

U.S. Small Business Administration



**SMALL BUSINESS
INNOVATION
RESEARCH PROGRAM
(SBIR)**

ANNUAL REPORT – FY 2002

**Office of Technology
U.S. Small Business Administration**

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OVERVIEW

This is the 20th annual report on the SBIR program, which summarizes program activities and results for FY 2002. The Small Business Innovation Development Act of 1982, Public Law 97-219, directs the U.S. Small Business Administration (SBA) to establish policy for monitoring, evaluating, and reporting on accomplishments of the Small Business Innovation Research (SBIR) program.

Public Law 97-219 was signed on July 22, 1982 and is set forth in section 9 of the Small Business Act. Congress reauthorized the SBIR program in 1986, and again in 1993, extending it to October 1, 2000. This reauthorization also increased the percentage of research and development (R&D) funds that participating Federal agencies must direct to small businesses under the program from 2 percent to 2.5 percent. On December 21, 2000, Public Law 106-554 was signed reauthorizing the SBIR program through September 30, 2008.

In FY 2002, the SBIR program continued to demonstrate that with focused program support from the Federal Government, small high-tech firms could convert basic ideas and research into commercial products. In doing so, these firms increase national productivity, and contribute to American leadership in the competitive international marketplace.

Over a 20-year period, Federal agencies participating in the SBIR program have awarded more than 69,000 awards worth over \$13.3 billion to thousands of small high-tech companies. The innovative small businesses that have received awards have applied their ingenuity and inventiveness to fulfilling Federal R&D requirements and to creating profitable commercial products. These products encompass a wide range of industries and technologies.

SBIR program highlights since FY 1983 include the following:

- Successful commercial sales arising from SBIR awards come from an ever-broadening range of technologies and industries such as laser manufacturing, medical research, robotics and military decision-making.
- New products and techniques emerging from SBIR awards support America's competitiveness worldwide, and improve the lives of people here and abroad.
- Research projects have been funded by SBIR awards relating to anti-terrorism such as detection and identification of foreign odors in grains, ultraspectral imager (missile identifier), the use of biofilms to counter bioterrorism, and robotic control for unmanned vehicles.
- Surveys by SBA and the General Accounting Office indicate that at least 25 percent of SBIR award recipients have reported commercial success of SBIR-supported product(s) within 4 years of receiving a Phase II award.
- Small disadvantaged and women-owned businesses have received a significant portion of SBIR awards.

As the company profiles and statistics in this report suggest, an increasing number of firms are succeeding in commercializing new products, processes and services derived from SBIR awards.

In administering and managing the SBIR program, SBA's Office of Technology encourages small, high-tech companies to respond to solicitations from Federal agencies participating in the program. A number of small businesses continue to win multiple awards reflecting their persistent spirit of innovation.

INTRODUCTION

Legislative Background

Public Law 97-219 required that each Federal agency having an extramural research and research and development (R/R&D) budget in excess of \$100 million in FY 1982, or any year thereafter, set aside a portion of such requirements for competitive award under the SBIR program. Through a 4-year phase-in period, civilian agencies were required to increase the percentage of their R/R&D set-asides from 0.2 percent in FY 1983 to 1.25 percent in FY 1986. The Department of Defense was allowed 5 years to phase in its increase from 0.01 percent in FY 1983, to 1.25 percent in FY 1987.

The Small Business Research and Development Enhancement Act of 1992 (Public Law 102-564) extended the SBIR program to October 1, 2000. It also incrementally increased the percentage of annual extramural R/R&D funds that participating Federal agencies must direct to small high-tech firms from 1.25 percent to 2.5 percent. Public Law 106-554 extended the SBIR program through September 30, 2008.

Public Law 102-564 also sought to:

- Expand and improve the SBIR program.
- Emphasize increased private-sector commercialization of technology developed under the program.
- Increase small business participation in Federal research and development.
- Improve dissemination of SBIR program information to encourage participation of women-owned and socially and economically disadvantaged small businesses.

Public Law 106-554 sought to:

- Continue the SBIR program through September 30, 2008.
- Clarify data rights pertaining to SBIR Phase I, Phase II, and federally-funded Phase III awards.
- Establish databases – one for the public and one for Government use – to collect and maintain in a common format information that is necessary to assist small business concerns and assess the SBIR program.
- Require agencies with an SBIR budget of over \$50,000,000 for fiscal year 1999 to enter into an agreement with the National Academy of Sciences for the National Research Council to conduct a review of each agency's SBIR program.
- Require SBIR agencies to report to SBA on the calculation of the agency's extramural budget.
- Establish the Federal and State Technology Partnership (FAST) Program to strengthen the technological competitiveness of small business concerns.
- Extend the Rural Outreach Program through September 30, 2005.

Participating Federal Agencies

Pursuant to the Small Business Act, the following Federal agencies are required to participate in the SBIR program:

- Department of Agriculture (DOA)
- Department of Commerce (DOC)
- Department of Defense (DOD)
- Department of Education (ED)

- Department of Health and Human Services (HHS)
- Department of Transportation (DOT)
- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration (NASA)
- Department of Energy (DOE)
- National Science Foundation (NSF)

SBIR Program Structure

The SBIR program is structured in three phases:

- Phase I: Awards up to \$100,000 are for research projects designed to evaluate the feasibility, and the scientific and technical merit of an idea. Phase I awards are for a period of up to 6 months.
- Phase II: Phase I projects with the most potential are funded for further development of the proposed idea. Phase II funding of up to \$750,000 may be awarded over a period of up to 2 years.
- Phase III: No SBIR funds may be used in this phase. Private-sector investment and support must be used to bring an innovation to market. However, as appropriate, Phase III funds may include follow-up contracts with Federal agencies for production of Phase II innovations.

SBA Authorities and Responsibilities

SBA has authority and responsibility to:

- Develop, coordinate, issue and update a policy directive for the Federal government-wide conduct of the SBIR and R/R&D Goaling Programs.
- Develop and administer an information and outreach program for the SBIR program.
- Develop and maintain a source and information file of interested small businesses.
- Develop, coordinate, publish and

disseminate SBIR Pre-Solicitation Announcements.

- Survey, monitor and report on each agency's SBIR program.
- Report at least annually to Congress on each agency's SBIR program and on SBA's monitoring activities.
- Coordinate private-sector commercialization of SBIR innovations.
- Obtain information on the current National Critical Technologies.

Authorities and Responsibilities for Participating Agencies

Each participating agency has the authority and responsibility to:

- Determine the categories of projects to include in its SBIR program.
- Issue SBIR solicitations in accordance with a schedule determined cooperatively with the SBA.
- Unilaterally determine research topics within each SBIR solicitation, giving special consideration to broad research topics and to topics that further one or more National Critical Technologies.
- Receive and evaluate proposals resulting from SBIR solicitations.
- Select awardees for SBIR funding agreements.
- Ensure that funding agreements under the SBIR program include provisions setting forth the respective rights of the United States and small businesses with regard to intellectual property rights and follow-on research.
- Administer SBIR funding agreements (or delegate such administration to another agency).

- Make payments to SBIR award recipients based on progress toward or completion of the funding agreement requirements.
- Submit annual reports on the SBIR and R/R&D goaling programs to the SBA.

P ROGRAM SERVICES

In setting SBIR program policy and in monitoring and evaluating the program, the SBA seeks to simplify and standardize grant and contract award procedures, minimize paperwork, and encourage small companies owned by women, minorities and disadvantaged individuals to participate in the program. The SBA also conducts an ongoing national information and outreach campaign, and ensures that participating agencies conform to SBIR policy directives.

The SBIR solicitation process minimizes administrative burden. It standardizes timely receipt and review of proposals, peer review, and adherence to cost principles. Also, it establishes guidelines for proprietary information, selection of awardees, data rights retention, title to Government property, and cost sharing.

Pre-Solicitation Announcements

The SBA's SBIR Pre-Solicitation Announcement to small businesses presents basic program solicitation information in a succinct and understandable manner. Each quarterly announcement provides complete information on all SBIR activity for that quarter, eliminating the need for small businesses to track the activities of each participating agency individually. The announcements are available from the SBA's Internet website which is www.sba.gov/sbir. The announcements provide small businesses with--

- A brief statement of each research topic, listed by participating agency;
- The opening and closing dates of each solicitation;
- An estimate of the number of awards to be made under each solicitation;

- The party to contact for a copy of the agency's solicitation; and
- A master schedule of solicitation opening and closing dates for all participating agencies.

Other SBIR information available from SBA includes award winners from the latest available fiscal year and the SBIR Proposal Preparation Handbook.

Outreach

SBA field representatives and public and private organizations play significant roles in dissemination of SBIR program information.

The SBA continued its aggressive outreach efforts for the SBIR program. The SBA participated in numerous conferences, seminars and workshops to promote the SBIR program to the small business community. In FY 2002, the SBA participated in three National SBIR conferences: the Houston SBDC SBIR Conference, the Delaware SBDC SBIR Conference and the 8th Annual Virginia SBIR Conference.

The SBA will continue to participate in local, regional and national events that promote the SBIR program, as well as utilizing the participants of FAST and the SBIR Rural Outreach to promote SBIR outreach and provide technical assistance, with an emphasis on outreach efforts to increase the participation of socially and economically disadvantaged small business concerns and women-owned small business concerns in the SBIR Program.

Another form of outreach involves briefing officials of foreign governments. During FY 2002, foreign interest in the SBIR program

continued to grow. SBIR-type programs are in place in the United Kingdom and other European countries.

P PROGRAM DATA

FY 2002 Summary

There have been long-term upward trends in the number of Phase I, Phase II and total SBIR awards.

- In FY 2002, the 10 agencies participating in the SBIR program released a total of 17 Phase I solicitations. The Department of Health and Human Services, the Department of Defense, the Department of Commerce and the Department of Education each released two solicitations; the Environmental Protection Agency released four solicitations; and the other five agencies released one each.
- Participating agencies received 22,340 Phase I proposals from small high-tech enterprises. Agencies subsequently made 4,243 Phase I awards, representing 18.9 percent of proposals received.
- A total of 2,914 Phase II proposals were received by participating agencies, resulting in 1,577 awards. These awards represented 54 percent of Phase II proposals received.
- In total, 25,254 Phase I and Phase II proposals were received in FY 2002. Phase I and Phase II awards totaled 5,820, representing 23 percent of the total number of proposals received.

The participating agencies made 303 Phase I awards and 123 Phase II awards to HUBZone small business concerns, for a total of 426 awards. Phase I awards totaled \$31.1 million, and awards for Phase II totaled \$87.7 million for a total of \$118.8 million to HUBZone small business concerns.

As defined in Section 9 of the Small Business Act, the SBA has designed and implemented the Technology Resources Network (Tech-Net) to streamline and standardize the reporting of SBIR awards and applicant information by the Federal agencies required to participate in the SBIR program. This process involved the SBA establishing several working sessions with the agencies to define the input data fields and a core set of output reports to help facilitate the agencies administration of the program. The SBA incorporated the unique needs of each agency into the design of the database system to insure that the system would provide much needed award and applicant information. Information such as name, size, location, abstracts and identifying number of each small business concern that has received a Phase I or Phase II award is available in this database. Agencies now have the ability to review awards and applicant information, and edit previously reported data interactively through Tech-Net. The public version of this database can be accessed by visiting the website www.tech-net.sba.gov.

The SBA is currently developing the Government database which will maintain information on all Phase II awards funded under the SBIR program. This database will not be accessible by the public; therefore, any confidential information that is provided by the SBIR Phase II awardees will not be disclosed to the public. A username and password will be required to access the database. The SBA will control the issuance of the username and passwords. Coordination with the participating agencies is critical in the development process to insure that the database data elements will capture sufficient information that will allow the SBA, each participating agency, GAO, the National Academy of Science and the Congress to effectively measure the impact

and success of the program. The SBA intends to have the Government database implemented and functional on or before October 1, 2004.

Federal and State Technology Partnership

During FY 2002, 27 FAST awards were made. Public Law 106-554 requires the SBA to report on the status and implementation of the mentoring networks. The states that implemented a mentoring network during the second year of the FAST program were Arizona, Arkansas, California, Delaware, Georgia, Iowa, Louisiana, Maine, Minnesota, Mississippi, Missouri, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Texas, Vermont, and Wisconsin. SBA issues a report on the FAST program annually, which discusses the program and awards made, in more detail.

Reporting of Follow-on Non-SBIR Awards

SBIR firms should be encouraged to develop and expand business applications of their SBIR research with the desired outcome of generating new employment and income. One purpose of follow-on funding agreements or Phase III is to commercialize the innovation and help the SBC grow. Section 4(c)(7) and 10(b)(13) of the Policy Directive requires agencies to report only those instances where a follow-on award with non-SBIR funds was issued to a concern other than the SBIR awardee that developed the technology to be pursued under the follow-on award.

In addition, SBA believes that the "notice" requirement in section 4(c)(7), as well as the "reporting" requirements in section 10(b)(13), require agency coordination of, at least, SBIR Program Managers/Coordinators and contracting activities. The intent of the program is to help small businesses grow through commercialization in Phase III. Therefore, when agencies make follow-on awards to a

concern other than the one that received the Phase I and II award, this should be reported to Congress.

In FY 2002, the SBA received notification from two agencies that the agency intended to award a follow-on Phase III funding agreement to other than the small businesses which developed the technology under a previous agreement SBIR funding agreement. SBA contacted the agencies and was successful in getting the agencies to comply with the SBIR Policy Directive guidance by issuing the award to the small businesses which developed the technology under the SBIR program.

Table 1: SBIR Program Data

	DOA	DOC	DOD	DOE	DOT	ED	EPA	HHS	NASA	NSF	TOTAL
<i>Fiscal Year 2002 SBIR Agency Obligations Summary (dollars in thousands)</i>											
Agency Extramural Budget	627,622	275,535	31,059,711	3,761,041	163,449	272,205	230,707	19,179,962	4,344,000	3,000,000	62,914,232
Agency SBIR Budget	15,690	6,938	778,663	94,025	4,086	6,805	5,767	479,499	108,600	77,400	1,577,493
Dollars Obligated	17,403	6,944	599,041	95,640	6,398	7,519	5,844	486,725	109,572	78,000	1,413,086
Percent of SBIR to Extramural Budget	2.41%	2.52%	1.93%	2.54%	3.91%	2.76%	2.53%	2.54%	2.52%	2.60%	2.25%
Deficit/Surplus	1,713	-14	-179,622	1,615	2,312	714	77	7,226	972	600	-164,407

	DOA	DOC	DOD	DOE	DOT	ED	EPA	HHS	NASA	NSF	TOTAL
<i>Fiscal Year 2002 Award Profile (dollars in thousands)</i>											
Total Phase I Awards	86	47	2,158	228	13	56	40	1,032	306	277	4,243
Minority/Disadvantaged Phase I Awards	13	3	415	22	3	21	3	2	57	49	588
Total Phase II Awards	39	13	661	100	5	12	12	391	278	66	1,577
Minority/Disadvantaged Phase II Awards	4	2	108	13	2	8	0	2	55	4	198
Total Phase I Dollars Awarded (\$)	6,348	3,347	181,480	22,573	1,275	4,260	2,795	138,748	21,242	29,400	411,468
Minority/Disadvantaged Phase I Dollars (\$)	990	223	34,417	2,195	299	1,273	209	433	3,984	4,900	48,923
Total Phase II Dollars Awarded (Obligations)	11,055	3,597	439,792	73,066	5,123	3,259	2,699	347,843	88,330	48,600	1,023,364
Minority/Disadvantaged Phase II Dollars (\$)	1,183	600	61,615	9,189	1,488	600	0	8,496	32,643	2,000	117,814
Average Amount for Phase I Awards (\$)	74	71	84	99	98	76	70	134	69	106	97

	DOA	DOC	DOD	DOE	DOT	ED	EPA	HHS	NASA	NSF	TOTAL
<i>Fiscal Year 2002 Agency Solicitation Profile</i>											
Number of Solicitations Released	1	2	2	1	1	2	4	2	1	1	17
Number of Research Topics in Solicitations	9	22	432	45	11	11	13	144	28	4	719
Number of Copies Distributed	1,000	0	32,200	2,100	250	2,250	0	141	0	0	37,941
Number of Phase I Proposals Received	449	308	12,859	971	202	387	556	3,472	1,659	1,477	22,340
Number of Phase II Proposals Received	68	25	1,055	189	8	36	36	799	550	148	2,914
Number of Phase I Awards	86	47	2,158	228	13	56	40	1,032	306	277	4,243
Number of Phase II Awards	39	13	661	100	5	12	12	391	278	66	1,577

Dollars obligated can include modifications to previous year's awards: DOD \$100,437K HHS \$134K and EPA \$349K

**Table 2: Number of SBIR Awards --
FY 1983 through FY 2002**

Fiscal Year	Phase I	Phase II	Totals
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
92	2,559	916	3,475
93	2,898	1,141	4,039
94	3,102	928	4,030
95	3,085	1,263	4,348
96	2,841	1,191	4,032
97	3,371	1,404	4,775
98	3,022	1,320	4,342
99	3,334	1,256	4,590
00	3,166	1,330	4,496
01	3,215	1,533	4,748
02	4,243	1,577	5,820
Total	51,101	19,021	70,122

There have been parallel long-term upward trends in the dollar amount of Phase I and Phase II total.

- During FY 2002, participating agencies awarded \$1.4 billion through the SBIR program.
- FY 2002 Phase I awards totaled over \$411 million.
- Phase II awards aggregating over \$1.0 billion were made in FY 2002.
- In FY 2002, minority/disadvantaged-owned firms received 786 awards totaling \$166 million.

Please see Table 3. (Note: The overall total does not include \$100.9 million in modifications. In awarding funding agreements under Phase II, agencies utilize various acquisition methods of obligation and funding. (For purposes of consistency, the acquisition data in this report reflect only actual obligations during FY 2002.))

**Table 3: Value of SBIR Awards--
FY 1983 through FY 2002
(in millions of dollars)**

Fiscal Year	Phase I	Phase II	Totals
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	248.9	389.1
89	107.7	321.7	431.9
90	118.1	341.8	460.7
91	127.9	335.9	483.1
92	127.9	371.2	508.4
93	154.0	490.7	698.0
94	220.4	473.6	717.6
95	232.2	601.9	834.5
96	228.9	645.8	916.3
97	277.6	789.1	1,106.9
98	262.3	804.4	1,066.7
99	299.5	797.0	1,096.5
00	302.0	888.2	1,190.2
01	317.0	977.3	1,294.3
02	411.4	1,023.3	1,434.7
Total	3,653.5	9,741.5	13,395.0

FY 2003 EST: - \$1.6 billion

Total does not include award modifications

As in prior years, in FY 2002 SBA continued to use a system of deficits and credits to evaluate agency SBIR budgets against actual amounts obligated.

Through its SBIR Policy Directive, SBA requires each participating agency to list the number of Phase I awards made both within 6 months and after 6 months of the closing date of its solicitation announcement. Table 4 (immediately following) provides this information for FY 2002.

Table 4: FY 2002-- Phase I Time Frame

Agency	Total FY 02 Phase I Awards	No. within 6 Months of Solicitation Close	No. More Than 6 Months After Solicitation Close
DOA	86	0	86
DOC	47	46	1
DOD	2,158	1,965	193
DOE	228	228	0
DOT	13	12	1
ED	56	56	0
EPA	40	0	40
HHS	1,032	1,032	0
NASA	306	306	0
NSF	277	277	0
TOTAL	4,243	3,922	321

calculating each participating agencies extramural budget. The results of that review are in the following chart (Table 5).

Extramural Budget Calculation

Public Law 106-554 directs each Federal agency with an SBIR program to provide annually, to the Small Business Administration, a report that includes a description of the methodology used for calculating the amount of the extramural budget of the Federal agency. Please see Table 5.

To monitor and report on the participating agencies' SBIR programs, SBA has established a reporting base to compare against each agency's budget data. To determine extramural obligations as a base for the size of each agency's SBIR program, the Small Business Act provides a definition of R&D.

It should be noted that a 3-year budget cycle is used for establishing extramural R/R&D obligations. Within any given year, a participating agency's initial estimate can change due to congressional action on that agency's R/R&D budget. To ensure proper implementation of the program, each agency establishes an estimated budget as a basis for operations during the year. The SBA uses a system of deficits and credits to make the necessary adjustments during the course of the budget cycle. In this way, SBA determines whether agencies comply with SBIR set-aside requirements.

The SBA's Chief Financial Officer's office has reviewed the methodology used in

**Table 5: CALCULATION OF EXTRAMURAL BUDGET
(\$ In Thousands)**

Agency Name	FY 2002 R&D Budget	Intramural Budget & Other	Extramural Budget	\$SBIR	Overall Compliance	Other Comments
Dept. of Agriculture	\$1,918,000	\$1,417,100	\$500,900	\$12,523	Yes	
Dept. of Air Force	\$14,669,931	\$6,152,823	\$8,517,108	\$212,928	Yes	
Dept. of Army	\$7,053,000	\$690,000	\$6,363,000	\$159,075	Yes	
Defense Advanced Research Projects Agency	\$2,252,700	\$229,700	\$2,023,000	\$50,575	Yes	
Defense Missile Defense Agency	\$6,909,938	\$1,343,455	\$5,566,483	\$139,162	Yes	
US Special Operations Command	\$394,800	\$3,810	\$390,990	\$9,780	Yes	
Defense Threat Reduction Agency	\$451,713	\$192,738	\$258,975	\$6,474	Yes	
Dept. of Navy (Office of Naval Research)	\$11,382,889	\$5,049,254	\$6,333,635	\$158,341	Yes	
Dept. of Energy	\$3,960,850	\$199,809	\$3,761,041	\$94,026	Yes	
Department of Health & Human Services	\$20,906,000	\$1,663,000	\$19,243,000	\$481,075	Yes	
Nat'l Institute of Standards & Technology	\$451,369	\$276,297	\$175,072	\$4,377	Yes	
Nat'l Science Foundation	\$3,260,008	\$163,000	\$3,097,008	\$77,430	Yes	
Dept. of Transportation	\$277,274	\$107,126	\$170,148	\$4,254	Yes	
Nat'l Oceanic Atmospheric Administration	\$564,301	\$420,588	\$143,713	\$3,593	Yes	
Dept. of Education						Non-submission as of 10/29/03
EPA						Non-submission as of 10/29/03
NASA						Non-submission as of 10/29/03

Highlights of Cumulative Data

The SBIR program continues to receive recognition for quality performance. The following highlights accomplishments of the SBIR program since it began in FY 1983:

- More than \$13.3 billion has been awarded.
- Participating agencies received a total of 390,833 Phase I and Phase II proposals in response to 270 SBIR solicitations. A total of 70,122 Phase I (51,101) and Phase II (19,021) awards have been made.
- Minority/ disadvantaged firms have received 8,834 awards, representing 12.5 percent of all SBIR awards. The value of these awards is \$2.9 billion, representing 22 percent of all dollars awarded under the program.
- Awards have been made to firms in all 50 states, Puerto Rico and the District of Columbia.
- Several participating agencies have allocated more for this program than required by law. In accordance with the law, each participating agency will continue to award at least 2.5 percent of its R/R&D extramural budget each fiscal year.

SUCCESS STORIES

The following stories represent the most recent successes from FY 2002 SBIR awards issued by the participating Federal agencies.

Scientific Monitoring, Inc. Scottsdale, Arizona

Scientific Monitoring, Inc. (SMI) whose domain expertise includes turbine engine control, health and information management, and high-response valves, provides business intelligence that optimizes maintenance planning and logistic operations for industries using gas turbine engines and generators. Examples are the aviation and power generation industries. SMI is an information technology company providing intelligent monitoring and control solutions for equipment health management. The company's mission is to be the leader in predictive Maintenance, Repair and Overhaul (MRO) decision support for turbine engine maintenance management and planning.

SMI was founded in 1993 originally as a high-tech research and development company serving the aerospace market. SMI has been awarded 20 SBIR awards, all of which are related to turbine engine control and monitoring technologies. The United States Air Force Research (AFRL) nominated SMI for the prestigious SBA Administrator's Award for Excellence that was awarded to the company in June 2000. SMI has obtained three U.S. patents and has several patent applications pending.

In 1999, Scientific Monitoring began developing Intelligent Condition-based Equipment Management System (ICEMS). The U.S. Air Force and NASA SBIR program funded the development and commercialization of ICEMS. The Air Force has selected the ICEMS technology for field testing and evaluation to be implemented into their ground-based engine management program. When implemented, it will be the

first engine health management technology in the last 10 years, funded by the AFRL, to be deployed in an active Air Force logistic program.

In 1994, SMI began developing the high response valve for the Army Aviation Applied Technology Directorate in Fort Eustis, Virginia. SMI successfully tested its first kilohertz, high response air valve in 1998 and accepted an AFRL SBIR in 1999 to continue development of the technology. Several companies and research organizations have expressed interest in the high-response valves for as and fuel flow control applications.

Because of SMI's achievements, the company is gaining a reputation as a leader in the turbine engine health management space.

CHI Systems, Inc. Lower Gwynedd, Pennsylvania

CHI Systems, Inc. was founded in 1985 to maximize individual and organizational productivity by making high technology systems more usable. Today, CHI Systems is a leader in human centered design and development of complex information systems for defense, aerospace, and training. The company's commitment to excellence has enabled it to forge powerful alliances with both large corporations and Government agencies. A driving force behind this success has been the SBIR program. To date, the company has received 59 Phase I and 22 Phase II SBIR awards, totaling over \$22 million, and remains active in the SBIR program. CHI Systems is headquartered in Philadelphia, with additional offices in San Diego and Orlando. The company employs 70 people, with annual revenues of \$7.5 million.

The company has built three strong business lines from its SBIR contracts, the first based on software agent architecture called COGNET that mimics human intelligence and behavior. NSF and SASA

supported development of this architecture based on new significant theories of human cognition. CHI Systems quickly found many applications for COGNET to provide automated human-like advice, mentoring, and tutoring for jobs as diverse as telephone operators, helicopter flight crews, and command and control specialists. A software product (iGEN) was recently added to allow customers to develop their own COGNET applications. This business line has produced over \$13 million in sales.

A second business line was built around software architecture for desktop command and control (C2) applications, developed through Army SBIR contracts. Called C3Core, it is an expandable scaleable, component based decision aiding architecture that uses the commercial "plug and play" software model to create a powerful business case based on software reuse. Using C3Core, new C2 applications can be quickly and easily assembled from reusable components and patent-pending reference architecture, resulting in cheaper, faster development, true cross-platform operation, and lower life-cycle costs. C3Core applications are currently being used by the Marine Corps and the Army. CHI Systems established its San Diego office as the exclusive developer of C3Core applications, which have generated \$13.5 million in sales.

A third business line is growing around a wearable electronic flight bag technology developed under Navy SBIR contracts. The product is a wearable computer device that gives aircraft flight crews quick digital access to flight manuals and checklists and procedures for timely and effective treatment of aircraft mechanical malfunctions. The product is currently being used by the Navy in test situations in contracts totaling \$2.5 million and projected for use in multiple military and civilian aircraft.

Touchstone Research Laboratory, Ltd. Triadelphia, West Virginia

Touchstone Research Laboratory has enjoyed remarkable success in leveraging SBIR successes into technological achievement for two innovative materials technologies which the company is developing. Since May 1998, the firm has won more than \$3.2 million in SBIR contracts and grants. Even though Touchstone was under contract on each of its four Phase II awards (including two DOD Phase II awards), the firm received \$6.7 million in non-SBIR contracts from the DOD and defense contractors for its SBIR-supported technologies. The firm negotiated an additional \$500,000 for an SBIR Phase II Enhancement contract for one of its original Phase II contracts. This funding represents the growing interest in DOD end-users in Touchstone's SBIR-funded technologies.

Touchstone's CFoam™ material is an innovative technology which transforms high-sulfur bituminous coal into a lightweight, strong, fire-resistant and thermally-insulating material. As such, the material could be used in Navy ships and other military applications, future spacecraft, commercial aircraft – even in home construction.

Touchstone's Brazed Aluminum Matrix Composite material system consists of an aluminum matrix composite (AMC) with continuous, high strength alumina fibers in "prepreg" form that is consolidated into shapes using a patented brazing process. The Brazed AMC technology utilizes a material that has twice the specific strength of typical aircraft aluminum, especially at high temperatures. Components are produced using an affordable manufacturing technique that is analogous to PMC filament winding. As such, this technology is applicable to a broad spectrum of defense, aerospace, and commercial markets.

Non-SBIR contracts that have been awarded to Touchstone for its two SBIR-funded technologies include: 1) \$4,200,999 in non-SBIR Air Force funding to develop the promising Carbon Foam technology for aircraft and spacecraft applications. A \$600,000 baseline effort was initiated under the competitive solicitation PRDA-00-04-MLKN "Materials & Process Development for Carbon Foam." An additional \$3,600,000 was added to this contract. 2) The Army Research Laboratory signed a Cooperative Agreement and obligated \$2,400,000 to assist Touchstone in the development of its Brazed AMC technology for potential Army applications. This Cooperative Agreement established a ceiling of \$14,950,000 for this development effort. 3) Touchstone received a \$100,000 contract from Lockheed Martin Skunk Works to help develop Touchstone's "Brazed AMC" technology for potential use in cryogenic fuel tanks and other aerospace applications.

Creative Action Inc. Akron, Ohio

Creative Action Inc. (CAI), believes changing individuals in a changing world demand innovative approaches to organizational challenges in both marketing and organizational development. CAI is a management consulting firm providing a full range of research and analysis; recommendations on new product and service opportunities; design and development of new products and services; and market introduction of new products originating within the corporation aimed primarily at the Mature Market. CAI works with both the public and private sectors and has a successful record of developing products for the marketplace. Annual revenue reached \$1 million in 2000.

Creative Action Inc. has developed two new products through the SBIR program: 1) The InterpreCare Language System (patent pending) enables staff in senior living facilities, day care facilities, and hospitals to

communicate with non-English speaking residents, clients, or patients. Currently, CAI has systems in distribution to communicate with Russian, Japanese, and Spanish speaking persons. Sales by year five are forecasted at \$7 million. A spin-off product, InterpreTalk, will be adapted to bridge the communications gap with non-English speaking refugees in social service agencies and employment sites. Sales in year five are also forecasted at \$7 million; and 2) The EZ Wheeler Cart (patented) and the HomePal Cart (patent pending) are ergonomically designed to eliminate carrying as well as reduce bending, lifting and reaching. Carts can be used for task such as filling and emptying clothes washers and dryers, loading and unloading grocery bags, as well as other household tasks, which can be difficult for the elderly. By year three, it is estimated that both carts will generate factory sales of \$14 million.

Since being founded in 1997, Creative Action, Inc. has experienced strong growth. Revenues have increased by 731 percent between 1997 and 2000, growing from \$124,581 to \$1,035,052.

Thanks to seven SBIR awards valued at \$2,274,520 from the National Institute of Health, Creative Action Inc. has successfully taken technologies developed in two separate SBIR projects through Phase I and II into Phase III. Revenue is projected to grow to over \$28 million by 2005.

GENERAL INFORMATION

Publications Update

All publicly distributed SBIR documents have been updated and are available on the SBA's website, which is www.sba.gov/sbir.

National Conferences

The Department of Defense and the National Science Foundation sponsored SBIR conferences in FY 2002 in Washington, DC; Anaheim, California; and Rapid City, South Dakota.

General Information

The SBA has offices located throughout the United States. For the one nearest you, look under "U.S. Government" in your telephone directory, or call the SBA Answer Desk at (800) 8-ASK-SBA. To send a fax to the SBA, dial (202) 205-7064. For the hearing impaired, the TTD number is (704) 344-6640.

To access the Agency's electronic public information services, you may access the following:

- Internet: using uniform resource locators URLs
- SBA Home Page:
<http://www.sba.gov/sbir>
- U.S. Business Advisor:
<http://www.business.gov>

You also may request a free copy of The Resource Directory for Small Business Management, a listing of for-sale publications and videotapes, from your local SBA office or the SBA Answer Desk.

U. S. Small Business Administration
Office of Technology

Total SBIR Awards for FY 2002 (In Order of Total Dollars Per State)

State	Number of Phase 1 Awards	Phase 1 Dollars	Number of Phase 2 Awards	Phase 2 Dollars	Total Awards	Total Dollars
Alabama	62	\$6,129,353	37	\$23,586,103	99	\$29,715,456
Alaska	2	\$79,243	0	\$0	2	\$79,243
Arizona	73	\$6,597,214	39	\$27,409,033	112	\$34,006,247
Arkansas	6	\$536,888	2	\$1,497,588	8	\$2,034,476
California	892	\$89,952,185	305	\$209,310,462	1197	\$299,262,647
Colorado	205	\$18,340,106	89	\$55,913,100	294	\$74,253,206
Connecticut	79	\$7,269,276	25	\$16,137,893	104	\$23,407,169
Delaware	12	\$983,738	4	\$1,701,000	16	\$2,684,738
District of Columbia	19	\$2,151,532	7	\$5,312,117	26	\$7,463,649
Florida	102	\$9,188,996	30	\$20,250,670	132	\$29,439,666
Georgia	45	\$4,575,114	16	\$9,628,490	61	\$14,203,604
Hawaii	15	\$1,716,285	5	\$1,735,072	20	\$3,451,357
Idaho	11	\$886,495	4	\$3,434,856	15	\$4,321,351
Illinois	61	\$6,615,273	16	\$10,052,456	77	\$16,667,729
Indiana	28	\$2,705,135	10	\$5,846,902	38	\$8,552,037
Iowa	12	\$1,769,545	5	\$3,647,067	17	\$5,416,612
Kansas	11	\$1,075,270	8	\$4,035,145	19	\$5,110,415
Kentucky	8	\$858,251	6	\$3,525,181	14	\$4,383,432
Louisiana	9	\$981,636	4	\$2,259,264	13	\$3,240,900
Maine	16	\$1,313,625	2	\$1,345,109	18	\$2,658,734
Maryland	199	\$21,579,820	75	\$52,704,347	274	\$74,284,167
Massachusetts	580	\$59,635,661	219	\$155,824,164	799	\$215,459,825
Michigan	89	\$8,922,670	21	\$15,062,500	110	\$23,985,170
Minnesota	55	\$5,232,280	32	\$21,534,489	87	\$26,766,769
Mississippi	9	\$718,609	3	\$2,492,546	12	\$3,211,155
Missouri	22	\$2,082,567	7	\$4,861,507	29	\$6,944,074
Montana	27	\$2,921,857	7	\$3,946,605	34	\$6,868,462
Nebraska	8	\$848,279	2	\$1,026,000	10	\$1,874,279
Nevada	16	\$1,441,504	9	\$5,824,272	25	\$7,265,776
New Hampshire	50	\$4,341,226	23	\$15,067,581	73	\$19,408,807
New Jersey	122	\$12,203,667	48	\$34,405,436	170	\$46,609,103
New Mexico	66	\$5,702,941	23	\$13,879,303	89	\$19,582,244
New York	164	\$17,836,011	60	\$44,818,002	224	\$62,654,013
North Carolina	37	\$4,808,683	24	\$18,334,061	61	\$23,142,744
North Dakota	5	\$765,214	2	\$596,000	7	\$1,361,214
Ohio	152	\$15,437,962	68	\$48,088,705	220	\$63,526,667

APPENDIX A

Dollar amounts reflect actual dollars

State Order

U. S. Small Business Administration
Office of Technology

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State	Number of Phase 1 Awards	Phase 1 Dollars	Number of Phase 2 Awards	Phase 2 Dollars	Total Awards	Total Dollars
Oklahoma	17	\$1,809,345	6	\$3,213,451	23	\$5,022,796
Oregon	49	\$5,643,141	19	\$12,920,333	68	\$18,563,474
Pennsylvania	147	\$15,113,830	58	\$39,771,005	205	\$54,884,835
Puerto Rico	1	\$96,780	0	\$0	1	\$96,780
Rhode Island	14	\$1,442,739	5	\$3,985,297	19	\$5,428,036
South Carolina	18	\$1,855,100	7	\$4,777,268	25	\$6,632,368
South Dakota	5	\$455,533	4	\$1,705,539	9	\$2,161,072
Tennessee	28	\$2,656,099	13	\$7,620,752	41	\$10,276,851
Texas	162	\$14,870,856	58	\$38,551,620	220	\$53,422,476
Utah	44	\$4,307,571	17	\$11,389,756	61	\$15,697,327
Vermont	8	\$758,986	2	\$1,566,162	10	\$2,325,148
Virginia	229	\$20,659,221	104	\$69,058,539	333	\$89,717,760
Washington	90	\$9,176,330	45	\$34,059,661	135	\$43,235,991
West Virginia	13	\$1,271,071	0	\$0	13	\$1,271,071
Wisconsin	39	\$5,251,710	15	\$9,869,232	54	\$15,120,942
Wyoming	5	\$747,295	5	\$2,430,034	10	\$3,177,329

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Colorado	205	\$18,340,106	89	\$55,913,100	294	\$74,253,206
Connecticut	79	\$7,269,276	25	\$16,137,893	104	\$23,407,169
Delaware	12	\$983,738	4	\$1,701,000	16	\$2,684,738
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APPENDIX B

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Ranking by Total Dollars

U. S. Small Business Administration
Office of Technology

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North Dakota	5	\$765,214	2	\$596,000	7	\$1,361,214
West Virginia	13	\$1,271,071	0	\$0	13	\$1,271,071
Puerto Rico	1	\$96,780	0	\$0	1	\$96,780
Alaska	2	\$79,243	0	\$0	2	\$79,243

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Ranking by Total Dollars

APPENDIX B