Reliability, Office of Energy Efficiency and Renewable Energy, Office of Environmental Management, Office of Fossil Energy, National Nuclear Security Administration, and Advanced Research Projects Agency—Energy.

[57] For example, more than one National Science Foundation account has extramural R&D funding as well as funding that is not R&D.

[58] Agencies are required to exclude, for example, subunits in the intelligence community from their extramural R&D

Given the complexity of this challenge, Congress required each agency to report its methodology to SBA annually within four months of enactment of its appropriation.[59] The *SBIR Program Policy Directive* requires that this report also include an itemization and explanation of excluded items.[60] However, GAO also found that at least six agencies did not itemize and/or explain exclusions from their calculations. In addition, according to GAO, agencies generally have submitted these reports to SBA too late for the SBA to provide timely feedback to the agencies after reviewing their methodologies and exclusions. GAO recommended that agencies submit their methodology reports in accordance with the four months provided after enactment of appropriations as specified in law.[61]

Another factor affecting the calculation of SBIR funding is that, in practice, agencies generally calculate their SBIR set-asides based on their extramural R/R&D *budgets* and not on their extramural R/R&D *obligations* as required by statute.[62] An agency's extramural R/R&D budget reflects its spending plans for a fiscal year, whereas an agency's extramural R/R&D obligations reflect the amount of funds an agency obligates[63] to spending in a fiscal year; a final obligation figure for extramural R/R&D may not be calculable until the end (or very close to the end) of a fiscal year. Thus, an agency's extramural R/R&D obligations (and the minimum SBIR set-aside amount) may be higher or lower than the level the agency anticipated in its extramural R/R&D budget.

Enactment of Appropriations after Start of Fiscal Year

Enactment of appropriations after the start of a fiscal year may also affect the ability of agencies to expend SBIR/STTR funds in that fiscal year. For example, if an agency plans its expenditures around a level specified in a continuing resolution but then receives a higher level of funding in its final appropriations act(s), then expenditure of the additional amount set aside for SBIR/STTR in that fiscal year may be difficult.

A related factor that may delay calculation of the amount to be set aside for SBIR/STTR is the time required for an agency to determine the amount of its extramural research funding. Appropriations acts often provide funding to accounts with multiple purposes, including extramural R&D, intramural R&D, and non-R&D activities. In such cases, agencies must make allocation decisions for these funds (subject to limitations and guidance provided in the

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budget.

[59] 15 U.S.C. §638(i)(2).

[60] Small Business Administration, *Small Business Innovative Research Program Policy Directive*, February 24, 2014, p. 40.

[61] U.S. Government Accountability Office, *Small Business Research Programs: More Guidance and Oversight Needed to Comply with Spending and Reporting Requirements*, GAO-14-431, June 2014.

[62] 15 U.S.C. §638(e).

[63] The U.S. Government Accountability Office defines obligation as:

> A definite commitment that creates a legal liability of the government for the payment of goods and services ordered or received, or a legal duty on the part of the United States that could mature into a legal liability by virtue of actions on the part of the other party beyond the control of the United States. Payment may be made immediately or in the future. An agency incurs an obligation, for example, when it places an order, signs a contract, awards a grant, purchases a service, or takes other actions that require the government to make payments to the public or from one government account to another.

Source: U.S. Government Accountability Office, *A Glossary of Terms Used in the Federal Budget Process*, GAO-05-734SP, September 2005, p. 70, http://gao.gov/assets/80/76911.pdf.

appropriations act(s) and related report language) before the extramural research budget can be calculated.

Similarly, agency officials have asserted that agencies had already planned their programs and made awards in FY2012 prior to enactment of the SBIR/STTR Reauthorization Act of 2011 which contained provisions increasing the set aside percentage and which was enacted a quarter into FY2012.[64]

Agency Views of Requirement to "Expend" Funds

Some program managers at agencies that fell short of the statutorily required expenditures in FY2012 told GAO that they believed their agency was in compliance if their agency spent the total amount reserved or budgeted for the program regardless of what year the funding is spent. GAO, however, responded that the statute requires each agency to "expend" the funds in the year it is set aside. GAO recommended that SBA revise its SBIR and STTR policy directives to accurately reflect the statutory language regarding program spending requirements.[65]

Congress might consider statutory changes that alter or clarify how agencies are to determine the amount to be set aside each year for SBIR and STTR, and whether those amounts must be spent in the same fiscal year; obligated, in whole or in part, for expenditure over multiple fiscal years; or expended without restriction to any given period.

Improving Technology Commercialization, Trade-Offs Among Program Objectives

A statutory goal of the SBIR and STTR programs is to foster the development and commercialization of new technologies. Success in achieving this goal can take different forms, for example an innovation that addresses an agency need (e.g., an improved material for a NASA spacecraft), a commercial opportunity, or both. Such innovations can promote economic growth, job creation, and national competitiveness, or address other societal needs and challenges such as national defense, public health, and environmental protection. The 2011 reauthorization act includes a number of provisions focused on improving commercialization. For example, the act authorizes agencies to provide assistance to SBIR/STTR awardees to overcome technical barriers and to allow agencies to establish commercialization readiness pilot programs.

Some analysts have cautioned against placing too much emphasis on commercialization for evaluating the success of the SBIR program. These analysts argue that commercialization is only one of the four overarching SBIR/STTR program goals, and that too strong of a focus on one goal might diminish the emphasis on the others.[66] GAO has noted that using commercialization outcomes as the primary metric of SBIR/STTR success may be insufficient because SBIR and STTR awardees make be making contributions to other agency goals—such as meeting research

[64] U.S. Government Accountability Office, *Small Business Research Programs: More Guidance and Oversight Needed to Comply with Spending and Reporting Requirements*, GAO-14-431, June 2014.

[65] U.S. Government Accountability Office, *Small Business Research Programs: More Guidance and Oversight Needed to Comply with Spending and Reporting Requirements*, GAO-14-431, June 2014.

[66] Testimony of David H. Finifter, Professor of Economics, Emeritus, Research Professor of Public Policy, The College of William and Mary, in U.S. Congress, House Committee on Small Business, *Oversight of the Small Business Innovation Research and Small Business Technology Transfer Programs*, hearings, 113th Cong., 2nd sess., May 21, 2014, available at http://smallbusiness.house.gov/calendar/eventsingle.aspx?EventID=373098.

needs or expanding innovation.[67] Given SBIR/STTR agencies' wide range of missions—from general missions, such as advancing fields of science, to more specific missions, such as providing for the national defense—some analysts have recommended that Congress continue to provide flexibility to agencies in the operation of their programs.[68]

Tracking of Commercialization Successes and Other SBIR Information

Data collection has been and remains an issue for the SBIR and STTR programs according to several reports. An August 2009 GAO study reiterated earlier GAO findings of deficiencies in the SBA Tech-Net system designed to collect information from agency SBIR programs. This report noted that "Although SBA did not meet its statutorily mandated deadline of June 2001, the database has been operational since October 2008, and contains limited new information but may also contain inaccurate historical data."[69] A November 2010 report issued by the SBA's Office of the Inspector General noted that "limited progress" had been made on the Tech-Net system.

> Participating agencies were still experiencing difficulty in searching the database for duplicative awards and other indicators of fraud because information in the Tech-Net database was incomplete, and the search capabilities of the system were limited…. Additionally, SBA had not developed the government-use component of Tech-Net to capture information on the commercialization of SBIR research and development projects.[70]

GAO also addressed agencies' shortcomings with respect to assessing the commercialization success of awardees in reports issued in November 2010 and August 2011. The earlier report found that "DOD lacks complete commercialization data to determine the effectiveness of the program in transitioning space-related technologies into acquisition programs or the commercial sector" and that "there are inconsistencies in recording and defining commercialization."[71] The later study indicated that "Comparable data are not available across participating agencies to evaluate progress in increasing commercialization of SBIR technologies."[72] The report goes on to state that, "with the exception of DOD, agencies that GAO reviewed did not generally take steps to verify commercialization data they collected from award recipients, so the accuracy of the data is largely unknown."[73]

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[67] U.S. Government Accountability Office, *Federal Research: Observations on the Small Business Innovation Research Program*, GAO-05-861T, June 28, 2005, http://gao.gov/assets/120/111851.pdf.

[68] Testimony of David H. Finifter, Professor of Economics, Emeritus, Research Professor of Public Policy, The College of William and Mary, in U.S. Congress, House Committee on Small Business, *Oversight of the Small Business Innovation Research and Small Business Technology Transfer Programs*, hearings, 113th Cong., 2nd sess., May 21, 2014, available at http://smallbusiness.house.gov/calendar/eventsingle.aspx?EventID=373098.

[69] Government Accountability Office, Small Business Innovation Research: Observations on Agencies' Data Collection and Eligibility Determination Efforts, GAO-09-956T, August 6, 2009, p. 11, http://www.gao.gov/products/GAO-09-956T.

[70] Small Business Administration, Office of the Inspector General, *Usefulness of the Small Business Innovation Research Tech-Net Database*, Report Number 11-02, November 12, 2010, p. 3, http://www.sba.gov/sites/default/files/oig_report_11_02.pdf.

[71] U.S. Government Accountability Office, *Space Acquisitions: Challenges in Commercializing Technologies Developed under the Small Business Innovation Research Program*, GAO-11-21, November 10, 2010, summary page, http://gao.gov/assets/320/312130.pdf.

[72] U.S. Government Accountability Office, *Small Business Innovation Research: SBA Should Work with Agencies to Improve the Data Available for Program Evaluation*, GAO-11-698, August 15, 2011, summary page, http://gao.gov/assets/330/322653.pdf.

[73] U.S. Government Accountability Office, *Small Business Innovation Research: SBA Should Work with Agencies to*

In a December 2013 report, GAO stated that it was "unable to assess the extent of technology transition associated with the military department SBIR programs because comprehensive and reliable technology transition data [for SBIR projects] are not collected."[74] Among the challenges GAO identified in this regard were the lack of a common definition for technology transition across SBIR programs resulting in potential inconsistencies in reporting and the difficulty in tracking transitions due to the long time periods over which they can take place. GAO stated that DOD has not communicated a timeline for when it will be able to comply with statutory reporting requirements. To address these shortcomings, GAO recommended that DOD establish a common definition for technology transition to be used by all DOD SBIR programs; develop a plan to meet new technology transition reporting requirements that will improve the completeness, quality, and reliability of SBIR transition data; and report to Congress on its plan for meeting the reporting requirements set out in P.L. 112-81.[75]

In testimony before the House Small Business Committee in July 2014, GAO once again noted the continuing problem. While acknowledging that DOD agencies have collected selected transition success stories on an ad hoc basis from SBIR program officials, acquisition program officials, prime contractors, and small businesses, GAO found that "the extent of transition is unknown because comprehensive and reliable transition data are not collected."[76] Further, GAO found that the two data systems used by DOD to identify transition successes program-wide "have significant gaps in coverage and data reliability concerns that limit their transition tracking capabilities. In addition, the systems are not designed to capture detailed information on acquisition programs, fielded systems, or on projects that did not transition."[77]

Concerns About Certain Awardees' ("SBIR Shops") Lack of Progress Toward Commercialization

Some critics of the SBIR/STTR programs express particular concern that some firms had become adept at competing for SBIR awards to support their research activities, but had little record of accomplishment in the commercialization of their work. These critics, who sometimes refer to such small businesses as "SBIR shops," assert that these firms may have little interest in commercialization. For example, Lux Research, Inc., an emerging technologies consulting firm, asserts that such firms "go from one SBIR grant to another for years, sometimes decades, and their teams have professional grant writers who are paid to do nothing else but submit successful grant applications into multiple agencies."[78]

Others analysts assert that that while the issue bears watching, the evidence shows that "more of the multiple award winners are also successful in commercialization, receiving additional

Improve the Data Available for Program Evaluation, GAO-11-698, August 15, 2011, summary page, http://gao.gov/assets/330/322653.pdf.

[74] U.S. Government Accountability Office, Small Business Innovation Research: DOD's Program Supports Weapon Systems Development, but Lacks Comprehensive Data on Technology Transition Outcomes, GAO-14-96, December 2013, p. 8, http://www.gao.gov/assets/660/659874.pdf.

[75] Ibid.

[76] U.S. Government Accountability Office, Small Business Innovation Research: DOD's Program Has Developed Some Technologies that Support Military Users, but Lacks Comprehensive Data on Transition Outcomes, GAO-14-748T, July 23, 2014, p. 6, http://gao.gov/assets/670/664971.pdf.

[77] Ibid, p. 6.

[78] Bilal Zuberi, Partner, Lux Research, Inc., "SBIR/STTR grants are great. 'SBIR shops' are not," May 20, 2014, http://www.luxcapital.com/blog/sbirsttr-grants-are-great-sbir-shops-are-not/.

investment dollars from other sources, and/or successful in having their technologies infused into federal agencies."[79]

Congress responded to such concerns in the 2011 reauthorization act by requiring agencies to track companies success in advancing their work from Phase I to Phase II or from Phase I to Phase III, establishing minimum performance standards in this regard, and denying firms the right to participate in Phase I and Phase II of an agency's SBIR and STTR programs for one year if they fail to meet these standards.

Concerns About Duplicative Awards and Other Types of Waste, Fraud, and Abuse

Identification and elimination of waste, fraud, and abuse in the SBIR/STTR programs have been abiding concerns of Congress. Congress has held multiple hearings, enacted legislation intended to address these concerns, and directed GAO to monitor and report on agency progress in implementing the law and combatting waste, fraud, and abuse. (For example, see "Provisions to Reduce Waste, Fraud, and Abuse" for a discussion of the waste, fraud, and abuse provisions of the 2011 reauthorization act.)

While waste, fraud, and abuse can occur in a variety of ways, duplication of research proposals has been a particular concern for many years. In 1995, GAO reported that contractors had received duplicate funding for similar SBIR research proposals and attributed such duplication to false contractor certifications, lack of a consistent definition for "similar" research," and lack of interagency sharing of data on SBIR awards.[80]

At a 2009 Senate Committee on Commerce, Science, and Transportation hearing, a technology company executive testified that his former employer sought to defraud agency SBIR programs in a number of ways, including duplication in Phase I and Phase II proposals prior to funding; duplication in Phase I and Phase II contracts after funding within performance reports; invoicing the government for the same equipment and materials under different SBIR grants; subcontracting SBIR work out to another company without the government's knowledge; and cross-charging labor and materials used to complete commercial work to government-funded SBIR contracts. The witness further asserted, "To certain types of individuals, the ease that research fraud can be conducted with SBIR funds becomes an addictive alternative to the hard work of commercializing actual research."[81]

At the same hearing, the NASA acting inspector general testified that the agency had investigated or was currently investigating cases of alleged fraud for submitting duplicate proposals to different federal agencies and receiving multiple awards for essentially the same work under the SBIR program; submitting different proposals to multiple federal agencies but providing duplicate deliverables based on the same research; failing to comply with subcontracting

[79] Testimony of David H. Finifter, Professor of Economics, Emeritus, Research Professor of Public Policy, The College of William and Mary, in U.S. Congress, House Committee on Small Business, *Oversight of the Small Business Innovation Research and Small Business Technology Transfer Programs*, hearings, 113th Cong., 2nd sess., May 21, 2014, available at http://smbiz.house.gov/UploadedFiles/5-21-2014_Finifter_Testimony.pdf.

[80] U.S. General Accounting Office, *Federal Research: Interim Report on the Small Business Innovation Research Program*, GAO/RCED 95-59, March 8, 1995, http://gao.gov/assets/160/154923.pdf.

[81] Testimony of Alfred J. Longhi, Jr., former Vice President, Lithium Power Technologies, in U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Waste, Fraud, and Abuse in the SBIR Program*, hearings, 112th Cong., 1st sess., August 6, 2009, available at http://www.gpo.gov/fdsys/pkg/CHRG-111shrg52753/html/CHRG-111shrg52753.htm.

limitations; using principal investigators who were not primarily employed by the small business awardee; and failing to perform a substantial portion of the research work contracted by NASA. In addition, he testified that some firms had misrepresented their eligibility, including false assertions of American ownership and meeting the small business size standard. While testifying that NASA had taken corrective measures to address vulnerabilities to waste, fraud, and abuse, he noted that "in the cases that we are conducting today, we still see the same violations that we saw as early as 1992."[82]

Among its provisions, the 2011 reauthorization act directs the SBA to amend its SBIR and STTR policy directives to include definitions or descriptions of fraud, waste, and abuse. The amended directives now identify a variety of actions that constitute waste, fraud, or abuse, including:

- misrepresentations or material, factual omissions to obtain, or otherwise receive funding under, an SBIR award;
- misrepresentations of the use of funds expended, work done, results achieved, or compliance with program requirements under an SBIR award;
- misuse or conversion of SBIR award funds, including any use of award funds while not in full compliance with SBIR program requirements, or failure to pay taxes due on misused or converted SBIR award funds;
- fabrication, falsification, or plagiarism in applying for, carrying out, or reporting results from an SBIR award;
- failure to comply with applicable federal costs principles governing an award;
- extravagant, careless, or needless spending;
- self-dealing, such as making a sub-award to an entity in which the principal investigator has a financial interest;
- acceptance by agency personnel of bribes or gifts in exchange for grant or contract awards or other conflicts of interest that prevents the government from getting the best value; and
- lack of monitoring, or follow-up if questions arise, by agency personnel to ensure that awardee meets all required eligibility requirements, provides all required certifications, performs in accordance with the terms and conditions of the award, and performs all work proposed in the application.[83]

The 2011 authorization act required GAO to publish an initial report within one year from the date of enactment of the act and every four years thereafter on agency efforts to combat waste, fraud, and abuse and comply with the provisions of the act in this regard. In November 2012, GAO published *Small Business Research Programs: Agencies Are Implementing New Fraud, Waste, and Abuse Requirements*. The GAO report found that the SBA had revised its SBIR and STTR policy directives in August 2012 to include new requirements to help agencies identify and prevent waste, fraud, and abuse, including 10 minimum requirements that all SBIR/STTR agencies must meet. GAO also found that while SBIR and STTR programs varied in their plans to implement the new requirements, program managers did not anticipate significant challenges

[82] Testimony of Thomas J. Howard, Acting Inspector General, NASA, in U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Waste, Fraud, and Abuse in the SBIR Program*, hearings, 112th Cong., 1st sess., August 6, 2009, available at http://www.gpo.gov/fdsys/pkg/CHRG-111shrg52753/html/CHRG-111shrg52753.htm.

[83] Small Business Administration, *Small Business Innovative Research Program Policy Directive*, February 24, 2014.

in this regard. GAO also noted that each agency already had in place tools to address or partially address the new requirements.

SBA Delays in Meeting Statutory Reporting Requirements

The Small Business Act has required the SBA to report annually to Congress on the SBIR and STTR programs since the inception of these programs. SBA compliance with this requirement has been an ongoing issue. Most recently, the SBA did not produce an annual report to Congress for FY2009 or FY2010, instead producing a single report covering the three-year period from FY2009 to FY2011. In addition, as of July 25, 2014, the SBA had not delivered an FY2012 or an FY2013 annual report to Congress. Failure to produce these reports on a timely basis may impede Congress's exercise of its oversight responsibilities. Among the issues that may affect the timeliness of SBA reporting are SBIR/STTR agencies' delays in providing data to the SBA and adequate staffing levels at SBA devoted to producing the report.

Other Issues

As the 2011 reauthorization law is implemented, Congress may decide to explore how the new provisions affect program operation and outcomes including efforts to identify and eliminate duplication of awards and to protect the rights of small businesses to data generated in the performance of an SBIR award. In addition, some experts question whether the SBIR and STTR programs are meeting their different mandated objectives. Other critics maintain that the government has no role in directly supporting industrial research and development. These and other issues may be debated as the SBIR and STTR programs continue to function through September 30, 2017.

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