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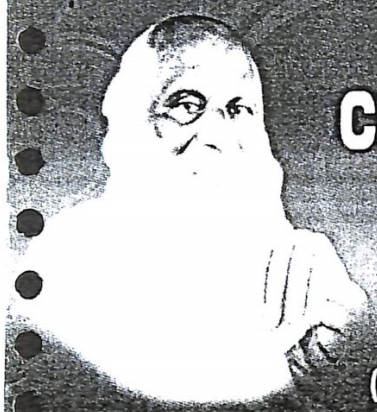

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An Assessment of the Small Business Innovation Research Program

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A Brief History of the SBIR Program

In the 1980s, the country's slow pace in commercializing new technologies—compared especially with the global manufacturing and marketing success of Japanese firms in autos, steel, and semiconductors—led to serious concern in the United States about the nation's ability to compete. U.S. industrial competitiveness in the 1980s was frequently cast in terms of American industry's failure "to translate its research prowess into commercial advantage." The pessimism of some was reinforced by evidence of slowing growth at corporate research laboratories that had been leaders of American innovation in the postwar period and the apparent success of the cooperative model exemplified by some Japanese *kieretsu*.

Yet, even as larger firms were downsizing to improve their competitive posture, a growing body of evidence, starting in the late 1970s and accelerating in the 1980s, began to indicate that small businesses were assuming an increasingly important role in both innovation and job creation. Research by David Birch and others suggested that national policies should promote and build on the competitive strength offered by small businesses. In addition to considerations of economic growth and competitiveness, SBIR was also motivated by concerns that small businesses were being disadvantaged vis-à-vis larger firms in competition for R&D contracts. Federal commissions from as early as the 1960s had recommended the direction of R&D funds toward small businesses. These recommendations, however, were opposed by competing recipients of R&D funding. Although small businesses were beginning to be recognized by the late-1970s as a potentially fruitful source of innovation, some in government remained wary of funding small firms focused on high-risk technologies with commercial promise. The concept of early-stage financial support for high-risk technologies with commercial promise was first advanced by Roland Tibbetts at the National Science Foundation (NSF). As early as 1976, Mr. Tibbetts advocated that the NSF should increase the share of its funds going to small business. When NSF adopted this initiative, small firms were enthused and proceeded to lobby other agencies to follow NSF's lead. When there was no immediate response to these efforts, small businesses took their case to Congress and higher levels of the Executive branch. In response, a White House Conference on Small Business was held in January 1980 under the Carter Administration. The conference's recommendation to proceed with a program for small business innovation research was grounded in:

- Evidence that a declining share of federal R&D was going to small businesses;
- Broader difficulties among small businesses in raising capital in a period of historically high interest rates; and
- Research suggesting that small businesses were fertile sources of job creation. Congress responded under the Reagan Administration with the passage of the Small Business Innovation Research Development Act of 1982, which established the SBIR program.

The SBIR Development Act of 1982

The new SBIR program initially required agencies with R&D budgets in excess of $100 million to set aside 0.2 percent of their funds for SBIR. This amount totaled $45 million in 1983, the program's first year of operation. Over the next 6 years, the set-aside grew to 1.25 percent.

The legislation authorizing SBIR had two broad goals:

- "to more effectively meet R&D needs brought on by the utilization of small innovative firms (which have been consistently shown to be the most prolific sources of new technologies) and
- to attract private capital to commercialize the results of federal research."

SBIR's Structure and Role

As conceived in the 1982 Act, SBIR's grant-making process is structured in three phases:

- Phase I is essentially a feasibility study in which award winners undertake a limited amount of research aimed at establishing an idea's scientific and commercial promise. Today, the legislation anticipates Phase I grants as high as $100,000.
- Phase II grants are larger – normally $750,000 – and fund more extensive R&D to further develop the scientific and technical merit and the feasibility of research ideas.
- Phase III. This phase normally does not involve SBIR funds, but is the stage at which grant recipients should be obtaining additional funds either from a procurement program at the agency that made the award, from private investors, or from the capital markets. The objective of this phase is to move the technology to the prototype stage and into the marketplace.

Phase III of the program is often fraught with difficulty for new firms. In practice, agencies have developed different approaches to facilitating this transition to commercial viability; not least among them are additional SBIR awards. Some firms with more experience with the program have become skilled in obtaining additional awards. Previous NRC research showed that different firms have quite different objectives in applying to the program. Some seek to demonstrate the potential of promising research. Others seek to fulfill agency research requirements on a cost-effective basis. Still others seek a certification of quality (and the additional awards that can come from such recognition) as they push science-based products toward commercialization. Given this variation and the fact that agencies do not maintain data on Phase III, quantifying the contribution of Phase III is difficult.

Overall roadmap to guide the research process :

The elements of this multi-step process are detailed below:

1. **Agree on initial guidelines.** These initial guidelines are based on the legislation, the Memorandum of Understanding, and contracts.

2. **Clarify objectives.** What central questions must the study answer? What other interesting but optional questions should be addressed? What questions will specifically not be considered? This is discussed further in Section 3 of this chapter.

3. **Develop operational definitions:** For example, while Congress has mandated that the study address the extent to which SBIR supports the agencies' missions, the Committee needs to develop operational definitions of "support" and "agency mission," in collaboration with agency managers responsible for program operations. This is a necessary step before developing the relevant metrics. This is discussed further in Section 4 of this chapter.

4. **Identify metrics for addressing study objectives.** The Committee will determine extent of commercialization fostered by SBIR—measured in terms of products procured by agencies, commercial sales, licensing revenue, or other metrics. This is discussed further in Section 5 of this chapter.

5. **Identify data sources.** Implementation of agreed metrics requires data. A wide mix of data sources will be used, so the availability of existing data and the feasibility of collecting needed data by different methods will also condition the selection of metrics, and the choice of study methods. The existence or absence of specific methodologies and data sets will undoubtedly lead to the modification, adoption, or elimination of specific metrics and methods. This is discussed further in Section 6 of this chapter.

6. **Develop primary research methodologies.** The study's primary research components will include interviews, surveys, and case studies to supplement existing data. Control groups and counterfactual approaches will be used where feasible and appropriate to isolate the effects of the SBIR program. Other evaluation methods may also be used on a limited basis as needed to address questions not effectively addressed by the principal methods. This is discussed further in Section 7 of this report.

7. **Complete Phase I.** Phase I of the NRC study will be formally completed once a set of methodologies is developed and documented, is approved by the Committee, and passes successfully through the Academy's peer review process.

8. **Implement the research** program (NRC Study Phase II). The variety of tasks involved in implementing the research program is previewed in Annex I of this report.

9. **Prepare agency-specific reports.** Results from the research program will be presented in five agency-specific reports—one for each of the agencies. Where appropriate, agency-specific findings and recommendations will be formulated by the relevant study subcommittee for review and approval by the full Committee.

10. **Prepare overview report.** A separate summary report, buttressed by the relevant commissioned work and bringing together the findings of the individual agency reports, along with general recommendations, will be produced for distribution. This final report will also draw out, as appropriate, the contrasts and similarities among the agencies in the way they administer SBIR. It will follow the approval procedure outlined above.

11. **Organize public meetings to review and discuss findings.** Following report review, findings and recommendations will be presented publicly for information, review, and comment.

12. **Submit reports.**

13. **Disseminate findings broadly.**