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NAVSWC MP 90-445

**FY89 TECHNOLOGY TRANSFER SUMMARY
NAVAL SURFACE WARFARE CENTER**

**BY RAMSEY D. JOHNSON
TECHNOLOGY BASE PROGRAM OFFICE**

AUGUST 1990

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FOREWORD

This report summarizes Naval Surface Warfare Center (NAVSWC) participation in the following five principal areas involving technology interactions with the public and private sectors:

1. Domestic Technology Transfer (DDT)
2. Navy Potential Contractor Program (NPCP)
3. Industry Independent Research & Development (IR&D)
4. Small Business Innovation Research (SBIR)
5. Technology Base Contracting

Center technical staff members supporting technology base and domestic technology transfer tasks contributed to the information presented in this report. Questions or requests for additional information should be referred to NAVSWC, Code D4, Mr. Ramsey D. Johnson, (301) 394-1505 or Autovon 290-1505.

Approved by:

Thomas A. Clare

THOMAS A. CLARE
Technical Director

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INTRODUCTION

The Naval Surface Warfare Center (NAVSWC) is an active participant in the following Navy and Department of Defense programs that promote technical interactions with the private sector:

- Navy Domestic Technology Transfer (DTT)
- Navy Potential Contractor Program (NPCP)
- Industry Independent Research and Development (IR&D) Program
- Small Business Innovation Research (SBIR) Program
- Category 6.1, 6.2, and 6.3A (Technology Base) Contracting

This report summarizes FY89 NAVSWC participation in these programs.

DOMESTIC TECHNOLOGY TRANSFER

BACKGROUND

For many years, the U.S. civilian sector has derived significant spinoff benefits from the Navy's efforts in the development and application of technology. In most cases, these transfer actions occurred on an ad hoc basis. Recognizing that the Nation would derive considerably greater benefits if DTT activity were encouraged and systematically pursued as a matter of policy, Congress passed legislation¹ to stimulate improved use of federally funded technology developments, including authority for Federal laboratories to participate in cooperative research and development agreements (CRDAs) with U.S. industry and academia. To underscore this legislative interest, the President issued an Executive order² calling for prompt action in implementing these initiatives for facilitating U.S. private sector access to Federal science and technology. The Department of Defense DTT Program was authorized³ in response to the requirements of References 1 and 2.

NAVY DTT

The Navy policy of actively promoting military-civilian DTT and associated CRDAs is promulgated by a directive from the Secretary of the Navy.⁴ In this context, DTT involves the transfer of technology developed by the Navy, including

inventions, software, and training technology, to the U.S. civilian sector for use in nonmilitary applications. Of course, in carrying out this policy, due care must be taken to avoid actions that might create the appearance of undue influence over, or competition with, private enterprise and the free operation of the economy. In addition, the policy must be carried out within the constraints of proper control of classified information, military sensitive unclassified information, and militarily critical technologies.

NAVSWC PARTICIPATION

NAVSWC was participating in technology transfer activities prior to the federally enacted legislation¹ and was a charter member of the Department of Defense Technology Transfer Consortium in 1971. This organization has subsequently evolved into the Federal Laboratory Consortium, of which NAVSWC continues to be a contributing member.

Although NAVSWC endorses and actively pursues technology transfer activities involving Center R&D efforts, significant and necessary limitations exist on the amount of NAVSWC-developed technology appropriate for transfer. With the work heavily oriented toward naval warfare applications, frequently no civilian application is apparent without extensive adaptive engineering effort. Security classification and export control of critical technologies are also significant constraints.

Public Law 99-502¹ requires that each Federal laboratory either establish an Office of Research and Technology Applications (ORTA) to manage DTT activities or perform the ORTA functions within an existing organizational structure. Since NAVSWC has long maintained a DTT office, this organizational structure was unchanged following passage and implementation of Public Law 99-502. The principal elements of NAVSWC participation in DTT are described below.

Cooperative Research and Development Agreements

As authorized by Public Law 99-502, a CRDA is any agreement between one or more Federal laboratories and one or more nonfederal parties under which the participants may provide personnel, services, facilities, equipment, or other resources toward the conduct of specified research or development efforts that are consistent with the missions of the participating Federal laboratories. Also, the Federal laboratories may receive funds from, but not provide funds to, nonfederal parties under a CRDA. Further, by statute, a CRDA is not a procurement contract or cooperative agreement as those terms are used in 31 U.S.C. 6303-6305, and the Federal Acquisition Regulation (FAR) and the DOD FAR Supplement are not applicable to these agreements.

NAVSWC has one active CRDA, effective as of 17 January 1990, with Loral Defense Systems. It involves the testing of a privately developed "Acoustic Test Vehicle."

Government-Industry Conferences

These conferences provide a forum for Government laboratories to inform industry participants about significant materials, processes, innovations, or developments that have promising potential for commercial application. The general format includes technical presentation sessions after which Government presenters are available for individual followup discussions with interested industrial representatives.

In August 1989, the Navy and the American Defense Preparedness Association cosponsored a government-industry conference entitled "Navy Domestic Technology Transfair." Fifty-two technical items from 13 Navy activities were offered to industry participants. NAVSWC representatives presented the following topics:

- Silver Oxide (AgO) Cathode
- Data Acquisition and Reduction Processor (DARP) for AN/YUK-43 Performance Monitor Interface (PMI)
- Application of Global Positioning System Satellites to Determine Earth's Gravity and Platform Orientation
- GPS-Aided Gravimetry at 30-km Altitude from a Balloon-borne Platform
- CMSTOOL Version 1.2
- Magnetostrictive Sensors and Actuators
- Method of Measuring Magnetic Effects Due to Eddy Currents
- Nondestructive Inspection by Eddy Current Methods of Carbon Fiber Reinforced Composites and Metals
 - (1) Method and device for measuring electrical resistivity
 - (2) Method for measuring defect depth
 - (3) Method for identifying the eddy current signature of anomalous conditions and a technique for accurately describing the size and shape of a fault
 - (4) Device for the inspection of materials by eddy current methods

Patents

As an incentive to stimulate DTT, Public Law 99-502 permits Government inventors to share royalties or other income resulting from the licensing of Navy inventions. Figure 1 shows the number of NAVSWC patents and inventions during FY85-89 that have commercial potential. One patent and two patent applications have been licensed, and the NAVSWC inventors are receiving a share of the royalty income.

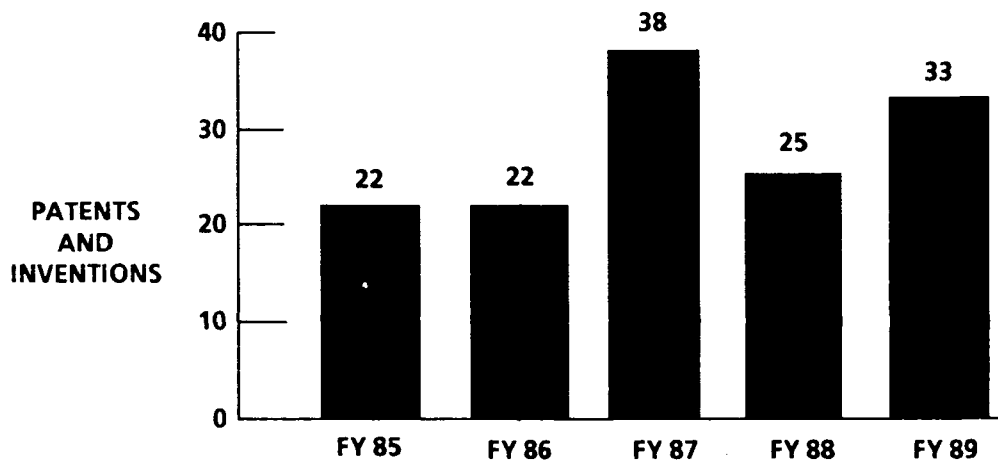


Figure 1. Inventions and patents with commercial potential

Navy DTT Fact Sheet

NAVSWC manages, edits, and publishes the *Navy Domestic Technology Transfer Fact Sheet*. This monthly publication highlights Navy-wide technology developments (that have been approved for public release) that are of potential benefit to public and private organizations, individuals, and other Federal laboratories. The program, sponsored by the Office of Naval Technology (Code ONT-26), provides a focus and a highly visible source of information for the dissemination of DTT contributions from the Navy laboratory community. All Navy laboratories are invited to contribute articles for publication in the *Fact Sheet*, which is distributed to over 10,000 subscribers across the country. NAVSWC contributed the following articles during FY85-89:

FY85

- Self-powered Vehicle Detector
- Surface Roughness Technique for Wind Tunnel Modeling

FY86

- Gauge Measures High Transient Pressures
- Tool Opens Large Containers

FY87

- New Method Improves Pollution Control Devices
- Computer Software More Reliable
- Digital Dosimeter Measures Radiation Doses
- Photographic Indicator Flashes Print Status

FY88

- NSWC Develops New Electro-Mechanical Transducer
- Scientists Receive Cash Awards for Invention

FY89

- Lightweight Nickel Composite Electrode
- Data Acquisition and Reduction Processor
- New Software Tool for Navy Development
- Electronic Security Indicating Attachment Developed
- High-energy Lithium Battery

Technology Application Assessments

Public Law 99-502 requires that DFT offices prepare application assessments for selected R&D projects performed by their laboratories that may have commercial applications.

A technology application assessment (TAA) is a description of a Government laboratory R&D project, process, or innovative development that is cleared for public release and has potential for alternative use in the private sector. This technical disclosure is provided to the National Technical Information Service (NTIS) and other appropriate release sources for broad dissemination in the public and private sectors. Preparation of TAAs by laboratory OKTAs is directed by Public Law 99-502¹ and DOD 3200.12-R-4.3. Figure 2 provides data on NAVSWC TAAs for FY85-89.

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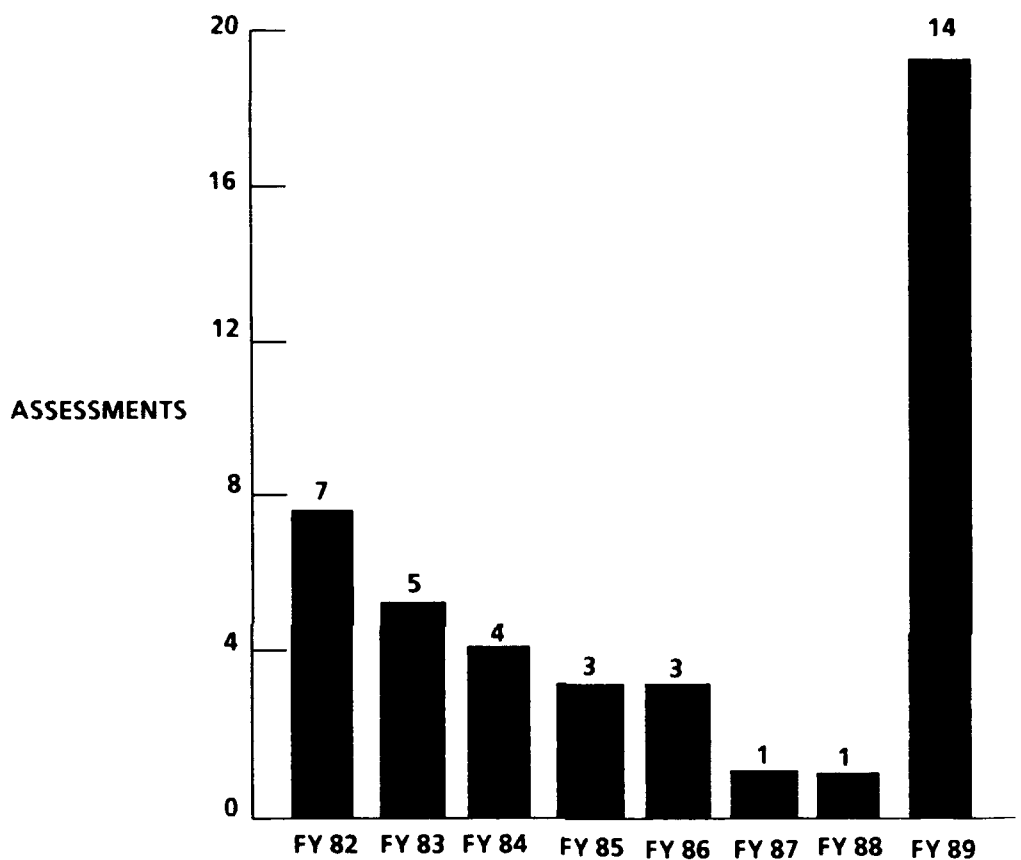


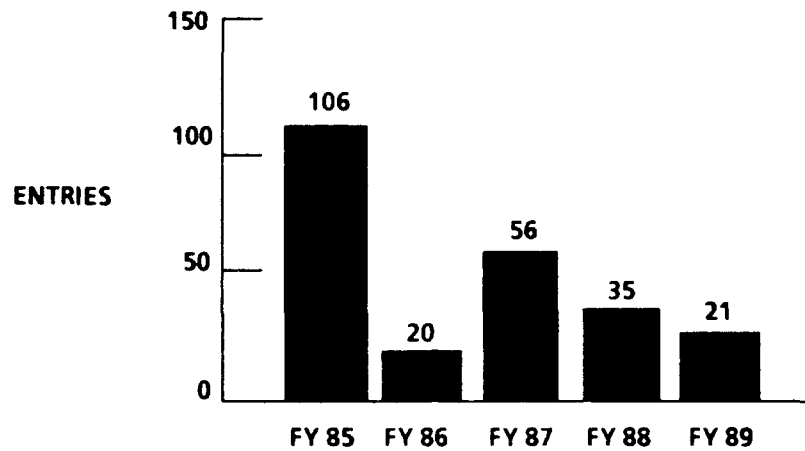
Figure 2. Technology application assessments

Other DTT Disclosures/Releases

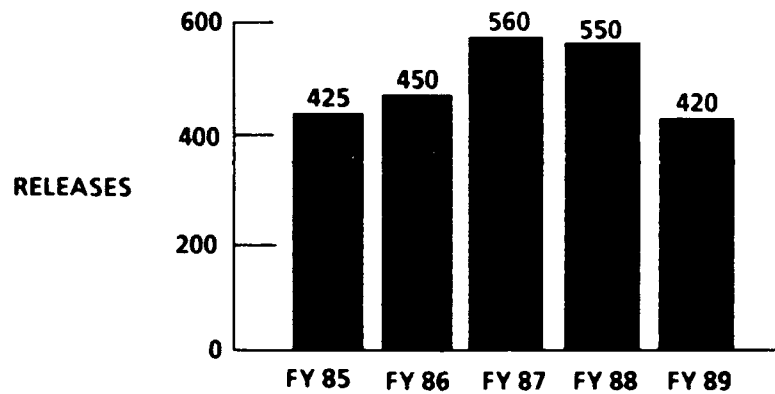
Figure 3 shows, for FY85-89, the number of NAVSWC technical publications entered in the National Technical Information Service; the number of unrestricted (public release) technical information disclosures to symposia, workshops, journals, and other publications; and the number of responses to information requests from individuals and private industry.

Numerous inquiries are also made directly to NAVSWC engineers and scientists in private communications; no formal records are kept of these.

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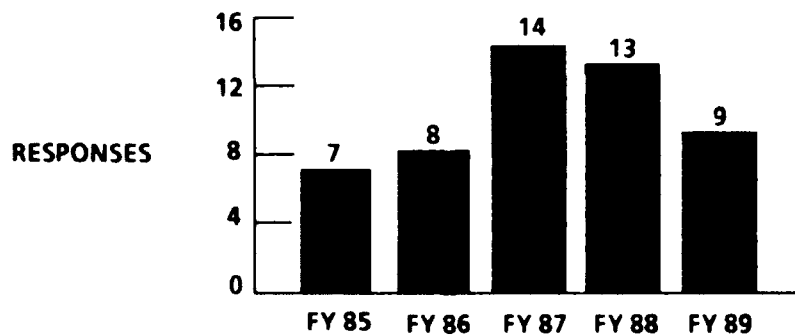


Figure 3. Other disclosures and releases

NAVY POTENTIAL CONTRACTOR PROGRAM

If technological developments are to be applied promptly to meeting Navy requirements, it is essential that the scientific and technical community have appropriate access to technical information about those requirements.

Some requirement information is conveyed to scientists and engineers by briefings, symposia, and site visits. However, there are problems inherent to the process that may preclude information from reaching those who may be able to solve Navy technical problems. They include

- Lack of access to information required to prepare timely and technically relevant contract proposals by qualified civilian groups that do not hold a contract.
- Lack of access by holders of current contracts to classified or military critical unclassified information in areas not concerning their contracts. Those data could assist them in developing alternate solutions and in planning and executing their IR&D programs.
- Lack of orientation concerning the operational environment and probable conditions in which Navy equipment must function.
- Prevention of the compromise of sensitive information while ensuring that it reaches those who have a valid "need to know."

NAVY POLICY

The Navy recognizes the need to facilitate the increased use of civilian sector technological investments in meeting military requirements. That will best be accomplished by providing civilian scientists with increased, appropriate access to defense technological data. Accordingly, the NPCP is being established to provide controlled access to relevant military data by the civilian scientific and technical sector. The NPCP will also allow use of civilian discretionary funds to address Navy needs. Navy activities are to encourage U.S. qualified firms, academia, other organizations, and individuals to participate in the NPCP. That includes U.S. firms under foreign ownership, control, or influence if the foreign interest risk is managed in accordance with the Industrial Security Regulation.⁵

The NPCP will permit no-cost negotiated agreements that authorize access to information for specified purposes. Such agreements are not government procurement contracts, grant agreements, or cooperative agreements as defined in sections 6303, 630, and 6305 of U.S.C., Title 31.⁶ Participants may use information derived from the agreements to support their IR&D programs without affecting allowability

of those efforts. Agreements allow access to information only, and neither party is permitted to require delivery of technical goods or services as condition for NPCP participation.

NPCP agreements are authorized only between one Navy party and one non-Navy party. Agreements are not authorized that involve multiple Navy sponsors, multiple non-Navy partners, derivative efforts, consortia, or combinations thereof.

NAVSWC PARTICIPATION

Figure 4 shows the number of NPCP agreements that NAVSWC has entered into during the FY85-89 period. The titles and names of the nongovernment participants are included in the following NAVSWC publications:

<u>FY</u>	<u>Publication</u>
85	NSWC MP 85-458
86	NSWC MP 87-30
87	NSWC MP 88-12
88	NSWC MP 89-38
89	NSWC MP 90-72

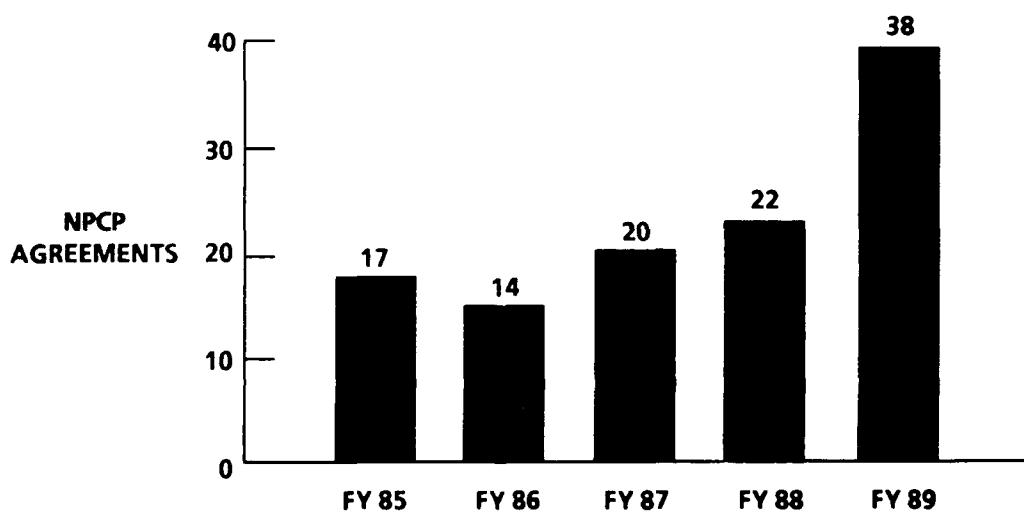


Figure 4. Navy Potential Contractor Program agreements

INDUSTRY INDEPENDENT RESEARCH AND DEVELOPMENT

IR&D is the technical effort conducted by private companies for their own business purposes; it is not sponsored by, or required in performance of, a contract or grant. IR&D represents a significant portion (about \$5B annually) of the Nation's technology base; thus, the government has an interest in encouraging its coordination with other technology efforts. To encourage industry to maintain a strong IR&D effort, the government allows an average of 40 percent of the cost to be applied to overhead rates.

The potential benefits to the Navy and Marine Corps from close coordination of industry IR&D efforts with Navy RDT&E programs are significant and range from exchanges of technology to development of cooperative R&D efforts with industry. To ensure that these benefits are fully realized, Navy and Marine Corps managers must be cognizant of relevant IR&D projects to exploit the associated results. Accordingly, the Navy has established a program to ensure the timely acquisition, dissemination, and application of IR&D information and to provide information to industry on Navy, Marine Corps, and DOD technology requirements and programs. Figure 5 summarizes NAVSWC support of industry IR&D.

To maintain its technological advantage and to ensure effective future defense capabilities, the DOD must aggressively employ all resources, including the IR&D programs of American industry, that can contribute to the development of future weapons systems. Specifically, the IR&D programs of DOD contractors will be thoroughly reviewed and evaluated for applicability to current and future Navy and Marine Corps needs as well as for technical quality. Because of the importance of IR&D to the Navy, the Navy will

- Make maximum use of industry programs by integrating them with Navy program plans.
- Make industry aware of the military threat, requirements, and problems facing the Navy and Marine Corps so that industry can plan and carry out IR&D that fills Navy and Marine Corps needs.
- Encourage basic research and innovative work in the programs of DOD contractors. This includes encouragement of industry contracts to academic institutions for basic research that supports the contractor's IR&D program.
- Recognize that the review and evaluation of DOD contractor IR&D programs is a valuable part of Navy RDT&E. The review process keeps the Navy abreast of technological advances, and the resulting feedback to the contractors ensures that the IR&D program is kept aligned with significant military needs.

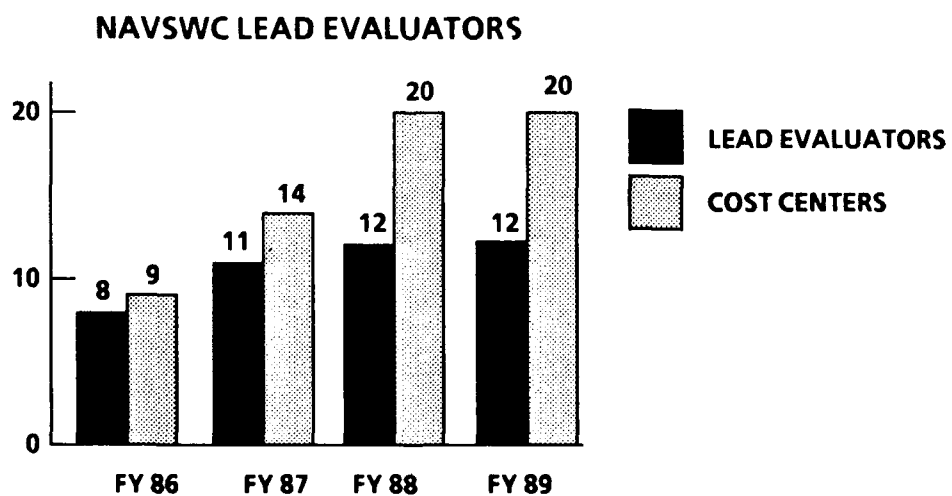
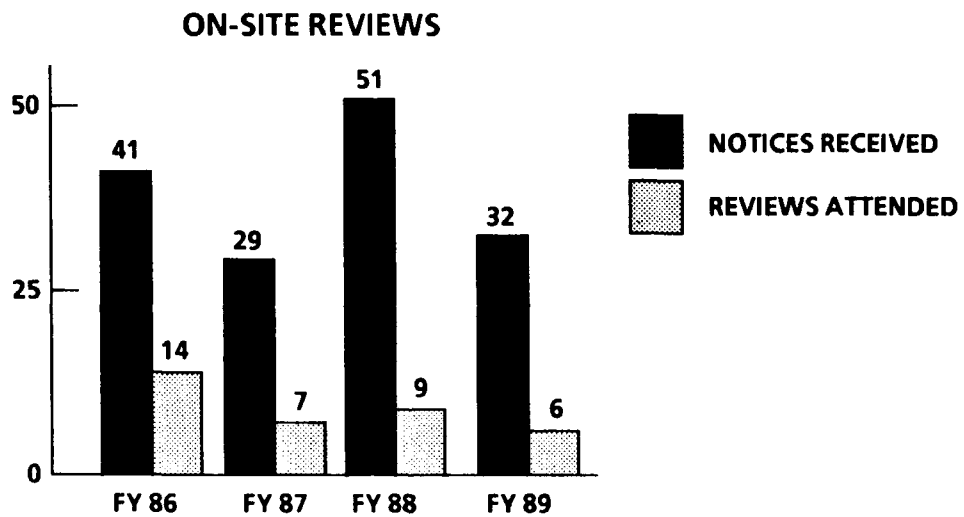
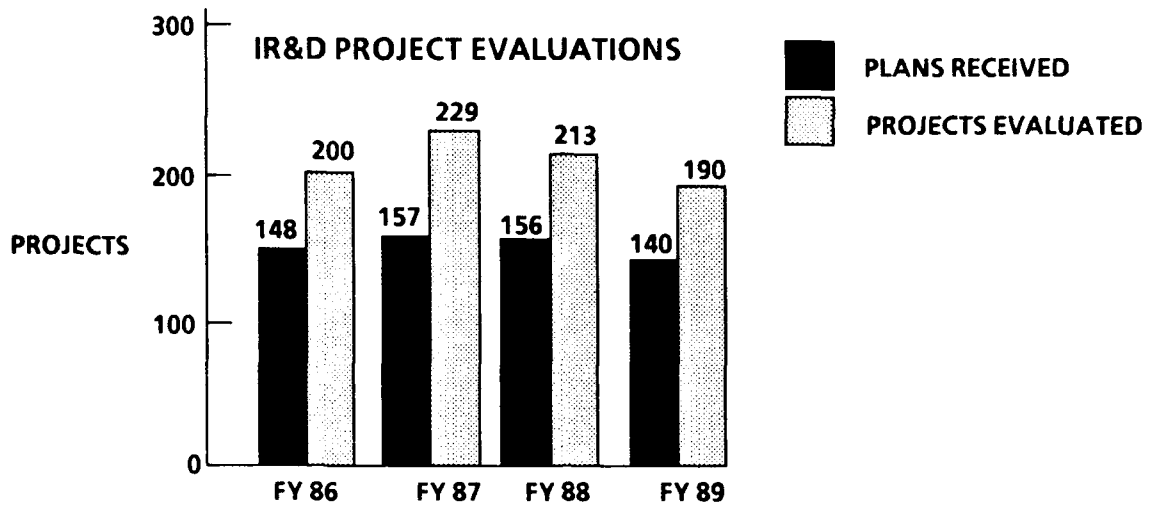


Figure 5. Industry independent research and development

- Give management attention and support to the IR&D review and evaluation process by providing qualified, credible, high-level evaluators; ensure that evaluations are timely and thorough; and give official recognition and credit to the evaluators.

SMALL BUSINESS INNOVATION RESEARCH

BACKGROUND

The SBIR program is mandated by Public Law 103. The basic design of the DOD SBI program is in accordance with the Small Business Administration (SBA) SBIR Policy Directive of June 1988. DOD components invite small business firms to submit proposals under an annual solicitation entitled SBIR. Firms with strong R&D capabilities in science or engineering in any of the topic areas presented are encouraged to participate. Subject to availability of funds, DOD components will support high-quality research or R&D proposals of innovative concepts to solve the listed defense-related scientific or engineering problems.

Objectives of the DOD SBIR program include stimulating technological innovation in the private sector, strengthening the role of small business in meeting DOD R&D needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DOD-supported research or R&D results. NAVSWC SBIR participation is summarized in Figure 6.

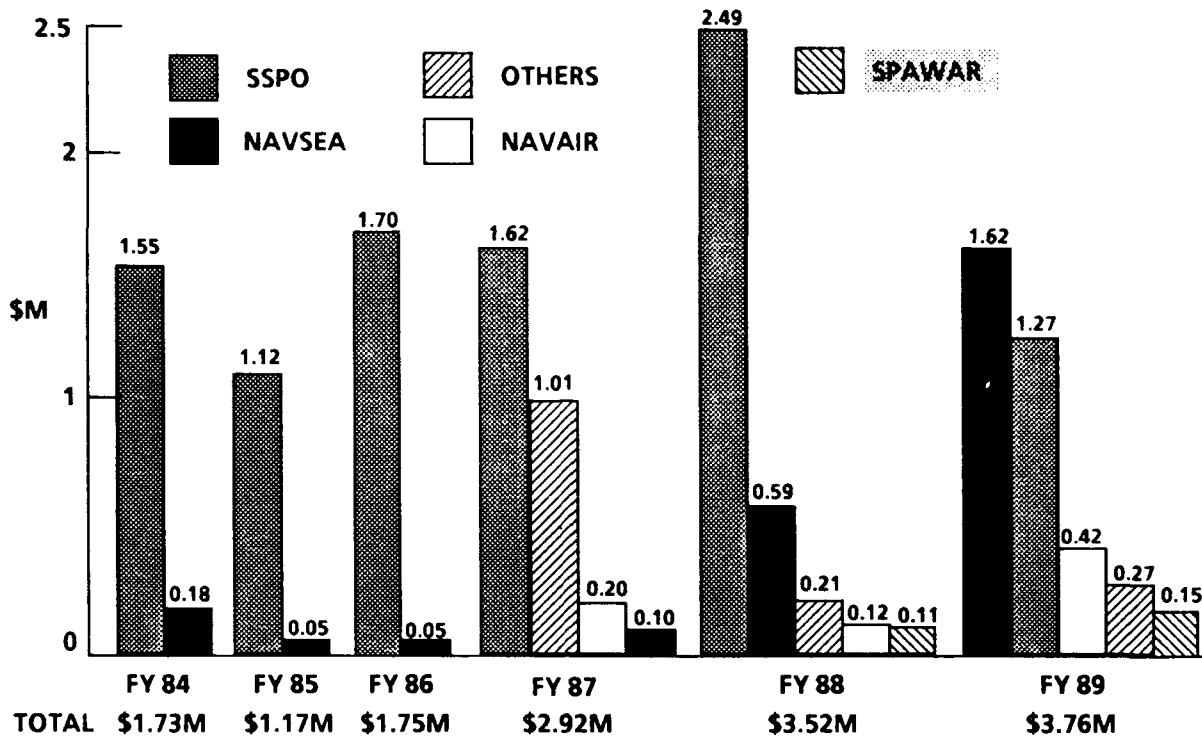
The annual DOD program solicitation strives to encourage scientific and technical innovation in areas specifically identified by DOD components. Guidance incorporates and exploits the flexibility of the SBA Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to DOD.

THREE-PHASE PROGRAM

Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas submitted under the SBIR program. Typically, it involves about half a man-year of effort over a period of 6 months or less. Proposals should concentrate on efforts that will significantly contribute to establishing the feasibility of the proposed effort. Successful completion of these efforts is a prerequisite for further DOD support in Phase II.

Phase II awards will be made to firms only on the basis of results from the Phase I effort and the scientific and technical merit of the Phase II proposal. Phase II

PHASE I FUNDING BY SPONSOR



PHASE II FUNDING BY SPONSOR

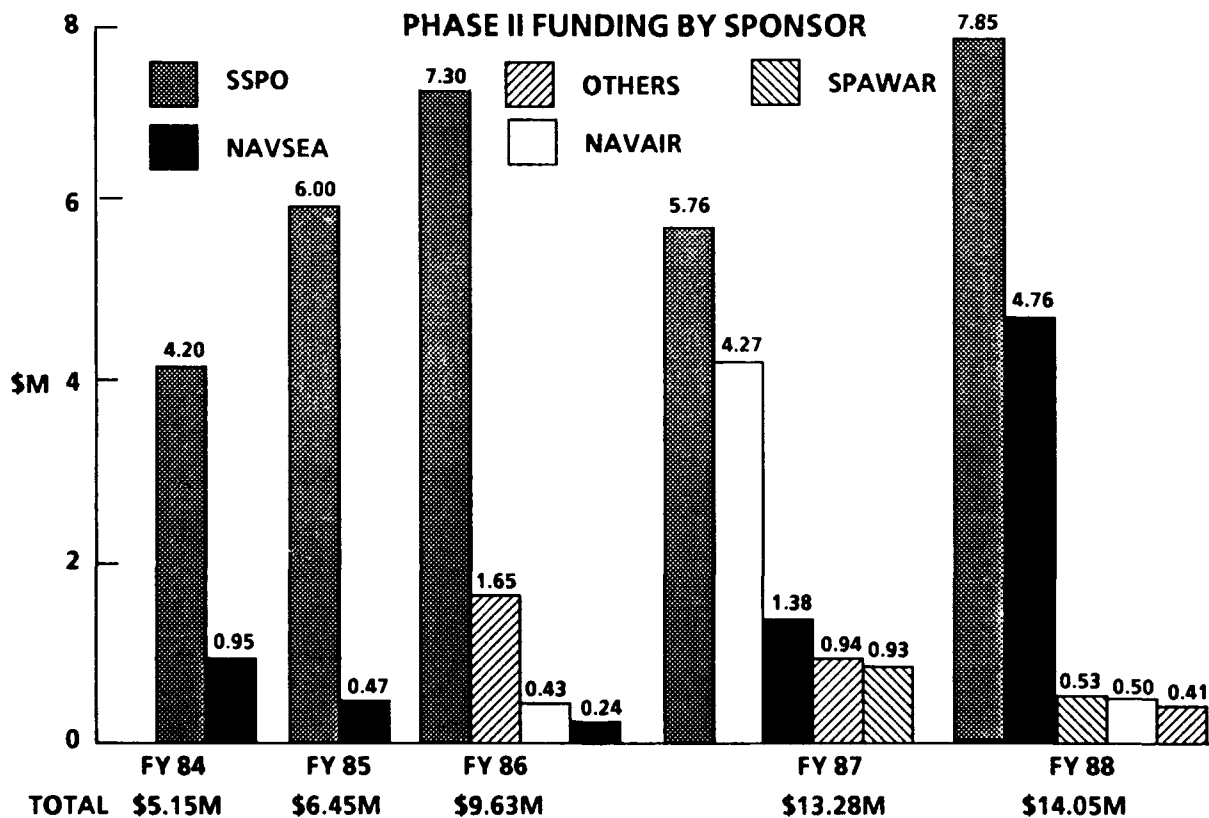


Figure 6. Small Business Innovation Research

awards will typically cover 2 to 5 man-years of effort over a period generally not to exceed 24 months, subject to negotiation. Phase II is the principal research or R&D effort and is expected to produce a well-defined deliverable product or process. A more comprehensive proposal is required for Phase II.

Under Phase III, nonfederal capital is expected to be used by the small business to pursue commercial applications of the research or development. Under Phase III, Federal agencies may also award non-SBIR-funded follow-on contracts for products or processes that meet the mission needs of those agencies. The solicitation is designed in part to provide incentives for the conversion of Federally-sponsored R&D innovation in the private sector. The Federal R&D can serve as both a technical and pre-venture capital base for ideas that may have commercial potential.

TECHBASE CONTRACTING

In addition to the cooperative efforts with industry described above, NAVSWC participates even more directly, in a major way, with industry by contracting out roughly half of its total Technology Base funding. Through these mutually beneficial contracts, the Navy is able to apply the talents and facilities of industry to the achievement of its technology objectives.

Technology base funding consists of the following Category 6 funding appropriations:

- 6.1: Research
- 6.2: Exploratory Development
- 6.3A: Advanced Development

Figure 7 shows a breakout of NAVSWC in-house and contracted TechBase funding for FY89 expenditures.

REFERENCES

1. Public Law 96-480, "Stevenson-Wydler Technology Innovation Act of 1980," 21 October 1980, as amended by Public Law 99-502, "Federal Technology Transfer Act of 1986," 20 October 1986.
2. Executive Order 12591, "Facilitating Access to Science and Technology," 10 April 1987.

3. DOD 3200.12-R-4, Domestic Technology Transfer Program Regulation, 27 December 1988,
4. SECNAVINST 5700.16, Domestic Technology Transfer.
5. DOD 5220.22-R of December 1985, Industrial Security Regulation.
6. U.S.C., Title 31, "Money & Finance: Treasury."
7. Public Law 97-219, "Small Business Innovation Development Act of 1982."
8. Public Law 99-443, "Small Business Innovation Research Program Extension."

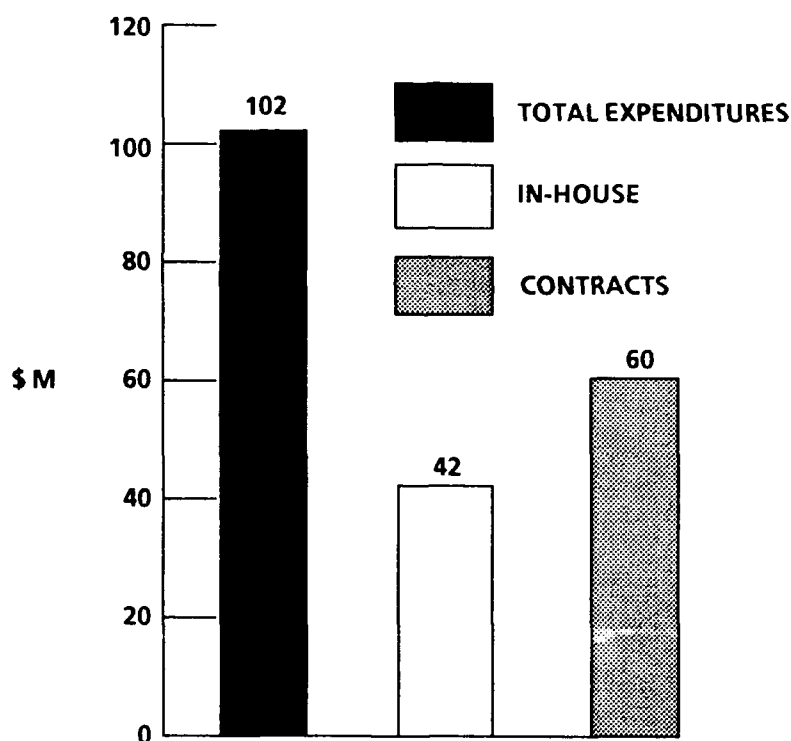


Figure 7. Technology base expenditures (FY89)

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