

SEPTEMBER 2022

Renew SBIR, Just Defend the Recipients against China

By Charles Wessner and Sujai Shivakumar

An April 2021 internal report by the Department of Defense (DOD) indicated that selected companies funded by the DOD's Small Business Innovation Research (SBIR) program are being targeted for intellectual property theft by state-sponsored Chinese firms. Based on an examination of a sampling of SBIR award recipients, the Pentagon study concluded that "nearly all cases show that China, not the U.S., is the ultimate beneficiary of DoD and other U.S. government research investments, some of which are significant in size." The study's authors cautioned that the study sample was small and that their methodologies warrant review, but their findings, however preliminary, are clearly a matter of concern for U.S. policymakers.

This justified concern, however, seems to have morphed into quite a different approach. Citing the Pentagon study's findings, Senator Rand Paul (R-KY), the senior Republican on the Senate Small Business and Entrepreneurship Committee, said in June 2022 that he would **not support** reauthorizing the SBIR program "without reforms to strengthen research security and stop abusive behavior by bad actors lining their pockets with taxpayer dollars."

In a move unrelated to national security, Senator Paul and several other lawmakers are also seeking legislative limits on the number of awards that can be made to individual SBIR companies. Multiple award winners do exist in the program, as they do in research contracts for leading U.S. universities and defense contractors. To the degree that multiple award winners are a concern, the authors would argue the proper purview is with the program manager. Having made the awards, they are best positioned to explain their decisions and, if needed, make any necessary adjustments. What should be avoided are legislative solutions that are necessarily rigid once codified into law. The flexibility of the program is one of its major advantages.

Nonetheless, the risks, however, are real. The *Wall Street Journal* **reported** in July that SBIR and the related Small Business Technology Transfer (STTR) program face "an overhaul or outright extinction" if Congress does not renew their budgets and funding runs out at the end of September. The DOD has already canceled a round of SBIR award solicitations "because of uncertainty over the program's future."

Leaving aside the accuracy of the Pentagon study's findings and what the appropriate steps to address its concerns are, the congressional impasse over SBIR funding endangers a vitally important and highly successful federal program. While not well known, SBIR helps small businesses conduct early-stage, high-risk research and development (R&D) by allocating small businesses a fixed share (3.2 percent) of federal agencies' annual R&D spending. Eleven different government agencies are required to participate in the program, with the DOD accounting for over half of spending, or about \$1.7 billion out of an annual total federal expenditure of roughly \$3.2 billion. The program is unique in its focus on leveraging the creativity and drive of small businesses in the United States to address pressing government and societal needs in defense, health, energy, space, and engineering.

The congressional impasse over SBIR funding endangers a vitally important and highly successful federal program.

Features of the Small Business Innovation Research Program

SBIR has several key features that set it apart from many U.S. programs to help small businesses. First and foremost, it is a highly competitive program with a 15 to 20 percent acceptance rate. It is implemented in three phases:

- Phase I involves awards of \$50,000 to \$250,000 for 6 to 12 months to enable the awardee to exhibit the technical merit, feasibility, and commercial potential of an innovation and to demonstrate the awardee's competency.
- Phase II involves awards of \$750,000 to \$1.8 million for two years to awardees who have satisfied the requirements of Phase I and are also considered sufficiently promising to receive further support to continue their R&D efforts. Only about half the companies meet this criterion, underscoring the competitive nature of the program.
 - A major advantage of the program is its flexibility and relative speed. Agencies have flexibility in how they execute the program—with direct to Phase II, jumbo awards, and other provisions that allow them to meet pressing agency needs and take advantage of emerging technological opportunities
- Phase III supports the awardee in commercializing the technology developed in Phases I and II. Phase III work is generally not eligible for SBIR funding, but the small business can use the reputational benefits of the awards to raise funds through other federal programs or from private investors. Private investors often view Phase III firms as having completed two rounds of due diligence with the prospect of an identified end-user market.

BRIDGING THE “VALLEY OF DEATH”

SBIR is one of the most important public-private partnerships in the United States and is currently one of the **most emulated** and extensively studied government R&D programs in the world. Around 70,000 patents and 700 public companies can **trace their origins** to SBIR-funded projects. An independent study **found** that, across the entire U.S. economy, “approximately 25% of the recent winners of *R&D Magazine's* prestigious R&D 100 Awards came from SBIR-nurtured firms.”

SBIR is one of the most important public-private partnerships in the United States and is currently one of the most emulated and extensively studied government R&D programs in the world.

The contributions of the program are many and varied. Conceptually, SBIR awards enable start-ups and small businesses to bridge the “Valley of Death,” the gap between research or proof of concept and commercial production. During this period, innovators frequently **find themselves unable** to fund development and demonstration of prototypes or undertake small-batch production in a laboratory in order to win a government procurement contract or attract private capital. Many promising innovations perish at this stage, lacking the funds to demonstrate the potential of their inventions to investors or customers. In academic terms, there are “information asymmetries” between inventors and investors, which means technologies need to be de-risked for private capital to flow in. SBIR is highly effective at de-risking investment in promising technologies.

The program is a very important pathway for the DOD to procure cutting-edge innovations. SBIR awards **enable small businesses** to sidestep some aspects of the “procurement thicket”—the complex, rules-intensive government procurement process that requires companies to acquire expertise in the federal acquisition regulations (FAR) and tends to favor large, incumbent firms, sometimes at the expense of innovative solutions.

Another major attribute of SBIR is speed. SBIR allows for a much shorter planning period than conventional Pentagon acquisition programs, which must be planned years ahead of the budget cycle. This advantage was evident in the use of SBIR awards during the Iraq War to develop real-time technological responses to the sudden emergence of improvised explosive devices, which inflicted many casualties on U.S. troops. The DOD made 38 SBIR awards to small companies in response to this challenge, **enabling deployment** of prototype countermeasures in Iraq within six months.

A PROVEN PROGRAM

The current fight over SBIR reauthorization worries U.S. defense officials because it jeopardizes a vital U.S. national security asset: the ability to leverage the innovative capabilities of U.S. small businesses to meet specific, defense-related technological needs in real time. SBIR is a proven tool for bringing innovation to DOD missions. There are many contemporary **examples**:

- **“Kamikaze” drones:** SBIR funding from the U.S. Air Force to AeroVironment, a small California-based company, enabled development of the Switchblade series of “kamikaze” drones, which are **now being used** extensively by Ukrainian armed forces against Russia.
- **Improved missile propellants:** A U.S. Army SBIR award to Montana-based Montec Systems enabled development of gelled propellants for rockets and missiles, which are safer, easier to handle, and deliver superior performance than existing alternatives.
- **Enhanced combat readiness:** A U.S. Navy SBIR award to Alaska-based Triverus enabled development of a highly effective system for rapidly cleaning and removing debris from aircraft carrier decks, helping carriers maintain operational readiness.
- **Next-generation reconnaissance:** A U.S. Air Force SBIR award to Colorado-based SEAKR Engineering enabled development of semiconductor-based recording systems for reconnaissance satellites (replacing physical tapes), and a subsequent SBIR award facilitated development of the first onboard processors for space and air platforms. SEAKR has grown into a 450-employee company and is now developing artificial intelligence and data-processing technologies for military satellite systems under the auspices of the Defense Advanced Research Projects Agency.

KEY FINDING FROM MULTIPLE EVALUATIONS: SBIR WORKS

The SBIR program has been subject to rigorous evaluation. The National Academies of Sciences, Engineering, and Medicine (NASEM) **conducted over a dozen major reviews** of various aspects of SBIR and its implementation by the five federal agencies that account for 96 percent of the program’s spending.

These reviews, backed by extensive independent data collection, found SBIR to be “sound in concept and effective in practice.” With respect to DOD SBIR awards, the NASEM study concluded that these awards are funding the development of mission-critical technologies supporting specific DOD needs. Moreover, the review also found that, in some cases, the awards have had a significant impact on entire industries. For example, the early NASEM studies cited early-stage awards to Qualcomm, which grew into the leading global designer of telecommunications chips, and iRobot, which **developed** “an entire new sector of personal robotics (as well as advanced DoD applications).” The collective impact of the program has been hugely productive compared to the level of federal investment.

SBIR and the China Challenge

According to the 2021 review, the limitations of which are underscored by its own authors, China is now appropriating technologies developed through SBIR to further its own industrial policy objectives. While this is undoubtedly accurate, it is not clear how this effort differs from many other Chinese practices. In the past decade, China has emerged as the principal commercial and strategic rival of the United States and is heavily investing in cutting-edge fields such as artificial intelligence, automated manufacturing, microelectronics, telecommunications, and space technology. An integral aspect of this effort is **technology acquisition**, part of a policy directing Chinese state and private entities to introduce, digest, absorb, and re-innovate foreign technology—capturing foreign innovations and introducing modifications deemed sufficient to enable China to assert intellectual property (IP) rights over the technology.

According to the 2021 DOD SBIR study, the limitations of which are underscored by its own authors, China is now appropriating technologies developed through SBIR to further its own industrial policy objectives.

In effect, Chinese industrial policy is systematically exploiting U.S. investments in research, development, and innovation on a massive scale, and Chinese activities with respect to SBIR are part of that broader effort. The 2021 case study review demonstrates that, in some cases, China has tapped into the DOD SBIR program to attempt to access the innovations of U.S. small businesses with military and commercial applications. China **recognizes** that DOD SBIR awards can serve as signals of the technological feasibility and commercial potential of particular innovations, and the awards often play an important role in attracting private investment. But such awards also attract Chinese interest in capturing those innovations—whether through legitimate means, covert acquisitions, or outright theft. This is not new. According to the study, scholars in China have been monitoring the SBIR program since at least 1989, seeing it as an important indicator of the DOD’s defense-related research priorities as well as a potential model for China’s own science and technology strategies.

MEETING THE CHINA CHALLENGE

The fact that China is seeking access to strategic innovations developed under U.S. research programs certainly does not warrant abolition of those programs—to do so would be self-defeating. But it does underscore the need to develop effective countermeasures to block Chinese acquisition of innovative U.S. technologies. To start with, the 2021 review recommended a series of common-sense internal measures the DOD can adopt:

- **Determine the scope of the problem.** Establish a pilot due-diligence program assessing the research methodologies used in the 2021 study to determine their effectiveness in tracking Chinese acquisition

of SBIR innovations. This pilot effort would work with other DOD offices, which are currently developing risk-assessment methodologies for DOD-funded academic research, where similar problems exist.

- **Monitor and screen.** Develop and scale up a monitoring and risk-assessment effort capable of screening tens of thousands of SBIR applicants and awardees. This would involve “semi-automated triaging and screening” to identify entities and individuals of concern that warrant further screening by humans. Monitor instances of fraud or potential national security risks for awardees that have completed Phases II or III.
- **Apply a tiered approach.** Increase the level of screening and risk assessment depending on the SBIR funding objective and phase, with Phase I awardees requiring a cursory or semi-automated screening and Phases II and III **involving** more robust, labor-intensive efforts.
- **Institutionalize the follow-up process.** Establish a new program office to oversee due-diligence efforts with respect to SBIR awards and other DoD-funded research on a department-wide basis. Initially, this initiative would partially overlap with the pilot assessment of research methodologies. At present, the DOD’s SBIR program does not have standard, department-wide capabilities to conduct pre- and post-award due diligence on applicants and awardees.

Whole-of-Government Support

The DOD’s internal initiatives can be buttressed by other federal agencies using their existing authority:

- **Office of the U.S. Trade Representative (USTR):** The USTR should include an assessment of Chinese misappropriation of U.S. intellectual property developed through SBIR funding in its annual reviews, pursuant to Section 182 (“the Special 301 provisions”) of the Trade Act of 1974. In particularly egregious cases, the USTR should initiate an investigation which could lead to trade sanctions and other penalties.
- **Committee on Foreign Investment in the United States (CFIUS):** The 2021 review **observes** that Chinese entities’ direct and indirect participation in venture-capital (VC) investments in SBIR awardees may be facilitating transfer of DOD-funded innovations to China. The Department of the Treasury’s CFIUS, which oversees foreign investments in U.S. entities from a national security perspective, has the (recently acquired) authority to review foreign entities’ acquisition of noncontrolling interests in U.S. producers of “critical technologies”—and, where appropriate, to disapprove them or order divestiture.
- **Bureau of Industry and Security (BIS):** “Critical technologies” include, among other things, “emerging and foundational” technologies. The BIS, at the Department of Commerce, is tasked with, and is currently addressing, the question of what constitutes “emerging and foundational” technologies for CFIUS enforcement purposes. For the BIS, this effort has proven to be a difficult and open-ended definitional process, for which SBIR awards could serve as useful guideposts. The BIS could establish a rebuttable presumption that a technology funded by a particular DOD SBIR award is “emerging and foundational” and thus subject to CFIUS review. However, this presumption could also lead to increased CFIUS scrutiny of SBIR awardees and potentially inhibit some small companies from seeking SBIR funding.
- **Cybersecurity support:** SBIR awardees are small businesses, which may lack the resources to implement measures sufficient to ward off cyber threats from sophisticated foreign actors. According to a recent nonprofit survey, only 18 percent of U.S. small businesses **are confident** in the efficacy of their cybersecurity regimes. The Biden administration is currently attempting to fashion a comprehensive federal cybersecurity policy out of the existing “patchwork” of federal measures. Initiatives to ensure enhanced cybersecurity for small businesses, particularly those contributing directly to national security,

should be deployed in this effort. A [recently announced initiative](#) by the Small Business Administration (SBA) to allocate \$3 million to state governments to implement a pilot program for small-business cybersecurity is well intentioned but woefully inadequate. Substantially more public measures and resources, including capacity building with respect to education and training programs, will be required. Without these additional resources, the United States risks losing the fruits of many years of research and the jobs and growth they can provide in the hands of innovative U.S. companies.

A Long-Term Perspective

Over the longer term, U.S. policymakers should consider measures to improve the domestic infrastructure supporting small-business innovation and to diminish the opportunities for foreign strategic competitors to access promising technologies:

- **Defend small business IP.** Small U.S. businesses that develop proprietary technologies are vulnerable to misappropriation of their IP by large foreign entities and may lack the financial and legal resources to defend themselves effectively. A [2020 study](#) by the Government Accountability Office (GAO) found that the U.S. Patent and Trademark Office, the SBA, and other federal agencies offer numerous programs to educate small businesses with respect to protection of their IP. However, the GAO found that many small businesses [remain underinformed](#), if not bewildered, with respect to IP issues, and substantial improvements to coordination within and between the relevant federal agencies are needed.
- **Build bridges across the “Valley of Death.”** Numerous studies [have found](#) that the United States needs to improve and expand its capability to support the transition from technology development to commercial manufacturing and scale-up of production, particularly with respect to innovative small businesses. Manufacturing USA, a network of federal applied research institutes, represents a partial response to this need, as do the activities of the Manufacturing Extension Partnership (MEP), which provides technical support and expertise to small firms in every U.S. state through local service providers.
- **Recognize the need for scale.** These programs are well conceived and reflect international best practice. Still, several third-party assessments of Manufacturing USA and MEP have pointed out that these organizations may well be too small in reach, too underfunded for their mission, and too narrowly focused to achieve their broader objective. It is clear that U.S. programs, however well conceived, are [under-resourced](#) given the sheer scale of the U.S. economy and the scope of comparable foreign efforts. Other countries may not be as successful at growing their own Silicon Valley, but not for want of trying, and over time they are getting better in creating both start-ups and “unicorns” (private companies worth more than \$1 billion).
- **Make competitive and scalable funding available.** One important factor underlying SBIR awardees’ acceptance of VC investments that might involve direct or indirect Chinese financing is arguably the dearth of alternative sources of early-stage funding in U.S. capital markets. Many SBIR companies with valuable, highly innovative products able to advance government mission needs in defense, energy, or health are not attractive candidates for VC funding—for example, there is not usually a mass market for tools for spacecraft, however essential they may be for the National Aeronautics and Space Administration.
- **Take more action.** President Biden’s plan to revitalize U.S. supply chains, [announced](#) in February 2022, included a series of welcome measures to expand access to capital for small manufacturers, including new and existing funding programs at the Department of the Treasury and the SBA. However, the funding challenge remains. In [July 2022](#), “Thousands of small business owners descended on Capitol Hill” to complain of inflation, supply-chain woes, and “limited access to capital.” They pointed out that

Congress has not reauthorized the SBA for over two decades and that “inaction . . . has rendered key programs outdated and ineffective.” Meanwhile, other countries have a panoply of programs, including their own versions of SBIR.

- **Reach an appropriate scale.** The question is not whether the United States should have these programs, but whether it can scale them to a level that can be effective.

The Importance of Continuity and Brand

SBIR, created by Congress in 1982, is an internationally recognized program with an active constituency and a track record strengthened by its longevity. The program’s steady investments have created a portfolio of companies able to respond to government needs over time as well as “winners” that later achieve Fortune 500 status. It also brings in new entrants every year; about a third of the awardees are first-time applicants.

SBIR has been extended and reauthorized periodically. Some congressional staff have even interpreted this history as a weakness, seeing SBIR as an out-of-date program from the 1980s. This is certainly not the view of the United States’ competitors, as China’s efforts illustrate. Despite periodic uncertainty over reauthorization, there has not been an interruption in the program’s funding since its inception 40 years ago. In 2017, pursuant to the National Defense Authorization Act for Fiscal Year 2017, SBIR and STTR were **extended** through September 30, 2022—and authorization will expire in a few weeks, absent congressional action.

Underscoring what is at stake, in a June 3, 2022, letter to Congress, Undersecretary of Defense for Acquisition and Sustainment William LaPlante and Undersecretary of Defense for Research and Engineering Heidi Shyu urged renewal of SBIR funding, warning that failure to reauthorize the programs **would result** in “approximately 1200 warfighter needs not being addressed through innovative research and technology development [and] could result in thousands of small businesses being forced to lay off workers, or drive them to other sources of funding, to include foreign investment.”

The underlying reality is that many other countries have adopted SBIR-type programs, often with considerable success—though it is important to recognize that the program is not a panacea, neither here nor abroad, for the many challenges facing innovative start-ups. It is, however, unquestionably one of the United States’ most effective innovation programs. To be sure, steps should be taken to defend small companies against cyberattacks and foreign-based efforts to acquire ownership or steal technology. That said, cutting this hugely successful program because of Chinese efforts to subvert it would be akin to closing major universities because of similar Chinese efforts to subvert their staff or steal the results of federally funded research or shutting down a major defense acquisition program because the Chinese or Russians have gained access to its technical secrets. SBIR can be made more secure with sustained effort but ending it will only help China. ■

Charles Wessner is a senior adviser (non-resident) with the Renewing American Innovation Project at the Center for Strategic and International Studies (CSIS) in Washington, D.C. Sujai Shivakumar is director and a senior fellow of the Renewing American Innovation Project at CSIS.

This report is made possible by general support to CSIS. No direct sponsorship contributed to this report.

This report is produced by the Center for Strategic and International Studies (CSIS), a private, tax-exempt institution focusing on international public policy issues. Its research is nonpartisan and nonproprietary. CSIS does not take specific policy positions. Accordingly, all views, positions, and conclusions expressed in this publication should be understood to be solely those of the author(s).

© 2022 by the Center for Strategic and International Studies. All rights reserved.