

**Small Business Innovation Research (SBIR) and  
Small Business Technology Transfer Research (STTR)**

**ECONOMIC OUTCOMES FOR COLORADO COMPANIES**  
**A Survey of Colorado SBIR Award Winners**

**SUMMARY OF RESULTS**

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**Prepared by:**

**Julie Arnett  
Kimberly Croll  
Danielle Elliot  
Karen Eye  
Gary Horvath**



**University of Colorado at Boulder  
Business Research Division  
CU Business Advancement Center**

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## **Executive Summary**

In May of 2002, the CU Business Advancement Center completed a survey of Colorado SBIR/STTR award winners as part of the Colorado Federal And State Technology (FAST) program. The survey was designed to determine the extent to which SBIR/STTR research is creating jobs and wealth in Colorado, and to identify ways to assist Colorado companies to successfully commercialize research results. Of the approximately 270 firms contacted, 82 firms completed the survey; a 30.3% response rate. The top four categories for the research conducted by the responding companies were defense, space and aeronautics, software, and medical/biotech.

As might be expected, most Colorado companies with SBIR/STTR grants are small in size and annual sales. Forty-two percent of the companies responding to the survey had less than four employees and less than 9% of the firms had more than 25 employees. Almost half of the responding firms expected to make less than \$1 million in sales over the next year.

Still, 65% of responding firms have experienced increased sales revenues as a direct result of the SBIR/STTR research. The companies indicated that SBIR/STTR research generated sales revenues from both new and improved products, processes and services. About 81% of the SBIR/STTR award winners benefited from a new product, process or service and 76.8% used the research to improve their products or services. It is estimated that SBIR/STTR research by these 82 responding firms alone, resulted in the following economic benefits:

- ❖ 415 new products, processes or services
- ❖ 360 improved products, processes or services
- ❖ 96 patents received
- ❖ 164 patent applications filed
- ❖ 165 license agreements
- ❖ 360 new research jobs added
- ❖ 260 new non-research jobs added
- ❖ 11 spin off companies in Colorado

About 61% of the firms received additional research funding from non-SBIR/STTR sources, however, companies were less successful in obtaining additional financing for commercial efforts. Only 15% of the companies indicated an increase in capital received, and half of those received less than \$500,000. The companies indicated the top factor needed to commercialize their SBIR/STTR research is funding after Phase II, followed by finding strategic partners, development of a business strategic plan, finding people to license their technology, and development of a marketing plan.

Only 26 of the 270 Colorado award winners, and 7 of responding firms, are located outside front range counties (Denver metro area, El Paso county, Larimer and Weld). According to the companies surveyed the most important factors in deciding where the company is located are the quality of life, availability of technical labor force, access to

high speed internet, proximity to research facility, and the cost of doing business. The majority of companies indicated they plan to stay where they are currently located or move within 10 miles of their current location. Very few said they plan to move to another area in Colorado, another state, or a country outside the U.S.

Companies conducting research in environmental or software areas were given the opportunity to express their level of interest in the services offered by the Colorado Federal And State Technology (FAST) program. 16% of respondents were interested in exploring rural Colorado as a business location and 20% were interested in assistance to locate a rural partner or licensee. As would be expected, the most popular service was introduction to investors (55.2%), followed by participation in an Industry SBIR Roundtable (51.5%) and Partnering Forums in local communities (48.6%). About 30% were interested in direct commercialization services, i.e. database research and consulting, or review and critique of their business plan.

## **Purpose**

This study was conducted by the CU Business Advancement Center to quantify the extent to which SBIR/STTR research is creating jobs and wealth in Colorado, and to identify ways to assist Colorado companies to successfully commercialize in Phase III.

## **Methodology**

Previous SBIR award winners for 1993 to 1998 were identified from the Small Business Administration Office of Technology Small Business Innovation Research Program website (<http://www.sba.gov/gopher/Innovation-And=Research/Awardees/awdco.txt>). Information for the years from 1999 until the present were found at the following web sites:

NASA's	<a href="http://sbir.nasa.gov">http://sbir.nasa.gov</a>
Department of Energy	<a href="http://sbir.er.doe.gov/sbir/">http://sbir.er.doe.gov/sbir/</a>
Department of Defense	<a href="http://dodsbir.net/awardslist/abso11/dodabs011.htm">http://dodsbir.net/awardslist/abso11/dodabs011.htm</a>
Department of Commerce	<a href="http://www.rdc.noaa.gov/~amd/abstracts01.pdf">http://www.rdc.noaa.gov/~amd/abstracts01.pdf</a>
DARPA	<a href="http://www.darpa.mil/sbir/">www.darpa.mil/sbir/</a>

This search of the databases identified approximately 313 companies. After the database was as accurate as possible, post cards were mailed to inform each company that they would be receiving a survey. A week later the survey was mailed. Forty companies were eliminated from the database because of bad addresses, leaving a total population of about 270 companies. The final response rate was 30.3% or 82 companies.

## **Company Profile**

As might be expected, many companies with SBIR/STTR grants are small in size and annual sales. In addition, they have typically received their first SBIR/STTR awards within the past ten years.

The majority of Colorado SBIR/STTR award winners (75.3%) have fewer than 10 employees. The size of the companies surveyed, by category follows:

- 42.0% had less than four employees,
- 33.3% had between five and nine employees,
- 16.0% had between 10 and 24 employees, and
- 8.6% had more than 25 employees.

The projected level of total gross sales for 2002 showed a majority of the companies had a level of sales that corresponded to their number of employees. This breakdown of projected sales follows:

- 17.7% of the companies indicated they would not have sales,
- 43.1% expect to make less than \$1 million in sales,
- 24.1% projected sales between \$1 million and \$2.5 million, and
- 15.2% projected sales between \$2.5 million and \$25 million.

(See Table A-I Appendix)

Companies were asked to classify their SBIR/STTR research into eleven categories. The top categories were:

- 32.9% defense research,
- 25.6% space and aeronautics,
- 24.4% software
- 25.6% medical/biotech

(See Table A-II Appendix)

The median year in which the companies received their first SBIR/STTR award was 1996. The breakdown of years by which the companies received their awards follows:

- 18.3% received their first award before 1990,
- 21.9% received their first award between 1990 and 1994,
- 39.1% received their first award between 1995 and 1999, and
- 20.7% received their first award in 2000 or 2001.

### **Impact of SBIR/STTR Research**

Efforts were made to evaluate the impact of the SBIR/STTR grants from several different perspectives. These perspectives included:

- new products, processes and services,
- improved products, processes, and services,
- research jobs
- non-research jobs,
- license agreements,
- patent applications filed,
- patent applications received,
- annual sales,
- venture capital received,
- non-SBIR\STTR funding received, and
- spin-off companies created

The grants appeared to positively impact new products, processes or services. During 2001 this impact was:

- 64.2% of the companies said between one and four new products, processes, or services resulted from SBIR/STTR awards; and
- 23.9% of the companies indicated that between five and nine new products, processes, or services resulted from SBIR/STTR awards;
- 7.5% of the companies said that between 10 and 24 new products, processes, or services resulted from the SBIR/STTR awards.

The grants appeared to positively impact improved products, processes or services. During 2001 this impact was:

- 71.9% of the companies said between one and four improved products, processes, or services resulted from SBIR/STTR awards; and
- 18.8% of the companies indicated that between five and nine improved products, processes, or services resulted from SBIR/STTR awards;
- 4.7% of the companies said that between 10 and 24 improved products, processes, or services resulted from the SBIR/STTR awards.

(See Table A-III Appendix)

The grants also positively impacted the number of research and non-research jobs added by the companies. The company breakdown by number of new research jobs added follows:

- 36.3% indicated that no new research jobs were added,
- 41.3% indicated that 1 to 4 new research jobs were added,
- 12.5% indicated that 5 to 9 new research jobs were added,
- 7.5% indicated that 10 to 24 new research jobs were added.

(See Table A-IV Appendix)

The number of non-research jobs added, appeared to be slightly less than the number of research jobs added. The company breakdown by number of new non-research jobs added follows:

- 45.6% indicated that no new non-research jobs were added,
- 41.8% indicated that 1 to 4 new non-research jobs were added,
- 3.8% indicated that 5 to 9 new non-research jobs were added,
- 6.3% indicated that 10 to 24 new non-research jobs were added.

(See Table A-IV Appendix).

Almost 65% of the responding companies indicated that they did not complete a license agreement as a result of their SBIR/STTR research. After receiving an SBIR/STTR award 30.4% of the companies had completed between one and four license agreements. (See Table A-IV Appendix)

About 52% of the companies indicated that they had not completed a patent application. About 32% of the companies had completed between one and four patent applications and 15.2% had completed between 5 and 9 patent applications. (See Table A-IV Appendix)

About 66% of the companies indicated that they had not received patents for the work completed as a result of the SBIR/STTR grants. Slightly less than 30% of the responding companies had received 1 to 4 patents. (See Table A-IV Appendix)

Colorado companies also considered their total cumulative annual sales increases, capital received, and non-SBIR/STTR funding as a direct result of products, processes, or services created through this research.

The SBIR/STTR funding impacted the companies in the following ways:

- 35.4% said there was no difference in sales as a result of the SBIR/STTR award;

- 29.1% indicated that annual sales have increased by less than \$500,000
- 8.9% said that sales had increased by between \$500,000 and \$999,999.
- 12.7% estimated that annual sales had increased by between \$1 million and \$2.4 million.
- 14.0% estimated that sales had increased by at least \$2.5 million.

(See Table A-V Appendix)

The funding from SBIR/STTR grants had minimal impact on the amount of venture capital raised by the companies. Slightly more than 84% of the companies said there was no change in their venture capital raised, while 11.5% indicated that the funding had allowed them to raise venture capital funding that was less than \$2.5 million. (See Table A-V Appendix)

Companies also received funding from non-SBIR/STTR sources. The breakdown by category of this funding is as follows:

- 37.2% indicated that there was no increase in funding,
- 29.5% received additional funding for amounts less than \$500,000,
- 7.7% received funding between \$500,000 and \$999,999,
- 11.5% received funding between \$1 million and \$2.4million, and
- 14.1% received funding greater than \$2.5 million.

(See Table A-V Appendix)

The final measure of impact is the creation of spin-off companies. The percentage of companies starting new spin-off companies follows:

- 11.0% indicated they had started a spin-off company in metro Colorado,
- No spin-off companies were started in rural Colorado
- 6.1% of the companies indicated they had started spin-off companies in states other than Colorado
- 3.7% indicated they had started spin-off companies outside the U.S.

## **Factors Affecting Operations**

As a means of understanding certain needs of the companies, they were asked to respond to questions about their future expansion or growth plans and the importance of certain business factors.

Over the next five years, very few companies expect to move their headquarters or production facilities. A majority expect to stay where they are currently located or expand within 10 miles of their current location. Only a very small percentage expressed a desire to move to a rural area in Colorado, another metro area in Colorado, another state or country outside the U.S. (See Table A-VI Appendix)

As a result of the SBIR/STTR research completed by the companies, only 8.5% thought it was highly likely they would be acquired by another company. Most believed it was unlikely they would be acquired.

The companies were asked to rate ten factors on importance of determining the location of their business. The top five factors were: (See Chart A-I Appendix)

- Quality of life (69.6%)
- Available technical labor force (41.0%)
- Access to high speed Internet (33.3%)
- Proximity to a research university (34.2%)
- Cost of doing business (26.0%)

The companies were also asked to rate the importance of factors in commercializing SBIR/STTR research completed by their company. The top five factors were: (See Table A-VII Appendix)

- Funding after Phase II (56.2%)
- Finding strategic partners (45.8%)
- Development of business strategic plan (39.7%)
- Finding people to license the technology (39.7%)
- Development of marketing plan (36.5%)

Colorado has recently received a FAST grant to provide certain free or cost-shared services relating to the commercialization of SBIR/STTR research in Colorado. Qualifying companies must be located in rural Colorado or working in the environmental and software areas. Qualifying companies were asked to indicate their level of interest in seven FAST services. The two highest-ranking services were: (See Table A-VIII Appendix)

- Introduction to investors (43.6%)
- Database market research and 12 hours of consulting (29.7%)

Overall, 56.3% of the companies rated the SBIR/STTR award as excellent in providing their company with assistance that will allow them to develop technology that can be commercialized.

## **Conclusion/Summary**

The recipients of SBIR/STTR awards that responded to the survey indicated that the research funded by these awards positively affected their companies. In addition, the research positively impacted both their new and improved products, processes, and services, and as a result company sales. As a result, the companies were able to add both full-time research and non-research jobs.

The research positively impacted the number of patent applications submitted and received. Also, the research allowed the companies to secure additional venture capital and non-SBIR/STTR research funding. Finally, the companies increased licensing opportunities and in some cases, the companies were able to create spin-off companies.

About 81% of the companies experienced benefits from a new product, process, or service and 76.8% experienced benefits from improved products, processes, or services

as a result of the SBIR/STTR research. It is estimated that 415 new products, processes, or services were created because of the research and 360 improved products, processes or services benefited the 80 companies surveyed.

It is estimated that responding companies added 360 new research jobs and 260 new non-research jobs as a result of the SBIR/STTR research. About 62.2% of the companies indicated that they added new research jobs and about 52.4% of the companies added new non-research jobs.

The number of license agreements completed by these 80 companies was estimated to be 165. The number of patent applications submitted was 164, and the number of patents actually received to date totaled 96. Out of the 80 companies surveyed, about 34% completed license agreements, and about 46% submitted patent applications. Out of these, only 33% had received a patent to date. The number of license agreements submitted and the patent applications submitted were almost the same, but the percentage of companies submitting those applications was somewhat different. More of the companies were submitting patent applications than license agreements.

About 62% of the companies indicated an increase in annual sales as a result of the SBIR/STTR research. Of these companies 78% experienced an increase in sales of less than \$2.5 million. The amount of venture capital received as a result of the research was low. Only 15% of the companies indicated an increase in capital received, and half of those received less than \$500,000. About 60% of the companies received additional non-SBIR/STTR funding as a result of the research. Of these companies, about 78% received less than \$2.5 million.

Most of the companies surveyed said their headquarters and production facilities would remain in their current location or move less than 10 miles from the current location. Very few companies indicated that they plan to move to another area in Colorado, another state, or another country outside the U.S. It was also indicated by the 80 companies surveyed that few of them believe they will be bought out by another company in the next five years.

The most important factors in determining the location of a business were:

- Quality of life
- Available technical labor force
- Access to high speed Internet
- Proximity to research university
- Cost of doing business

The most important factors in commercializing SBIR/STTR research were:

- Funding after Phase II
- Finding strategic partners
- Development of business strategic plan
- Finding people to license your technology
- Development of marketing plan

## APPENDIX

Note: When comparing data from the report to data in the table please note that most calculations in the body of the report are based on the people who actually rate the service (i.e., percentages are calculated excluding not applicable responses).

<b>TABLE A-I APPENDIX PROJECTED TOTAL GROSS SALES FOR 2002</b>					
No sales	17.7%	\$1.0M to \$2.4M	24.1%	\$5.0M to \$9.9M	5.1%
<\$500,000	30.4%	\$2.5M to \$4.9M	6.3%	\$10.0M to \$24.9M	3.8%
\$500,000 to \$999,999	12.7%				

(Q4)

<b>TABLE A-II APPENDIX RESEARCH BEING CONDUCTED BY EACH COMPANY</b>					
Computer Hardware	11.0%	Environmental	22.0%	Defense	32.9%
Medical/Biotech	25.6%	Energy	14.6%	Space and Aeronautics	25.6%
Telecommunications	8.5%	Software	24.4%	Optics	12.2%
Education	8.5%	Consumer Products	3.7%	Other	17.1%

(Q1)

<b>TABLE A-III APPENDIX BENEFITS FROM NEW &amp; IMPROVED PRODUCTS, PROCESSES OR SERVICES</b>						
	Number					
	0	1-4	5-9	10-24	25-49	50+
New Product, Process or Service	1.5%	64.2%	23.9%	7.5%	1.5%	1.5%
Improved Product, Process or Service	1.6%	71.9%	18.8%	4.7%	1.6%	1.6%

(Q7&8)

<b>TABLE A-IV APPENDIX BENEFITS FROM RESEARCH</b>						
	Number					
	0	1-4	5-9	10-24	25-49	50+
Full-time Research Jobs Added	36.3%	41.3%	12.5%	7.5%	1.3%	1.3%
Full-time Non-research Jobs Added	45.6%	41.8%	3.8%	6.3%	2.5%	0
License Agreements Completed	64.6%	30.4%	2.5%	1.3%	1.3%	0
Patent Applications Completed	51.9%	31.6%	15.2%	1.3%	0	0
Patents Company has Received	65.8%	29.1%	3.8%	1.3%	0	0

(Q9-13)

TABLE A-V APPENDIX TOTAL CUMULATIVE FINANCIAL AMOUNTS								
	Amount							
	No Sales	<\$500,000	\$500,000- \$999,999	\$1M- \$2.4M	\$2.5M- \$4.9M	\$5M- \$9.9M	\$10M- \$24.9M	\$25M+
Amount Annual Sales have Increased	35.4%	29.1%	8.9%	12.7%	2.5%	5.1%	5.1%	1.3%
Venture Capital Received	84.6%	7.7%	3.8%	1.3%	1.3%	1.3%	0	0
Non-SBIR/STTR Funding Received	37.2%	29.5%	7.7%	11.5%	6.4%	2.6%	3.8%	1.3%

(Q14-16)

TABLE A-VI APPENDIX POSSIBLE RELOCATION WITHIN THE NEXT FIVE YEARS		
	Headquarters	Production Facilities
Remain in Current Location	67.1%	53.7%
Move to within 10 miles of Current Location	36.6%	31.7%
Move to Other Metro Area in Colorado	3.7%	7.3%
Move to Rural Area in Colorado	3.7%	2.4%
Move to a Metro Area in Another State	1.2%	2.4%
Move to a Rural Area in Another State	1.2%	2.4%
Move Outside the US	1.2%	0

(Q18 & 19)

TABLE A-VII APPENDIX IMPORTANT FACTORS IN COMMERCIALIZING SBIR/STTR RESEARCH					
	High				Low
Development of business/strategic plan	39.7%	27.4%	9.6%	8.2%	15.1%
Development of marketing plan	36.5%	29.7%	13.5%	6.8%	13.5%
Development of a manufacturing process	26.8%	28.2%	21.1%	4.2%	19.7%
Establish management team	23.9%	25.4%	26.8%	11.3%	12.7%
Funding after Phase II	56.2%	16.4%	6.8%	5.5%	15.1%
Cost of securing a patent	9.7%	19.4%	27.8%	18.1%	25.0%
Time to complete patent process	9.7%	12.5%	26.4%	22.2%	29.2%
Finding people who will license your technology	39.7%	20.5%	8.2%	12.3%	19.2%
Completing government regulations	18.6%	8.6%	25.7%	27.1%	20.0%
Finding strategic partners	45.8%	27.8%	6.9%	2.8%	16.7%

(Q22)

TABLE A-VIII APPENDIX INTEREST IN APPLICABLE FAST SERVICES					
	Low				High
Industry SBIR Roundtable	22.2%	5.6%	19.4%	27.8%	25.0%
Partnering forums in local areas	25.0%	8.3%	19.4%	22.2%	25.0%
Database market research and 12 hours of consulting	27.0%	18.9%	18.9%	5.4%	29.7%
Assistance in locating a rural partner or licensee	38.9%	22.2%	19.4%	5.6%	13.9%
Review and critique of business plan	18.4%	18.4%	34.2%	15.8%	13.2%
Introduction to investors	20.5%	10.3%	12.8%	12.8%	43.6%
Explore rural Colorado as a business location	43.2%	10.8%	27.0%	8.1%	10.8%

(Q24)

## CHART A-I APPENDIX IMPORTANT FACTORS IN BUSINESS LOCATION

