



March 2024

SMALL BUSINESS RESEARCH PROGRAMS

Increased
Performance
Standards Likely
Affect Few
Businesses Receiving
Multiple Awards

GAO Highlights

Highlights of [GAO-24-106398](#), a report to congressional committees.

Why GAO Did This Study

Small businesses are important drivers of economic growth, but they can face challenges accessing capital to fund research and development. Through the SBIR and STTR programs, agencies provide awards (e.g., grants and contracts) to small businesses for several purposes, including to meet federal R&D needs, increase private sector commercialization, stimulate innovation, and encourage participation by disadvantaged and women-owned small businesses. New awards amounted to approximately \$3 billion during FY 2021, according to data from the Small Business Administration (SBA), which oversees the programs.

The SBIR and STTR Extension Act of 2022 includes a provision for GAO to examine small businesses that received multiple awards. This report examines 1) the extent to which multiple awardees received 50 or more Phase II awards from participating agencies, 2) how multiple awardees compare on measures of progress toward program goals, and 3) the extent to which increased performance standards affect multiple awardees' participation.

For all three objectives, GAO compiled and analyzed data from multiple sources, including SBA. GAO also reviewed agency documentation and interviewed officials from the 11 participating agencies and SBA and a non-generalizable selection of 10 small businesses.

View [GAO-24-106398](#). For more information, contact Candice N. Wright at (202) 512-6888 or wrightc@gao.gov.

March 2024

SMALL BUSINESS RESEARCH PROGRAMS

Increased Performance Standards Likely Affect Few Businesses Receiving Multiple Awards

What GAO Found

Through the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, businesses compete for federal R&D awards. Phase I awards fund businesses to assess feasibility, and Phase II awards fund them to develop prototypes or make other advancements.

Twenty-two small businesses received 50 or more Phase II awards from federal agencies in the 10-year period from fiscal years (FY) 2011 through 2020. During this period, these 22 businesses, referred to as multiple awardees, represented fewer than 1 percent of all Phase II awardees (22 of 6,865). They received 11 percent of total Phase II awards and 10 percent of total Phase II award dollars.

The 11 participating agencies varied in the percentage of awards to multiple awardees. Agencies associated with multiple awardees have specific R&D needs and do not cap the number of awards per business. Other agencies have broader needs, prioritize attracting new applicants, or use award caps.

Phase II Awards Issued to Multiple Awardees in the Small Business Innovation Research and Small Business Technology Transfer Programs, Fiscal Years 2011–2020

Agency	Number of awards	Percentage of awards
Department of Homeland Security	46	26%
Department of Transportation	27	23%
Department of Defense	1,718	17%
Department of Energy	199	12%
Department of Commerce	17	10%
National Aeronautics and Space Administration	154	10%
Environmental Protection Agency	5	6%
U.S. Department of Agriculture	10	3%
Department of Health and Human Services	89	2%
Department of Education	1	1%
National Science Foundation	0	0%
Overall	2,266	11%

Source: GAO analysis of data from the Small Business Administration. | [GAO-24-106398](#)

Note: For more details, see table 3, [GAO-24-106398](#).

SBIR and STTR program goals include meeting federal R&D needs, increasing private sector commercialization, stimulating innovation, and encouraging participation by disadvantaged and women-owned small businesses. On average, multiple awardees performed below or similarly to other awardees in measures of progress toward these goals, according to GAO's analysis.

The SBIR and STTR Extension Act of 2022 created increased standards for some businesses, calling for greater success rates in transitioning from Phase I to Phase II and from Phase II to commercialization. But GAO's analysis suggests these standards may have minimal effects on participation by multiple awardees. In FY 2023, six companies did not meet the new standards. According to GAO's analysis, a small number of businesses are generally at risk of not meeting the standards. Among those, few may face meaningful consequences, because the limit on awards is higher than these businesses generally receive per year.

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Abbreviations

DHS	Department of Homeland Security
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
FY	fiscal year
HHI	Herfindahl-Hirschman Index
HHS	Department of Health and Human Services
NASA	National Aeronautics and Space Administration
NSF	National Science Foundation
OSTP	Office of Science and Technology Policy
R&D	research and development
SBA	Small Business Administration
SBIR	Small Business Innovation Research
STTR	Small Business Technology Transfer
USDA	U.S. Department of Agriculture

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March 29, 2024

The Honorable Jeanne Shaheen
Chair
The Honorable Joni Ernst
Ranking Member
Committee on Small Business and Entrepreneurship
United States Senate

The Honorable Frank D. Lucas
Chairman
The Honorable Zoe Lofgren
Ranking Member
Committee on Science, Space, and Technology
House of Representatives

The Honorable Roger Williams
Chairman
The Honorable Nydia M. Velázquez
Ranking Member
Committee on Small Business
House of Representatives

Small businesses are important drivers of economic growth, but they can face challenges in accessing capital to fund research and development (R&D). Congress established the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs to enable small businesses to undertake and obtain the benefits of R&D.¹ According to the Small Business Administration (SBA), which oversees SBIR and STTR, the programs aim to

- stimulate technological innovation;
- use small business to meet federal research and R&D needs;

¹The Small Business Innovation Development Act of 1982 established the SBIR program. Pub. L. No. 97-219, 96 Stat. 217. This act amended section 9 of the Small Business Act, Pub. L. No. 85-536, 72 Stat. 384 (1958), codified as amended at 15 U.S.C. § 638. The Small Business Technology Transfer Act of 1992 established the STTR program. Pub. L. No. 102-564, §§ 201-02, 106 Stat. 4249, 4256-61. This act made additional amendments to section 9 of the Small Business Act.

-
- foster and encourage participation in innovation by socially and economically disadvantaged small businesses and women-owned small businesses; and
 - increase private-sector commercialization of innovations derived from federal research and R&D funding, thereby increasing competition, productivity, and economic growth.²

Eleven participating federal agencies make SBIR or STTR awards, generally in the form of grants, contracts, or cooperative agreements.³ According to the most recent SBA data available at the time of our analysis, this amounted to approximately \$3 billion in new awards during fiscal year (FY) 2021.

SBA's latest SBIR/STTR annual report states that the programs are highly competitive, but some small businesses ("awardees") have obtained multiple awards. This has spurred concern that they crowd out new businesses. To ensure that small businesses progress to commercialization, Congress has established both minimum performance standards for participation and increased performance standards for more experienced businesses.⁴ The standards cover metrics such as dollar amounts of sales and other revenues that result from SBIR/STTR funding.

The SBIR and STTR Extension Act of 2022 includes a provision for GAO to examine small businesses that received 50 or more Phase II awards

²The SBIR and STTR programs are similar in that participating agencies identify topics for R&D projects and make awards to qualified small businesses. The STTR program also requires the small business awardees to partner with a nonprofit research institution, such as a university or federally funded research and development center. It aims to foster technology transfer through cooperative R&D between small businesses and research institutions. Both programs are to be carried out in accordance with statutory and regulatory requirements and under oversight and guidance of SBA. See 15 U.S.C. § 638.

³The Department of Defense also uses other transaction authorities for a limited number of awards, according to agency officials.

⁴Although the law refers to these as minimum performance standards for participation and increased minimum performance standards for experienced firms, for the purposes of this report, we will refer to them as minimum performance standards and increased performance standards, respectively. 15 U.S.C. § 638(qq)(1)-(2) (minimum performance standards); SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. 2180, 2189-91, to be codified at 15 U.S.C. § 638(qq)(3) (increased performance standards).

across all participating agencies from FY 2011 through 2020.⁵ Phase II awards involve developing a prototype or other advancements, whereas Phase I awards are given earlier, typically to determine scientific and technical merit. For the purposes of this report, we refer to small businesses that received 50 or more Phase II awards during the 10-year period as “multiple awardees.” For comparison, we also examined two other groups of businesses: those that received between one and 15 Phase II awards and those that received between 16 and 49 Phase II awards.

This report examines 1) the extent to which multiple awardees received 50 or more Phase II awards from participating agencies, 2) how multiple awardees compare on measures of progress toward SBIR/STTR program goals, and 3) the extent to which increased performance standards affect multiple awardees’ participation. The scope of our work included SBA and the 11 participating agencies, including participating subcomponents within those agencies.

For all three objectives, we collected data for awards made from FY 2011 through 2020. For the third objective, we also collected data from FY 2021 to ascertain consequences of businesses not meeting increased standards. These data included award data, company registry data, and company commercialization data from SBA, as well as patent data from the U.S. Patent and Trademark Office’s PatentsView database. We assessed the reliability of the data, cleaned the data, and merged the data into combined datasets. After doing so, we found the data elements we used for our report to be sufficiently reliable for our purposes.

In addition, we interviewed officials from SBA and the 11 participating agencies. For these interviews, we included subcomponents that issued 10 percent or more of their agencies’ Phase II awards during the period. We also reviewed related agency documentation, such as solicitations.

We interviewed a non-generalizable selection of 10 small businesses that participated in SBIR from FY 2011 through 2020. We selected these businesses based on a broad range of factors, including location, industry, number of employees, and past performance. This included six multiple awardees and four businesses that received 16 to 49 Phase II

⁵Pub. L. No. 117-183, § 10, 136 Stat. at 2194. The SBIR and STTR Extension Act of 2022 reauthorized and amended the Small Business Act.

awards during the period. See appendix I for additional information on our objectives, scope, and methodology.

We conducted this performance audit from November 2022 to March 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Participating Agencies

From FY 2011 through 2020, 11 federal agencies participated in the SBIR program, and five of those agencies also participated in the STTR program (see table 1).⁶ Pursuant to the Small Business Act, agencies with an extramural research or R&D budget greater than \$100 million are required to participate in SBIR, and agencies with such obligations greater than \$1 billion are required to participate in STTR.⁷

Table 1: Agencies Participating in the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs, Fiscal Years 2011–2020

Agencies participating in SBIR and STTR	Agencies participating only in SBIR
Department of Defense	Department of Agriculture
Department of Energy	Department of Commerce
Department of Health and Human Services	Department of Education
National Aeronautics and Space Administration	Department of Homeland Security
National Science Foundation	Department of Transportation
	Environmental Protection Agency

Source: GAO analysis of data from the Small Business Administration. | GAO-24-106398

⁶A sixth agency, the U.S. Department of Agriculture, began participating in STTR in FY 2023.

⁷15 U.S.C. § 638(f)(1), (n)(1)(A). Agencies' R&D programs generally include funding for two types of R&D: intramural and extramural. Intramural R&D is conducted by employees of a federal agency in or through government-owned, government-operated facilities. Extramural R&D is generally conducted by nonfederal employees outside of federal facilities. Federal agency, as defined under the statute, does not include agencies within the intelligence community. 15 U.S.C. § 638(e)(2).

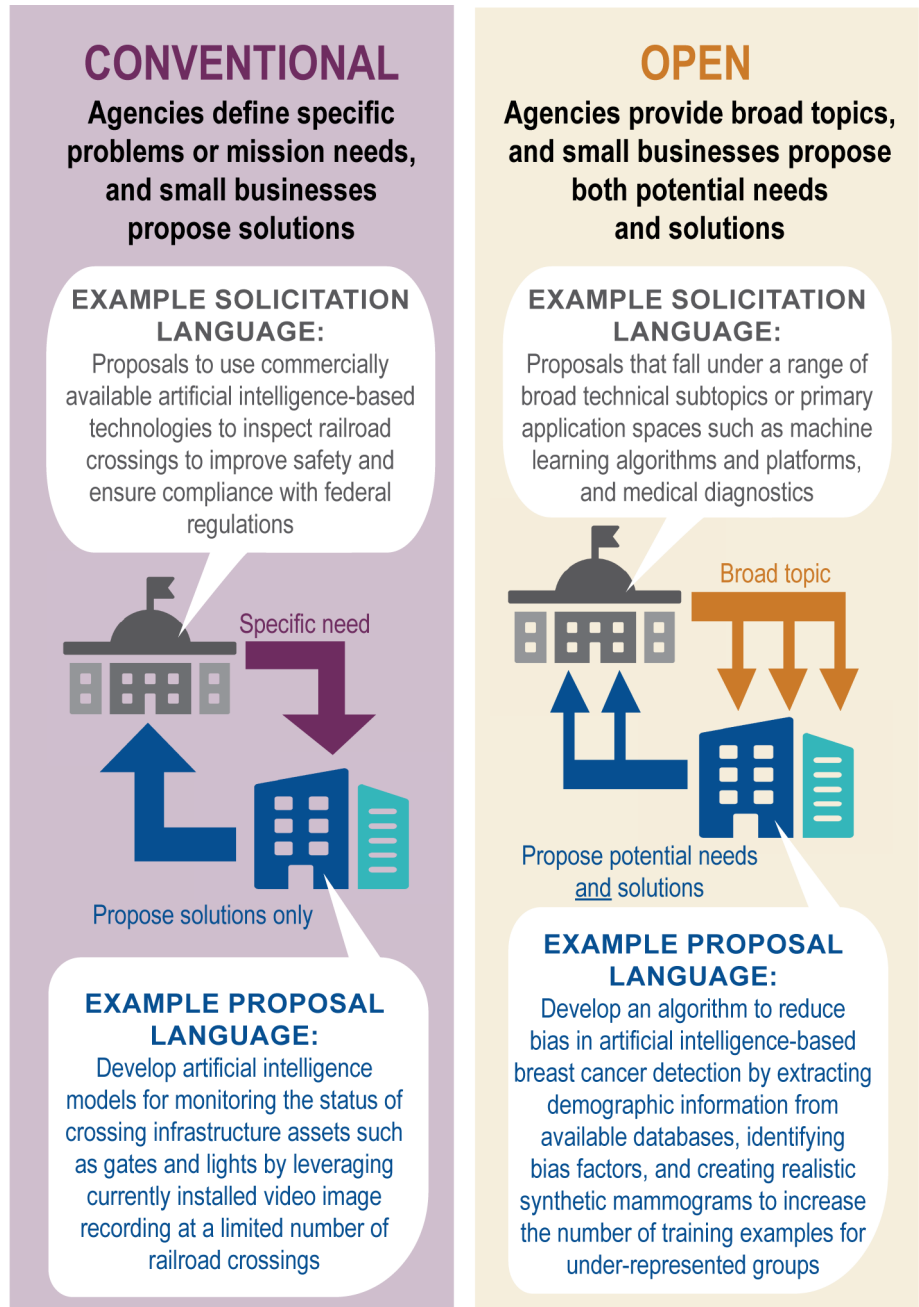
SBA's SBIR and STTR Policy Directive guides the general operation of agencies' SBIR/STTR programs.⁸ According to the directive, each participating agency is to issue a solicitation at least annually, requesting proposals that address certain topics.

The topics that agencies create may influence the types of businesses that submit proposals (such as multiple awardees), because SBA encourages businesses to match their core competencies with agencies' particular needs. We reported in September 2023 that topics can take two forms: conventional and open (see fig. 1).⁹ For conventional topics, agencies define specific problems or mission needs, and small businesses propose solutions. For open topics, agencies define broad topics, and small businesses propose both the potential needs and solutions to address the needs. Agencies may use all conventional topics (e.g., Department of Transportation), all open topics (e.g., National Science Foundation), or a mix of the two (e.g., Department of Health and Human Services).

⁸SBA, SBIR and STTR Policy Directive (May 3, 2023). SBA issues policy directives for the general conduct of the SBIR and STTR programs in accordance with 15 U.S.C. § 638(j), and (p).

⁹GAO, *Small Business Research Programs: Most Agencies Allow Applicants to Define Needs and Propose Solutions*, [GAO-23-106338](#) (Washington, D.C.: Sept. 29, 2023).

Figure 1: Conventional and Open Topics in the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs



Source: GAO analysis of information from the Small Business Administration and the 11 SBIR/STTR agencies; GAO (icons). | GAO-24-106398

In September 2023, we found that agencies with specific R&D needs or procurement needs may be more likely to use conventional topics. Three agencies—the Department of Defense (DOD), Department of Homeland Security (DHS), and National Aeronautics and Space Administration (NASA)—primarily use the SBIR/STTR programs to procure technologies that meet their mission needs, according to officials we interviewed for the September 2023 report.¹⁰ From FY 2019 through 2021, these three agencies issued all or a majority of awards from conventional topics. The remaining eight agencies funded technologies with a focus on external end users, according to officials. External end users may include other federal agencies, other public entities, or consumers. These eight agencies used a mix of topic types.

Program Phases

Under the SBIR/STTR awards process, participating agencies issue awards for three phases of technology development (see fig. 2):

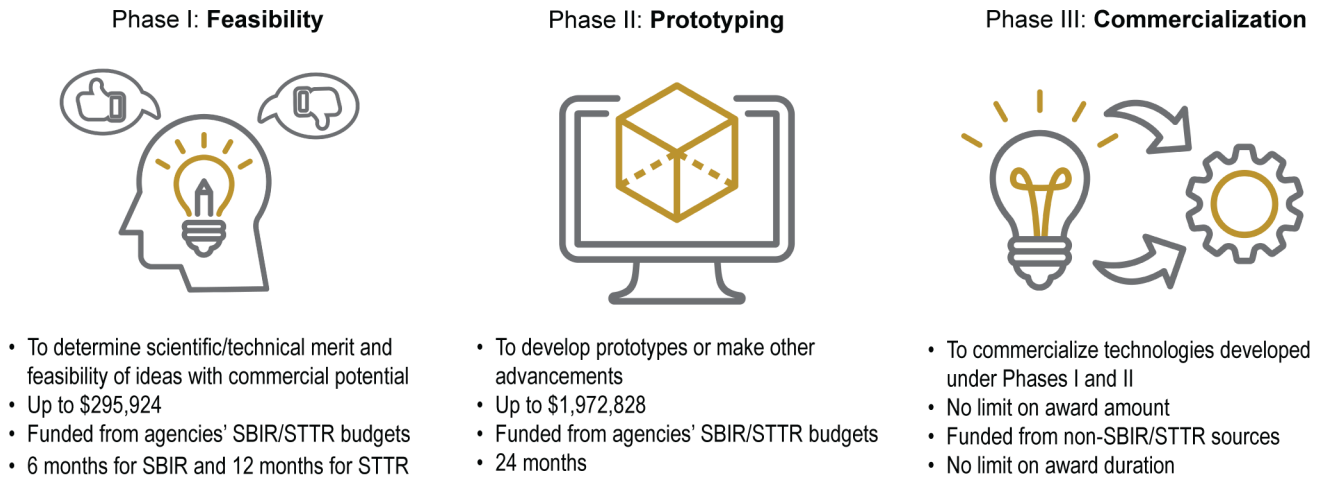
- **Phase I: Feasibility.** Small businesses conduct R&D activities to determine the scientific and technical merit and the feasibility of ideas that may have commercial potential. Businesses compete for these awards in response to agency solicitations.
- **Phase II: Prototyping.** Small businesses develop prototypes or make other advancements. Phase I awardees with projects that demonstrate scientific and technical merit may compete for Phase II awards to continue R&D. Some agencies issue Direct-to-Phase-II awards to businesses that did not receive a Phase I award but completed equivalent work using non-SBIR/STTR funds.¹¹
- **Phase III: Commercialization.** Small businesses work toward commercializing technologies developed under Phases I and II, including further R&D or testing. Federal agencies may issue Phase III awards without further competition under certain circumstances. Unlike Phase I and II awards, agencies do not fund Phase III awards with the portions of their budgets that are designated for SBIR/STTR.

¹⁰[GAO-23-106338](#).

¹¹DOD, the National Institutes of Health (within the Department of Health and Human Services), and the Department of Education are authorized to issue Direct-to-Phase-II awards through FY 2025. 15 U.S.C. § 638(cc).

Figure 2: Phases of the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

Authorized award amounts as of October 2022



Source: GAO analysis of information from the Small Business Administration (SBA). Galuh Sekar/stock.adobe.com (images). | GAO-24-106398

Note: Maximum award amounts include any modifications to the original award amount. Agencies may seek a waiver from SBA to issue awards above the maximum values. In addition, agencies may provide longer performance periods where appropriate for particular projects. SBIR/STTR budget refers to the portion of an agency's extramural research or R&D budget designated for the SBIR/STTR programs.

Performance Standards

Small businesses that have received a certain number of awards must meet two performance standards: the transition rate standard and the commercialization standard.¹² The transition rate standard requires businesses to demonstrate success in maturing technologies from Phase I to Phase II, as measured by their ratio of Phase II to Phase I awards. The commercialization standard requires businesses to demonstrate success in maturing technologies past Phase II. Businesses that do not meet minimum levels of the standards are ineligible to submit new Phase I or Direct-to-Phase-II proposals during the 1-year period beginning on

¹²The Small Business Act, as amended, refers to these as "Progress to Phase II Success" and "Progress to Phase III Success." 15 U.S.C. § 638(qq)(1) and (2). However, the SBA SBIR/STTR policy directive refers to them as transition rate and commercialization, respectively. SBIR and STTR Policy Directive § 6(a)(7)(i)-(v) (2023). For the purposes of this report, we use SBA's terms.

the date on which such determination is made.¹³ Further, the SBIR and STTR Extension Act of 2022 created additional increased standards for some businesses, effective April 1, 2023.¹⁴ Businesses that do not meet the increased standards (but do meet the minimum standards) may not receive more than 20 total Phase I and Direct-to-Phase-II awards from each participating agency during the 1-year period beginning on the date on which such determination is made.¹⁵ For more information on these standards, see appendix II.

Twenty-Two Awardees Received 50 or More Phase II Awards Each from Fiscal Years 2011 to 2020

Twenty-two small businesses received 50 or more Phase II awards each across all participating agencies from FY 2011 through 2020. In contrast, we identified 126 businesses that received between 16 and 49 Phase II awards and 6,717 businesses that received between one and 15 Phase II awards. The 22 “multiple awardees” received approximately 10 percent of total Phase II awards and dollars over the period, although this percentage varied across participating agencies.

Multiple Awardees Received About 10 Percent of Phase II Awards and Dollars

Multiple awardees, which represented less than 1 percent of all Phase II awardees (22 of 6,865), received approximately 10 percent of Phase II awards and dollars from FY 2011 through 2020 (see table 2). For information broken out by each business, see appendix III. However, we found that the SBIR/STTR award process was competitive, based on a common measure of market concentration.¹⁶

¹³15 U.S.C. § 638(qq)(1)(B). SBIR and STTR Policy Directive § 6(a)(7)(ii). Direct-to-Phase-II awards are issued to businesses that did not receive a Phase I award but completed equivalent work using non-SBIR/STTR funds. Businesses may continue working on any current SBIR/STTR projects, as the consequence only applies to obtaining new awards.

¹⁴Pub. L. No. 117-183, § 8, 136 Stat. at 2189-90, to be codified at 15 U.S.C. § 638 (qq)(3).

¹⁵Pub. L. No. 117-183, § 8, 136 Stat. at 2189-90, to be codified at 15 U.S.C. § 638 (qq)(3)(A)(ii). The period of review begins yearly on June 1 and concludes on May 31.

¹⁶We found that the SBIR/STTR programs had a Herfindahl-Hirschman Index (HHI) value of 11 and 10 for Phase II awards and dollars, respectively, from FY 2011 to 2020. HHI approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum of 10,000 points when a market is controlled by a single firm. HHI values greater than 1,800 indicate highly concentrated markets that may lack sufficient competition. To calculate HHI, we squared the market share of each small business—in this case measured by the number of Phase II awards or award dollars each business received in the period we reviewed—and then summed the resulting numbers.

Table 2: Multiple Awardees' Share of Awards and Dollars, FY 2011–2020

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

	Number of awards			Award dollars		
	Phase I	Phase II	Total	Phase I	Phase II	Total
Awards to multiple awardees	4,221	2,266	6,487	\$677,885,345	\$2,524,576,853	\$3,202,462,199
Total awards	38,974	19,732	58,706	\$7,832,593,812	\$24,803,263,472	\$32,635,857,284
Percentage	11%	11%	11%	9%	10%	10%

Source: GAO analysis of data from the Small Business Administration. | GAO-24-106398

Note: Multiple awardees are the 22 small businesses that received 50 or more Phase II awards across all participating agencies from fiscal years (FY) 2011 through 2020. We identified 13,166 total businesses that received awards, including 6,865 that received Phase II awards. Award dollars are in 2022 dollars. Percentages are rounded to the nearest 1 percent.

Multiple awardees also had a higher median number of employees than other businesses participating in SBIR/STTR. Based on SBA data, we found that multiple awardees had a median of 161 employees from FY 2011 through 2020. Businesses with 16 to 49 awards and one to 15 awards had medians of 47 and six employees, respectively.¹⁷

Certain Agencies Were More Likely to Issue Awards to Multiple Awardees

Agencies varied in the extent to which they issued Phase II awards to multiple awardees from FY 2011 through 2020 (see table 3). DHS issued the highest percentage of Phase II awards to multiple awardees. DOD issued the greatest number of Phase II awards both to multiple awardees and to awardees overall.

¹⁷Businesses self-report their number of employees to SBA.

Table 3: Percentage of Phase II Awards Issued to Multiple Awardees, by Participating Agency, FY 2011–2020

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

Agency	Number of Phase II awards		Percentage
	Issued to multiple awardees	Total	
Department of Homeland Security	46	180	26%
Department of Transportation	27	118	23%
Department of Defense ^a	1,718	10,277	17%
Department of the Army	385	1,942	20%
Department of the Navy	544	2,893	19%
Other	383	2,121	18%
Department of the Air Force	405	3,270	12%
Department of Energy	199	1,662	12%
Department of Commerce	17	163	10%
National Aeronautics and Space Administration	154	1,537	10%
Environmental Protection Agency	5	81	6%
U.S. Department of Agriculture	10	294	3%
Department of Health and Human Services	89	4,175	2%
Department of Education	1	86	1%
National Science Foundation	0	1,159	0%
Overall	2,266	19,732	11%

Source: GAO analysis of data from the Small Business Administration. | GAO-24-106398

Note: Multiple awardees are small businesses that received 50 or more Phase II awards across all participating agencies from fiscal years (FY) 2011 through 2020. Percentages are rounded to the nearest 1 percent or first significant digit.

^aDepartment of Defense subcomponent total awards do not sum to 10,277, because 51 awards had missing data for subcomponent.

Multiple factors could explain this variation across agencies. For example, some agencies have instituted caps that limit the number of proposals a business can submit or the number of awards it can receive. In addition, agencies have different needs and priorities for their SBIR/STTR programs, such as procuring technologies for the agency’s use or a preference for attracting new or diverse applicants. These differences may facilitate participation of multiple awardees at some agencies more than others.

Agency caps. Some agencies have chosen to implement proposal and award caps that limit businesses from receiving multiple awards. These caps limit the number of proposals a business can submit or the number

of awards a business can receive per solicitation or fiscal year.¹⁸ Five of the 11 agencies use proposal or award caps (see table 4).¹⁹ Of note, the three agencies that issued the highest percentages of their Phase II awards to multiple awardees—DHS, Transportation, and DOD—do not use any caps.

¹⁸These agency-specific proposal and award caps are in addition to the limits on Phase II awards for a single topic. The Small Business Act, as amended, allows a Phase II awardee to receive one additional sequential Phase II award to continue the work of an initial Phase II award due to the lengthy time it takes to mature a technology. 15 U.S.C. § 638(bb)(1)-(2); SBIR and STTR Policy Directive § 4(b)(5), at 23-24 (2023).

¹⁹Agencies with caps may still issue awards to multiple awardees, for example, if those awardees receive the bulk of their awards from other agencies.

Table 4: Participating Agencies’ Proposal and Award Caps in the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs, as of March 2024

Agency	Proposal cap per business	Award cap per business	Percentage of Phase II awards issued to multiple awardees, FY 2011-2020
Department of Homeland Security	—	—	26%
Department of Transportation	—	—	23%
Department of Defense	—	—	17%
Department of Energy ^a	10 proposals per Phase I solicitation ^b	—	12%
Department of Commerce	—	—	10%
National Aeronautics and Space Administration ^a	10 proposals per solicitation	Five Phase I SBIR awards and two Phase I STTR awards per solicitation	10%
Environmental Protection Agency ^a	One proposal per solicitation	—	6%
U.S. Department of Agriculture	—	Two Phase I awards per fiscal year	3%
Department of Health and Human Services	—	—	2%
Department of Education	—	—	1%
National Science Foundation ^a	One Phase I proposal per solicitation	—	0%

— = No cap

Source: GAO analysis of data from the Small Business Administration and information from participating agencies. | GAO-24-106398

Note: Multiple awardees are small businesses that received 50 or more Phase II awards across all participating agencies from fiscal years (FY) 2011 through 2020. Percentages are rounded to the nearest 1 percent or first significant digit.

^aThe Department of Energy, National Aeronautics and Space Administration, Environmental Protection Agency, and National Science Foundation, respectively, issued an average of two, two, one, and four relevant solicitations per fiscal year from FY 2011 to 2020.

^bThe proposal cap does not apply to proposals to the Advanced Research Projects Agency-Energy.

Agency mission needs. Agencies with specific R&D and procurement needs generally awarded a higher percentage of their awards to multiple awardees, compared to other agencies. As stated previously, agencies with specific R&D needs also may be more likely to use conventional topics to solicit SBIR/STTR proposals. With conventional topics, agencies define specific problems or mission needs, and small businesses propose solutions. In contrast, with open topics, small businesses identify problems and propose solutions. See table 5 for a comparison of agencies’ use of conventional topic awards with their percentage of awards to multiple awardees.

Table 5: Percentage of Conventional Topic Awards and Percentage of Phase II Awards Issued to Multiple Awardees, by Participating Agency

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

Agency	Percentage of awards from conventional topics, FY 2019-2021	Percentage of Phase II awards issued to multiple awardees, FY 2011-2020
Department of Homeland Security	100%	26%
Department of Transportation	100%	23%
Department of Defense	69%	17%
Department of the Army	98%	20%
Department of the Navy	100%	19%
Other	100%	18%
Department of the Air Force	34%	12%
Department of Energy	92%	12%
Department of Commerce	58%	10%
National Aeronautics and Space Administration	100%	10%
Environmental Protection Agency	100%	6%
U.S. Department of Agriculture	0%	3%
Department of Health and Human Services	29%	2%
Department of Education	5%	1%
National Science Foundation	0%	0%
Overall	59%	11%

Source: GAO analysis of data from the Small Business Administration and the 11 SBIR/STTR agencies. | GAO-24-106398

Note: Multiple awardees are small businesses that received 50 or more Phase II awards across all participating agencies from fiscal years (FY) 2011 through 2020. Percentages are rounded to the nearest 1 percent or first significant digit.

The three agencies with the highest percentages of awards to multiple awardees—DHS, Transportation, and DOD—are among the agencies with specific R&D needs.²⁰ In September 2023, we reported that these three agencies issued all or most awards from conventional topics in recent years.²¹ Within DOD, Army and Navy issued a higher percentage of awards from conventional topics than Air Force. Army and Navy also

²⁰NASA also uses the programs primarily to procure technologies. However, NASA may issue a lower percentage of its awards to multiple awardees because it caps the number of proposals and awards that a business can receive per solicitation.

²¹GAO-23-106338. The SBIR and STTR Extension Act of 2022 requires each DOD subcomponent to use at least one open topic per fiscal year beginning in FY 2023 (180 days after September 30, 2022). Pub. L. No. 117-183, § 7(a)(2), 136 Stat. at 2188, to be codified at 15 U.S.C. § 638(ww).

issued a higher percentage of awards to multiple awardees than Air Force. DHS and DOD officials we interviewed for this report said that multiple awardees may have a better understanding of specific agency needs when they submit proposals in response to solicitation topics. Similarly, Transportation officials said that multiple awardees generally work in a specific technology area important to their mission and are more familiar with SBIR/STTR program requirements. In addition, DHS and DOD use the SBIR/STTR programs primarily to procure technologies that meet their mission needs, according to officials we interviewed for the September 2023 report. Some of these technologies (e.g., missile defense) may have limited or no private-sector markets.²²

In contrast, the four agencies that issued the lowest percentages of awards to multiple awardees primarily issue open topic awards and fund technologies with a focus on external end users. The National Science Foundation (NSF) and the Departments of Education, Health and Human Services (HHS), and Agriculture (USDA) issued all or most awards from open topics in recent years. With open topics, agencies define broad issue areas, and small businesses propose both the potential needs and the solutions to address the needs. All four of these agencies fund technologies intended for end users in other federal agencies, other levels of government, or the private sector.

Agency efforts to attract new and diverse applicants. Agencies that have prioritized efforts to attract new or diverse applicants generally awarded a lower percentage of their awards to multiple awardees, based on our review of efforts reported in the most recent SBIR/STTR annual report.²³ These efforts would generally not target multiple awardees that already have experience with the SBIR/STTR programs. HHS and NSF, two of the three agencies that issued the lowest percentages of their Phase II awards to multiple awardees, reported many efforts to attract new or diverse applicants. For example, both have developed partnerships with minority-serving institutions (e.g., Historically Black Colleges and Universities) and entrepreneurial education programs.

²²Similarly, NASA officials said that some of the technologies that they fund may not have a private market.

²³We reviewed efforts included in SBA's most recent SBIR/STTR annual report for FY 2019. Participating agencies report these efforts to SBA. We use the term "diverse applicants" to refer to applicants with diverse demographics (e.g., whether they are women or from socially and economically disadvantaged groups) for ownership and research participants.

Other agencies reported similar efforts. For example, Commerce's National Institute of Standards and Technology prioritizes awarding proposals from underrepresented groups if those proposals have high technical merit. In addition, NASA measures the number of new and diverse applicants to analyze changes over time.

In contrast, the three agencies that issued the highest percentages of their Phase II awards to multiple awardees—DHS, Transportation, and DOD—reported fewer efforts to attract new or diverse applicants as of FY 2019. Specifically, their efforts were limited to attending conferences, workshops, or other events.²⁴

Multiple Awardees Performed Below or Similarly to Others in Meeting Program Goals

The SBIR and STTR programs aim to meet federal R&D needs, increase private sector commercialization, stimulate innovation, and encourage participation by disadvantaged and women-owned small businesses.²⁵ On average, multiple awardees performed below or similarly to other awardees in available measures of progress toward achieving program goals.

Agencies State That Multiple Awardees Have Helped Meet Their R&D Needs

Officials from six agencies with the highest percentages of awards to multiple awardees said that multiple awardees have helped meet their specific R&D needs.²⁶ The officials provided several explanations for why multiple awardees may be well-suited to meeting their agencies' R&D needs, but they did not cite any specific metrics as part of their explanations:

Alignment with needs. Department of Energy (DOE), DHS, DOD, and NASA officials said that multiple awardees often work in niche areas that

²⁴However, in November 2023, DHS launched a Phase 0 program that offers webinars on program processes, designed for first-time applicants. The National Institutes of Health and the Department of Energy (DOE) have also established Phase 0 programs, which are designed to assist first-time applicants in drafting competitive applications. DOD and Transportation do not have Phase 0 programs.

²⁵In addition, the STTR program aims to foster technology transfer through cooperative R&D between small businesses and research institutions.

²⁶The six agencies are Commerce, DHS, DOD, DOE, NASA, and Transportation. Officials from the remaining five agencies said they did not have a basis to judge, for example, because they made so few awards to multiple awardees. For example, Education officials said that the one award that Education made to a multiple awardee was in 2011, and the Education office that made the award has since been moved to HHS.

align with agency R&D needs.²⁷ For example, NASA officials said few businesses have expertise in heliophysics—the study of the sun and how it affects space.

Experience. DHS, DOD, and NASA officials said that multiple awardees may better understand federal R&D needs because of past experience with the SBIR/STTR programs.

Resources. DOD, DOE, and NASA officials said that multiple awardees may have more resources than other awardees, which may be used for proposal preparation and equipment investments. DOE officials said that startups may not have the laboratories, equipment, and other necessary physical capital that multiple awardees have.

Representatives from four of 10 businesses we interviewed said that multiple awardees' size may help them address agency needs.²⁸ For example, they said that awards from agencies with national security missions often involve high administrative costs to meet auditing and cybersecurity requirements. Multiple awardees may spread these costs across multiple projects, whereas the costs could present barriers to entry for other businesses.

Multiple Awardees Reported Lower Sales and Investments and Fewer Resulting Patents

According to our analysis of SBA commercialization data and patent data, multiple awardees reported lower total and private sector sales and investments per Phase II dollar and fewer awards resulting in patents, compared to other awardees from FY 2011 through 2020.²⁹ Other aspects of commercialization and innovation may not be captured by

²⁷Eleven of the 22 multiple awardees are classified under two industries as defined by the North American Industry Classification System: engineering services; and R&D in the physical, engineering, and life sciences. However, they may operate in niche areas within those industries.

²⁸These four businesses were all multiple awardees.

²⁹Sales and investments are in dollars. For sales and investments, other awardees are those that received 16 to 49 Phase II awards across all participating agencies from FY 2011 to 2020. Businesses with fewer awards are not subject to performance standards and are not required to document information on sales and investments. SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. at 2190-91, to be codified at 15 U.S.C. § 638 (qq)(3)(B)(iii).

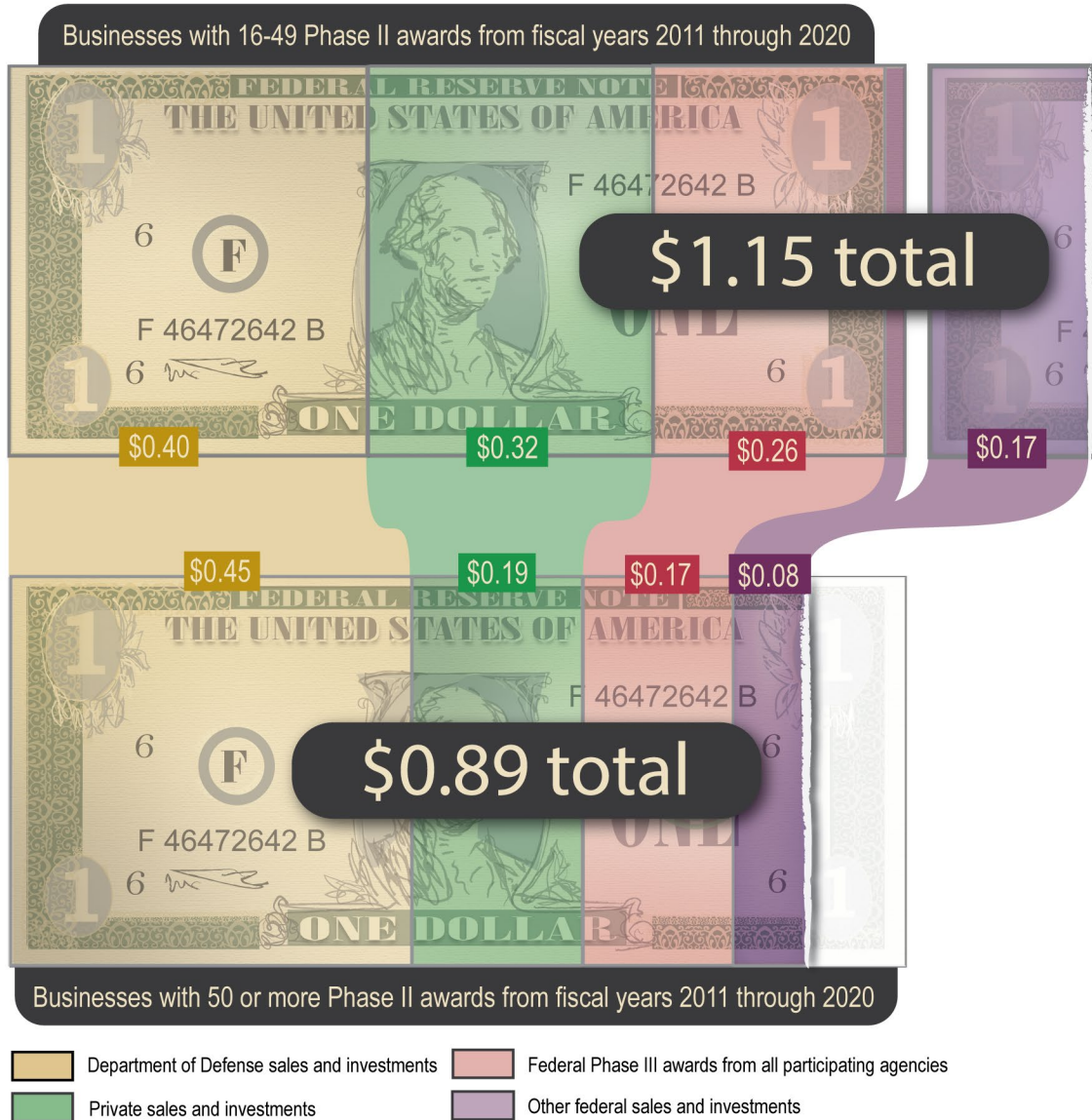
available measures.³⁰ The following describes our findings in these two areas.

Sales and investments. Multiple awardees reported lower private sector sales and investments per Phase II award dollar compared to certain other awardees from FY 2011 through 2020 (see fig. 3). In contrast, multiple awardees reported higher sales to and investments from DOD. Technologies for national security may not have a private commercial market. We reviewed multiple awardees' websites and found that 10 of 22 develop technologies that are primarily for the warfighter, such as intelligence acquisition technologies, as opposed to technologies that are intended to be used in other sectors. The remaining 12 may develop technologies that are relevant to both DOD's mission and the private sector, such as helicopter sensors designed to help pilots navigate storms. DOD officials said that multiple awardees have developed hardware and software technologies, as well as system components that use both hardware and software.

³⁰Aspects of commercialization and innovation include patents generated, copyrights and trademarks, commercial sales, firm growth, acquisitions, and technology spillover. For more information, see National Academies of Sciences, Engineering, and Medicine, *Review of the SBIR and STTR Programs at the National Science Foundation* (Washington, D.C.: The National Academies Press, 2023).

Figure 3: Small Businesses' Commercialization Per Phase II Award Dollar, by Source, FY 2011–2020

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs



Source: GAO analysis of data from the Small Business Administration; GAO (icons). | GAO-24-106398

Notes: SBIR/STTR awards can occur in three phases. Phase I awards are typically to determine scientific and technical merit, and Phase II awards may involve developing a prototype or other advancements. Phase III awards are to commercialize technologies developed in earlier phases.

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program Data Rights

The SBIR/STTR programs provide awardees with exclusive rights to data, including software, created during the course of the award for a period of 20 years, with license rights to the government. These rights prevent the government from releasing, disclosing, or permitting access to the data for commercial, manufacturing, or procurement purposes outside the government without the awardees' written permission.

Patent protections are also effective for 20 years, but they involve public disclosure of the idea a business seeks to protect. In the SBIR/STTR programs, once this information is published in a patent, the government's nondisclosure obligation with respect to the publicly disclosed data terminates. Thus, awardees may choose not to seek patents for SBIR/STTR-funded work.

These data rights are an indicator of businesses' value, especially for technologies without a physical presence (e.g., software) and for which the government is the end user.

Because SBIR/STTR data rights apply to all awards, multiple awardees and other awardees likely possess these rights for each of the technologies they produced, consistent with the terms of the SBIR/STTR funding agreement. However, data on the possession and use of SBIR/STTR data rights are not readily available.

Source: GAO analysis of SBIR/STTR Policy Directive § 8, at 51-59. | GAO-24-106398

Number of awards is across all participating agencies. We did not include businesses with fewer than 16 awards, because they are not subject to performance standards and are not required to document information on sales and investments. SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. at 2190-91, to be codified at 15 U.S.C. § 638 (qq)(3)(B)(iii). We identified 126 businesses with 16-49 Phase II awards and 22 businesses with 50 or more Phase II awards. Four businesses with 16-49 awards had missing commercialization data and were not included in the dollar calculations. Amounts are in nominal dollars.

Patents. For awards issued from FY 2011 through 2020, we found that awards to multiple awardees were less likely to result in a patent compared to other awards. For multiple awardees, 3.4 percent of Phase II awards could be linked to at least one patent. For businesses with 16 to 49 Phase II awards, 5.1 percent of Phase II awards could be linked to a patent. And for businesses with one to 15 Phase II awards, 4.2 percent of Phase II awards could be linked to a patent. However, patenting may not present a complete picture because, according to six of 10 businesses we interviewed, they may use other methods to protect their intellectual property (see sidebar).

Additional indicators of commercialization and innovation can be difficult to measure. For example, tracking awardees' commercialization is difficult if they are later acquired by larger businesses. In addition, some innovation measures do not go beyond the outcomes associated with individual businesses. According to a report from the National Academies, awardees may apply knowledge gained from an award to their other work, principal investigators may leave the businesses and continue research in other businesses or industries, and scientific knowledge in publications and patents may spill over to other businesses.³¹

No Multiple Awardees Were Owned by People from Disadvantaged Groups, and Only One Was Women-Owned

Multiple awardees were less likely than other awardees to be owned by people from disadvantaged groups and women (see table 6), according to data for awards issued in FY 2011 through 2020. No multiple awardees were owned by people from socially and economically disadvantaged groups. One was women-owned, and one was located in a historically underutilized business zone.³²

³¹National Academies, *Review of the SBIR and STTR Programs at the National Science Foundation*.

³²SBA designates economically distressed areas as historically underutilized business zones based on data such as unemployment and poverty rates.

Table 6: Small Businesses' Location and Ownership Demographics, FY 2011–2020

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

Number of Phase II awards	Percentage of awardees		
	Located in a historically underutilized business zone	Owned by people from socially and economically disadvantaged groups	Women-owned
1-15	4%	8%	13%
16-49	1%	6%	10%
50 or more	5%	0%	5%

Source: GAO analysis of data from the Small Business Administration. | GAO-24-106398

Note: Number of awards is across all participating agencies over the 10-fiscal-year (FY) period. We identified 6,717 businesses with 1-15 Phase II awards, 126 businesses with 16-49 Phase II awards, and 22 businesses with 50 or more Phase II awards. Percentages are rounded to the nearest 1 percent or first significant digit.

In addition to supporting small businesses owned by people from disadvantaged groups and women, agencies may also foster and encourage participation in innovation and entrepreneurship by supporting small businesses that employ researchers from these groups. For example, small businesses employ researchers who lead individual SBIR/STTR projects—called principal investigators—and who may not be part of the company ownership. Because multiple awardees have a higher median number of employees compared to other awardees, they may have more principal investigators who are not owners. This could mean a corresponding larger impact on the participation of people from disadvantaged groups and women in innovation and entrepreneurship through the principal investigators that they employ. Furthermore, according to eight of 10 small businesses we interviewed and a recent academic report, multiple awardees and other small businesses may serve as incubators for professional training or people who go on to start their own businesses.³³

However, data on principal investigators are limited. HHS, NSF, and one DOE subcomponent (Office of Science) collect data on whether principal investigators are from socially and economically disadvantaged groups and whether they are women. DOD collects data on whether principal investigators are from socially and economically disadvantaged groups. The Environmental Protection Agency (EPA) collects data on whether

³³Maryann Feldman, Evan E. Johnson, Remi Bellefleur, Savannah Dowden, and Eshika Talukder, "Evaluating the Tail of the Distribution: The Economic Contributions of Frequently Awarded Government R&D Recipients," *Research Policy*, vol. 51 (2022).

principal investigators are women. The remaining six of the 11 participating agencies—Commerce, DHS, Education, NASA, Transportation, and USDA—as well as DOE’s Advanced Research Projects Agency-Energy do not collect any demographic data on principal investigators.

The Small Business Act, as amended, authorizes but does not require participating agencies to collect demographic data on principal investigators. It states in two successive provisions that agencies shall collect annually “such information from awardees as is necessary to assess the SBIR program...including whether an awardee is owned by a woman or has a woman as a principal investigator; is owned by a socially or economically disadvantaged individual or has a socially or economically disadvantaged individual as a principal investigator.”³⁴

However, new requirements under what is commonly referred to as the CHIPS and Science Act of 2022 may result in agencies collecting demographic data on principal investigators for SBIR/STTR awards. The act requires that all federal research agencies collect and submit to NSF standardized participant-level annual demographic data from all applications for the agencies’ merit-reviewed R&D awards.³⁵ This may include data on principal investigators’ race, ethnicity, sex, and socioeconomic status.³⁶ Once implemented, agencies may have data providing a more complete understanding of the researchers they support and, consequently, agencies may better assess their efforts to foster and encourage diverse participation.

Officials from eight of 11 agencies told us that they are awaiting guidance on the specific demographic data collection required by the CHIPS and Science Act before beginning or changing data collection. Under the act,

³⁴15 U.S.C. § 638(g)(8)(A)(iii-iv), (k)(1)(F)(ii-iii), and (o)(9)(A)(iii-iv) provide existing authority to collect participant-level information; however, a lack of clarity in codification exists. Specifically, the inclusion of the term “or” within each of the two provisions may permit agencies’ collection of either the first (owner information) or the second (principal investigator information), while also not collecting information on the other personnel, when both may be relevant.

³⁵Research and Development, Competition, and Innovation Act, Pub. L. No. 117-167, div. B, § 10502(a)(1), 136 Stat. 1366, 1610, (2022), to be codified at 42 U.S.C. § 19152(a)(1).

³⁶The act further states that socioeconomic indicators may include employment status, occupation, educational attainment, parental education, and income. In addition to these three items, the act also requires data on geographic location and years since completion of doctoral degree. Pub. L. No. 117-167, § 10502(b), 136 Stat. at 1610, to be codified at 42 U.S.C. § 19152(b).

the Director of the White House Office of Science and Technology Policy (OSTP) shall establish a policy to ensure uniformity and standardization of the required data collection.³⁷ No later than 2 years after the policy is issued, the act requires agencies to submit 5 years of data or an analysis for why such data cannot be provided. The act does not specify a time frame for OSTP to develop the policy that triggers this requirement for agencies.³⁸ OSTP officials said that they are in the process of developing this policy together with NSF.

Increased Performance Standards Are Unlikely to Meaningfully Limit Participation of Businesses Receiving Multiple Awards

Our analysis of SBA documentation and data suggests that increased performance standards established by the SBIR and STTR Extension Act of 2022 may have minimal effects on participation of multiple awardees in the SBIR/STTR programs. The SBIR and STTR Extension Act of 2022 created two increased performance standards for experienced firms: the increased transition rate standard and the increased commercialization standard.³⁹ SBA implemented increased transition rate and commercialization standards for the first time in FY 2023, and six businesses did not meet the standards. However, the businesses will likely face minimal consequences.

³⁷Pub. L. No. 117-167, § 10510, 136 Stat. at 1613, to be codified at 42 U.S.C. § 19158 (defining the term “Director” to mean the Director of the Office of Science and Technology Policy (OSTP)) and § 10502(a)(2), 136 Stat. at 1610, to be codified at 42 U.S.C. § 19152 (directing the Director of OSTP to consult with the heads of each federal research agency and establish and update as necessary, a policy to ensure uniform and standardized data collection for the federal research agencies).

³⁸Pub. L. No. 117-167, § 10502(a)(3)(A)(B), 136 Stat. at 1610, to be codified at 42 U.S.C. § 19152(a)(3)(A)-(B).

³⁹As with the minimum standards for participation, the Small Business Act, as amended, refers to these as “Progress to Phase II Success” and “Progress to Phase III Success.” SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. at 2189-91, to be codified at 15 U.S.C. § 638(qq)(3)(A) and (B). However, the SBA SBIR/STTR policy directive refers to them as transition rate and commercialization, respectively. SBIR and STTR Policy Directive § 6(a)(7)(i)-(v) (2023). For the purposes of this report, we use SBA’s terms.

A Small Number of Businesses Are at Risk of Not Meeting Increased Performance Standards, but Some May Shift Their Strategies

A small number of businesses are at risk of not meeting the increased transition rate standard or commercialization standard (see textbox), and the businesses may shift their strategies to meet the standards.

Increased Performance Standards in the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

The SBIR and STTR Extension Act of 2022 created two increased performance standards for experienced firms: the increased transition rate standard and the increased commercialization standard.

- To meet the increased transition rate standard, businesses with 51 or more Phase I awards over a consecutive 5-year period must obtain one Phase II award for every two Phase I awards. The consecutive 5-year period includes the 5 fiscal years prior to the last fiscal year.
- To meet the increased commercialization standard, businesses must obtain a minimum dollar amount of aggregate sales and investments resulting from SBIR/STTR work, per Phase II award. For businesses with 51-100 Phase II awards over a consecutive 10-year period, the minimum amount is \$250,000. For businesses with 101 or more such awards, the minimum amount is \$450,000. The consecutive 10-year period includes the 10 fiscal years prior to the last 2 fiscal years.

The Small Business Administration applies these increased standards in addition to minimum performance standards. Experienced firms that do not meet the increased standards (but meet the minimum standards) may not receive more than 20 total Phase I and Direct-to-Phase-II awards from each participating agency for a 1-year period.

Source: GAO analysis of SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. at 2189-91, to be codified at 15 U.S.C. § 638(qq)(3)(A)-(B) and Small Business Administration, "Performance Benchmark Requirements," accessed January 19, 2024, <https://www.sbir.gov/faqs/performance-benchmarks>. | GAO-24-106398

Transition Rate Standard

Four businesses did not meet the increased transition rate standard calculated in FY 2023, according to SBA documentation.⁴⁰ We also conducted a counterfactual analysis of what may have occurred if the increased transition rate standard had been in effect in prior years. Our analysis of SBA data showed that these same four businesses were among nine that may not have met the increased transition rate standard if it had been in effect in recent years. See businesses A, B, C, and D in table 7. We only included calculations for FY 2017 through 2021 in our

⁴⁰The increased transition rate calculated in FY 2023 assessed the extent to which businesses that received 51 or more Phase I awards from FY 2017 through 2021 (the consecutive 5-year period prior to the last fiscal year) progressed to Phase II in FY 2018 through 2022.

analysis because the necessary data for earlier years were outside the data we collected for FY 2011 through 2021.⁴¹

Table 7: Small Businesses That May Not Have Met the Increased Transition Rate Standard if It Had Been in Effect for FY 2017–2021

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

Small business	Fiscal year (FY)				
	2017	2018	2019	2020	2021
A	○	○	○	○	○
B	○	○	○	○	○
C	○	○	○	○	●
D	●	●	●	●	○
E	○	○	●	●	●
F	○	○	●	●	●
G	●	○	●	●	●
H	○	●	●	●	●
I	○	●	●	●	●

Legend: ● = Met transition rate standard; ○ = Did not meet transition rate standard

Source: GAO analysis of Small Business Administration data, SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. 2180, 2189-91, to be codified at 15 U.S.C. § 638(qq)(3)(A)-(B), and Small Business Administration, "Performance Benchmark Requirements," accessed Jan. 19, 2024, <https://www.sbir.gov/faqs/performance-benchmarks>. | GAO-24-106398

Note: To meet the increased transition rate standard, businesses with 51 or more Phase I awards over a consecutive 5-year period must obtain one Phase II award for every two Phase I awards. The consecutive 5-year period includes Phase I awards from the 5 fiscal years prior to the last fiscal year. For example, the transition rate calculated for FY 2017 assessed the extent to which businesses that received 51 or more Phase I awards in FY 2011-2015 (the consecutive 5-year period prior to the last fiscal year) progressed to Phase II in FY 2012-2016.

To meet the increased transition rate standard in the future, businesses may pursue strategies to obtain more Phase II awards.⁴² For example, representatives from five of 10 businesses we interviewed said that they could focus on lower-risk ideas that are more likely to transition. Representatives from two additional businesses said that they could shift their focus to agencies that give more Phase II awards to increase their chances of transitioning. While the SBIR/STTR program generally funds

⁴¹The increased transition rate calculated for FY 2017 assessed the extent to which businesses that received 51 or more Phase I awards from FY 2011 through 2015 (the consecutive 5-year period prior to the last fiscal year) progressed to Phase II in FY 2012 through 2016. FY 2021 was the most recent year with available data at the time of our analysis.

⁴²However, businesses may not receive more than two Phase II awards for a given Phase I award.

one Phase II award for every two Phase I awards, the rate at individual agencies varies (see fig. 4).

Figure 4: Ratio of Phase II to Phase I Awards by Participating Agency, FY 2011–2020

Small Business Innovation Research and Small Business Technology Transfer Programs

Agency	Ratio of Phase II to Phase I	Percentage of Phase II awards issued to multiple awardees
Department of Homeland Security	0.58	26%
Department of Transportation	0.81	23%
Department of Defense	0.61	17%
Department of Commerce	0.62	10%
Department of Energy	0.54	12%
National Aeronautics and Space Administration	0.39	10%
Environmental Protection Agency	0.37	6%
U.S. Department of Agriculture	0.39	3%
Department of Health and Human Services	0.46	2%
Department of Education	0.45	1%
National Science Foundation	0.38	0%
Overall	0.52	11%

	0.5 - 0.59
	0.6 - 0.69
	0.7 or above

Source: GAO analysis of Small Business Administration data. | GAO-24-106398

Note: Multiple awardees are small businesses that received 50 or more Phase II awards across all participating agencies over the 10-fiscal-year period. Transition rates were calculated using Phase I awards from 2011 through 2019 and Phase II awards from 2012 through 2020. Percentages are rounded to the nearest 1 percent or first significant digit.

Commercialization Standard

Four businesses did not meet the increased commercialization standard calculated in FY 2023, according to SBA documentation.⁴³ These included two that also did not meet the increased transition rate standard

⁴³The increased commercialization metric calculated in FY 2023 assessed the extent to which businesses that received 51 or more Phase II awards from FY 2011 through 2020 (the consecutive 10-year period prior to the last 2 fiscal years) obtained the minimum required sales and investments.

that year. We did not conduct a counterfactual analysis for the increased commercialization standard because the necessary data were outside the data we collected for FY 2011 through 2021.

To meet the increased commercialization standard in the future, businesses may pursue strategies to better secure additional sales or investments relating to research funded with Phase II awards.⁴⁴ For example, some businesses may attempt to target research topics that are more likely to result in follow-on federal procurement contracts such as topics within DHS and DOD, if they do not already.

However, officials from DOD's Office of the Undersecretary of Defense for Research and Engineering told us that the department often declines to procure successful SBIR/STTR efforts. According to officials, this happens because DOD's mission needs and priorities have changed during the course of the Phase I or II award. For example, technology needs, program management and priorities, and budgets may change. Officials said that current awardees may be conducting R&D and developing technologies that no longer align with DOD's future needs and priorities through no fault of their own. Consequently, awardees often produce technology that is either too early or too late to be deployed in the field.

Few Businesses May Face Consequences Under Increased Performance Standards

Small businesses not meeting standards may not face meaningful consequences. The six small businesses that did not meet the increased standards in FY 2023 may not receive more than 20 Phase I or Direct-to-Phase-II awards from each agency from June 1, 2023 to May 31, 2024. However, some of these businesses may not have sought and received more than 20 Phase I or Direct-to-Phase-II awards from a single agency anyway. Three of the businesses—including two that did not meet either standard—may no longer be eligible for the SBIR/STTR programs for other reasons.⁴⁵ One additional business did not plan to submit proposals for more than 20 Phase I awards from a single agency, according to representatives we interviewed. The remaining two received more than 20 Phase I awards per year from DOD in recent years, so they could face

⁴⁴Small businesses may use patents to meet the minimum performance standard for commercialization but not the increased performance standard for commercialization. See appendix II for more information.

⁴⁵Eligible businesses must be organized for profit, located in the United States, and have no more than 500 employees (including affiliates), among other requirements.

meaningful consequences (i.e., fewer future awards than the business would have received otherwise) as a result of not meeting the standards.

Our analysis examining what may have happened if the increased transition rate standard had been in effect in recent years similarly showed that few businesses would have faced consequences from not meeting the standards. Four of the nine businesses that did not meet the increased standards, had they been applied retroactively, would not have faced meaningful consequences. This is because they did not receive more than 20 Phase I or Direct-to-Phase-II awards from a single agency in the year that the penalty would have been applied. The remaining five businesses would have received an estimated 165 fewer DOD awards as a consequence of not meeting the standards.⁴⁶ No awards from other agencies would have been forfeited, because the five businesses did not receive more than 20 Phase I or Direct-to-Phase-II awards at other agencies in the year that the consequence would have been applied. However, had the increased performance standards been in effect during prior years, businesses may have changed their strategies in order to meet the increased performance standards. This may have resulted in unintended effects on the SBIR/STTR programs.⁴⁷ In addition, DOD, like other agencies, can seek waivers from SBA to continue providing multiple awards to individual businesses if doing so is critical to the agency's mission or serves a national security interest.⁴⁸

If the increased standards had been in effect in recent years, other small businesses may have had additional award opportunities. However, the award amounts would likely be a small proportion of total funding. For example, in our analysis of prior years, the 165 potential forfeited awards amounted to an estimated \$27.5 million. This was approximately 0.6

⁴⁶Four of these five businesses were among the six that did not meet an increased standard in FY 2023, the first year that the increased standards went into effect.

⁴⁷When a policy change takes effect, entities affected by the policy are expected to change their behaviors to the extent practicable in order to adapt to the policy and to act in their own best interest. Our counterfactual analysis of what may have occurred in the past does not account for any changes in businesses' strategy.

⁴⁸Pub. L. No. 117-183, § 8, 136 Stat. at 2191, to be codified at 15 U.S.C. § 638(qq)(3)(E)(i).

percent of total SBIR/STTR Phase I award dollars and 2 percent of DOD's Phase I award dollars in those years.⁴⁹

Agency Comments

We provided a draft of this report to Commerce, DHS, DOD, DOE, Education, EPA, HHS, NASA, NSF, SBA, Transportation, and USDA for review and comment. Commerce, Education, NASA, and SBA provided technical comments, which we incorporated, as appropriate. DHS, DOD, DOE, EPA, HHS, NSF, Transportation, and USDA did not have any comments on the report.

We are sending copies of this report to the appropriate congressional committees; the Secretaries of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, and Transportation; the Administrators of the SBA, EPA, and NASA; the Director of the NSF; and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-6888 or WrightC@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Candice N. Wright
Director, Science, Technology Assessment, and Analytics

⁴⁹We estimated award amounts based on the five small businesses' average award amount in the year the consequence would be applied, including Phase I awards and Direct-to-Phase-II awards. Award amounts are inflation adjusted to 2022 dollars.

Appendix I: Objectives, Scope, and Methodology

The SBIR and STTR Extension Act of 2022 includes a provision for GAO to examine small businesses that received 50 or more Phase II awards across all participating agencies from fiscal years (FY) 2011 through 2020.¹ For the purposes of this report, we refer to small businesses that received 50 or more Phase II awards during the 10-year period as “multiple awardees.” For comparison groups, we also examined businesses that received one to 15 and 16 to 49 Phase II awards.

This report examines 1) the number of multiple awardees from FY 2011 through 2020; 2) how multiple awardees compare on measures of progress toward SBIR/STTR program goals; and 3) the extent to which increased performance standards affect multiple awardees’ participation. The scope of our work includes the Small Business Administration (SBA) and the 11 participating agencies. To address our objectives, we 1) analyzed data from multiple sources, 2) interviewed agency officials and reviewed related agency documentation, and 3) interviewed a non-generalizable selection of small businesses that participated in the Small Business Innovation Research (SBIR) program from FY 2011 through 2020.

Analysis of Data on Awards and Small Businesses

We obtained data from multiple sources, assessed reliability, cleaned and merged the data as needed, and analyzed the data to answer our research objectives.

SBIR award data and registry data. We downloaded publicly available award-level data from SBA’s SBIR.gov web page.² We selected data from FY 2011 through 2021, the most recent year with available data at the time of download. The data include information on each award issued, the agency issuing the award, and the small business receiving the award (e.g., whether the businesses was women-owned at the time of award). We found that many of the awards were missing a unique identifier for the small business (DUNS number).

To fill in missing identifiers, we requested data from SBA’s company registry. The registry is an SBA database of companies registered to participate in the SBIR and Small Business Technology Transfer (STTR) programs. The database includes fields that describe the businesses, including their DUNS number, as of the businesses’ most recent SBIR/STTR proposal. We used analytical software to merge the registry

¹SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 10, 136 Stat. 2180, 2194.

²SBIR Award Data (accessed Feb. 3, 2023), <https://www.sbir.gov/sbirsearch/award/all>.

data with the award data, matching observations on company name. We then filled in missing DUNS numbers in the award data with DUNS numbers from the registry data.³ To assess reliability of the merged dataset, we conducted tests to identify outliers and invalid values (according to the data dictionary). We collected written responses from agencies on issues we identified. Based on agency responses, we cleaned the data, including updating values or changing invalid values to missing. After cleaning the data, we found the data elements we used for the purposes of our report to be sufficiently reliable.⁴ We also converted award amounts to 2022 dollars using the gross domestic product price index.

We identified unique small businesses that won 50 or more Phase II awards from FY 2011 through 2020 (multiple awardees) based on DUNS number. We analyzed the share of Phase II awards that went to multiple awardees using company names and DUNS numbers in combination. We found several businesses that had multiple DUNS numbers and several DUNS numbers associated with multiple businesses. To reconcile these inconsistencies, we reviewed information in the award and registry data, reviewed business websites, and searched the following databases:

- **CLEAR by Thomson Reuters:** CLEAR is public and proprietary records software that is commonly used for law enforcement and fraud investigation. Information available includes business locations, other names associated with businesses, and websites.
- **Accurint by LexisNexis:** Accurint is a database of public and proprietary information that is used to verify the identification of individuals and their assets. Information available includes professional and property registration and employment history.

We reconciled these inconsistencies for businesses that won 16 or more Phase II awards across all participating agencies from FY 2011 through 2020, the population that was subject to the minimum performance standard for commercialization and for which commercialization data were most reliable, as discussed below. We also shared findings from CLEAR and Accurint with an ongoing GAO engagement examining risks of fraud, waste, and abuse in the SBIR/STTR programs.

³This uses the small business's DUNS number as of its most recent proposal as a proxy for DUNS number at the time of award.

⁴We did not assess the reliability of fields we did not use for this report.

To further analyze multiple awardees' share of awards, we used the Herfindahl-Hirschman Index (HHI). The Department of Justice and other agencies use HHI as a measure of market concentration. The HHI takes into account the relative size distribution of the firms in a market. It approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum of 10,000 points when a market is controlled by a single firm. HHI values greater than 1,800 indicate highly concentrated markets that may lack sufficient competition. To calculate HHI, we squared the market share of each small business—in this case measured by the Phase II dollars each business received in the 10-year period we reviewed—and then summed the resulting numbers.

We also used these award data to calculate the percentage of awardees that were women-owned, owned by people from socially and economically disadvantaged groups, and located in a historically underutilized business zone (HUBZone).

D&B Hoovers data from Dun & Bradstreet. To categorize small businesses into industries, we analyzed data from D&B Hoovers on businesses' North American Industry Classification System codes. We reviewed documentation on the data and found them to be sufficiently reliable for our purposes.

PatentsView data. To identify awards that resulted in a patent, we analyzed data from the public PatentsView database maintained by the U.S. Patent and Trademark Office. We downloaded the following variables from PatentsView: patent ID, patent application and grant dates, and government interest award number. The award numbers were identified from the government interest statements by PatentsView. To assess the reliability of PatentsView data, we reviewed documentation from the Patent and Trademark Office and interviewed knowledgeable officials. We did not review certificates of correction for additional disclosures or corrections to the award numbers after the patents were granted. Based on our review, we determined that these data were sufficiently reliable for our purposes. We used analytical software to match awards with patents and compared the percentage of awards with matched patents between multiple awardees and other awardees from FY 2011 through 2020.

SBA company commercialization report data. To examine businesses' aggregate sales and investments, we analyzed data from SBA's company commercialization report database. The data include federal and private

sales and investments by SBIR/STTR award. We requested the data from SBA for SBIR/STTR awards made from FY 2011 through 2021. To assess the reliability of the data, we reviewed relevant documentation from SBA, interviewed SBA officials, and performed logic tests to identify potential errors. Based on our review, we determined that these data were sufficiently reliable for our purposes. We compared average dollar amounts between multiple awardees and businesses with 16 to 49 Phase II awards from FY 2011 through 2020.

Agency Interviews and Documentation

We interviewed officials or collected written responses from SBA and the 11 participating agencies on: agency efforts to attract new and diverse applicants, proposal and award caps, the extent to which multiple awardees have met agencies' needs, technologies funded through SBIR/STTR awards, agency data on principal investigators, and increased performance standards.

We collected and reviewed related documentation to corroborate information from these interviews. This included several documents from SBA: the most recent SBIR/STTR annual report from FY 2019, the SBIR/STTR policy directive, data dictionaries, small business ineligibility reports from FY 2015 through 2023, and guidance on minimum and increased performance standards. We also reviewed participating agency documents, such as solicitations and information on Phase 0 programs. Finally, we reviewed reports on the participating agencies' SBIR/STTR programs from the National Academies of Sciences, Engineering, and Medicine.⁵

Small Business Interviews and Documentation

We interviewed a non-generalizable selection of 10 businesses that participated in the SBIR program from FY 2011 through 2020. Six of these businesses were multiple awardees and four were not. We asked these businesses about their perspectives on how the increased performance standards might change their behavior, if at all. We chose businesses that 1) would not have met the increased transition rate standard if it had been in effect in recent years, 2) received at least one award from agencies that have a proposal or award cap, and 3) have not received enough awards to be subject to the increased performance

⁵National Academies of Sciences, Engineering, and Medicine, *Review of the SBIR and STTR Programs at the National Science Foundation* (Washington, D.C.: The National Academies Press, 2023); *Assessment of the SBIR and STTR Programs at the National Institutes of Health* (Washington, D.C.: The National Academies Press, 2022); and *Review of the SBIR and STTR Programs at the Department of Energy* (Washington, D.C.: The National Academies Press, 2020).

standards. We also selected businesses to represent a variety of other traits (e.g., geographic locations, number of employees, industry, ownership by women and people from socially and economically disadvantaged groups, or HUBZone location).

To identify the types of technologies that multiple awardees develop, we reviewed multiple awardees' public websites. Two analysts conducted a content analysis to code whether the websites discussed developing technologies related to defense. The analysts then reconciled any differences in their coding.

We conducted this performance audit from November 2022 to March 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Minimum and Increased Performance Standards

Small businesses that have received a certain number of awards must meet two minimum performance standards to be eligible for future awards: the transition rate standard and the commercialization standard.¹ The transition rate standard requires businesses to demonstrate success in maturing technologies from Phase I to Phase II, as measured by their ratio of Phase II to Phase I awards. The commercialization standard requires businesses to demonstrate success in maturing technologies past Phase II.

The SBIR and STTR Extension Act of 2022 created increased, more rigorous performance standards for some more experienced businesses. These apply to both the transition rate standard and the commercialization standard.² These increased standards became effective on April 1, 2023.³

The Small Business Administration (SBA) assesses businesses' performance against the standards annually. Businesses that do not meet the minimum standards are ineligible to submit new Phase I or Direct-to-Phase-II proposals during the 1-year period beginning on the date on which such determination is made.⁴ Experienced firms that do not meet the increased standards (but meet the minimum standards) may not receive more than 20 total Phase I and Direct-to-Phase-II awards from each participating agency during the 1-year period beginning on the date on which such determination is made.⁵

¹The Small Business Act, as amended, refers to these as "Progress to Phase II Success" and "Progress to Phase III Success." 15 U.S.C. § 638(qq)(1) and (2). However, the SBA SBIR/STTR policy directive refers to them as transition rate and commercialization, respectively. SBIR and STTR Policy Directive § 6(a)(7)(i)-(v). For the purposes of this report, we use SBA's terms.

²SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. 2180, 2189-91, to be codified at 15 U.S.C. § 638(qq)(3).

³Pub. L. No. 117-183, § 8, 136 Stat. at 2192, to be codified at 15 U.S.C. § 638(qq)(3)(G).

⁴15 U.S.C. § 638(qq)(1)(B). SBIR and STTR Policy Directive § 6(a)(7)(ii). Direct-to-Phase-II awards are issued to businesses that did not receive a Phase I award but completed equivalent work using non-SBIR/STTR funds. Businesses may continue working on any current SBIR/STTR projects, as the consequence only applies to obtaining new awards.

⁵The period of review begins yearly on June 1 and concludes on May 31. SBA, "Performance Benchmark Requirements," accessed Jan. 19, 2024, <https://www.sbir.gov/performance-benchmarks>. The SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. 2180, 2189-90 (2022), to be codified at 15 U.S.C. § 638(qq)(3)(A)(ii).

**Appendix II: Minimum and Increased
Performance Standards**

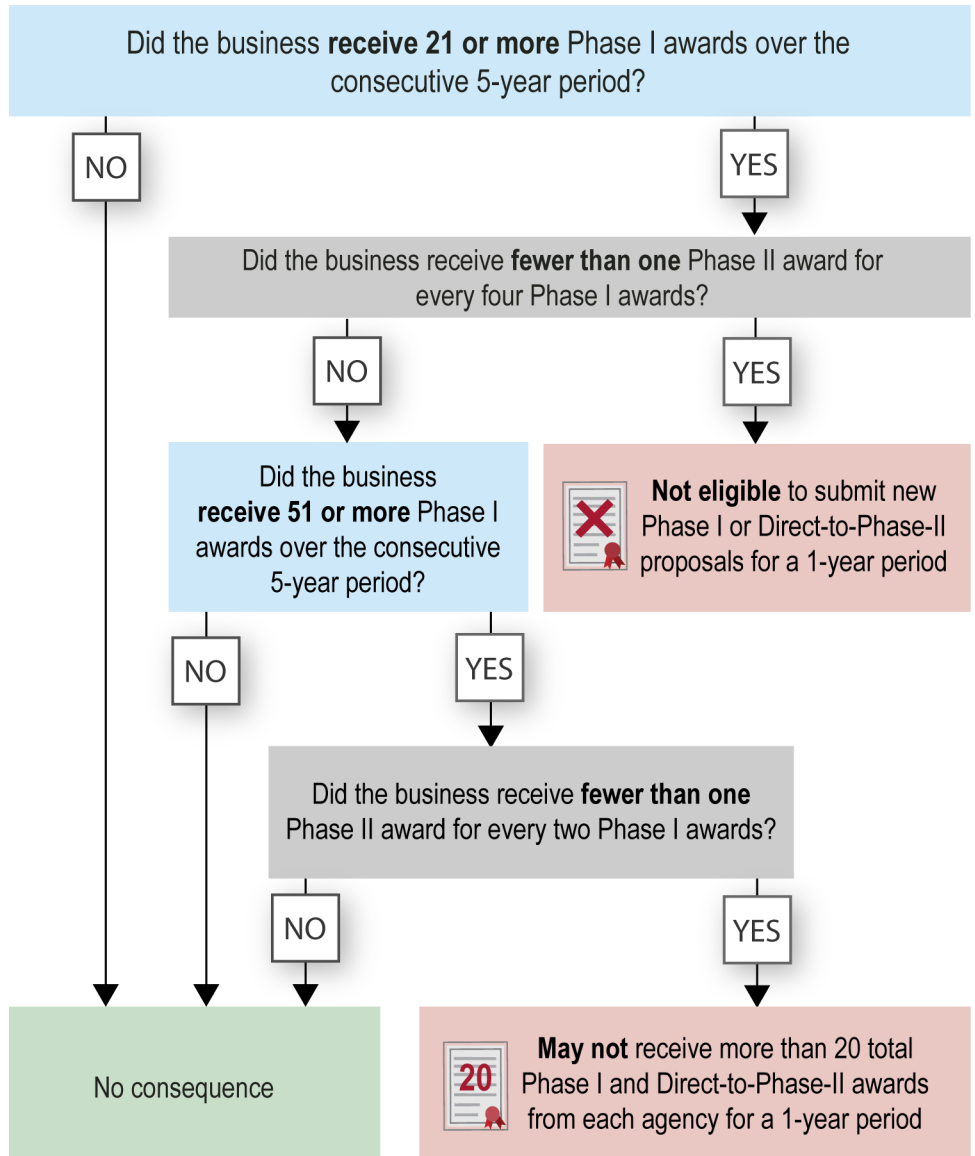
Transition Rate

The transition rate is calculated as the total number of Phase II awards divided by the total number of Phase I awards.⁶ The minimum performance standard for transition rate applies to businesses that received 21 or more Phase I awards over a period of 5 consecutive years. In addition, experienced firms—businesses that received 51 or more Phase I awards over a consecutive 5-year period—must meet an increased performance standard for transition rate (see fig. 5).

⁶Because the rate is calculated as a ratio of total awards—as opposed to the percentage of Phase I awards that transition to Phase II—businesses can compensate for Phase I awards that do not transition with other Phase I awards that transition to two Phase II awards. For example, if a business had 21 Phase I awards that did not transition and three Phase I awards that transitioned to two Phase II awards each, it would still meet the standard with a transition rate of 0.25. However, businesses may not receive more than two Phase II awards for a given Phase I award. For more information, see: SBA, “Performance Benchmark Requirements,” accessed Jan. 19, 2024, <https://www.sbir.gov/performance-benchmarks>.

Figure 5: Decision Tree for Determining Whether a Small Business Has Met Minimum and Increased Performance Standards for Transition Rate

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs



Source: GAO analysis of 15 U.S.C. § 638(qq); Small Business Administration, SBIR and STTR Policy Directive § 6(a)(7)(ii); and Small Business Administration, "Performance Benchmark Requirements," accessed Jan. 19, 2024, <https://www.sbir.gov/faqs/performance-benchmarks>; GAO (icons). | GAO-24-106398

Note: The consecutive 5-year period includes the 5 fiscal years prior to the last fiscal year. Consequences for not meeting the standards are applied during the 1-year period beginning on the date on which such determination is made.

**Appendix II: Minimum and Increased
Performance Standards**

Commercialization

The minimum performance standard for commercialization requires businesses that received 16 or more Phase II awards over a period of 10 consecutive years to demonstrate commercialization through either sales revenue, investments, or patents (see fig. 6).

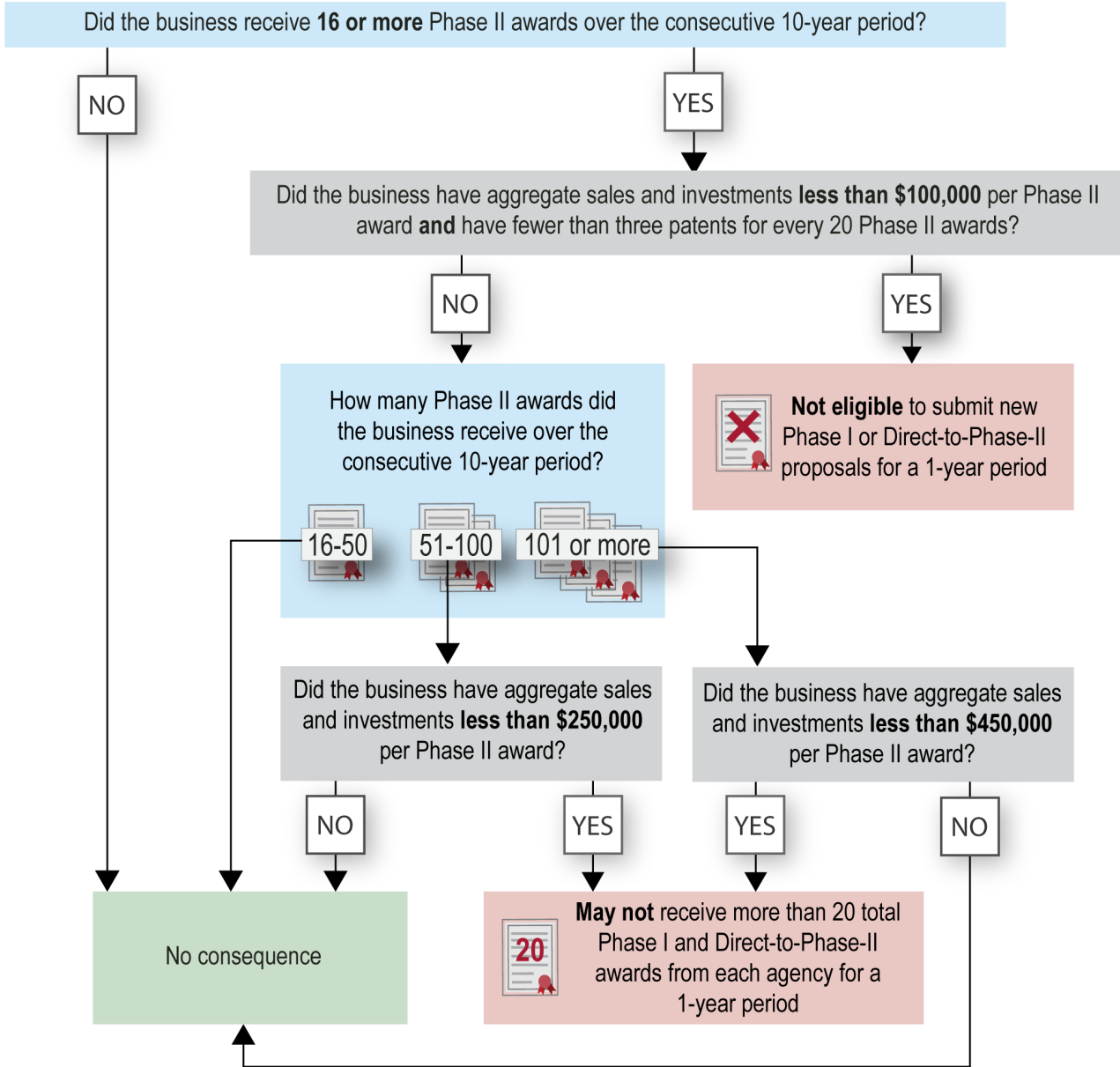
In addition, two tiers of experienced firms must meet an increased performance standard for commercialization (also see fig. 6). To meet the increased commercialization standards, businesses may demonstrate commercialization through either sales revenue or investments, but not patents.⁷

⁷SBIR and STTR Extension Act of 2022, Pub. L. No. 117-183, § 8, 136 Stat. 2180, 2190-91 (2022), to be codified at 15 U.S.C. § 638(qq)(3)(B) and (C). See also, SBA, “Performance Benchmark Requirements,” accessed Jan. 19, 2024, <https://www.sbir.gov/performance-benchmarks>.

Appendix II: Minimum and Increased Performance Standards

Figure 6: Decision Tree for Determining Whether a Small Business Has Met Minimum and Increased Performance Standards for Commercialization

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs



Source: GAO analysis of 15 U.S.C. § 638(qq); Small Business Administration, SBIR and STTR Policy Directive § 6(a)7(ii); and Small Business Administration, "Performance Benchmark Requirements," accessed Jan. 19, 2024, <https://www.sbir.gov/faqs/performance-benchmarks>; GAO (icons). | GAO-24-106398

Note: The consecutive 10-year period includes the 10 fiscal years prior to the last 2 fiscal years. Consequences for not meeting the standards are applied during the 1-year period beginning on the date on which such determination is made.

Appendix III: Awards and Dollars Issued to Multiple Awardees

Table 8: Awards and Dollars Issued to Multiple Awardees Across All Participating Agencies, FY 2011–2020

Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs

Business	Number of awards			Award dollars		
	Phase I	Phase II	Total	Phase I	Phase II	Total
Business 1	503	235	738	\$76,762,240	\$253,744,270	\$330,506,510
Business 2	396	177	573	\$62,484,917	\$196,700,456	\$259,185,373
Business 3	310	169	479	\$54,460,849	\$203,940,458	\$258,401,307
Business 4	292	189	481	\$46,157,585	\$205,090,561	\$251,248,146
Business 5	280	144	424	\$44,996,420	\$163,133,900	\$208,130,320
Business 6	261	127	388	\$42,132,294	\$133,811,618	\$175,943,912
Business 7	197	117	314	\$31,823,581	\$125,814,112	\$157,637,693
Business 8	158	99	257	\$28,925,965	\$119,413,294	\$148,339,260
Business 9	241	99	340	\$41,529,369	\$105,432,326	\$146,961,695
Business 10	207	90	297	\$34,561,764	\$100,487,295	\$135,049,060
Business 11	176	95	271	\$28,987,353	\$93,770,553	\$122,757,906
Business 12	156	84	240	\$23,970,127	\$88,596,665	\$112,566,792
Business 13	157	84	241	\$23,599,350	\$87,640,908	\$111,240,259
Business 14	103	71	174	\$15,516,654	\$86,482,368	\$101,999,022
Business 15	118	67	185	\$17,656,827	\$83,896,815	\$101,553,643
Business 16	79	64	143	\$10,374,345	\$90,820,573	\$101,194,918
Business 17	122	66	188	\$18,121,245	\$70,636,693	\$88,757,937
Business 18	93	58	151	\$17,912,040	\$67,415,744	\$85,327,784
Business 19	107	56	163	\$16,593,219	\$66,701,571	\$83,294,789
Business 20	123	69	192	\$18,816,228	\$63,593,891	\$82,410,119
Business 21	77	53	130	\$12,147,571	\$64,238,667	\$76,386,239
Business 22	65	53	118	\$10,355,402	\$53,214,115	\$63,569,517
Total	4,221	2,266	6,487	\$677,885,345	\$2,524,576,853	\$3,202,462,199

Source: GAO analysis of data from the Small Business Administration. | GAO-24-106398

Note: Multiple awardees are the 22 small businesses that received 50 or more Phase II awards across all participating agencies from fiscal years (FY) 2011 through 2020. We identified 13,166 total businesses that received awards, including 6,865 that received Phase II awards. Award dollars are in 2022 dollars.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Candice N. Wright, (202) 512-6888 or wrightc@gao.gov

Staff Acknowledgments

In addition to the contact named above, Tind Shepper Ryen (Assistant Director), Kelsey L. Kennedy (Analyst-in-Charge), Edith Yuh (Analyst-in-Charge), Hannah Bisbing, Jehan A. Chase, Victoria Coxon, and Alec McQuilkin made key contributions to this report. In addition, Sara Daleski, Mark Kuykendall, and Curtis Martin contributed to the report.

Related GAO Product

Small Business Research Programs: Most Agencies Allow Applicants to Define Needs and Propose Solutions. [GAO-23-106338](#). Washington, D.C.: Sept. 29, 2023.

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