



The National Academy of Sciences Study of the Small Business Innovation Research Program

A Summary Prepared by the Small Business Technology Council

The Small Business Innovation Research (SBIR) program was created by Congress in 1982. In 2005, Congress requested the National Research Council (NRC) to “conduct a comprehensive study of how the SBIR program has stimulated technological innovation and used small businesses to meet Federal research and development needs” and to make recommendations with respect to the SBIR program. This study, the most scientific and comprehensive of SBIR ever undertaken, was performed by the National Academy of Sciences and released in preliminary form in September 2007. SBIR Programs at the following agencies were studied: the Department of Defense, the National Institutes of Health, the National Aeronautics and Space Administration, the Department of Energy, and the National Science Foundation. These five agency programs account for over 90% of the SBIR Program by dollars.

The NAS focused its study on two sets of concerns. First, how well do the agency SBIR programs meet four societal objectives set by Congress? Second, can the management of agency SBIR programs be made more effective? Are there best practices in agency SBIR programs that could be extended to other agencies’ SBIR programs?

The four Congressional objectives of SBIR are to:

- (1) stimulate technological innovation**
- (2) use small business to meet federal research and development needs**
- (3) foster and encourage participation by minority and disadvantaged persons in technological innovation.**
- (4) increase private sector commercialization of innovations**

Summary of Key Findings

“The SBIR program is sound in concept and effective in practice.”

The SBIR is an effective program that is successfully meeting most of the Congressional objectives.

The program is fair and open and regularly attracts new participants. Between 1992 and 2005, inclusive, more than 14,800 firms received at least one Phase II award.

SBIR successfully fills a gap in early stage financing that is not addressed by other funding sources.

Multiple SBIR awards to individual companies are not a problem. Agencies tracking new awardees indicate that at least one third of awards go to companies that have not previously won an award at that agency. There is no substantiated evidence that multiple award winners are a problem at any agency. Most multiple award winners are producing the significant commercial products and sales that SBIR was designed to stimulate.

Individual departments, agencies and military services have adapted the SBIR program effectively to their particular needs. This flexibility is a key aspect of the program's success: *"The program has been successful partly because a 'one size fits all approach' has not been imposed."*

"Currently, the program is delivering results that meet most of the Congressional objectives"

(1) Stimulating technical innovation.

Using a variety of metrics, the NAS study found that the SBIR program is contributing to the nation's stock of new scientific and technical knowledge. Knowledge output metrics included patents, publications, licenses to use patents, presentations, analytical models, algorithms, new research equipment, reference samples, prototypes, new products and processes, spin-off companies, and "new" human capital. SBIR has also fostered a variety of relationships between universities and small business, aiding the transfer of university research to the marketplace.

(2) Using small business to meet federal research and development needs.

The NAS study found that the SBIR program objectives are aligned with, and contribute significantly to, fulfilling the mission of each of the studied agencies.

- Small businesses in SBIR are providing the agencies with rapid responses to changing needs.
- SBIR solicitations at DOD and NASA are directed at high-priority needs, including acquisitions.
- SBIR solicitations at NSF and DoE are strongly focused on the agencies' research agendas, including those of units within the agencies, and SBIR proposals are responsive to these agendas.
- SBIR topics are guidelines are utilized at NIH. Applications falling within these topics and guidelines are accepted. Committees, called "Study Sections", made up of experts from the research community, evaluate and score the applications based on their merit.
- The DOD "prerelease" process helps the services receive better, more focused proposals and helps companies avoid the cost of a non-responsive application and better understand the problems the government wants to solve.

(3) Fostering and encouraging technological innovation by minority and disadvantaged persons.

The NAS study found a mixed record in regard to this objective. The program does support the growth of a diverse array of small businesses, including minority- and women- owned business by providing market access, funding and recognition. Numerous individual instances of meeting this objective were noted. But agencies do not have a uniformly positive record in funding research by minority- and women- owned businesses, and current trends are "troubling". The study noted that documentation of minority- and women- owned business has been inadequate at certain agencies and that better monitoring and more analysis is needed.

(4) Increasing private sector commercialization of innovations

SBIR commercial success includes sales, license revenues, R&D investment and research contracts and ultimate sale of equity. The ability to track commercialization results, however, is limited and it is highly likely that efforts at quantification understate the true commercial impact of SBIR.

SBIR addresses a funding gap for early stage technology development not handled by venture capital investment. Venture capitalists are often focused on a given geographic area and are prone to herding tendencies, as illustrated by the dot.com boom. "Many good ideas die on the way to market. This reality belies a widespread myth that U.S. Venture Capital markets are invariably able to identify promising entrepreneurial ideas and finance their transition to market." Most venture capital in the United States is directed at later stage developments. Venture capital firms tend not to invest upstream in high-risk, early-stage technology.

An NAS survey of 790 Phase II projects with commercial sales showed average sales per project of about \$2.4 million. The results were skewed by a few large successes, with more than half of the projects having sales of less than \$1M. Of these sales, 35% were to the private sector, 32% to DOD, 10% to DOD prime contractors, 14% to export sales, and the rest to other agencies and to state and local governments.

In addition to sales revenue, SBIR companies have financed themselves through the following means (in decreasing rank of dollar value): funding and investment from non-SBIR federal funds, private (angel) investment, US venture capital, foreign investment, company self-investment, personal funds, and state and local government funds. The average additional investment reported by 839 Phase II projects was about \$1.5 million.

Conclusions and recommendations

The SBIR program is proving effective in meeting Congressional objectives. It is increasing innovation, encouraging participation by small companies in federal R&D, providing support for small firms owned by minorities and women, and resolving research questions for mission agencies in a cost-effective manner. The SBIR programs at each of the agencies are, by and large, operated in a fair and open manner. Although there is no single simple metric for determining commercial success, the data heavily support the view that the program has a strong commercial focus and the program is successful in commercializing innovative technologies in a variety of ways. *“Should the Congress wish to provide additional funds to the program in support of these objectives, those funds could be employed effectively by the nation’s SBIR program.”*

The NAS study makes the following recommendations:

- No fundamental changes should be made to the program.
- The program’s inherent flexibility should be maintained.
- The basic Phase I, Phase II, Phase III structure should be kept in place. Allowing firms to apply directly for Phase II awards would be detrimental to the program.
- Experimentation by the agencies, such as the Fast Track program, should be encouraged. Agencies should be encouraged to develop pilot programs and experiment with further potential improvements to the SBIR program
- Evaluation methodologies and practices should be strengthened. Congress should consider a provision for additional program funds for SBIR management and evaluation.
- Funding mechanisms beyond Phase II, such as the NSF Phase IIB program and NIH continuation awards, could be adopted at other agencies. Any such program should be carefully monitored and evaluated to ensure the result is positive.
- The standard limits on award size have not changed since 1995. Phase I awards should be increased to \$150,000, and Phase II awards should be increased to \$1,000,000.
- The processing periods for awards vary substantially by agency. Agencies should also specifically report on initiatives to shorten decision cycles.
- Multiple award winners do not appear to be a problem. Awards should be based on merit. Setting an arbitrary limit to the number of awards that a company receives is neither necessary nor desirable in light of the contributions made by these firms. Agencies should avoid imposing quotas on multiple award winners, which limit innovative ideas and restrict opportunities to provide high quality solutions to the government.