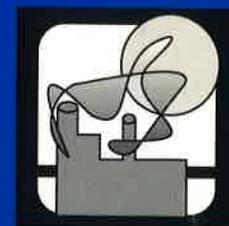


SBA

U.S. SMALL  
BUSINESS  
ADMINISTRATION



# Small Business Innovation Development Act



*Office of Innovation, Research and Technology*

*9th Annual Report*

*1992*



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***“If America is to maintain and strengthen our competitive position, we must continue not only to create new technologies, but to more effectively translate those technologies into commercial products.”***

***President George Bush***

Requests for copies of this SBA report should be sent to:

U.S. Small Business Administration

Office of Innovation, Research and Technology

409 Third Street, S.W.

Washington, D.C. 20416

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U.S. SMALL BUSINESS ADMINISTRATION  
WASHINGTON, D.C. 20416

OFFICE OF THE ADMINISTRATOR

OCT 20 1992

Honorable Dale L. Bumpers  
Chairman, Committee on Small Business  
United States Senate

Honorable John J. LaFalce  
Chairman, Committee on Small Business  
House of Representatives

I am pleased to provide you with the ninth year results of the Small Business Innovation Development Act of 1982. (PL 97-219 and 99-443)

Last year, you were advised that small business concerns from across the United States had successfully competed for 3,183 Small Business Innovation Research (SBIR) awards totaling \$460.7 million for fiscal 1990.

This year's report shows a significant increase in these figures. For fiscal 1991, small business concerns received 3,341 SBIR awards amounting to \$483.1 million in obligated funding from the eleven Federal agencies that presently participate in the SBIR Program.

Along with facts and figures on the progress of the SBIR Program, this report contains information on the achievement of small business goals in federal research and R&D awards and an update on the commercialization of SBIR efforts.

We continue to depart from traditional fiscal reporting for awards. SBIR awards initiated in fiscal 1991 but made after the close of the fiscal year are included in this report. This method more accurately reflects the fiscal 1991 activity of the SBIR Program.

The review and analysis of the facts and figures in this report were made by the Office of Innovation, Research and Technology of this Agency. Copies have been forwarded to the Office of Science and Technology Policy, the Office of Federal Procurement Policy and the General Accounting Office.

I consider the SBIR Program and its positive results to be the product of what can be accomplished when various agencies work together to provide opportunities for qualified small business concerns to compete for federal research and development awards.

Sincerely,

Patricia Saiki  
Administrator

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## **SBIR AWARDS HELP EXCITING BIOTECH INDUSTRY**

**A**s this report shows, the Small Business Innovation Research (SBIR) Program offers an increasing number of the nation's small hi-tech enterprises monetary awards in about 160 technology areas — everything from computer systems technology, hydrodynamics and laser technology to cellular biology, ceramics and biotechnology and genetic engineering. Few of these technology areas, if any at all, hold out more excitement and promise than biotechnology. ■ The biotechnology industry, now moving into its second decade, already has produced life-saving and life-prolonging new drugs — including drugs to treat anemia, dwarfism in children, heart attacks and hepatitis. Biotechnology companies, most of them small and many of them still in the high-risk developmental stage, also are working on drugs to kill cancer cells without hurting normal ones and working on drugs to prevent blood clots. In the testing stages are plants genetically engineered to resist

pests and prolong the life of fruits and vegetables. ■ The federal government, as SBIR awards show, is a strong supporter of biotechnology research. ■ The Small Business Administration's Office of Innovation, Research and Technology, which coordinates the SBIR Program, is proud of the fact that of 20 major biotech companies ranked in the Wall Street Journal by stock market capitalization, 13 were SBIR awardees. Among them, these 13 companies have received 57 program awards. ■ The company profiles on the following three pages illustrate what the assistance of SBIR awards has meant to three successful biotech enterprises and how the awards have helped in the development of company products and commercialization of those products.

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***“Of 20 major biotech companies. . . 13 were SBIR awardees. These 13 firms received 57 program awards.”***

**IMMUNOMEDICS, INC.**  
**Morris Plains, New Jersey**

Immunomedics, Inc. of Morris Plains, NJ, which has received five SBIR awards, is a 10 year old biopharmaceutical company applying antibody-based technology to the development of products for the improved detection and treatment of cancer and infectious diseases. Integral to these products are highly specific monoclonal antibodies designed to deliver radioisotopes, chemotherapeutic agents or toxins to tumors and sites of infections. ■ Dr. Hans Hansen, Immunomedics vice president for exploratory research, says that "Phase I and Phase II SBIR awards played a significant part in the preclinical development of ImmuRAID-CEA, our colorectal cancer imaging product, as well as providing funding for the preparation of the first clinical lots of the imaging agent. These funds were critical to the success of this project, not only providing support for supplies and salaries, but also for purchases of essential equipment needed for manufacture of the first clinical material. ■ "SBIR support continues to be vital for development of new products emerging from biopharmaceutical companies." ■ Immunomedics' ImmuRAID-CEA colorectal



*Immunomedics' ImmuRAID-CEA, a colorectal cancer imaging product, is injected into the patients bloodstream. The antibodies seek out and bind to collections of colorectal cancer cells.*

cancer imaging product, which carries its own trademark, is now being reviewed by the Food and Drug Administration for approval to market this product in the

U.S. Immunomedics has filed an application with the Committee for Proprietary Medicinal Products to market and sell this product in Europe. ■ The company also has five imaging products and two therapy products in clinical trials. The imaging products in clinical trials consist of an antibody fragment directly labeled, in a stable fashion, with the widely available, inexpensive radioisotope, technetium-99m (Tc-99m). This radioisotope enhances imaging, particularly in the liver, which is the first spread site for many cancers. The labeling of Tc-99m to the antibody is performed in an easy, one-step, one-vial, five minute procedure by a nuclear medicine technologist. ■ Immunomedics also has received

promising clinical trial results in the U.S. and Europe for an infectious disease imaging agent, ImmuRAID-MN3. Company scientists have successfully extended Immunomedics' direct labeling technology in the development of a potential new cancer therapeutic, involving the binding of potent, deep-penetrating radioisotope to a monoclonal antibody.

***"SBIR support continues to be vital for development of new products emerging from biopharmaceutical companies."***

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**SCIOS, INC.**  
**Mountain View, California**

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Scios, Inc., formerly California Biotechnology (Cal Bio), has used 27 awards from the Department of Health and Human Services to develop a wide range of medical products and to attract large private pharmaceutical and biotechnology companies as commercial partners. ■ Human lung surfactant (HLS) is a protein and lipid mixture essential for proper respiratory function. In its absence, the lung's air sacs collapse and cannot be re-inflated by inhaling. Such a condition affects 40,000 premature infants a year. Through its genetic engineering, Scios produced a natural surfactant product that offers therapeutic advantages. Both patient mortality and lung damage should be decreased. ■ Scios also has had success in the field of atrial natriuretic peptide (ANP), a naturally occurring hormone which is produced in the heart and which



helps regulate blood volume through its effect on the heart, lungs and kidneys. By cloning the gene which encodes human ANP, Scios produced the hormone both

synthetically and by using recombinant DNA methods. Used in patients with kidney disorders, the Scios-produced hormone dilates blood vessels and increases elimination of water and salt from the body. ■ Fibroblast growth factor (FGF) is a potent wound-healing agent which stimulates the growth of new blood vessels and connective tissues. Scios' clinical trials on the factor have demonstrated its

applicability to pressure sores, venous ulcers, diabetic ulcers and skin graft sites.

■ In its commercialization progress, Scios has formed partnerships with Genentech in the U. S. , Byk Gulden, a German firm, for HLS, and E. Merck and Kaken Pharmaceutical (Japan) for FGF. ANP is currently being developed by Scios. ■ Scios was founded 10 years ago. Today, it is a publicly-held company with more than 180 employees.

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*“Scios has used 27 SBIR awards to develop a wide range of medical products and to attract commercial partners.”*

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**MEDIMMUNE, INC.**  
**Gaithersburg, Maryland**



MedImmune, Inc., of Gaithersburg, MD, the recipient of eight SBIR awards, is involved in producing and marketing products for the prevention and treatment of infectious diseases and cancer. Conventional vaccines work by stimulating the production of antibodies which neutralize infecting organisms in the body's fluids, an effective approach for preventing diseases such as polio. ■ But to be effective in the treatment of AIDS, cancers and certain infectious diseases, vaccines also must be capable of killing the infected cells which contain the pathogen. MedImmune is using its expertise in immune regulation, immunotherapeutics and genetic engineering to target products which will both neutralize pathogens and kill infected cells. ■ One focus of the company's vaccine development strategy is its proprietary BCG technology; progress in this work has been furthered by two SBIR awards. MedImmune is applying this technology to develop vaccines for AIDS and Lyme disease, among other targets. ■ Among the company's programs benefitting from SBIR awards is the research and development of a vaccine for B19

Parvovirus, which causes serious illness due to red blood cell destruction in fetuses and in patients with weakened immune systems. MedImmune expects to start a clinical trail of this vaccine as early as 1993. ■ Another MedImmune product, called Respivir, is aimed at preventing respiratory syncytial virus disease (RSV) in infants and small children. A MedImmune program to develop a second generation product for RSV is also benefitting from an SBIR award. This will be a monoclonal antibody-based product which could provide enhanced neutralization of the virus. ■ "SBIR awards are an excellent vehicle by which small companies can obtain funds to accelerate ongoing programs or to initiate new ones that otherwise could not be pursued," says Dr. James D. Young, MedImmune's vice president of research and development.

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***"SBIR awards are an excellent vehicle by which companies can obtain funds to accelerate ongoing programs."***

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## OVERVIEW



The Small Business Innovation Research (SBIR) Program continues to illustrate that the nation's small hi-tech enterprises, with federal government help, can successfully move their products, processes and services out of laboratories and other testing facilities into the commercial marketplace. In short, SBIR - which began nine years ago, has directed more than 21,000 awards worth more than \$2.7 billion to thousands of hi-tech companies - works! ■ There is no doubt about the talents and determination among entrepreneurs. But there also is no doubt that in many cases, small hi-tech companies could not have turned their ideas into profitable products without the assistance received from the SBIR Program. ■ As this annual report for fiscal 1991 shows, through program statistics and stories of awardee successes, an ever-increasing number of SBIR Program participants are succeeding in commercializing their new products, processes and services - and in so doing are helping to boost our nation's competitiveness in world markets and improve our environment and physical well-being. Surveys by the Small Business Administration and the General Accounting Office show that at least one in four — and perhaps even more — SBIR participants have recorded commercial sales success within six years of receiving their Phase II awards. ■ It also is encouraging that an increasing number of small firms headed by minorities are winning SBIR awards and proving their own technical and innovative talents. ■ In administering and supervising the SBIR Program, the Small Business Administration and its Office of Innovation, Research and Technology continues efforts to encourage more and more small hi-tech enterprises to respond to agency award solicitations. It has been noted that a number of program participants are winning multiple

awards; this is an understandable development in view of the firms' abilities and past successes. Such multiple award winners, along with their fellow small hi-tech managers, recognize the value of the time-old advisory, "innovate or stagnate."

■ The SBIR Program began in fiscal 1983. In its nine years, SBIR can list these highlights and accomplishments:

■ In response to 117 solicitations, the 11 federal agencies involved in the program have received 141,430 proposals from small hi-tech firms, resulting in 21,427 awards worth more than \$2.765.2 billion.

■ In fiscal 1991, 3,341 awards were made, worth \$483.1 million.

■ More than 40,000 names and addresses of small firms are now recorded on SBIR's fully automated outreach system mailing list, and thus receive current information on SBIR programs and policies and useful information on agency solicitations for proposals.

■ The increasing number of commercial sales successes have come in a wide area of technologies and industries — everything (as the success stories in this report show) from superconductors, filter technology and automatic speech recognition to pharmaceuticals, gas purification and optics. ■ The new products and new technologies resulting from SBIR awards are helping to maintain and improve America's world competitiveness and to improve the life of millions in our country and abroad.

## INTRODUCTION

**W**hen the Small Business Innovation Development Act (Public Law 97-219) was enacted in 1982, the aim of the executive branch and Congress was to strengthen the role of small innovative companies in federally-funded research and development. The nation thus would develop a stronger base for technical innovation and wider commercialization of the ideas generated in the laboratories, research facilities and factory floors of small hi-tech enterprises. ■ The statute, which created the SBIR Program, also was enacted with a growing realization and appreciation that small businesses — especially small hi-tech businesses — are responsible for most of our new products, processes and technologies, and are particularly capable of turning research and development into new and helpful products and processes. In many cases, all these small innovators needed was an infusion of SBIR assistance. ■ This report is the ninth in a series of annual reports pursuant to the Act and reflects, among other things, SBIR Program results and activities during fiscal 1991 (the year ended Sept. 30, 1991). The report is presented by the Small Business Administration (SBA), which is directed by the Act to set program policy and to monitor, evaluate and report the progress of the SBIR Program.

■ **Findings & Purpose Of The Act** - The President signed the Small Business Innovation Development Act on July 22, 1982. The Act originally was to expire on Oct. 1, 1988, but during fiscal 1986 Congress enacted legislation extending the law through Sept. 30, 1993. The President signed the extension legislation on Oct. 6, 1986. ■ In passing the 1982 legislation, Congress said it found that technological

innovation creates jobs, increases productivity, competition and economic growth, and is a valuable counterforce to inflation and the United States balance of payments deficit. ■ Congress also said that while small business is the nation's principal source of significant innovations, the vast majority of federally funded research and development had been conducted by large businesses, universities and government laboratories.

■ Based upon these findings, Congress described four purposes of the act:

1. To stimulate technological innovation.
2. To use small businesses to meet federal research and development needs.
3. To foster and encourage participation by minority and disadvantaged persons in technological innovation.
4. To increase private sector commercialization innovations derived from federal research and development.

■ **Two Distinct Programs** - The law created two distinct programs and directed that the programs be implemented by SBA. The primary program is the Small Business Innovation Research (SBIR) Program. The secondary program is the Research and Research and Development (R&R&D) Goaling Program. ■ Under the SBIR Program, each federal agency with an extramural budget for research or research and development in excess of \$100 million for fiscal 1982, or any fiscal year thereafter, must establish an SBIR Program. The program is funded by setting aside a set percentage of the participating agency's extramural research or research and development contracting dollars during each fiscal year. The maximum set aside is 1.25 percent. Civilian agencies were given four years to reach the 1.25 percent maximum; the Department of Defense was allowed five years.

■ There were 11 participating federal SBIR agencies during fiscal 1991:

Department of Agriculture	Department of Transportation
Department of Commerce	Environmental Protection Agency
Department of Defense	National Aeronautics & Space Administration
Department of Education	National Science Foundation
Department of Energy	Nuclear Regulatory Commission
Department of Health and Human Services	

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## INTRODUCTION

### ■ SBIR is a Three Phase Program

■ Phase I: Phase I awards average \$50,000 and are made for research projects to evaluate the scientific and technical merit and feasibility of an idea.

■ Phase II: Phase I projects with the most potential are funded to further develop the proposed idea for one or two years. Most Phase II awards are funded for \$500,000 or less.

■ Phase III: An innovation is brought to market by private sector investment and support. No SBIR funds may be used in Phase III. When appropriate, Phase III may involve follow-on production contracts with a federal agency for future use by the federal government.

■ In line with a General Accounting Office (GAO) recommendation, SBA now requires participating SBIR federal agencies to submit their annual reports to SBA six months after the close of the fiscal year. Previously, submissions were required three months after the close of the year. This additional reporting time allows participating agencies to report actual obligations rather than estimated obligations.

### ■ The Goaling Program

The law requires federal agencies with a budget for research or research and development in excess of \$20 million for any fiscal year to establish small business goals for awarding research and research and development (R&R&D) funding agreements to small companies. The annual goal to be set cannot be less than an agency's achievement during the previous fiscal year. In addition to the 11 SBIR agencies, seven other agencies participate in the goaling program.

Department of the Interior  
Department of Justice  
Department of the Treasury  
Department of Veteran Affairs

Agency for International Development  
Smithsonian Institution  
Tennessee Valley Authority

### ■ SBA Authorities and Responsibilities

The law designated SBA as the agency for program implementation, governing policy and monitoring and analysis. The SBA's authorities and responsibilities are:

1. Developing, coordinating, issuing and updating a policy directive for the federal government-wide conduct of the SBIR and goaling programs.
2. Developing and administering an SBIR Program information and outreach program.
3. Developing and maintaining a mailing list of interested small business concerns.
4. Developing, coordinating, publishing and disseminating SBIR Pre-Solicitation Announcements.
5. Surveying, monitoring and reporting on agency SBIR Programs.
6. Reporting at least annually to Congress on the two programs and on SBA monitoring activities.
7. Private sector coordination on the commercialization aspects of SBIR innovations.

### ■ Agency SBIR Program Authorities and Responsibilities

The authorities and responsibilities of the participating agencies are to:

1. Determine categories of projects to be in the agency's SBIR Program.
2. Issue SBIR solicitations in accordance with a schedule determined cooperatively with SBA.
3. Receive and evaluate proposals resulting from SBIR solicitations.
4. Select awardees for SBIR funding agreements.
5. Administer an agency's SBIR funding agreements (or delegate such administration to another agency).
6. Make payments to SBIR award recipients on the basis of progress toward or completion of the funding agreement requirements.
7. Submit an annual report on the SBIR and goaling programs to SBA and the Office of Science and Technology Policy.

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## SBIR PROGRAM SERVICES

In setting SBIR Program policy and in monitoring and evaluating the program, SBA acts to keep contract award procedures simple and standardized, to keep paperwork to a minimum and to encourage small companies owned by minorities and the disadvantaged to participate in the program. SBA also conducts an ongoing national information and outreach campaign and makes sure the agencies conform with SBIR policy directives.

### ■ Automated Outreach System

SBA, in carrying out a major responsibility, initiates programs and policies to make sure that all interested small businesses are provided with current program and solicitation information and opportunities available in the SBIR Program. Toward this end, SBA has developed a mailing list of those individuals and small firms that have requested to be included. This list was converted to a fully computerized process seven years ago. ■ In the last year, SBA worked to improve and update this informational mailing list, to insure the current interest of small firms represented — and thus the accuracy of the listing. Another SBA objective was to save taxpayer paperwork and mailing costs. The result was that at fiscal 1991's end, the automated outreach list contained 40,000 names and addresses, which are continuously updated to minimize expense and maximize outreach. ■ As required by law, the solicitation process minimizes regulatory burdens and mandates timely receipt and review of proposals, peer review, proprietary information guidelines, selection of awardees, data rights retention, title to government property, cost sharing and cost principles.

### ■ Pre-Solicitation Announcements

SBA's SBIR Pre-Solicitation Announcements to small businesses present basic program solicitation information in a succinct and understandable manner. Each publication provides complete information on all quarterly SBIR activity and eliminates the need for small businesses to track the activities of each participating agency. ■ The Pre-Solicitation Announcements are published and distributed prior to the time of agency solicitations. The announcements provide small businesses with a brief statement of each agency research topic, the opening and closing dates of each solicitation, an estimate of the number of awards to be made under each solicitation, who to contact for a copy of the agency solicitation and a master schedule of agency opening and closing dates. The response from the public to these Pre-Solicitation Announcements has been excellent. ■ During fiscal 1991, SBA published four Pre-Solicitation Announcements. For the nine years of the program, over 2.2 million announcements have been distributed.

### ■ SBIR Seminars and Conferences

During fiscal 1991, SBA cooperated with numerous organizations that conducted SBIR seminars and conferences. This cooperation included providing information, materials and speakers. SBA field representatives and public and private organizations have become a significant part of the information dissemination process. ■ SBA continues to publish a special SBIR Program pamphlet which in addition to providing program information also serves as a mechanism for mailing list development. SBA field offices have been furnished a supply of the pamphlets and will continue to be a primary source of outreach. In order to meet the demand for speakers throughout the country, SBA utilized an audio/visual program which presents a detailed explanation of the SBIR Program. The audio/visual program is available on video tape. ■ Another form of outreach used by SBA are briefings to officials of foreign governments. During fiscal 1991, foreign interest in the SBIR Program grew even stronger and SBA's staff briefed a number of foreign government officials. SBIR-type programs are in place in Europe and the United Kingdom.

## SBIR Program Data

### Fiscal Year 1991 SBIR Agency Obligations Summary (Dollars in Thousands)

	DOA	DOC	DOD	DOE	DOT	ED	EPA	HHS	NASA	NRC	NSF	Total
Agency Extramural Budget	\$391,052	83,431	18,725,443	3,101,240	181,499	158,600	282,591	7,346,122	6,023,600	91,546	1,697,400	38,082,524
Agency SBIR Budget	\$4,888	1,043	234,068	38,765	2,269	1,983	3,532	91,826	75,295	1,144	21,218	476,031
Dollars Obligated	\$4,888	1,213	240,609(a)	38,765	6,272	2,753	3,621	93,117(b)	69,349	475(c)	22,018(d)	483,080
Percent of SBIR To Extramural Budget	1.25%	1.45%	1.28%	1.25%	3.45%	1.70%	1.28%	1.27%	1.15%	.52%	1.25%	1.27%
Deficit/Surplus	0	+170	+6,541	0	+4003	+770	+89	+1,291	-5,946	-669	+800	+7,049

### Fiscal Year 1991 Award Profile (Dollars in Thousands)

	DOA	DOC	DOD	DOE	DOT	ED	EPA	HHS	NASA	NRC	NSF	Total
Total Phase I Awards	36	14	1,250	173	41	22	31	517	280	5	184	2,553
Minority/Disadvantaged Phase I Awards	5	2	179	18	4	4	4	29	26	0	18	289
Total Phase II Awards	16	4	318	65	12	10	14	168	123	2	56	788
Minority/Disadvantaged Phase II Awards	2	0	25	6	1	0	2	14	8	0	4	62
Total Phase I Dollars Awarded (\$)	1,756	479	64,486	8,582	2,026	651	1,522	25,089	13,856	249	9,162	127,858
Minority/Disadvantaged Phase II Dollars Awarded (\$)	248	69	7,963	895	194	120	196	1,431	1,289	0	895	13,300
Total Phase II Dollars Awarded (\$)	3,132	734	158,249	30,183	4,246	2,102	2,099	66,595	55,493	211	12,812	335,856
Minority/Disadvantaged Phase II Dollars Awarded (\$)	370	0	10,690	2,979	299	0	300	4,524	3,976	0	960	24,098
Average Amount for Phase I Awards (\$)	49	34	52	50	49	30	49	49	49	50	50	50

### Fiscal Year 1991 Agency Solicitation Profile

	DOA	DOC	DOD	DOE	DOT	ED	EPA	HHS	NASA	NRC	NSF	Total
Number of Solicitations Released	1	1	2	1	1	1	1	2	1	1	1	13
Number of Research Topics in Solicitations	8	7	1,102	34	41	10	11	736	15	8	26	1,998
Number of Copies Distributed	13,000	2,500	108,000	27,000	15,000	1,800	5,000	21,589	25,000	460	45,000	269,349
Number of Phase I Proposals Received	296	134	11,609	1,401	597	320	367	2,064	2,583	57	1,492	20,920
Number of Phase II Proposals Received	22	9	711	158	25	29	28	391	224	6	131	1,734
Number of Phase I Awards	36	14	1,250	173	41	22	31	517	280	5	184	2,553
Number of Phase II Awards	16	4	318	65	12	0	14	168	123	2	56	788

(a) 2,298K modifications to non FY 91 Awards plus 22,775K total agency FY dollar amount set-aside for select proposals in negotiation, but not obligated.

(b) 1,433K modifications to non FY 91 Awards

(c) 15K in modifications to non FY 91 Awards

(d) 45K in modifications to non FY 91 Awards

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## SBIR PROGRAM DATA

### ■ Commercialization Matching System

A major goal of the SBIR Program is to bring research and development results to the marketplace. ■ The SBIR Program therefore not only encourages more research and development, but it also encourages commercialization by offering the possibility of economic reward for innovations successfully marketed by SBIR firms. ■ At each stage of a small firm's progress through this program, there are policies and incentives to promote research work with commercial potential and to encourage the availability of the completed research in the marketplace. ■ Recognizing that most small firms with innovative products have difficulty finding the financing required for the final development, manufacture, and marketing of their product, SBA has developed a Commercialization Matching System. The system maintains information on all SBIR awardees including the company name and address, principal investigator, and information about the innovation to be commercialized. The system also includes information on financing sources that have requested inclusion and will provide information on the type of investment opportunities they are seeking.

■ From this data base, the Commercialization Matching System provides technical abstracts of SBIR projects to possible investors, and provides SBIR firms with information on sources of capital that might consider investing in their innovations. Matching selections from the data base are made on the basis of technology and industry preferences, geographic preferences, and dollar thresholds. Over 15,000 SBIR projects and nearly 500 capital sources are currently listed in the data base. In order to provide accurate information to SBIR awardees, the data on sources of capital were updated in fiscal 1991.

### ■ Reporting Requirements

The number of proposals received from small hi-tech enterprises has increased steadily over the years — a trend which illustrates the past award successes and the ever-growing awareness and acceptance of the SBIR Program within the small business community. There also has been year-to-year increases in the dollar value of awards made. ■ In fiscal 1991, 22,654 Phase I and Phase II proposals were received. A record 3,341 awards worth a record \$483.1 million were made. Since the program was first implemented, there have been 21,427 awards to qualified small businesses. The awards were worth more than \$2.7 billion.

### ■ SBIR Reporting Requirements

Beginning with fiscal 1983, each agency establishing an SBIR Program set aside a set percentage of its extramural R&R&D budget for award to small businesses. Through a phased-in process over a four-year period, civilian agencies were required to increase the percentage of their set asides, from 0.2 percent in fiscal 1983 to 1.25 percent in fiscal 1986. The Department of Defense was allowed five years to phase in the program and was required to set aside 0.01 percent in fiscal 1983 and reach 1.25 percent in fiscal 1987. ■ Each agency required by Sections 4(f) and 4(h) of Public Law 97-219 to establish an SBIR Program for Research and Development (R&R&D) was required to report annually to SBA on the number of grant, contract and cooperative agreement awards over \$10,000 and to report the dollar value of all such awards, identifying SBIR awards and comparing the number and amount of such awards with awards to other than small business. ■ To properly monitor and report on the participating agencies' SBIR Programs, SBA established a reporting base to compare against each agency's budget data. In determining extramural R&R&D obligations as a base for the size of the SBIR Programs, the Act provided a definition of research and development identical to that in the Office of Management and Budget (OMB) Circular A-11 on the "Preparation and Submission of Budget Estimates." ■ Agencies submit to the National Science Foundation (NSF) breakdowns of their total R&R&D obligations into intramural and extramural R&R&D obligations, which are published in

## SBIR PROGRAM DATA

### SBIR Awards

<i>Fiscal Year</i>	<i>Phase I</i>	<i>Phase II</i>	<i>Totals</i>
83	686	—	686
84	999	338	1,337
85	1,397	407	1,804
86	1,945	564	2,509
87	2,189	768	2,957
88	2,013	711	2,724
89	2,137	749	2,886
90	2,346	837	3,183
91	2,553	788	3,341
Total	16,265	5,162	21,427

“Federal Funds for Research and Development.” ■ For agencies with SBIR Programs, SBA reviews the NSF data and uses as an extramural base for SBIR that amount determined by the agency to be its extramural budget. A distinction between intramural and extramural is not made for agencies participating in the R&R&D goaling program, since the agency goal is based upon total R&R&D budget obligations. ■ Because of the three-year budget cycle in estimating extramural R&R&D obligations, and consequent changes in the SBIR bases, some differences between SBIR required expenditures and actual obligations are to be expected. Because of these obligations and the base reporting arrangement, SBA uses a system of deficits and credits for adjusting future years. Thus SBIR agencies proceed on the best available estimates and ultimately, through adjustments, achieve the percentages specified by law.

#### ■ SBIR Agency Total Obligation Summary

During fiscal 1991, the 11 participating SBIR agencies awarded \$483.1 million through the SBIR Program; the total represented a 1.5 percent increase over the approximately \$460.7 million obligated in fiscal 1990. Phase I awards were worth \$127.9 million in fiscal 1991; Phase II awards totaled \$335.9 million. The overall award dollar total includes \$3.8 million in modifications to non-1991 awards.

■ In awarding Phase II two-year funding agreements, agencies utilize various acquisition methods of obligation and funding. For purposes of consistency in our reporting, the acquisition data in this report reflect only actual obligations during

fiscal 1991. ■ As in prior years, SBA continues to use a system of deficits and credits to evaluate agency SBIR budgets to actual amounts obligated. At the beginning of each fiscal year, SBA provides each agency with estimates (based upon NSF data) of the agency’s extramural and SBIR budget. These estimates change during the year to reflect congressional action on a participating agency’s R&R&D budget. Thus to ensure proper implementation, each agency establishes a budget and proceeds during the year on that budget. Adjustments may then be made in the following year.

#### ■ Solicitation Profile

Thirteen Phase I SBIR solicitations were released by the 11 participating agencies in fiscal 1991; DoD and HHS each released two solicitations; the other nine agencies released one each. ■ As a result of the solicitations, 20,920 Phase I proposals were received from small businesses. A total of 2,553 Phase I awards were made in fiscal 1991. Phase I awards represented 12 percent of proposals

## SBIR PROGRAM DATA

received. ■ During fiscal 1991, a total of 1,734 Phase II proposals were received and resulted in 788 new awards. The fiscal 1991 awards represented 45 percent of all Phase II proposals received. ■ Minority/disadvantaged-owned firms received 289 Phase I awards in fiscal 1991, worth \$13.3 million, and 62 Phase II awards worth \$24.1 million. Since the program's inception, minority/disadvantaged-owned firms have received 2,342 awards, representing 10.9 percent of all SBIR awards; the value of these awards totaled \$259 million, representing 9.4 percent of all dollars awarded.

### ■ R&R&D Goaling Agencies

During fiscal 1983 and 1984, agencies required to submit annual R&R&D goaling reports often submitted inaccurate data or incomplete reports. As a result, the General Accounting Office recommended that SBA change reporting requirements to obtain additional data from reporting agencies; that all agencies be required to submit accurate or revised reports for fiscal 1983 and 1984, and that SBA change the due dates for R&R&D goaling reports to ensure that budget data were consistent with data reported to OMB. Consistent with these recommendations, SBA required all R&R&D goaling agency annual reports to include the following information:

1. Previous fiscal year's total R&R&D obligations.
2. Previous fiscal year's total R&R&D-obligated dollars to small businesses, minority and disadvantaged small businesses, and women-owned small businesses under funding agreements, and the percentage to the agency's total

## Value of SBIR Awards

(in millions of dollars)

<i>Fiscal Year</i>	<i>Phase I</i>	<i>Phase II</i>	<i>Total</i>
83	\$44.5	\$—	\$44.5
84	48.0	60.4	108.4
85	69.1	130.0	199.1
86	98.5	199.4	297.9
87	109.6	240.9	350.5
88	101.9	284.9	389.1*
89	107.7	321.7	431.9*
90	118.1	341.8	460.7*
91	127.9	335.9	483.1*
Total	\$825.3	\$1,915.0	\$2,765.2**

EST: Fiscal 92

\$460+

\*includes awards modifications

\*\*contains all \$ expended and/or obligated

R&R&D obligations. (Women-owned small business data are not required by law to be collected by the agencies therefore the data are incomplete.)

3. Current fiscal year's total R&R&D budget.
4. Current fiscal year's total R&R&D small business goal based on the percentage of obligations to small businesses made the previous fiscal year.
5. Current fiscal year achievement of the singular small business R&R&D goal and the dollars obligated through prime funding agreements by categories of small business, minority and disadvantaged small business and women-owned small business.
6. The total number and dollar value of R&R&D awards to small business for contracts, grants, and cooperative agreements over \$10,000 and a comparison of such awards to awards made to non-small businesses for the same categories.

## SBIR PROGRAM DATA

To evaluate the agencies' R&R&D Goaling Program, SBA uses a final budget report from OMB entitled "Conduct of R&D by Agency." This report details the agencies' total R&R&D obligations for the reported fiscal year and provides R&D budget estimates for future years. SBA then computes the agencies' total R&R&D obligations to small business, as reported to SBA, to determine the actual percentage of the R&R&D obligations awarded to small business. ■ As in prior years, there was some difference between each agency's total R&R&D obligations reported to SBA as compared to data reported to OMB. Since SBA uses the OMB data as an actual base, the agency percent awards to small business may be higher or lower in this report compared to that percentage as reported by the agency to SBA. ■ In fiscal 1991, \$2.2 billion was awarded to small business under the R&R&D Goaling Program, representing 3.6 percent of the total R&D obligations for 18 reporting agencies. ■ R&R&D awards to minority/disadvantaged-owned firms totaled \$673 million in fiscal 1991, representing 30 percent of all agency R&R&D obligations to small businesses.

### ■ Cumulative Data

Since the SBIR Program's start, over \$2.7 billion has been awarded to small businesses; \$259 million was awarded to minority/disadvantaged-owned small businesses. ■ Each participating agency will continue to award at least the maximum of 1.25 percent as required by law. Therefore, unless agency R&D budgets significantly increase or decrease, total SBIR dollars obligated in the future are estimated to remain at about the present level. ■ A total of 16,265 Phase

## Fiscal Year 1991 Phase I Time Frame

<i>Agency</i>	<i>Total FY 91 Phase I Awards</i>	<i>Number Within Six Months of Solicitation Close</i>	<i>Number Over Six Months of Solicitation Close</i>
DOA	36	6	36
DOC	14	14	0
DOD	1,250	636	614
DOE	173	173	0
DOT	41	40	1
ED	22	22	0
EPA	31	3	28
HHS	517	35	482
NASA	280	211	69
NRC	5	5	0
NSF	184	122	62
<b>TOTAL</b>	<b>2,553</b>	<b>1,261</b>	<b>1,292</b>

I and 5,162 Phase II awards have been made since the program's beginning. The agencies received 129,176 Phase I proposals and 12,254 Phase II proposals responding to 117 SBIR solicitations. Several participating agencies have allocated more for this program than required by law. Awards have been made to firms in 50 states, Puerto Rico and the District of Columbia. The SBIR Program continues to receive national acceptance and international recognition for quality performance. ■ SBA requires, through its SBIR Policy Directive, that each participating agency list the number of Phase I awards made within six months, and beyond six months, of the closing date of the agency's solicitation announcement.

# Research Goals

## Agency Research and Research and Development Data (dollars in thousands)

Agency	Agency % Goal FY '91	Total R&D Budget	\$ Goal	Agency Reported \$ To Small Business	% Awarded To Small Business	\$ Awarded To Minority/ Disadvantaged	% Awarded To Minority Disadvantaged
DOA	0.0	\$1,395,330	NR	NR	NR	NR	NR
DOC	2.0	528,800	10,576	2,762	.5	3,123	0.4
DOD	4.8	34,870,000	1,674,000	1,427,000	4.1	367,000	1.0
DOE	1.3	6,006,300	78,082	82,968	1.3	14,417	0.3
DOI	0.0	592,500	1,185	1,730	0.0	0	0.0
DOT	28.0	380,300	106,484	83,005	22.0	52,878	14.0
ED	1.1	142,900	1,572	3,315	2.3	12,103	8.4
EPA	8.8	439,700	38,700	30,100	6.8	7,000	1.6
HHS	1.8	9,349,367	173,898	167,617	1.7	29,567	0.2
NASA	7.4	6,008,500	444,600	409,200	6.8	172,400	2.9
NSF	1.1	1,706,600	19,290	19,474	1.1	6,870	0.4
NRC	3.2	91,546	2,929	2,798	3.1	1,144	1.2
AID	5.5	113,300	623	3,900	3.4	0	0.0
DOJ	15.4	46,108	7,101	10,372	22.5	7,070	15.3
DVA	1.2	255,529	1,022	1,231	0.4	170	0.7
SI	0.4	48,000	376	268	0.3	0	0.0
TR	15.7	10,906	1,715	140	1.3	0	0.0
TVA	NR	NR	NR	NR	NR	NR	NR
Total	-	62,035,686	2,562,153	2,245,880	3.6	673,250	1.1

NR = Not reported

# Research Goals

## Small Business

## Non-Small Business

Agency	Number of Contracts Awarded	Dollar Amount Of Contracts	Number of Grants Awarded	Dollar Amount of Grants	Number of Co-op Agreements	Dollar Amount of Co-op	Number of Contracts Awarded	Dollar Amount of Contracts	Number of Grants Awarded	Dollar Amount of Grants	Number of Co-op Agreements	Dollar Amount of Co-op
DOA	11	574	52	4,881	11	506	14	1,146	1,381	367,869	565	28,277
DOC	169	11,478	2	99	5	3,255	22	1,694	477	95,717	374	110,509
DOD	22,166	1,652,000	NU	NU	NR	NR	40,264	17,918,000	NR	NR	NR	NR
DOE	94	82,970	NR	NR	NR	NR	NR	5,923,330	NR	NR	NR	NR
DOI	56	1,730	NR	NR	NR	NR	100	5,853	NR	NR	NR	NR
DOT	773	89,846	NR	NR	NR	NR	972	220,337	21	13,153	7	802
ED	42	6,068	NR	NR	NR	NR	139	89,561	849	163,846	NR	NR
EPA	248	29,000	NR	NR	NR	NR	393	82,100	NR	NR	NR	NR
HHS	668	138,362	173	75,164	18	9,221	2,555	611,250	37,912	7,090,456	2,552	836,472
NASA	1,968	478,600	NR	NR	NR	NR	2,743	5,080,200	4,277	375,300	601	74,400
NSF	127	10,930	337	26,970	NR	NR	121	140,800	15,289	1,624,800	NR	NR
NRC	24	3,626	NR	NR	NR	NR	17	7,987	16	1,461	3	200
AID	NR	NR	NR	NR	NR	NR	130	90,000	NR	NR	NR	NR
DOJ	86	6,743	9	1,536	13	2,043	104	7,690	35	5,618	69	13,438
DVA	9	1,231	NR	NR	NR	NR	7	1,053	NR	NR	NR	NR
SI	10	268	0	0	0	0	0	0	0	0	0	0
TR	8	140	NU	NU	NU	NU	8	5	NU	NU	NU	NU
TVA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

NR = Not reported

NU = Not used by reporting agency

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## **SBIR COMMERCIALIZATION: A Continuing Success Story**

**A**s last year's SBIR annual report showed, a significant number of program participants have seen their research projects turn into commercial successes. That basic finding still stands: The percentage of commercialized SBIR projects increases with time, reaching about 25 percent six years after initial Phase II funding. ■ The following section of this report includes examples of participant company growth and commercial success. ■ The commercialization findings were documented in an SBA publication, "Results of Three-Year Commercialization Study of the SBIR Program," which was distributed to administration officials and members of Congress. The document described the survey methodology and offered more than 50 charts to illustrate the amount of commercialization and the

factors which influenced commercialization. The document also included examples of commercialization success. ■ SBA's commercialization study results gained additional credibility through an SBIR commercialization study done by the General Accounting Office (GAO). In that survey, "Federal Research: Small Business Innovation Research Shows Success, But Can Be Strengthened," GAO found that about one-third of responding Phase II program participants had achieved commercial "sales." The percentage difference in the SBA and GAO surveys is one of relatively small degree and can likely be accounted for by differences in commercialization definitions and in survey techniques (mail vs. telephone).

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*"A significant number of program participants have seen their research projects turn into commercial successes."*

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**EMCORE, CORP.**  
**Somerset, New Jersey**

S

Superconductors, which are of increasing interest to scientists, the White House and Congress, have now achieved real-world applicability. This is due in large part to EMCORE Corp.'s technological breakthroughs in developing scalable manufacturing methods for thin film superconducting devices. ■ EMCORE has been assisted in its work by 19 SBIR awards from the Defense Department and the National Science Foundation. Today, the firm is the dominant U. S. supplier of superconductor systems and is one of the two largest sources worldwide. Another of EMCORE's objectives is the development of a reproducible chemical vapor deposition (CVD) process technology for the growth of high-quality superconducting thin films. ■ EMCORE was founded in 1984 as a vendor of metalorganic CVD (MOCVD) epitaxial growth systems to the III/V compound semiconductor industry. Capitalizing on technological breakthroughs in high temperature superconductivity (HTSC) at the Naval Research Laboratory, EMCORE used its SBIR



funding to develop a reactor design based on the use of a high-speed rotating disk susceptor. This allowed a new level of uniformity to be attained in a multi-wafer growth system. ■ EMCORE is currently supplying superconductor MOCVD systems, materials and process technology to the Defense Department and to

commercial customers. Sales of the HTSC MOCVD reactor now total about \$2.5 million. ■ "EMCORE views the SBIR program as an invaluable vehicle for developing a commercially viable superconductor technology," said Dr. N. E. Schumaker, company president. "The SBIR Program really works. It is a very selective and cost-effective vehicle for the timely development and introduction of new technology. Without SBIR support, EMCORE's project would never have reached fruition."

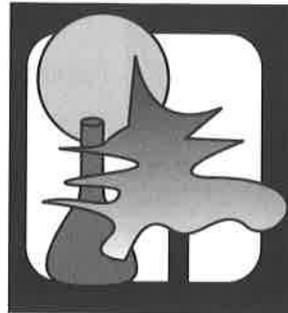
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***"The SBIR Program is a very selective and cost-effective vehicle for the timely development and introduction of new technology."***

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**ADA TECHNOLOGIES, INC.**  
Englewood, Colorado

**T**hanks in large part to SBIR funding, ADA Technologies, an environmental science and engineering company, has been able to develop successful technologies in a surprisingly wide number of areas: water spray technology for fire suppression, filter technology for rapid smoke clean-up in enclosed spaces, use of chemical additives to decrease particulate emissions from industrial sources, and products which address acid rain and automobile emissions and support Clean Air Act amendments passed by Congress in 1990. ■ ADA Technologies has received 19 SBIR awards from the Departments of Defense, Energy, Health and Human Services and the Environmental Protection Agency. ■ One of the firm's successes, the ADA Multigas Analyzer, was specifically developed for the measurement of trace gas species in flue gas and now aids utilities and other industrial enterprises in controlling emission of nitrogen oxides and other gases dangerous to the environment. The firm's analyzer uses a photodiode array with ultraviolet light to take flue gas constituent measurements in real time; a feedback loop then



allows the user to modify the amount of ammonia injected into the gas process. ADA officials say that "use of the analyzer will directly impact reduction of nitrogen oxide emissions from industrial sources into the atmosphere." Although a competing instrument was recently introduced by a large company, the ADA

instrument is expected to compete favorably at a lower price. ■ To aid in the commercialization of the Multigas Analyzer, ADA has issued a license to LAND Combustion for manufacture and worldwide sales and distribution. ADA expects to export the analyzer to Japan, where the instrument would be applicable in more than 200 installations, and to Germany, which recently enacted new emission

regulations requiring installation of nitrogen oxide control on new and existing boilers. ■ ADA was founded in 1985; it then had one employee. The SBIR awards provided the company with its early revenue base. Today, ADA employs about 20 scientists and engineers and has been cited as one of the fastest-growing small businesses in the country.

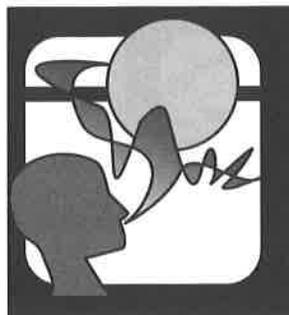
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***"ADA Technologies expects to export (its) analyzer to Japan, where the instrument would be applicable in more than 200 installations."***

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**SYNETICS CORP.**  
**Wakefield, Massachusetts**

**S**ynetics Corp., a minority-owned enterprise, was founded in 1984 specializing in defense-related work. Today, the company is rapidly diversifying into commercial and international work — applying technologies such as speech recognition, artificial intelligence, networking and fiber optics. Synetics' current work includes automating functions of port management activities in West Africa, developing a national DNA database for the Federal Bureau of Investigation, installing a network for a publishing firm, and designing a facilities management system for a waste water treatment plant. ■ This diversification has been substantially assisted by 30 SBIR awards from the Departments of Defense and Education. ■ In a direct application of its SBIR contracts, Synetics' automatic speech recognition (ASR) technologies initially focused on replacing manual inputs with voice inputs in a "hands intense" environment. For example, the pilot of an Army Apache helicopter once contended with 30 buttons to control on-board equipment; with



ASR, the pilot can now concentrate on the flight environment while the gunner selects a weapon solely by voice control. ■ Synetics also provided ASR technology to a commercial firm to develop a product called LIPSINC, which permits low-risk prison parolees to check with their parole officers by telephone. Using

LIPSINC, the parolee calls a computer, which then verifies the parolee's location and requests that the caller repeat random phrases. The responses are matched with a previously stored voice template for caller identification. ■ Synetics today employs about 300 workers in 15 locations; its sales to state and federal agencies and to corporations in the U. S. and overseas total about \$30 million a year.

As with other successful program participants, Synetics' commercial success in carrying out SBIR-assisted projects has attracted private investors. ■ Synetics founders, engineers Bahar Uttman and Bill O'Halloran, say their participation in SBIR "has boosted our credibility as a full service provider. SBIR allows us to anticipate and prepare for the future needs of our clients."

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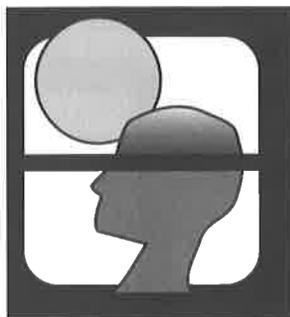
*"SBIR allows us to anticipate and prepare for the future needs of our clients."*

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**PHARMATEC, INC.**  
**Alachua, Florida**

M

Many diseases of the central nervous system resist treatment because therapeutic drugs are unable to penetrate the blood-brain barrier. Pharmatec Inc., a research-based pharmaceutical development company, has used funding from 10 SBIR awards received from the Department of Health and Human Services and the Department of Energy to develop two effective and related drug delivery technologies. ■ The first is a novel chemical delivery system for enhanced and sustained delivery of drugs to the brain. This technology uses a unique chemical trick to alter the structure of drugs which might be used to treat brain diseases. These drugs have not been used because they do not adequately penetrate the blood-brain barrier or because the drugs cause peripheral toxicity in concentrations which treat brain diseases. Pharmatec's technology has resulted in a new inactive drug conjugate which readily penetrates the blood-brain barrier and then is converted to a charged form which is locked with brain tissue, but can be excreted from other areas with no blood-brain barrier.



Pharmatec's second technology is a new pharmaceutical excipient, specifically a complexing agent which enables brain-targeted drugs and numerous other insoluble drugs to be dissolved in water and thus prevents drug precipitation after injection. In addition, the excipient stabilizes compounds which tend to degrade in traditional dosage forms. The technology has proven useful for formulating the

brain-targeted chemical delivery systems. ■ Pharmatec says its SBIR awards and the resulting technologies attracted the interest of investors and helped provide credible evaluation of the firm's emerging products. Private investments now total several million dollars. The firm also says the SBIR awards were instrumental in facilitating studies used to support an investigational new drug

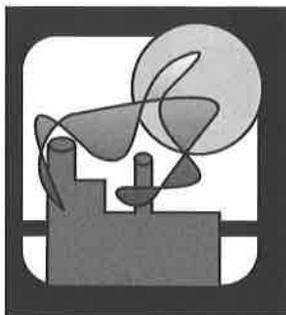
application. These awards helped Pharmatec explore specific chemical synthetic routes now being used for products with orphan drug designations and for new ways to treat neural dysfunction resulting from AIDS. ■ "The results," the firm summarizes, "will be improved quality of life for all Americans."

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*"SBIR awards attracted the interests of investors and helped provide credible evaluation of the firm's emerging products."*

**ADVANCED TECHNOLOGY  
MATERIALS, INC.  
Danbury, Connecticut**

**A** Advanced Technology Materials (ATM) is an outstanding example of how a firm that wins SBIR awards and then develops commercially viable new products can attract private investment to boost sales, widen markets and develop even more new products. Using funding from its first three SBIR awards, ATM developed three products that brought in more than \$12 million from equity capital firms and commercial partners. ■ In 1987, ATM received a Phase I SBIR award from the Department of Energy aimed at developing a gas purifier to remove contaminants from the gases used in chemical vapor desposition (CVD) processing of solar cells. It was felt that such a device would be commercially important because gaseous contaminants can have a profound effect on the yield and therefore the cost of solar cell manufacture. ATM also recognized that this technology could be adapted to the semiconductor industry. CVD technology is widely used to make semiconductor chips. ■ In a relatively short time, ATM produced a working prototype. Even



before the expiration date of the Phase I award, the firm began shipping prototypes for customer evaluation and attracted Millipore Corp., a major corporation, as a partner. With the help of Phase II funding, ATM introduced its Waferpure gas purifier product line. Cumulative sales of this product now total almost \$10 million. ■ ATM then received an Environmental Protection Agency SBIR award to develop a novel “gas scrubber” for the semiconductor industry. Again, ATM was successful. Its scrubber — designed to treat many of the toxic and flammable

semiconductor process gas effluent streams used today — has been very well received by private industry. ■ ATM used an SBIR award from the Strategic Defense Initiative Office to develop a gas generator which safely produces gases used in semiconductor manufacture on a “just-in-time” basis, so that no gases have to be stored in inventory.

In 1991, ATM and Millipore formed a joint venture to manufacture and market these gas nanoline products. ■ ATM President Gene Banucci says, “Most importantly, our first three SBIR awards were converted into more than \$12 million in private equity. That’s the true mark of the SBIR Program — if you make it work for you, tremendous financial leverage can result.”

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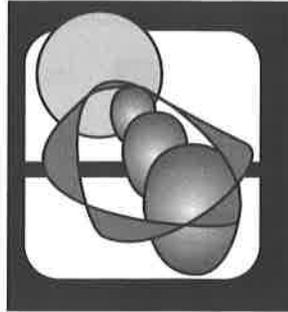
***“Our first three SBIR awards were converted into more than \$12 million in private equity.”***

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**EMBREX, INC.**  
**Morrisville, North Carolina**

**E**mbrex was founded in 1985 as a bioscience and bioengineering enterprise concentrating on products that would increase the productivity and profitability of the poultry industry in the U. S. and abroad.

Thanks in large part to SBIR awards from the Department of Agriculture, Embrex developed a system for large-scale handling and vaccination of eggs prior to hatching and while in the embryo stage. The SBIR awards also helped the company explore other "in ovo" (in the egg) approaches to improve poultry health and physiology. ■ Embrex's multi-egg vaccination injection system, which involves up to 30,000 eggs per hour, uses a fluid delivery technique to administer vaccine in precise quantities. The system also reduces hatchery labor costs by eliminating hand vaccination and boosts the health of birds by eliminating stress at the time of vaccination. ■ Embrex's first commercial vaccination system, called INOVOJECT, was introduced in late 1989. The first commercial contract using the system was signed several months later. While using its SBIR award funding,



Embrex obtained private venture capital investments to help development of a fully commercial egg injection system. A second and improved INOVOJECT system was introduced in late 1991. ■ In November 1991, Embrex raised \$16.7 million (net of expenses) through a public stock offering. ■ The company has about 60 employees, most of whom are engaged in research and customer service. John Hagan, vice president for finance and administration, says Embrex's "ability to obtain capital from both venture and public sources, and its ability to attract and retain talented scientific and technical personnel, was enhanced significantly by the knowledge and expertise gained from the work funded by the SBIR awards."

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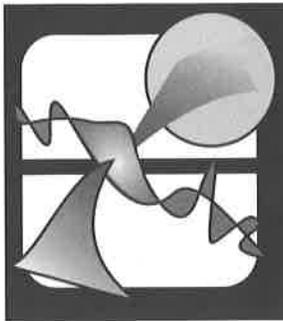
***"While using its SBIR award funding, Embrex obtained private venture capital investments to help development of a fully commercial egg injection system."***

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**PHYSICS OPTICS CORP.**  
Torrance, California

P

Since its founding in 1985, Physical Optics Corp. (POC) has been an active participant in the SBIR Program, and the company has won more than 100 SBIR awards from five federal agencies (the Departments of Defense, Energy and Transportation; the National Science Foundation and NASA). According to President Johanna Jansson, "POC's entire current portfolio of optics and photonics technologies originated from SBIR funding." ■ POC has introduced four related SBIR-funded product families to the commercial market — holographic filters, holographic diffusers, fiber optic wavelength division multiplexers and fiber optic voice/video links. Holographic components provide unique signal processing and information storage that cannot



be accomplished conventionally. Based on such components, POC is now developing new photonic systems for application in high-data rate fiber optic communications, monitoring instrumentation and high-speed computing. ■ The

company says its has received \$2.5 million in commercial contracts as a result of products developed with SBIR awards. In addition, POC has attracted equity investment of \$2.6 million from two private venture capital firms. The firm also says that its SBIR awards have provided a "solid financial base resulting in an additional \$2 million in open credit lines." ■ POC has begun

holographic technology product commercialization in Japan and Europe and has received two commercial contracts which have strong potential for licensing agreements. ■ Today, POC employs about 65 people.

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*"POC's entire current portfolio of optics and photonics technologies originated from SBIR funding."*

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**ASTROPOWER, INC.**  
Newark, New Jersey

**A**

AstroPower is the fourth largest U. S. manufacturer of photovoltaic products today—thanks in large part to the 29 SBIR awards received from the Departments of Defense and Energy and from the National Science Foundation. ■ AstroPower's principal business is the development and manufacture of a novel thin-film polycrystalline photovoltaic solar cell for the direct conversion of sunlight to electricity. This business also includes the manufacture and sale of photovoltaic modules and solar cell and module production equipment. The company's creative engineering and extensive research base in semiconductor film growth has led to the development of optically-enhanced ultra-bright LED designs, ultra-thin silicon solar cells and a variety of related space solar cells and high performance detectors. Most of these ideas were seeded by SBIR awards. ■ AstroPower's core technology is liquid-phase epitaxy, which provides the highest degree of crystal perfection and purity in semiconductor film growth. This technology was expanded to



include electro-epitaxy, which is the current-controlled growth of epitaxial films and which provides additional benefits of thick, constant composition layers and semiconductor film growth over dielectric layers. ■ Follow-up contracts are helping AstroPower to widen its product development and technologies. The National Institute of Standards and Technology awarded the firm a three-year, \$1.4 million research and development contract to help expand the firm's laboratory scale electro-epitaxy material growth technique into a manufacturing process. A joint agreement with Dow Chemical Co. will provide assistance in the early-stage

manufacture and commercialization of AstroPower's new Silicon-Film product. And the National Renewable Energy Laboratory awarded AstroPower a three-year, \$5 million contract to improve processes and reduce costs in photovoltaic module manufacturing. ■ AstroPower President Allen Barnett says that

“the SBIR Program has been essential in allowing us to hire and retain talented people, gain and maintain technical momentum, attract long-term investors and develop innovative ideas into commercial products. Without the SBIR Program, we might have remained a low-tech, one product company, with little or no future against industry competition.” ■ Today, AstroPower employs about 92 people. Eight years ago, it employed three.

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*“The SBIR Program has been essential in allowing us to hire and retain talented people, gain and maintain technical momentum.”*

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## DISTRIBUTION OF SBIR AWARDS

**T**he maps on the following pages show the distributions of fiscal 1991 SBIR awards (Phase I plus Phase II) by state. For a more detailed look at the geographical distribution of SBIR awards, the amount of funding by metropolitan area (as defined by the Census Bureau) is shown in Exhibit 1. The metropolitan areas are listed in order of their population in millions (column 1). ■ The next two columns show the SBIR funding (Phase I plus Phase II) for fiscal 1991 and for the program to date. A per capita funding rate is calculated by dividing the cumulative SBIR dollars by the population in millions. The last two columns show the running cumulative total and the cumulative percentage. ■ The metropolitan areas with the largest growth rates in SBIR awards are shown in the accompanying "Funding" table (to avoid distortions, only those areas awarded at least \$1 million awards in fiscal 1991 are shown). Both Chattanooga, TN, and Burlington, VT, have made this list for the second year in a row. ■ As reported last year, most SBIR awards in past years and also in fiscal 1991 go to large metropolitan areas. However, small

towns and rural settings are by no means excluded from the SBIR program. Nearly \$150 million has been awarded to communities with populations under 125,000. As a group, these communities would be in the top 20 percent of all metropolitan areas in terms of total dollars per capita, and ahead of Philadelphia and New York. In fiscal 1991, the following areas received their first SBIR awards: Barton, VT; Mumford, AL; Prestonburg, KY; East Jordan, MI; Spooner, WI; Norfolk, NE, and Redford, TX. ■ The metropolitan areas were also ranked by total SBIR funding, fiscal 1983-91. The top 50 areas are shown in Exhibit 2. Large metropolitan areas dominate the ranking: 17 of the first 25 have over one million population. The ranking is not very different from last year. The biggest gains were rendered by Portland, OR (from 60th place to 50th place), Santa Barbara, CA (29 to 25), Chicago, IL (15 to 11) and Houston, TX (24 to 21). ■ Lastly, the metropolitan areas were ranked by total dollars per capita. Now the ranking is dominated by smaller areas; 15 of the first 25 have populations under 500,000. In this ranking,

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## DISTRIBUTION OF SBIR AWARDS

the biggest gains were made by Cedar Rapids, IA (64th place to 50th place), Bryan-College Station, TX (25 to 15), Burlington, VT (24 to 17), Tucson, AZ (37 to 31), and Santa Barbara, CA (13 to 9). ■ Technology investment policies followed by SBIR participating agencies are reflected in the amount of funding for awards made in various technology areas. Those areas are described and listed in Exhibit 4. ■ Exhibit 5 summarizes, by participating agency, the dollar amount of fiscal 1991 funding made in each technology area. The accompanying graph in Exhibit 6 illustrates the fiscal 1991 technology distribution for all agencies combined. Exhibits 7 and 8 show corresponding distributions for the entire program to date—that is, fiscal 1983-91. ■ Again in fiscal 1991, the same four technology areas continued to receive the most SBIR funding: Information Processing, Biotech-

nology/Microbiology, Optical Devices/Lasers and Advanced Materials. Each of these areas received more than \$40 million. Four other areas each received more than \$30 million: Computer/Communication, Signal/Image Processing, Electronic Equipment/Instrumentation and Medical Instrumentation. ■ With regard to the cumulative funding in Exhibit 7, the Information Processing area has maintained its lead over Optical Devices/Lasers.

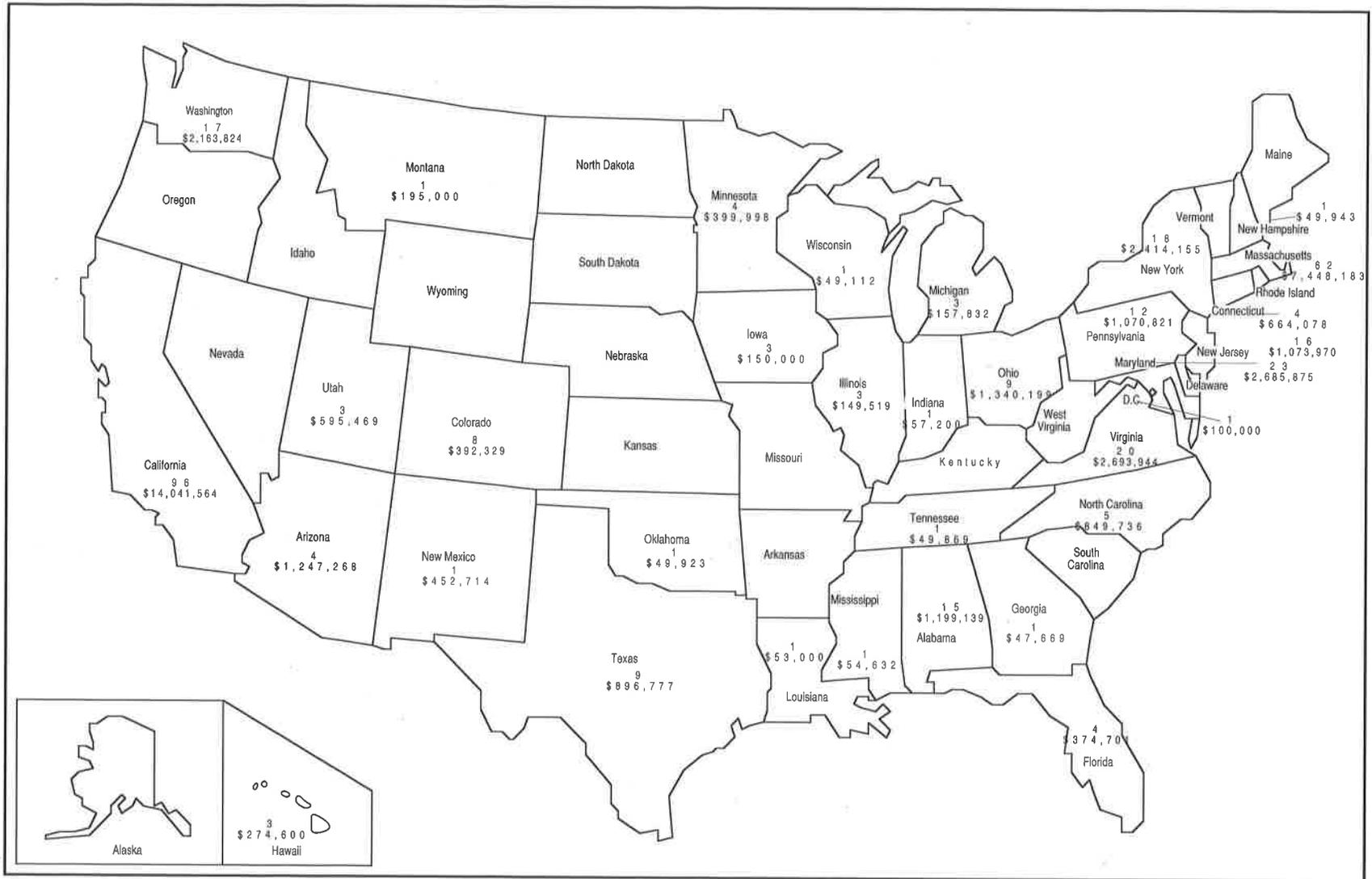
# GEOGRAPHIC DISTRIBUTION

## Fiscal 1991 Phase I and Phase II Awards (number and dollar value)



# GEOGRAPHIC DISTRIBUTION

## Fiscal 1991 Phase I and Phase II Awards to Minority Companies (number and dollar value)



# Exhibit One

## Distribution of SBIR Funding by Metropolitan Areas

Metropolitan Area	Pop (M)	FY91 (\$K)	FY83-91 (\$K)	Total \$ Per Cap	Cum \$	Cum %
NEW YORK AREA	15.529	14439	82129	5289	82129	3.1%
LOS ANGELES AREA	13.075	37601	250669	19172	332798	12.5%
CHICAGO-LAKE COUNTY	7.381	8256	37660	5102	370458	13.9%
BAY AREA (SF)	5.534	41004	247016	44634	617474	23.2%
PHILADELPHIA AREA	5.697	15948	96365	16914	713839	26.8%
DETROIT-ANN ARBOR, MI	4.601	4793	33456	7272	747295	28.1%
BOSTON AREA	4.056	63845	386220	95229	1133515	42.6%
DALLAS-FT. WORTH AREA	3.655	2325	21418	5859	1154933	43.4%
HOUSTON, GALVESTON, TX	3.634	7744	24776	6817	1179709	44.4%
WASHINGTON, DC-MD-VA	3.565	39089	225922	63372	1405631	52.8%
MIAMI-FT. LAUDERDALE, FL	2.912	240	3173	1090	1408804	53.0%
CLEVELAND-AKRON AREA	2.766	2366	10410	3764	1419214	53.4%
ATLANTA, GA	2.561	1765	14259	5569	1433473	53.9%
ST LOUIS, MO-IL	2.438	1336	5736	2353	1439209	54.1%
PITTSBURGH-BEAVER VALLEY, PA	2.316	2901	19864	8576	1459073	54.9%
MINNEAPOLIS-ST PAUL, MN-WI	2.295	6293	33664	14667	1492737	56.1%
SEATTLE-TAKOMA AREA	2.284	4807	56237	24618	1548974	58.2%
BALTIMORE, MD	2.280	5613	35229	15451	1584203	59.6%
SAN DIEGO, CA	2.201	20320	123128	55934	1707331	64.2%
TAMPA-ST PETE-CLEARWATER, FL	1.914	98	2988	1561	1710319	64.3%
PHOENIX, AZ	1.900	2909	13560	7136	1723879	64.8%
DENVER-BOULDER-LONGMONT, CO	1.847	13394	69640	37696	1793519	67.4%
CINCINNATI AREA, OH, KY, IN	1.690	251	3345	1979	1796864	67.6%
MILWAUKEE-RACINE, WI	1.552	1924	4698	3027	1801562	67.7%
KANSAS CITY, MO-KS	1.518	668	2489	1640	1804051	67.8%
PORTLAND, OR	1.153	2728	7086	6147	1811137	58.1%
NEW ORLEANS, LA	1.334	978	5377	4030	1816514	68.3%
NORFOLK-VA BEACH AREA, VA	1.310	1272	8628	6589	1825142	68.6%
COLUMBUS, OH	1.299	297	13326	10256	1838468	69.1%
SACRAMENTO, CA	1.291	1670	8193	6344	1846661	69.4%

Metropolitan Area	Pop (M)	FY91 (\$K)	FY83-91 (\$K)	Total \$ Per Cap	Cum \$	Cum %
SAN ANTONIO, TX	1.276	2063	8767	6869	1855428	69.8%
INDIANAPOLIS, IN	1.213	586	2915	2404	1858343	69.9%
BUFFALO-NIAGRA AREA	1.182	2902	21371	18086	1879714	70.7%
PROVIDENCE AREA, RI, MA	1.109	2210	11880	10717	1891594	71.1%
CHARLOTTE AREA, NC, SC	1.065	0	189	177	1891783	71.1%
HARTFORD AREA, CT	0.967	4425	30368	31401	1922151	72.3%
SALT LAKE CITY-OGDEN, UT	1.041	4648	37415	35928	1959566	73.7%
OKLAHOMA CITY, OK	0.983	189	1183	1204	1960749	73.7%
ROCHESTER, NY	0.980	2450	10911	11130	1971660	74.1%
LOUISVILLE, KY-IN	0.963	145	1293	1343	1972953	74.2%
MEMPHIS, TN-AR-MS	0.960	604	1557	1623	1974510	74.2%
MIDDLESEX-SOMMERSET AREA, NJ	0.950	3771	15292	16095	1989802	74.8%
MONMOUTH-OCEAN, NJ	0.935	1088	4171	4460	1993973	75.0%
DAYTON-SPRINGFIELD, OH	0.934	6957	37509	40181	2031482	76.4%
NASHVILLE, TN	0.931	249	2412	2592	2033894	76.5%
BIRMINGHAM, AL	0.911	649	2504	2749	2036398	76.6%
GREENSBORO-WINSTON SALEM, NC	0.900	682	1912	2126	2038310	76.6%
ORLANDO, FL	0.898	2233	17125	19062	2055435	77.3%
JACKSONVILLE-DAYTONA, FL	1.174	0	915	780	2056350	77.3%
ALBANY-SCHENECTADY, NY	0.844	2032	8148	9659	2064498	77.6%
HONOLULU, HI	0.817	1818	6346	7770	2070844	77.9%
RICHMOND-PETERSBURG, VA	0.810	49	1631	2013	2072475	77.9%
WEST PALM BEACH AREA, FL	0.756	50	4312	5707	2076787	78.1%
STOCKTON-MODESTO, CA	0.749	496	1206	1610	2077993	78.1%
TULSA, OK	0.734	748	4913	6698	2082906	78.3%
AUSTIN, TX	0.726	2316	18559	25549	2101465	79.0%
SCRANTON-WILKES-BARRE, PA	0.726	0	609	839	2102074	79.0%
ALLENTOWN-BETHLEHEM, PA-NJ	0.657	459	3391	5163	2105465	79.2%
RALEIGH-DURHAM, NC	0.651	4024	26971	41456	2132436	80.2%
SYRACUSE, NY	0.649	108	5667	8728	2138103	80.4%

\* per capita rate is obtained by dividing by the population in millions

# Exhibit One

## Distribution of SBIR Funding by Metropolitan Areas

Metropolitan Area	Pop (M)	FY91 (\$K)	FY83-91 (\$K)	Total \$ Per Cap	Cum \$	Cum %
GRAND RAPIDS, MI	0.649	0	283	436	2138386	80.4%
OMAHA, NE-IA	0.614	100	442	720	2138828	80.4%
TOLEDO, OH	0.611	466	3101	5074	2141929	80.5%
GREENVILLE-SPARTANBURG, SC	0.606	49	705	1163	2142634	80.6%
TUCSON, AZ	0.602	4512	16050	26643	2158684	81.2%
KNOXVILLE, TN	0.591	1393	27788	47011	2186472	82.2%
HARRISBURG AREA, PA	0.577	0	306	530	2186778	82.2%
LAS VEGAS, NV	0.570	1587	3020	5303	2189798	82.3%
EL PASO, TX	0.562	50	100	178	2189898	82.3%
BATON ROUGE, LA	0.546	0	784	1437	2190682	82.4%
SPRINGFIELD, MA	0.518	1099	4891	9446	2195573	82.6%
NEW HAVEN, CT	0.597	3195	22969	38493	2218542	83.4%
YOUNGSTOWN, OH	0.510	0	99	194	2218641	83.4%
LITTLE ROCK AREA, AR	0.506	49	1388	2745	2220029	83.5%
CHARLESTON, SC	0.486	0	524	1079	2220553	83.5%
ALBUQUERQUE, NM	0.474	5856	39095	82409	2259648	85.0%
WICHITA, KS	0.470	0	297	632	2259945	85.0%
COLUMBIA, SC	0.445	0	508	1142	2260453	85.0%
FLINT, MI	0.435	576	624	1435	2261077	85.0%
CHATTANOOGA, TN-GA	0.426	2230	4476	10519	2265553	85.2%
LANSING-E LANSING, MI	0.425	199	2481	5840	2268034	85.3%
WORCESTER, MA	0.408	2889	12632	30976	2280666	85.7%
SAGINAW-BAY CITY-MIDLAND, MI	0.404	180	1169	2896	2281835	85.8%
CANTON, OH	0.400	0	482	1204	2282317	85.8%
YORK, PA	0.398	0	225	566	2282542	85.8%
LANCASTER, PA	0.394	1208	11006	27970	2293548	86.2%
JACKSON, MS	0.392	0	227	579	2293775	86.2%
AUGUSTA, GA-SC	0.390	0	50	128	2293825	86.2%
DES MOINES, IA	0.381	1181	1914	5020	2295739	86.3%
COLORADO SPRINGS, CO	0.380	3085	12851	33783	2308590	86.8%

Metropolitan Area	POP (M)	FY91 (\$K)	FY83-91 (\$K)	Total \$ Per Cap	CUM \$	CUM %
SHREVEPORT, LA	0.365	0	37	101	2308627	86.8%
CORPUS CHRISTI, TX	0.363	0	49	135	2308676	86.8%
MELBOURNE AREA, FL	0.361	3556	19601	54266	2328277	87.5%
SPOKANE, WA	0.357	0	2951	8268	2331228	87.7%
FORT WAYNE, IN	0.356	0	345	969	2331573	87.7%
MADISON, WI	0.345	1336	6187	17939	2337760	87.9%
SALINAS-SEASIDE-MONTEREY, CA	0.340	155	2285	6727	2340045	88.0%
SANTA BARBARA, CA	0.339	5174	20054	59087	2360099	88.7%
PENSACOLA, FL	0.337	447	2940	8721	2363039	88.8%
LEXINGTON, KY	0.332	49	1113	3352	2364152	88.9%
READING, PA	0.321	0	538	1676	2364690	88.9%
UTICA-ROME, NY	0.315	497	1199	3802	2365889	89.0%
APPLETON-OSHKOSH-NEENAH, WI	0.308	90	445	1447	2366334	89.0%
MONTGOMERY, AL	0.299	0	50	167	2366384	89.0%
ATLANTIC CITY, NJ	0.297	99	1402	4714	2367786	89.0%
ROCKFORD, IL	0.280	0	50	178	2367836	89.0%
EUGENE-SPRINGFIELD, OR	0.263	1626	6958	26436	2374794	89.3%
SALEM, OR	0.262	715	3312	12636	2378106	89.4%
BINGHAMTON, NY	0.262	543	3206	12246	2381312	89.5%
NEW LONDON-NORWICH, CT-RI	0.260	395	2861	11025	2384173	89.6%
POUGHKEEPSIE, NY	0.257	49	99	386	2384272	89.6%
JOHNSTOWN, PA	0.254	0	30	118	2384302	89.6%
DULUTH, MN-WI	0.244	0	100	411	2384402	89.6%
SOUTH BEND-MISHAWAKA, IN	0.241	458	1528	6330	2385930	89.7%
PROVO-OREM, UT	0.241	599	2518	10470	2388448	89.8%
SAVANNAH, GA	0.240	0	50	209	2388498	89.8%
ANCHORAGE, AK	0.235	0	140	596	2388638	89.8%
HUNTSVILLE, AL	0.234	6968	37430	160163	2426068	91.2%
ROANOKE, VA	0.225	2965	16613	73868	2442681	91.8%
LUBBOCK, TX	0.225	0	50	222	2442731	91.8%

\* per capita rate is obtained by dividing by the population in millions

# Exhibit One

## Distribution of SBIR Funding by Metropolitan Areas

Metropolitan Area	Pop (M)	FY91 (\$K)	FY83-91 (\$K)	Total \$ Per Cap	Cum \$	Cum %
RENO, NV	0.225	1117	5637	25098	2448368	92.1%
TALLAHASSEE, FL	0.218	0	295	1353	2448663	92.1%
KALAMAZOO, MI	0.218	0	753	3459	2449416	92.1%
PORTSMOUTH AREA, NH, ME	0.215	553	2657	12358	2452073	92.2%
WATERBURY, CT	0.212	2474	12968	61199	2465041	92.7%
LINCOLN, NE	0.206	750	2787	13523	2467828	92.8%
PORTLAND, ME	0.206	767	6322	30734	2474150	93.0%
GAINESVILLE, FL	0.200	1189	7677	38423	2481827	93.3%
WACO, TX	0.188	0	98	522	2481925	93.3%
YAKIMA, WA	0.183	50	50	273	2481975	93.3%
CHAMPAIGN-URBANA-RANTOUL, IL	0.171	235	6830	39918	2488805	93.6%
ASHEVILLE, NC	0.170	0	449	2641	2489254	93.6%
CEDAR RAPIDS, IA	0.169	994	2286	13543	2491540	93.7%
NASHUA, NH	0.163	358	1599	9792	2493139	93.7%
TOPEKA, KS	0.161	76	1392	8657	2494531	93.8%
WATERLOO-CEDAR FALLS, IA	0.152	50	605	3993	2495136	93.8%
OLYMPIA, WA	0.147	432	1770	12074	2496906	93.9%
MANCHESTER, NH	0.145	47	1152	7939	2498058	93.9%
JACKSON, MI	0.144	0	150	1039	2498208	93.9%
ATHENS, GA	0.142	615	2354	16636	2500562	94.0%
MEDFORD, OR	0.140	0	50	357	2500612	94.0%
PASCAGOULA, MS	0.128	0	347	2707	2500959	94.0%
WICHITA FALLS, TX	0.127	0	49	386	2501008	94.0%
ABILENE, TX	0.126	0	100	794	2501108	94.0%
BURLINGTON, VT	0.125	1384	5040	40449	2506148	94.2%
LAFAYETTE-W LAFAYETTE, IN	0.124	200	4800	38585	2510948	94.4%

Metropolitan Area	Pop (M)	FY91 (\$K)	FY83-91 (\$K)	Total \$ Per Cap	Cum \$	Cum %
LAS CRUCES, NM	0.123	1047	6597	53634	2517545	94.7%
BLOOMINGTON-NORMAL, IL	0.123	50	50	407	2517595	94.7%
CHARLOTTESVILLE, VA	0.121	350	2888	23789	2520483	94.8%
MUNCIE, IN	0.121	0	96	794	2520579	94.8%
BRYAN-COLLEGE STATION, TX	0.121	1776	5177	42856	2525756	95.0%
LAWTON, OK	0.121	49	2922	24209	2528678	95.1%
STATE COLLEGE, PA	0.115	248	2433	21230	2531111	95.2%
BELLINGHAM, WA	0.114	499	1139	10018	2532250	95.2%
GLENS FALLS, NY	0.112	0	52	463	2532302	95.2%
MIDLAND, TX	0.111	49	547	4915	2532849	95.2%
FAYETTEVILLE-SPRINGDALE, AR	0.107	100	1394	12980	2534243	95.3%
SANTA FE, NM	0.106	1187	10226	96290	2544469	95.7%
BLOOMINGTON, IN	0.102	350	3665	36037	2548134	95.8%
KOKOMO, IN	0.101	0	50	493	2548184	95.8%
ROCHESTER, MN	0.098	195	245	2500	2548429	95.8%
FITCHBURG-LEOMINSTER, MA	0.096	424	2208	22928	2550637	95.9%
LA CROSSE, WI	0.094	0	39	414	2550676	95.9%
ELMIRA, NY	0.091	1660	9950	109945	2560626	96.3%
BISMARCK, ND	0.086	0	50	581	2560676	96.3%
BANGOR, ME	0.083	43	271	3249	2560947	96.3%
PITTSFIELD, MA	0.081	0	287	3548	2561234	96.3%
RAPID CITY, SD	0.077	0	206	2679	2561440	96.3%
VICTORIA, TX	0.076	0	407	5355	2561847	96.3%
CASPER, WY	0.071	0	50	704	2561897	96.3%
GRAND FORKS, ND	0.069	0	1092	15735	2562989	96.4%
NOT IN Metropolitan Area		14104	96690		2659679	100.0%

\* per capita rate is obtained by dividing by the population in millions

# Exhibit Two

## SBIR Awards by Metropolitan Areas (ordered by total dollars, Fiscal 83-91)

<i>Metropolitan Area</i>	<i>Pop (M)</i>	<i>FY91 (\$K)</i>	<i>FY83-91 (\$K)</i>	<i>Total \$ Per Cap</i>
BOSTON AREA	4.056	63845	386220	95229
LOS ANGELES AREA	13.075	37601	250669	19172
BAY AREA (SF)	5.534	41004	247016	44634
WASHINGTON, DC-MD-VA	3.565	39089	225922	63372
SAN DIEGO, CA	2.201	20320	123128	55934
PHILADELPHIA AREA	5.697	15948	96365	16914
NEW YORK AREA	15.529	14439	82129	5289
DENVER-BOULDER-LONGMONT, CO	1.847	13394	69640	37696
SEATTLE-TAKOMA AREA	2.284	4807	56237	24618
ALBUQUERQUE, NM	0.474	5856	39095	82409
CHICAGO-LAKE COUNTY	7.381	8256	37660	5102
DAYTON-SPRINGFIELD, OH	0.934	6957	37509	40181
HUNTSVILLE, AL	0.234	6968	37430	160163
SALT LAKE CITY-OGDEN, UT	1.041	4648	37415	35928
BALTIMORE, MD	2.280	5613	35229	15451
MINNEAPOLIS-ST PAUL, MN-WI	2.295	6293	33664	14667
DETROIT-ANN ARBOR, MI	4.601	4793	33456	7272
HARTFORD AREA, CT	0.967	4425	30368	31401
KNOXVILLE, TN	0.591	1393	27788	47011
RALEIGH-DURHAM, NC	0.651	4024	26971	41456
HOUSTON, GALVESTON, TX	3.634	7744	24776	6817
NEW HAVEN, CT	0.597	3195	22969	38493
DALLAS-FT. WORTH AREA	3.655	2325	21418	5859
BUFFALO-NIAGRA AREA	1.182	2902	21371	18086
SANTA BARBARA, CA	0.339	5174	20054	59087

<i>Metropolitan Area</i>	<i>Pop (M)</i>	<i>FY91 (\$K)</i>	<i>FY83-91 (\$K)</i>	<i>Total \$ Per Cap</i>
ROANOKE, VA	0.225	2965	16613	73868
TUCSON, AZ	0.602	4512	16050	26643
PITTSBURGH-BEAVER VALLEY, PA	2.316	2901	19864	8576
MELBOURNE AREA, FL	0.361	3556	19601	54266
AUSTIN, TX	0.726	2316	18559	25549
ORLANDO, FL	0.898	2233	17125	19062
MIDDLESEX-SOMMERSET AREA, NJ	0.950	3771	15292	16095
ATLANTA, GA	2.561	1765	14259	5569
PHOENIX, AZ	1.900	2909	13560	7136
COLUMBUS, OH	1.299	297	13326	10256
WATERBURY, CT	0.212	2474	12968	61199
COLORADO SPRINGS, CO	0.380	3085	12851	33783
WORCESTER, MA	0.408	2889	12632	30976
PROVIDENCE AREA, RI, MA	1.109	2210	11880	10717
LANCASTER, PA	0.394	1208	11006	27970
ROCHESTER, NY	0.980	2450	10911	11130
CLEVELAND-AKRON AREA	2.766	2366	10410	3764
SANTA FE, NM	0.106	1187	10226	96290
ELMIRA, NY	0.091	1660	9950	109945
SAN ANTONIO, TX	1.276	2063	8767	6869
NORFOLK-VA BEACH AREA, VA	1.310	1272	8628	6589
SACRAMENTO, CA	1.291	1670	8193	6344
ALBANY-SCHENECTADY, NY	0.844	2032	8148	9659
GAINESVILLE, FL	0.200	1189	7677	38423
PORTLAND, OR	1.153	2728	7086	6147

\* per capital rate is obtained by dividing by the population in millions.

# Exhibit Three

## SBIR Awards by Metropolitan Areas (ordered by total dollars per capita)

<i>Metropolitan Area</i>	<i>POP (M)</i>	<i>FY91 (\$K)</i>	<i>FY83-91 (\$K)</i>	<i>Total \$ Per Cap</i>	<i>Metropolitan Area</i>	<i>POP (M)</i>	<i>FY91 (\$K)</i>	<i>FY83-91 (\$K)</i>	<i>Total \$ Per Cap</i>
HUNTSVILLE, AL	0.234	6968	37430	160163	COLORADO SPRINGS, CO	0.380	3085	12851	33783
ELMIRA, NY	0.091	1660	9950	109945	HARTFORD AREA, CT	0.967	4425	30368	31401
SANTA FE, NM	0.106	1187	10226	96290	WORCESTER, MA	0.408	2889	12632	30976
BOSTON AREA	4.056	63845	386220	95229	PORTLAND, ME	0.206	767	6322	30734
ALBUQUERQUE, NM	0.474	5856	39095	82409	LANCASTER, PA	0.394	1208	11006	27970
ROANOKE, VA	0.225	2965	16613	73868	TUCSON, AZ	0.602	4512	16050	26643
WASHINGTON, DC-MD-VA	3.565	39089	225922	63372	EUGENE-SPRINGFIELD, OR	0.263	1626	6958	26436
WATERBURY, CT	0.212	2474	12968	61199	AUSTIN, TX	0.726	2316	18559	25549
SANTA BARBARA, CA	0.339	5174	20054	59087	RENO, NV	0.225	1117	5637	25098
SAN DIEGO, CA	2.201	20320	123128	55934	SEATTLE-TAKOMA AREA	2.284	4807	56237	24618
MELBOURNE AREA, FL	0.361	3556	19601	54266	LAWTON, OK	0.121	49	2922	24209
LAS CRUCES, NM	0.123	1047	6597	53634	CHARLOTTESVILLE, VA	0.121	350	2888	23789
KNOXVILLE, TN	0.591	1393	27788	47011	FITCHBURG-LEOMINSTER, MA	0.096	424	2208	22928
BAY AREA (SF)	5.534	41004	247016	44634	STATE COLLEGE, PA	0.115	248	2433	21230
BRYAN-COLLEGE STATION, TX	0.121	1776	5177	42856	LOS ANGELES AREA	13.075	37601	250669	19172
RALEIGH-DURHAM, NC	0.651	4024	26971	41456	ORLANDO, FL	0.898	2233	17125	19062
BURLINGTON, VT	0.125	1384	5040	40449	BUFFALO-NIAGRA AREA	1.182	2902	21371	18086
DAYTON-SPRINGFIELD, OH	0.934	6957	37509	40181	MADISON, WI	0.345	1336	6187	17939
CHAMPAIGN-URBANA-RANTOUL, IL	0.171	235	6830	39918	PHILADELPHIA AREA	5.697	15948	96365	16914
LAFAYETTE-W LAFAYETTE, IN	0.124	200	4800	38585	ATHENS, GA	0.142	615	2354	16636
NEW HAVEN, CT	0.597	3195	22969	38493	MIDDLESEX-SOMMERSET AREA, NJ	0.950	3771	15292	16095
GAINESVILLE, FL	0.200	1189	7677	38423	GRAND FORKS, ND	0.069	0	1092	15735
DENVER-BOULDER-LONGMONT, CO	1.847	13394	69640	37696	BALTIMORE, MD	2.280	5613	35229	15451
BLOOMINGTON, IN	0.102	350	3665	36037	MINNEAPOLIS-ST PAUL, MN-WI	2.295	6293	33664	14667
SALT LAKE CITY-OGDEN, UT	1.041	4648	37415	35928	CEDAR RAPIDS, IA	0.169	994	2286	13543

\*per capita rate is obtained by dividing by the population in millions

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## TECHNOLOGY AREAS

### Exhibit Four

#### 1000 Computer, Information Processing, Analysis

- 1100 Computer and communication systems**
  - 1110 Computer systems technology
  - 1120 Communication and control systems
  - 1130 Networks and architectures
  - 1140 Computer security
  
- 1200 Information processing and management**
  - 1210 Data and information processing
  - 1220 Artificial intelligence
  - 1230 Computer software
  - 1240 Robotics and automation
  - 1250 Man machine interface
  
- 1300 Signal and image processing**
  - 1310 Signal processing
  - 1320 Image processing
  - 1330 Navigation, guidance, positioning
  
- 1400 Systems studies**
  - 1410 General studies
  - 1420 Operations and systems analysis
  - 1430 Safety systems, health and risk analysis
  
- 1500 Mathematical sciences**
  - 1510 Math fundamentals
  - 1520 Numerical modeling
  - 1530 Math modeling

#### 2000 Electronics

- 2100 Microelectronics**
  - 2110 Microelectronics:materials, concepts, processing
  - 2120 Compound semiconductors
  - 2130 Photovoltaics
  - 2140 Optoelectronics
  
- 2200 Electronics device performance**
  - 2210 Electronic device performance, packaging, reliability
  - 2220 Radiation damage and hardening
  - 2230 Testability
  
- 2300 Electronic equipment and instrumentation**
  - 2310 Electronic equipment and systems
  - 2320 Data and information processing equipment
  - 2330 Sensors, transducers, instrumentation
  
- 2400 Electromagnetic radiation/propagation**
  - 2410 RF technology
  - 2420 Electronic warfare
  - 2430 Target detection
  - 2440 Metal and mine detection
  
- 2500 Microwave and millimeter wave electronics**
  - 2510 Microwave electronics
  - 2520 Millimeter wave electronics
  
- 2600 Optical devices and lasers**
  - 2610 Optical and IR sensors, components
  - 2620 Optical fiber technology
  - 2630 Laser technology
  - 2640 Higher frequency EM radiation

## TECHNOLOGY AREAS

### 3000 Materials

#### 3100 Advanced materials

- 3110 Metallic, magnetic, highT, conducting & superconducting materials
- 3120 Polymers
- 3130 Ceramics
- 3140 Composites and lightweight materials
- 3150 Construction materials
- 3160 Fire, fabric, and insulation materials
- 3170 EM transparent materials
- 3180 Biomaterials

#### 3200 Materials processing and manufacturing

- 3210 Materials processing
- 3220 Manufacturing methods
- 3230 Joining and welding technology
- 3240 Separation/characterization of multiphases

#### 3300 Coatings, corrosion and surface phenomena

- 3310 Corrosion
- 3320 Coatings
- 3330 Thin films and surfaces

#### 3400 Materials performance

- 3410 Failure, fracture, fatigue
- 3420 Lubrication, wear and seals
- 3430 Repair
- 3440 Non-destructive evaluation

#### 3500 Fundamentals and instrumentation

- 3510 Materials fundamentals/general
- 3520 Instrumentation

### 4000 Mechanical Performance of Vehicles, Weapons, Facilities

#### 4100 Hydrodynamics

- 4110 Hydrodynamics
- 4120 Watercraft

#### 4200 Aerodynamics

- 4210 Fundamental aerodynamics
- 4220 Aerodynamic performance
- 4230 Aerodynamic facilities, instrumentation

#### 4300 Acoustics

- 4310 Underwater acoustic detection and communication
- 4320 Vibration related acoustics

#### 4400 Mechanical performance of structures and equipment

- 4410 Shock vibration and structural performance of vehicles, facilities, equipment
- 4420 New structural concepts
- 4430 Performance of engine, equipment, mechanical components
- 4440 Weapons performance and effects

#### 4500 Control

- 4510 Control concepts
- 4520 Vehicle/weapon motion control
- 4530 Structural controls

#### 4600 Mechanical measurements

- 4610 Mechanical measurements (pressure, velocity, etc.)

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## TECHNOLOGY AREAS

### 5000 Energy Conversion and Use

- 5100 Transport sciences**
  - 5110 Fluid mechanics
  - 5120 Flow/fluid measurement and enhancement
  - 5130 Heat transfer
  - 5140 Refrigeration/cryogenics
  
- 5200 Propulsion/combustion technology**
  - 5210 Propulsion systems
  - 5220 Propellants, fuels, explosives
  - 5230 Combustion
  - 5240 Fire detection
  - 5250 Exhaust gases & gas analysis
  
- 5300 Large scale energy usage**
  - 5310 Industrial energy processes and utilization
  - 5320 Physics, nuclear physics, fusion and plasma
  - 5330 Energy use in buildings
  
- 5400 Energy conversion/electric power**
  - 5410 Batteries, fuel cells, electrochemistry, energy storage
  - 5420 Alternative energy conversion
  - 5430 Electric power technology

### 6000 Environment & Natural Resources

- 6100 Ocean science**
  - 6110 Ocean science and instrumentation
  
- 6200 Atmospheric sciences**
  - 6210 Atmospheric science and monitoring
  - 6220 Remote sensing
  - 6230 Chemical and biological measurement
  - 6240 Particulates and aerosols
  - 6250 Pollution abatement and environment control
  
- 6300 Water management**
  - 6310 Water monitoring and characterization
  - 6320 Water treatment
  - 6330 Water management and utilization
  - 6340 Ice, snow, frost detection
  
- 6400 Earth sciences**
  - 6410 Earth sciences
  - 6420 Soil measurement and manipulation
  
- 6500 Environment protection**
  - 6510 Nuclear, chemical, biological waste management
  - 6520 CBR defense

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## TECHNOLOGY AREAS

### 7000 Life Sciences

#### 7100 Medical instrumentation

- 7110 Medical measurements
- 7120 Measurements/techniques for radiation/imagery
- 7130 Medical devices
- 7140 Devices/systems for physically impaired

#### 7200 Biotechnology and microbiology

- 7210 Biotechnology and genetic engineering
- 7220 Cellular biology
- 7230 Drugs, vaccines, toxicity, immunology, therapeutic agents
- 7240 Disease detection and screening

#### 7300 Behavioral sciences

- 7310 Behavior, human factors, cognition
- 7320 Training, testing, simulation
- 7330 Social studies

#### 7400 Physiology and miscellaneous

- 7410 Physiological mechanisms, injury, miscellaneous
- 7420 Dental
- 7430 Food, nutrition, agriculture
- 7440 Biotic resources
- 7450 Animal models and veterinary medicine
- 7460 Plant physiology

# Exhibit Five

## Fiscal 1991 Phase I and II Awards by Technology Area and Agency (dollars in thousands)

	DOD	DOE	NASA	HHS	NSF	DOT	EPA	NRC	ED	DOA	DOC	TOTAL	
<b>1000</b>	<b>COMPUTER, INFORMATION, ANALYSIS</b>												
1100	COMPUTER, COMMUNICATION	22028	1718	4297	3607	1164	760	0	50	59	225	64	33972
1200	INFORMATION PROCESSING	27410	1295	11552	6769	2057	723	150	50	795	444	66	51311
1300	SIGNAL/IMAGE PROCESSING	18785	697	5376	1775	1195	1854	0	0	225	0	303	30210
1400	SYSTEMS STUDIES	9932	1697	1746	2011	422	341	0	156	289	49	0	16643
1500	MATH MODELLING	7733	149	5021	565	623	0	0	0	0	50	0	14141
<b>2000</b>	<b>ELECTRONICS</b>												
2100	MICROELECTRONICS	18049	2202	3542	0	2639	49	0	0	0	0	0	26481
2200	DEVICE PERFORMANCE	4929	899	549	942	149	349	0	105	0	0	0	7922
2300	EQUIPMENT/INSTRUMENTATION	16436	4065	8211	3977	1899	448	50	50	60	0	0	35196
2400	EM RADIATION/PROPAGATION	22076	138	1076	0	145	149	0	0	0	0	34	23618
2500	MICROWAVE/MM WAVE	5830	1584	1281	49	49	0	0	0	0	0	0	8793
2600	OPTICAL/LASER	23607	4935	10656	4131	2281	582	50	205	29	48	339	46863
<b>3000</b>	<b>MATERIALS</b>												
3100	ADVANCED MATERIALS	23601	6043	6585	2502	3175	542	149	0	0	814	0	43411
3200	PROCESSING/MANUFACTURING	6970	2498	2915	246	2013	300	246	0	0	249	0	15437
3300	COATINGS/CORROSION	12715	2348	4634	2113	2510	149	599	0	0	99	0	25167
3400	PERFORMANCE/FATIGUE	6424	1043	3737	99	1262	448	150	50	0	300	35	13548
3500	FUNDAMENTALS/INSTRUMENTS	2201	2148	2188	2829	1246	0	0	0	0	142	235	10989

\*multiple technology areas assigned to awards

# Exhibit Five

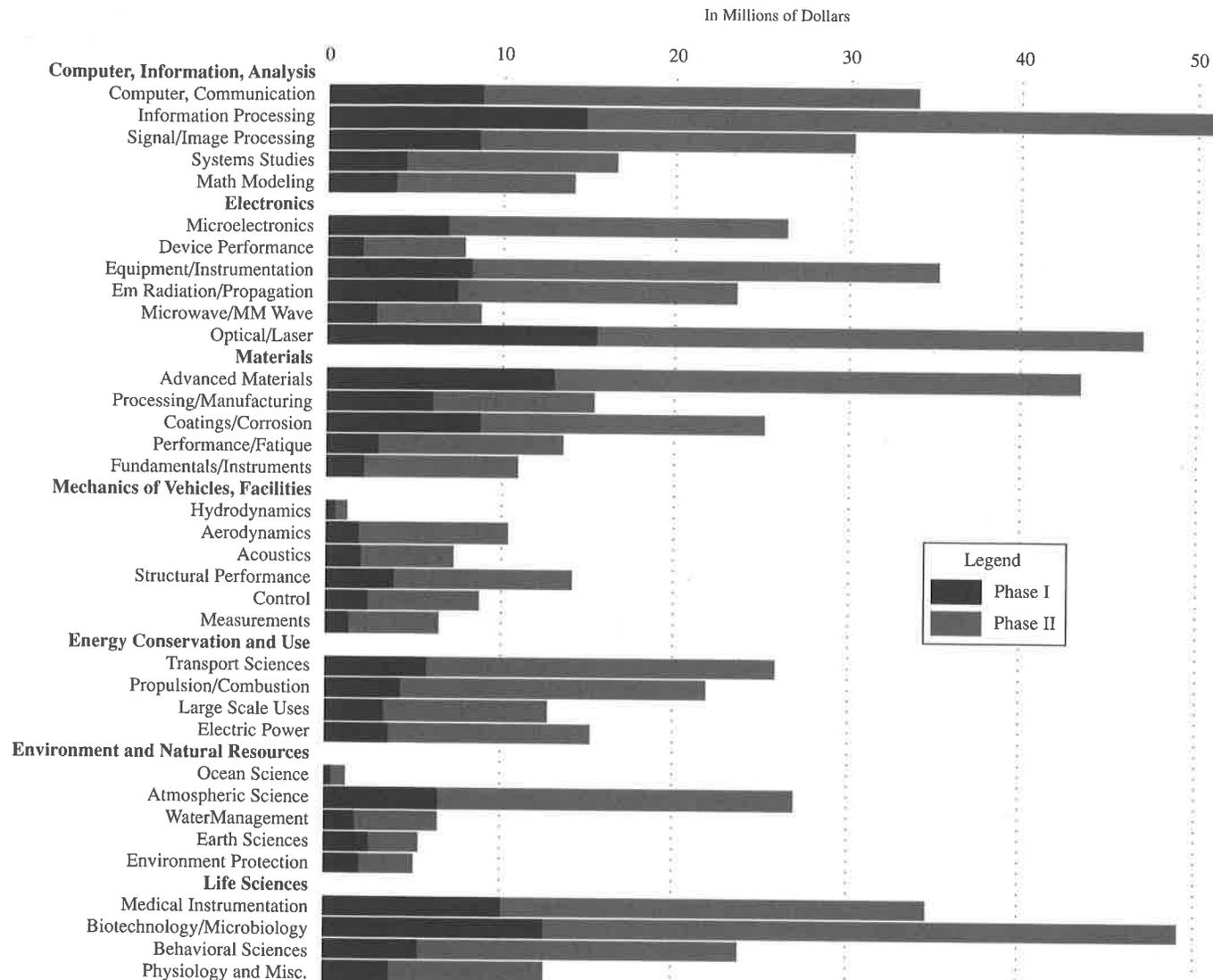
## Fiscal 1991 Phase I and II Awards by Technology Area and Agency (dollars in thousands)

	DOD	DOE	NASA	HHS	NSF	DOT	EPA	NRC	ED	DOA	DOC	TOTAL
<b>4000 MECHANICS OF VEHICLES, FACILITIES</b>												
4100 HYDRODYNAMICS	343	49	544	0	292	0	0	0	0	0	0	1228
4200 AERODYNAMICS	4495	0	5344	0	676	0	0	0	0	0	0	10515
4300 ACOUSTICS	4996	0	2122	0	48	0	0	0	217	0	0	7383
4400 STRUCTURAL PERFORMANCE	10338	547	2292	0	648	148	0	50	0	195	0	14218
4500 CONTROL	3678	999	3535	0	0	573	0	0	0	0	0	8785
4600 MEASUREMENTS	3542	497	1742	0	316	382	0	0	0	0	34	6513
<b>5000 ENERGY CONSERVATION AND USE</b>												
5100 TRANSPORT SCIENCES	7792	5354	9637	1483	1035	99	0	0	0	445	0	25845
5200 PROPULSION/COMBUSTION	9182	5926	5436	99	498	299	449	0	0	0	0	21889
5300 LARGE SCALE USES	1067	10212	596	0	932	0	0	0	0	0	35	12842
5400 ELECTRIC POWER	4142	4435	4520	1361	567	0	196	0	0	0	0	15221
<b>6000 ENVIRONMENT AND NATURAL RESOURCES</b>												
6100 OCEAN SCIENCE	545	148	99	0	50	0	0	0	0	0	403	1245
6200 ATMOSPHERIC SCIENCE	6075	6112	6788	3362	2459	98	1347	0	0	340	401	26982
6300 WATER MANAGEMENT	1341	50	3076	500	575	50	548	0	0	360	33	6533
6400 EARTH SCIENCES	1402	2945	50	0	764	50	0	106	98	0	0	5415
6500 ENVIRONMENT PROTECTION	1545	996	100	0	149	438	1718	0	0	229	0	5175
<b>7000 LIFE SCIENCES</b>												
7100 MEDICAL INSTRUMENTATION	710	696	1376	28835	1116	299	0	0	1482	100	0	34614
7200 BIOTECHNOLOGY/MICROBIOLOGY	2815	1248	499	42673	998	0	0	0	0	766	35	49034
7300 BEHAVIORAL SCIENCES	10748	0	788	9356	376	495	0	50	1379	619	0	23811
7400 PHYSIOLOGY AND MISC.	1148	0	2518	4360	1238	0	50	0	0	3241	70	12625

\*multiple technology areas assigned to awards

# Exhibit Six

## Distribution of Fiscal 1991 Phase I and II Awards Among Technology Areas (multiple technology areas assigned to awards)



# Exhibit Seven

## Fiscal 1983-91 Phase I and II Awards by Technology Area and Agency (dollars in thousands)

	DOD	DOE	NASA	HHS	NSF	DOT	EPA	NRC	ED	DOA	DOC	TOTAL	
<b>1000</b>	<b>COMPUTER, INFORMATION, ANALYSIS</b>												
1100	COMPUTER, COMMUNICATION	101612	11166	21599	21076	5961	3006	0	560	2742	525	364	168611
1200	INFORMATION PROCESSING	178165	17800	57715	49468	13905	3514	200	1091	6425	1388	607	330278
1300	SIGNAL/IMAGE PROCESSING	121020	7355	32222	18540	7110	3513	0	480	502	250	1250	192242
1400	SYSTEMS STUDIES	61352	5203	3876	11311	2095	1893	199	2431	804	1811	0	90975
1500	MATH MODELLING	63064	2629	37722	9516	7540	643	198	2088	230	50	60	123740
<b>2000</b>	<b>ELECTRONICS</b>												
2100	MICROELECTRONICS	104696	12470	20843	588	11277	99	0	242	0	50	0	150265
2200	DEVICE PERFORMANCE	34635	2827	3974	4856	705	449	0	493	0	0	0	47939
2300	EQUIPMENT/INSTRUMENTATION	104071	30825	33477	19874	8900	3659	1820	958	1580	2255	768	208187
2400	EM RADIATION/PROPAGATION	136261	1490	4216	1913	955	1326	397	49	30	0	449	147086
2500	MICROWAVE/MM WAVE	38582	4559	9630	590	401	49	49	0	30	0	226	54116
2600	OPTICAL/LASER	162562	36240	50581	29190	12851	2885	1000	867	86	943	934	298139
<b>3000</b>	<b>MATERIALS</b>												
3100	ADVANCED MATERIALS	154382	44581	38371	12868	15117	5290	1292	118	30	2970	264	275283
3200	PROCESSING/MANUFACTURING	43003	29576	18657	7745	12749	1007	3071	348	30	1505	260	117951
3300	COATINGS/CORROSION	83907	21636	19283	9011	11487	436	1988	50	0	619	34	148451
3400	PERFORMANCE/FATIGUE	58720	14374	13257	711	8954	4649	224	934	0	1167	35	103025
3500	FUNDAMENTALS/INSTRUMENTS	12692	5834	8077	14004	5230	0	1037	0	0	192	528	47594

\*multiple technology areas assigned to awards

# Exhibit Seven

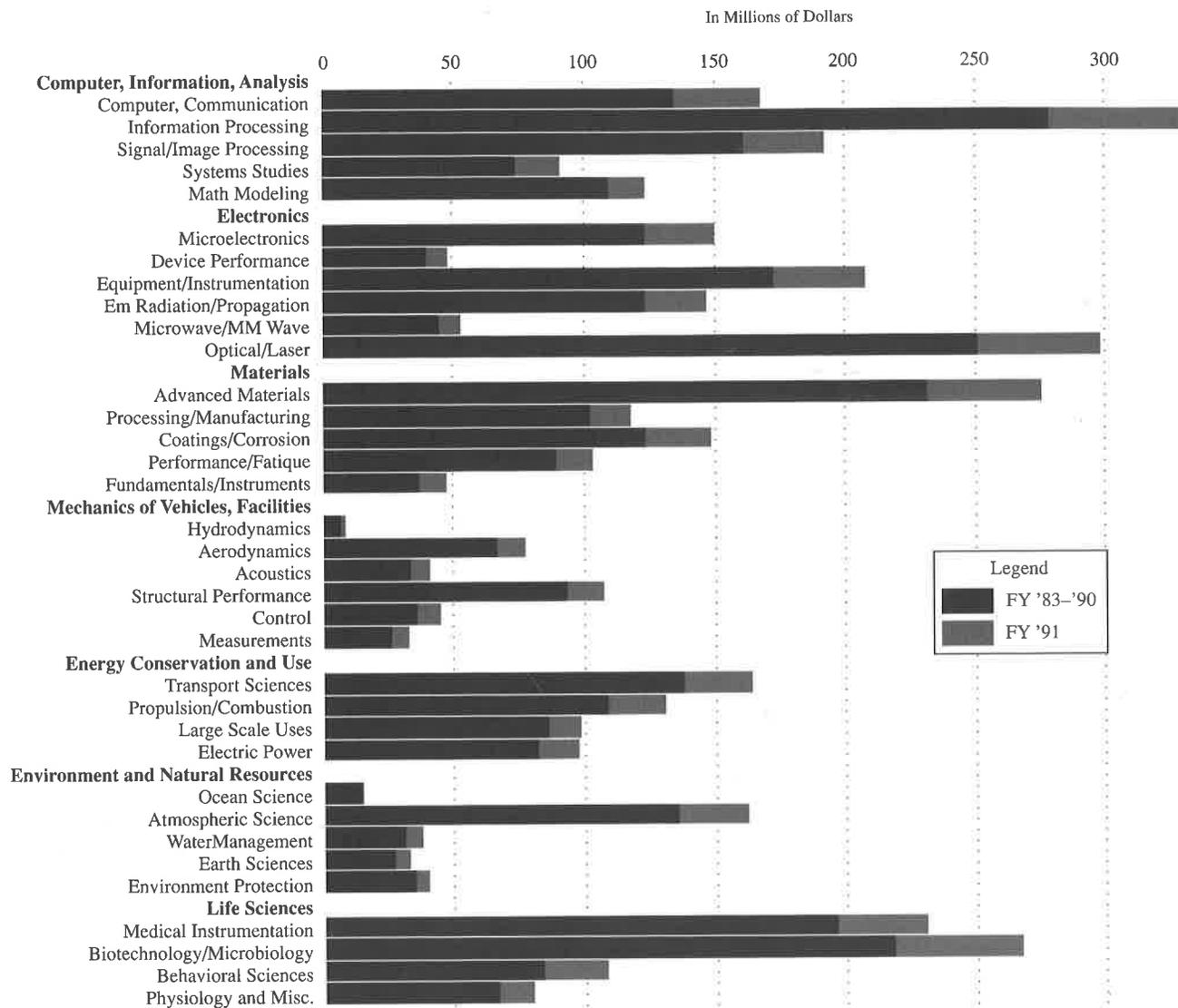
## Fiscal 1983-91 Phase I and II Awards by Technology Area and Agency (dollars in thousands)

	DOD	DOE	NASA	HHS	NSF	DOT	EPA	NRC	ED	DOA	DOC	TOTAL
<b>4000 MECHANICS OF VEHICLES, FACILITIES</b>												
4100 HYDRODYNAMICS	6926	49	593	0	327	0	0	0	0	0	259	8154
4200 AERODYNAMICS	36110	587	37652	0	1316	1243	0	0	0	0	34	76942
4300 ACOUSTICS	32914	2146	3727	612	215	399	0	0	498	0	530	41041
4400 STRUCTURAL PERFORMANCE	85123	2413	12004	2194	3456	1973	0	200	29	291	23	107706
4500 CONTROL	20466	6531	12729	1530	1846	1170	0	150	0	240	0	44662
4600 MEASUREMENTS	19168	3108	6838	681	1505	1076	0	149	0	0	57	32582
<b>5000 ENERGY CONSERVATION AND USE</b>												
5100 TRANSPORT SCIENCES	65129	24199	50826	14950	5215	447	743	1107	0	1145	0	163761
5200 PROPULSION/COMBUSTION	66988	28252	25513	1161	4678	1436	2682	50	0	450	30	131240
5300 LARGE SCALE USES	12706	73496	3994	3107	3671	396	360	474	0	557	56	98817
5400 ELECTRIC POWER	49738	21207	13766	5309	6432	100	287	0	0	622	0	97461
<b>6000 ENVIRONMENT AND NATURAL RESOURCES</b>												
6100 OCEAN SCIENCE	8028	1846	1265	0	1562	50	0	0	0	0	2078	14829
6200 ATMOSPHERIC SCIENCE	51517	26941	31910	26134	10147	2590	9113	98	0	1901	2509	162860
6300 WATER MANAGEMENT	12369	2686	9162	1377	4439	899	4353	288	0	2224	63	37860
6400 EARTH SCIENCES	11197	11343	1345	0	6134	397	170	388	98	1446	225	32743
6500 ENVIRONMENT PROTECTION	14816	8984	1167	269	3360	886	9879	330	0	395	0	40086
<b>7000 LIFE SCIENCES</b>												
7100 MEDICAL INSTRUMENTATION	15895	4498	5880	191310	3485	1252	0	100	8028	465	30	230943
7200 BIOTECHNOLOGY/MICROBIOLOGY	14643	12226	3373	216715	12558	348	928	0	347	6222	154	267514
7300 BEHAVIORAL SCIENCES	38243	0	6177	50085	1990	3226	0	50	6268	1970	0	108009
7400 PHYSIOLOGY AND MISC.	5641	3396	8498	31112	8627	399	324	0	60	20189	1145	79391

\*multiple technology areas assigned to awards

# Exhibit Eight

## Distribution of Fiscal 1983-91 Phase I and II Awards Among Technology Areas (multiple technology areas assigned to awards)



**A**fter completing a study analyzing programmatic requirements and after soliciting agency options, SBA authorized the agencies to increase their program solicitation page count to 23, plus statutorily required inclusions.

### ■ Incomplete and Untimely Goaling Data

Despite repeated attempts to obtain the necessary statistics, both the Department of Agriculture and the Tennessee Valley Authority failed to comply with program requirements for procurement data annual report submission.

### ■ General Information

SBA, in its continuing attempt to minimize program expense and increase efficiency, upgraded automation capabilities. Newer, more sophisticated personal computers, local area network (LAN) hardware and updated software training were acquired.

### ■ National SBIR Conferences

Starting in fiscal 1992, the National Science Foundation and the Department of Defense, in cooperation with 18 federal agencies and departments, will conduct three national SBIR conferences. In previous years, these conferences were called Federal High Tech. Normally, only two were

held each year. These sessions have been well attended and received by participants.

### ■ Automated Telephone Answering System

The special Automated Telephone Answering System completed its first year of service, with excellent results. The system provides a simplified and expedient arrangement for small business placement on the SBIR Pre-Solicitation Announcement Mailing List. In addition, the system reduces the administrative burden on SBIR staff members, thus enabling them to spend more time on other productive work. Through the answering system, incoming person-to-person telephone calls were reduced by 75 percent. Almost 50 percent of all file additions are now automated.

### ■ General Accounting Office Commercialization Study Results

P. L. 99-443 requires the General Accounting Office (GAO) to provide Congress with a report on the SBIR Program by Dec. 31, 1991. The report was to include "an evaluation of Phase III of the SBIR Program, including a discussion of the aggregate commercial trends for products which are then currently in, or have completed, Phase III of the Program." At the end of fiscal 1991 (Sept. 30, 1991), this report had not been formally issued. But significant preliminary findings were made public. Those preliminary findings are very favorable. The preliminary report also includes suggestions for legislative changes to further improve Program results.

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## SBIR ADMINISTRATIVE ISSUES

### ■ GAO's conclusions in its preliminary report:

"In summary, our survey indicates that even though SBIR projects have not yet had sufficient time to achieve their full commercial potential, the Program overall is showing success in Phase III activity. This is indicated by the \$1.1 billion in sales and additional development funding reported as of July 1991, two thirds of which has occurred in the private sector, showing a significant movement toward the program goal of increasing private sector commercialization. ■ "In addition, the outlook is positive -- the majority of these Phase II projects remain active in Phase III, and companies expect up to \$3 billion in further sales and additional development funding through 1993. However, the extent of commercialization varies widely by agency and could be enhanced if greater emphasis, particularly by DoD, were placed on increasing private sector commercialization. This, along with attention to the other issues dealing with company participation in Phase II, could further strengthen the effectiveness of the program."

### ■ Reauthorization Prospects for the SBIR Program

Without reauthorization by Congress, the SBIR Program is to end on Oct. 1, 1993. At the end of fiscal 1991, Congress had gathered the necessary information on which to base its reauthorization decision. ■ Preliminary indications point to the fact that Congress has received favorable reports on the operations and direction of the Program -- the quality of SBIR

research compares favorably with other federal research and impressive levels of commercialization have been achieved. In addition, the GAO and SBA studies of program management and operations have been very favorable. Moreover, SBIR Program support by the nation's small business community has been very strong. ■ These positive findings and indications all point to a constructive and approving reauthorization process.

All of SBA's programs and services are extended  
to the public on a nondiscriminatory basis.

**SBA**

Helping Build America's Future