Testimony of

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COMMITTEE ON SCIENCE AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES

The Role of the SBIR and STTR Programs in Stimulating Innovation at Small High-Tech Businesses

23 April 2009

On behalf of

The Small Business Technology Council and **The National Small Business Association**
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SBTC is the nation's largest association of small, technology-based companies in diverse fields, and represents more companies that are active in the federal Small Business Innovation Research (SBIR) Program than any other organization. SBTC is proud to serve as the technology council of the National Small Business Association.

Founded in 1937, the National Small Business Association (NSBA) is the nation's oldest nonprofit advocacy organization for small business, serving more than 150,000 small companies throughout the United States.

Chairman Wu, Ranking Member Smith, members of the Subcommittee, thank you for the opportunity to appear here today to discuss the importance of technological innovation to the United States and the reauthorization of the SBIR and STTR Programs. I am Jere W. Glover, Executive Director of the Small Business Technology Council (SBTC) of the National Small Business Association in Washington, DC. I have been involved in federal science and technology innovation programs since 1978, when, as Counsel to the House Small Business Committee, I helped convene the first joint House-Senate hearings on the subject. [1] I subsequently testified before Congress regarding small business and innovation on numerous occasions, as Deputy Chief Counsel for Advocacy at SBA during the Carter Administration and as Chief Counsel during the Clinton Administration.[2]

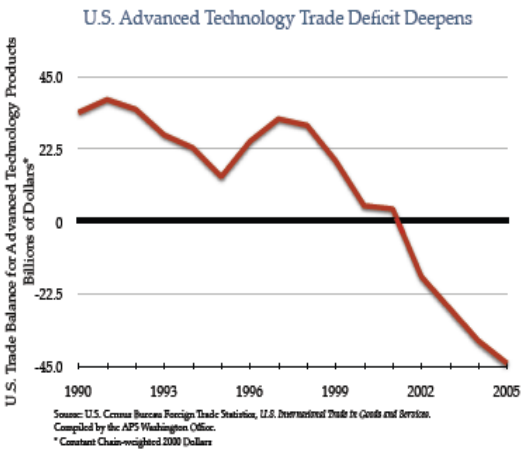
An outgrowth of the White House Conference on Small Business in 1995, SBTC is the nation's largest association of small, technology-based companies in diverse fields, and represents more companies that are active in the federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program than any other organization. SBTC also serves as the Technology Council of the National Small Business Association, the nation's oldest nonprofit advocacy organization for small business, which represents over 150,000 small companies across the United States. I appear here today on behalf of both organizations.

This hearing comes at a critical time. For more than a decade, other nations have been chipping away at the U.S.' global leadership in technological innovation. Now a second powerful threat is upon us – the worst recession since the Great Depression.

As the chart below shows, our global market share in this key economic area is declining:

While the pie is getting bigger, the U.S. share is getting smaller.

Another way of looking at this is to plot the balance of trade. Our trade surplus in advanced technology exports has disappeared; we now have a deficit:



The global challenge also shows up in U.S. patent statistics. Here again, the pie is getting larger, as more patents are issued each year. But here again, the U.S. share of the pie is shrinking. U.S. patents issued to Americans have fallen from two-thirds of all those issued in 1980, to less than half today.

Over the past seven months, technological innovation has faced a new menace: a deep global recession that is drying up both the supply of capital and the demand for technological goods and services. Unemployment is increasing.

To help restore our economy and strengthen our place in the world, we must encourage the growth of technology and innovation. As I hope to show in my testimony, small business generally, and the SBIR Program specifically, offer extremely efficient ways to meet the challenges we face. Of course, SBIR alone cannot do all that is needed. Programs such as the Department of Commerce's Advanced Technology Program (ATP) and the Technology Innovation Program (TIP) of the National Institute of Standards and Technology should be expanded, and new efforts to encourage and commercialize innovation should be explored. Likewise, we need to promote early-stage investments in technologies, like those provided by "angel" investors. We should also provide assistance for small businesses in filing foreign patents.

In this testimony, however, I want to concentrate on a few key themes:

1) Small business has a well-established track record of creating most new jobs in the U.S. economy, and particularly so when the economy is coming out of recessions. For purposes of today's discussion, what's especially important about small business job creation is that small business has now become the largest single source of employment for U.S. scientists and engineers, outstripping large business, universities and government.

2) Small business also has become the nation's leading source of technological innovations, particularly breakthrough innovations, as measured by several indicators.

3) As demonstrated by the recent National Academy of Sciences reports and an array of earlier analyses, the SBIR Program has become uniquely and powerfully effective in harnessing these small business scientists and engineers, as well as their breakthrough innovations, to the task of meeting federal agency R&D needs.

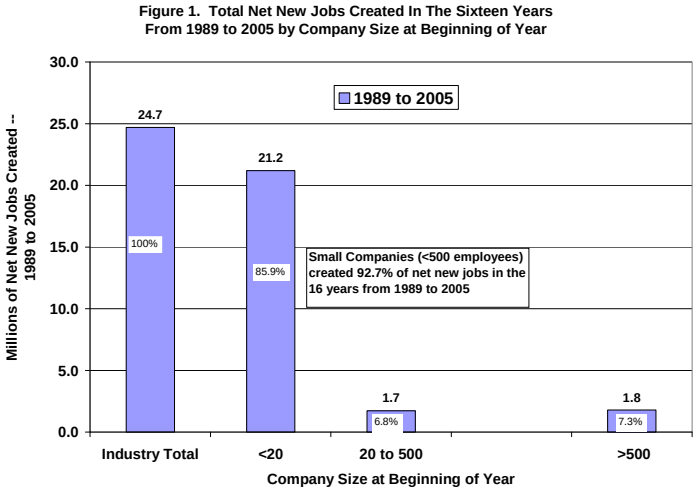
4) While some modest adjustments in the SBIR Program would be helpful – such as those recommended by the National Academy studies – overall Congress should renew the Program without major design changes. An increase in the Program's allocation of federal funds would yield important benefits to the federal government and to the nation's economy and global competitiveness.

5) The STTR Program, while newer and smaller than SBIR, shows great promise in uniting small business and university capabilities in innovation, and deserves to be expanded.

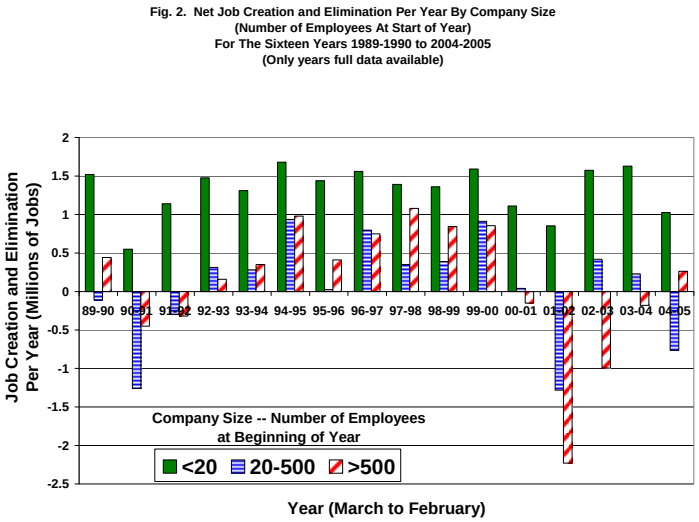
Let me expand on each of those points.

SMALL BUSINESS AND JOBS

For the past 40 years, small companies have created 60-80% of all net new jobs, on average.[3] In other words, add up all the new jobs created, subtract the jobs lost when businesses close their doors, and you find that, year in and year out, small business supplies our country with two-thirds to three-quarters of all the new jobs. This tempo may even be increasing. Recent data from the U.S. Bureau of Census and the Office of Advocacy, U.S. Small Business Administration, [4] shows that small businesses (with less than 500 employees) created *93 percent* of the net new jobs in the U. S. during the period 1989 to 2005.



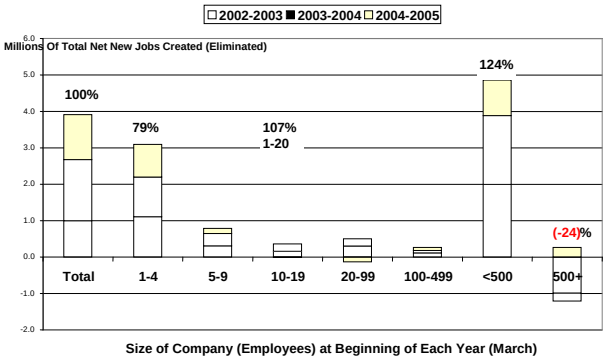
As striking as these figures are, the role of small business as a job creator *during recessions* is even more remarkable. The year-by-year table (based on the same data sources) shows the impact.



As Figure 2 shows, in the recession years of 1990-1 and 2000-2002, small businesses created ***all*** net new jobs. In fact, one can say that small businesses created *more than 100% of all net new jobs*, since large companies were actually shedding jobs during these periods. In 2001-2, at the trough of the recession, more than 2 million net jobs disappeared at large companies.

Moreover, this pattern of large business job loss persists until well after the country has ended its recession by statistical measures. In 1992, large companies continued to shed jobs. In 2002-3, they shed more than a million of them. Small businesses offset ***all*** of these large business job losses in 1992 and again in 2002-4. For these years, small business created 124% of all net new jobs, by offsetting the 25% loss in large business employment.

Figure 3: Total USA Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001-2002 Recession)



<u>In other words, if recent history is any guide, we can look to small businesses to do most of the hiring in this recession for now and the foreseeable future.</u>

This strongly suggests that supporting small businesses in stimulus legislation is likely to have the maximum short-term and medium-term payoffs on Main Street, and more broadly, on the population as a whole. (The population as a whole seems to grasp this. According to a recent Zogby Poll, 63% of the public believes that "small business and entrepreneurs will lead the U.S. to a better future" while only 21% belive that "large corporations and business leaders" will do so.[5])

There are obviously many worthy objectives to be supported in the economic stimulus legislation. It's unfortunate, however, that much of the legislation seems to have overlooked this major point of economic leverage.

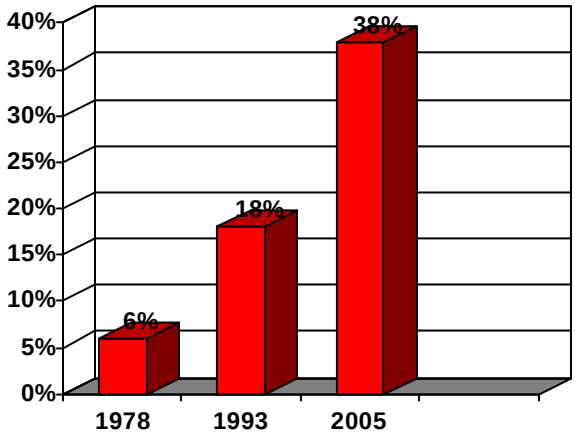
SMALL BUSINESS AND SCIENCE AND ENGINEERING

Our focus today is on one aspect of how small business supports the broader economy – its role as a technological innovator.

1. SCIENCE AND ENGINEERING EMPLOYMENT

One reason why small business seems to be getting better and better at technological innovation is that it employs more and more scientists and engineers. The trend over the past generation is shown in the chart below.

Percent of U.S. Scientists and Engineers Employed by Companies with Fewer than 500 Employees[6] (Figure 4)



Strikingly, there are now more scientists and engineers working in smaller companies (38%) than in any other sector. Some 27% of U.S. scientists and engineers currently work for large companies, 16% for universities, 13% for government, and 6% for nonprofits.[7]

The SBIR Program, which may be at least partly responsible for small business' growing science and engineering firepower, has deployed it to remarkable effect.

2. PATENTS

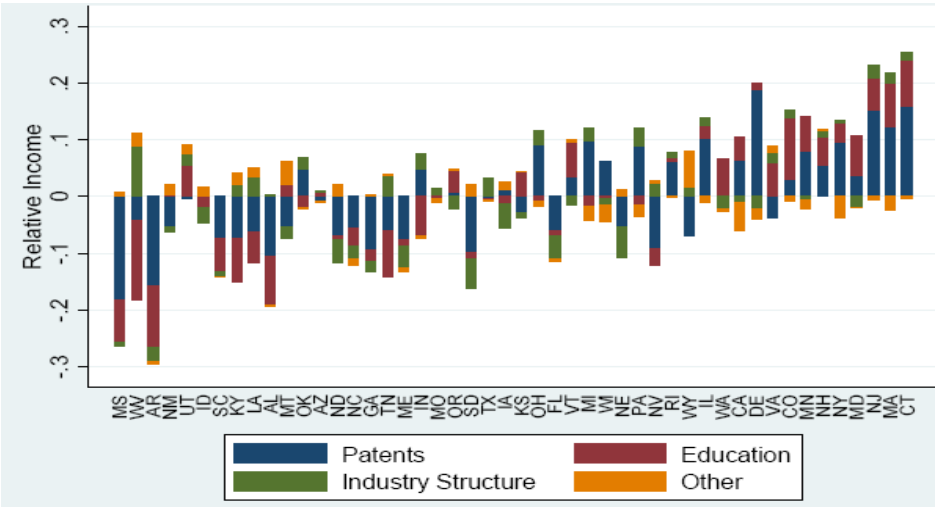
Since a major consideration at today's hearing is stimulating the economy through science and engineering innovations, consider an important but often overlooked measure of wealth and poverty -- patent productivity.

For a striking illustration of the relationship between patents and wealth, we can turn to a recent economic study for the Federal Reserve Bank by Paul Bauer, Mark Schweitzer and Scott Shane.[8] The authors measured eight determinants of personal income growth per capita, in the 48 contiguous states of U.S., from 1939 to 2004.

By far the most important growth determinant for the 1939-2004 period proved to be knowledge stocks. For this, the authors used three indices: high school and college attainment rates, and patents per capita. Upon closer examination, the overwhelmingly dominant indicator of income growth proved to be patents per capita.

The chart[9] below shows the power of this indicator in each of the 48 states studied:

The Impact of Patents on Wealth and Poverty (Figure 5)

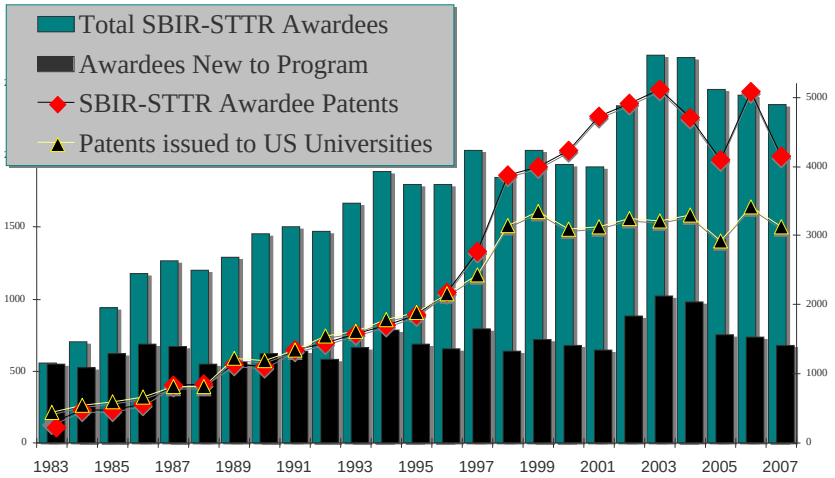


Broadly speaking, the above chart can be read from left to right. States with lagging growth over the period studied are on the left; those with higher growth, on the right. Remarkably, the patent indicator is the top predictor of both wealth and poverty. States with low patents per capita tend to be poor. Those with higher patents per capita tend to be affluent.

Overall, patents are more closely associated with economic growth than education, industry structure, or any of the other variables tested.

This finding underscores the importance of an earlier study of *patent productivity*, which showed that small technology-based companies produce 13 times more patents per employee than larger technology-based companies, and that these smaller company patents are twice as likely to be among the most cited in other patent applications.[10]

Firms in the SBIR Program are among the most prodigious producers of patents in the United States. Figure 6 below, provides a glimpse.[11]



As of today, more than 60,000 patents have been issued to SBIR companies – despite the fact that the program is only 25 years old. A relatively modest program, representing only 2½% of extramural R&D spending at 11 federal agencies, SBIR nevertheless is accounting for 40% more patents than all U.S. universities combined, and is generating new patents at an average speed of 13 a day.

SBIR also does a remarkable job of spreading contract dollars, and therefore the resulting patents, around the country. By way of contrast, in 2005 about 70% of venture capital investments went to just 5 states – versus only 45% of SBIR contract dollars. The "middle 20" states – those ranked 15-25 in SBIR contract dollars -- obtained 25% of SBIR dollars but only 6% of VC dollars. *Although venture capital investments exceed SBIR funding by about 10 to 1, there were still 15 states that received little or no venture investment -- and 5 states that received virtually none. SBIR dollars reach virtually every state.*[12]

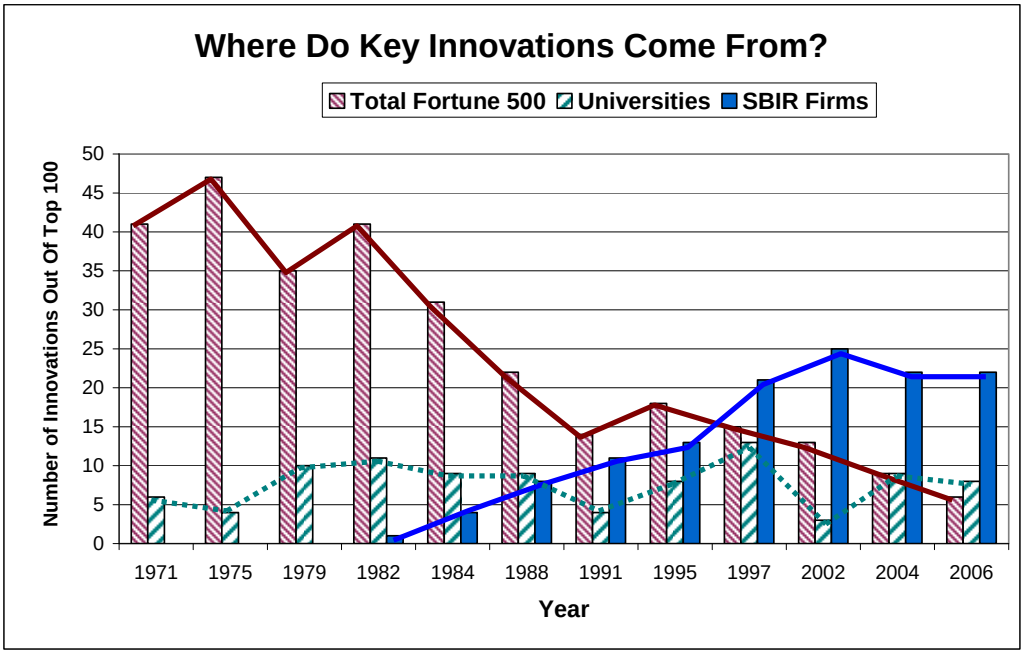
3. Innovation Quality

Is the *quality* of SBIR innovation output matched by its quantity? Are these innovations really groundbreaking and economically significant?

From the perspective of the federal government, for whom the SBIR research is performed, the quality would appear to be quite high. The U.S. Government Accountability Office has studied the SBIR Program on at least ten occasions since the program began, and offered positive assessments in each case.[13] So have several earlier reports by the National Academy of Sciences and the National Academy of Engineering.[14]

One indication of the importance of a patent is the number of times that it is cited in other patent applications. A study of companies that were "serial innovators" (with 15 or more patents over five years), found that over one-third were small companies, many of them SBIR companies. Patents from these small "serial innovators" were cited 28% more often by other inventors, were twice as likely to be among the top 1% of the most widely cited patents, and were twice as closely linked to scientific research than were the patents from the large "serial innovators".[15]

From a different perspective, the Information Technology and Innovation Foundation recently analyzed the annual lists of the 100 most technologically-important innovations, as selected each year by a panel of judges for *R&D Magazine*.[16] In the chart below (Figure 7), the authors compared the performance of innovations from SBIR companies on these annual assessments, with those from Fortune 500 companies and universities.



As the chart indicates, <u>for the past decade, about one-fourth of the most important technological innovations in the nation have been coming from the SBIR Program</u>. Or, as the authors themselves put it:

> "The results show that these SBIR-nurtured firms consistently account for a quarter of all R&D 100 award winners – a powerful indication that the SBIR Program has become a key force in the innovation economy of the United States."[17]

It perhaps bears repeating that this is surely a unique level of economic performance for such a relatively small federal program.

4. WHY?

The metrics suggesting both the value and the profusion of SBIR innovations raise a very important question: Why? Why would a modest program produce such outsized results?

The National Academy of Sciences team studying the SBIR Program wondered about that, too.

Part of the answer, the NAS says, can be found in the scrupulously meritocratic design of the SBIR Program. SBIR is founded on competition, peer review, and the milestones of Phase I, Phase II and Phase III that are gated by rigorous demonstrations of scientific validity and commercial potential.

In their recent report on the SBIR Program at the National Science Foundation, the Academy also suggests that a new and different model of innovation appears to be emerging from the SBIR Program.[18]

Figure 1-1 below shows the "Linear Model of Innovation" that is presumed to occur in most R&D programs, whether public or private: basic research gives way to applied research, which in turn is developed and commercialized.

The NAS believes that something very different is happening in SBIR.

Figure 1-2, just below 1-1, attempts to describe the new process – as a "Feedback Model of Innovation." At each step of the way between basic research and commercialization, feedback loops evolve, altering the previous and succeeding steps. These loops recalibrate and revise innovations, delivering much more commercializable end products. But the process doesn't end there. The commercialization step itself, rather than being the end point, is the source of yet another feedback loop -- leading to new characteristics, trade-offs, and unanticipated applications. Thus, while the "Feedback Model" appears to be more complex than the "Linear Model," it is actually far more efficient at delivering usable innovations.

FIGURE 1-1 The Linear Model of Innovation.

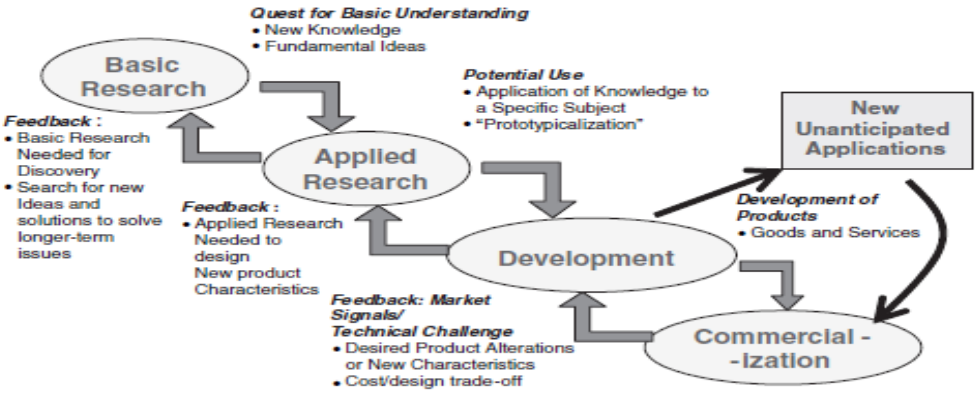


FIGURE 1-2 A Feedback Model of Innovation.

Notably, the NAS extracted this analysis and schematic from its report on the National Science Foundation and reiterated it in the final report on the SBIR Program as a whole.

Further insights into the why the design of SBIR Program seems to work so well are provided throughout the Academy reports on the various federal agency SBIR Programs, as well as in the White Paper on the SBIR program written by its founder, Roland Tibbetts, which is attached to this testimony as an annex. The Tibbetts paper, in particular, focuses on the way in which SBIR is aligned with the motives of scientists, inventors, and investors. (Tibbetts also comments on how changes that were proposed by H.R. 5819 of the last Congress would have weakened the foundations of the SBIR Program's success since 1982.)

THE NAS EVALUATION OF THE SBIR PROGRAM

This Committee was instrumental, during the last SBIR reauthorization cycle, in directing that the National Research Council should conduct a broad scientific review of the SBIR Program. This ambitious effort, which the NRC assigned to the National Academy of Sciences, cost over $5 million and took more than 5 years. The result was a series of agency studies, and a broad program overview, that offers the most comprehensive analysis of SBIR – and for that matter virtually any federal science and technology program – ever undertaken.

Completed just this past January, the NAS findings paint a remarkably positive portrait of the Program. The studies and even the summaries are extremely rich and detailed, and worth careful consideration. SBTC's own précis of the research, which we hope and believe is a fair overview of the studies, follows:

The SBIR program is sound in concept and effective in practice.

The SBIR is an efficient program that is successfully achieving important public objectives.

SBIR's results meet the key Congressional objectives for the Program.

(1) Stimulating technical innovation.

The NRC study found that, by a wide variety of metrics, the program is contributing to the nation's stock of new scientific and technical knowledge.

(2) Using small business to meet federal research and development needs.

The NAS study found that the SBIR program objectives are aligned with, and contribute significantly to, fulfilling the mission of each of the studied agencies. This is also true across a wide variety of metrics. The inherent flexibility of the SBIR Program makes it especially valuable to agencies with widely-varying missions.

(3) Increasing private sector commercialization of innovations.

SBIR is successfully commercializing innovations. Commercial success includes sales, license revenues, R&D investment, research contracts and the sale of equity. The average sales per Phase II project were $2.4 million and the average investment for Phase II was $1.5 million. Given the inherent technical risks involved, "the fact that a high proportion of the projects reach the market place in some form is significant, even impressive."

(4) Supporting the growth of a diverse array of businesses.

SBIR provides market access, funding, and recognition to a wide array of businesses, including those owned by women and minorities.

Conclusions:

The program is achieving its goals of successfully increasing innovation, encouraging participation by small companies in federal R&D, providing support for small firms owned by minorities and women, and resolving research questions for mission agencies in a cost-effective manner.

Recommendations:

- No fundamental changes should be made to the program.
- The basic Phase I, Phase II, Phase III structure should be preserved. Allowing firms to apply directly for Phase II would be detrimental to the program.
- Experimentation by the agencies, such as the Fast Track program should be encouraged.
- Agencies should be encouraged to develop pilot programs to experiment with potential improvements to the SBIR program.
- Funding mechanisms beyond Phase II, such as the NSF Phase IIB program and NIH continuation awards, could be adopted at other agencies.
- Any such "Phase IIB" type program should be carefully monitored and evaluated to ensure the result is positive.
- The standard limits on award size have not changed since 1995. The Phase I limit should be increased to $150,000 and Phase II should be increased to $1,000,000.
- The processing periods for awards vary substantially by agency. Agencies should also specifically report on initiatives to shorten decision cycles.
- Multiple award winners do not appear to be a problem. Awards should be based on merit. Setting an arbitrary limit to the number of awards that a company receives is neither necessary nor desirable in light of the contributions made by these firms.
- Additional attention should be paid to outreach efforts, including the existing FAST and Rural Outreach programs, and further outreach to women and minorities.
- Some internal tracking mechanisms should be upgraded, and Congress should consider a provision for additional program funds for management and evaluation.
- Should Congress decide to allocate additional funds to the SBIR Program, those funds could be utilized effectively.

SBTC RECOMMENDATIONS FOR THE REAUTHORIZATION OF THE SBIR AND STTR PROGRAMS

Congress could take no action with a better promise of stimulating the U.S. economy over the short, medium, and long term than to reauthorize and strengthen the SBIR Program.

SBTC specifically recommends that Congress:

1. Make the Programs permanent. SBIR has just been given a strong endorsement by one of the most extensive studies of any federal program ever undertaken by the National Academy of Sciences. This follows three previous studies by the NAS and the National Academy of Engineering that positively evaluated SBIR, as well as ten favorable GAO studies.

SBIR is now the largest single source of patents in the United States, accounting for 40% more patents annually than all U.S. universities combined. It is also the source of a quarter of the most important technological innovations in the United States each year. It is generating, directly or indirectly, billions of dollars in wealth, far outstripping its cost.

It has stimulated the creation of thousands of successful companies, provided the nation with a host of vital defense, homeland security, and life sciences technologies, resulted in billions of dollars in economic activity, and created tens of thousands of high-paying jobs.

If this is not a successful and cost-effective federal program, one may reasonably ask what is.

SBIR should not have to re-justify its existence every three or four years. Delays in Congressional approval of reauthorization that were totally unrelated to SBIR caused the Program to temporarily shut down in 2000. Uncertainty about its future, as each reauthorization looms, puts thousands of jobs, and hundreds of companies, in jeopardy. SBIR has proved its worth. Congress should make it a permanent program, conduct normal cycles of Congressional oversight and management hearings, and make occasional adjustments as needed to the Program's legal framework.

2. Increase the allocation of R&D dollars going into the Program. As the foregoing data have shown, SBIR has become a vital contributor to the nation's technological development and wealth creation. The Program leverages federal R&D resources in uniquely efficient ways. Given the global competitive challenges faced by the United States, SBIR should be given the resources to access America's untapped innovation resources. SBTC recommends that the SBIR share of federal R&D dollars be gradually increased from today's 2½% to 5%, at the rate of .5% per year. At a 5% level, smaller companies would still be receiving less than one-sixth of the dollars that their numbers of scientists and engineers, and their patent production, should entitle them to. Today they receive less than one-seventh. A portion of this increase should be allocated to expanding SBIR commercialization programs in the federal agencies, such as the Defense Department's highly-successful Commercialization Pilot Program (CPP).

3. Take the steps recommended by the National Academy of Sciences to strengthen the Program.

The NAS studies include several valuable recommendations for strengthening the management of SBIR Programs in the various agencies, and for improving SBIR outreach, among other subjects.

The NAS also recommends that SBIR Phase I awards be increased to a limit of $150,000 and the Phase II awards to $1.25 million limit, to adjust for the inflation and cost increases that have occurred since the last such adjustment 14 years ago.

At the same time, the Academy correctly notes, Congress must be careful not to extend the dollar limits too high. Companies with promising technologies will be driven out of the Program if fewer firms and fewer innovations absorb more of the available dollars in each funding cycle. (Multiple awards to single firms in single funding cycles would have a similar effect.) Awards in excess of statutory limits, or multiple awards to a single company during a single award cycle, should be approved in advance on the basis of a written justification and a higher level of review. They should be monitored and compared to the performance of other contract awards.

SBTC agrees with the Academy on giving federal agencies ample space to experiment with "Phase IIB" and similar development efforts.

4. Maintain the integrity of SBIR as a small business program.

At various times in the past, legislation has been proposed that would allow large firms and Universities, either alone or acting through intermediaries, to have unrestricted access to the SBIR Program.

Such an action would violate the foundation of small business law in this country, and more than half a century of legal precedents. It would also violate the "common sense" understanding of most citizens about the proper definition of a small business and the proper use of taxpayer dollars intended for small business.

The most persistent controversy in this area has been about the conditions under which venture capital companies can participate in the SBIR Program.

It is often stated that venture capital companies are "prevented" from participating in the SBIR Program.

This is incorrect.

VC's can participate in the SBIR Program.

The only limitation on VC participation is determined by a two-pronged test.

Prong # 1: Does the VC seek (or hold) *a minority or a majority* ownership position in the SBIR company?

If the answer is *a minority position*, then any VC-backed SBIR company – and any VC -- is free to participate in the SBIR Program as it wishes.

Prong # 2: Is the VC itself a large business, with 500 or more employees, including affiliates and subsidiaries?

If the answer is no, then the VC may participate in the SBIR Program in any manner it wishes, as *either a majority or a minority* shareholder in an SBIR company.

If the answer is yes, then the VC may seek (or hold) only *a minority* position in an SBIR company.

In other words, VC's can and do have access to the SBIR Program. In fact, the percentage of VC-backed companies in the SBIR Program has been *rising*. The sole purpose of the VC restriction in the SBIR Program is to prevent an SBIR company from becoming a subsidiary of a large business and still access funds that Congress intended for small businesses.

Subsidiaries of large companies have not been able to access funds or programs legally designated for small business since the enactment of the Small Business Act and the related "affiliation rule" in 1953, long before SBIR's enactment in 1982.

SBIR receives only 2.5% of extramural federal R&D. SBTC sees no reason to divert any of these funds to large companies that are eligible for the other 97.5%. We have, however, repeatedly offered to work with the large venture capital companies that are seeking innovation funding from Congress, to try to address their concerns in other ways. The matching of VC investments in biotechnology with funds from the National Institutes of Health, which the VC and biotechnology industries reportedly are seeking from Congress and NIH, represents one such path.

A further danger, should large VC's be permitted to hold majority interests in SBIR companies, is that absent extensive monitoring and evaluation, such VC control could quickly shift from be *allowed* to being *required*, as a selection criteria for SBIR contract awards. A concentration of large VC influence in the SBIR Program would also skew SBIR dollars more toward the handful of local areas, such as Boston and San Francisco, where most VC investments tend to be directed. As noted on page 7, above, the SBIR Program is far more egalitarian in its investments.

SBIR/STTR and the Universities – expanding a successful partnership

The STTR Program, enacted in the 1990's, provides an important adjunct to SBIR by facilitating partnerships between small, technology-based businesses and Universities. Like SBIR, STTR offers an important venue for public-private, and nonprofit-private, partnerships in pursuit of technological innovation. SBIR researchers often have ties to universities, and STTR researchers always do. The National Academy of Sciences report found that SBIR collaboration and subcontracting with universities was widespread. The STTR program has allowed this collaboration to grow.

In a separate and revealing study, the New England Innovation Alliance (NEIA) surveyed in depth 17 of its members that are participating in the SBIR Program. The NEIA study found that these 17 SBIR companies had 175 subcontracts with 101 different universities worth over $28 million, while employing 243 university professors and graduate students.

So this avenue of collaboration offers the promise of a classic win-win situation.

Together, SBIR/STTR companies and the Universities can:

- Identify University R&D with potential downstream commercial applications, strengthening this awareness and focus,
- Develop new revenue streams for the Universities through R&D sales and licensing,
- Supplement the income of University-based researchers that work on SBIR and STTR projects, thus aiding the Universities in attracting and retaining talented faculty,
- Expose students who work on SBIR/STTR projects, or intern at SBIR/STTR companies, to the world of commercial R&D, and
- Jointly transfer valuable technology to the nation as a whole.

As the shift in science and engineering talent from large companies to small ones makes clear (see Figure 4 on page 6, above), large firms are a declining source of employment for university science and engineering graduates. In fact, large firms outsource many of these jobs to foreign companies.

At the same time, however, the growth in science and engineering talent in *small businesses* makes SBIR companies a crucial source of future employment opportunities for University science and engineering graduates. Such attractive and realistic opportunities to collaborate with leading-edge technology companies can help Universities attract students to science and engineering careers in the first place.

Moreover, the STTR program is a locus of contracts and subcontracts that provide financial support to Universities.

A more robust STTR Program would hold significant promise of reinvigorating the growth in University patents (see Figure 6 on page 7, above) and in improving University performance in developing key innovations (se Figure 7 on page 8, above).

To enhance cooperation between Universities and small, technology-based companies, SBTC further recommends that the STTR share of federal R&D dollars be increased from the current 0.3% to 0.6% in FY2010 and 0.9% in FY2011 and thereafter.

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[1] **The 1978 hearings showed that, despite their demonstrated superior efficiencies at innovating, small companies received only 3.5% of federal R&D contract dollars. Today, with far more science and engineering talent at their disposal, and a far more widely acknowledged record of innovations, small companies still receive only 4.3% of those R&D contract dollars. And SBIR/STTR accounts for more than half of that.**

[2] See "Small Business and Innovation," Report of the Joint House and Senate Small Business Committees, August 9 and 10, 1978. As an example of my testimony on the subject, see *Testimony of Jere Glover, Chief Counsel for Advocacy, Small Business Administration,* Senate Small Business Committee, August 4, 1999, http://www.sba.gov/advo/laws/test99_0804.pdf

[3] U.S. Small Business Administration, *Small Business FAQ's*, 2009.

[4] SBA Office of Advocacy, from data provided by the U.S. Bureau of the Census, Statistics of U.S. Business. See: http://www.sba.gov/advo/research/dyn_b_d8905.pdf. This data series runs from 1989 through 2005 only.

[5] WE Media Zogby Poll, 25 February 2009, http://www.zogby.com/news/ReadNews.cfm?ID=1678

[6] National Science Foundation, *Science and Engineering Indicators*, 2007.

[7] Ibid. (For a very thoughtful and nuanced analysis of this shift, see the White Paper by SBIR Founder Roland Tibbetts that is attached as an annex to this testimony.)

[8] "Altered States: A Perspective on 75 Years of State Income Growth," Federal Reserve Bank of Cleveland, *Annual Report 2006*. For more detail, see Paul Bauer, Mark Schweitzer, Scott Shane, *State Growth Empirics: The Long-Term Determinants of State Income Growth*, Working Paper 06-06, Federal Reserve Bank of Cleveland, May 2006. www.clevelandfed.org/research/Workpaper/2006/wp0606.pdf

[9] *Ibid*., p. 46

[10] Diana Hicks, *Small Serial Innovators: The Small Firm Contribution to Technical Change*, CHI Research, 2003, produced under contract to the Small Business Administration, contract SBA01C-0149.

[11] Innovation Development Institute, 2009, from U.S. Patent and Trademark Office data.

[12] SBIR data from U.S. Small Business Administration, www.sba.gov/sbir/2004SBIRStateChart.xls
Venture capital data from National Science Foundation, *Science and Engineering Indicators, 2006*, Table 8-42.

[13] *Federal Research: Assessment of Small Business Innovation Research Programs*, GAO Report RCED89-39, January 23, 1989; *Federal Research: Small Business Innovation Research Program Shows Success But Could Be Strengthened*, GAO Report T-RCED 92-3, October 3, 1991; *Federal Research: Interim Report on the Small Business Innovation Research Program*, GAO Report 95-59, March 8, 1995; *Federal Research: Observations on the Small Business Innovation Research Program*, GAO Report RCED 98-32, April 17, 1998; *Small Business Innovation Research*, GAO report 06-565, April 2005; *Federal Research: Observations on the Small Business Innovation Research Program*, GAO Report GAO-05-861-T, June 28,2005.

[14] *Conflict and Cooperation in the National Competition for High Technology Industry*, National Academy of Sciences, 1996; *Small Business Innovation Research Program: Challenges and Opportunities*, Board on Science, Technology and Economic Policy, National Academies of Science and Engineering, 1999; *SBIR: Assessment of the Department of Defense Fast Track Initiative*, STEP Board, National Academies of Science and Engineering, 2000.

[15] Hicks, *Small Serial Innovators: The Small Firm Contribution to Technical Change*, *op. cit.*.

[16] Fred Block and Matthew Keller, *Where Do Innovations Come From? Transformations in the U.S. National Innovation System 1970-2006*, Information Technology and Innovation Foundation, July 2008.

[17] Ibid., p. 15

[18] *An Assessment of the SBIR Program at the National Science Foundation*, National Academy of Sciences, 2008, page 17. See: http://www.nap.edu/catalog/11929.html . As noted in Footnote 13 of this study, "This view was echoed by Duncan Moore: 'Innovation does not follow a linear model. It stops and starts.' " See also National Research Council, *SBIR: Program Diversity and Assessment Challenges*, Charles W. Wessner, ed., Washington, DC: The National Academies Press, 2004 p. 24.

Annex 1: SBIR's Contribution to Economic Development, Selected States

State	SBIR employment (est.)	SBIR patents	SBIR $ 1983-2008
Arizona	7,772	950	$432,883,657
Georgia	4,825	631	$242,583,673
Illinois	5,771	1,017	$414,004,010
Maryland	28,172	2,578	$1,290,340,195
Michigan	10,683	1,655	$539,891,230
Missouri	4,031	415	$114,289,277
Nebraska	951	300	$41,751,188
New Mexico	42,872	603	$422,922,243
New York	25,938	3,431	$1,203,963,026
Oregon	9,537	1,084	$89,312,577
Tennessee	6,153	275	$220,677,450
Texas	24,432	2,620	$1,050,945,751

Source: © Innovation Development Institute, 2009

Annex 2: Jere Glover Biographical Statement

JERE W. GLOVER
Executive Director
Small Business Technology Coalition

Jere Glover is an attorney with the Brand Law Group in Washington, DC representing small businesses on SBIR-related issues. He also serves as the Executive Director of the Small Business Technology Council (SBTC), a group of small high tech companies most of whom are involved in the Small Business Innovation Research (SBIR) program. He served on the Board and the investment committee of the Telecommunications Development Fund and is a Board member of Homeland Ventures Partners. In 2006 Jere was selected as SBIR Man of the Year.

As one of the creators of the SBIR program, Jere's experience with SBIR is extensive. He was Counsel to the House Small Business Committee, where he directed an extensive set of hearings on small business and innovation that laid the ground work for SBIR in 1978. He was also the lead-off witness before Congress in 1982 when SBIR was first proposed. He was later Counsel to the Senate Small Business and Entrepreneurship Committee, where he worked on Small Business Technology Transfer (STTR) Program Reauthorization. Throughout SBIR's existence, he has been one of its most active supporters.

Jere has a unique blend of private and public sector experience. A former CEO and attorney in private practice, Jere also spent many years in government service, most of it focused on minimizing the regulatory burden on business. For more than six years, he was the federal government's lead defender of small businesses in the regulatory process. In that capacity, he systematically analyzed hundreds of regulatory actions by federal agencies, identifying flaws and shortcomings in many of those actions and helping the affected businesses seek relief, without undermining the broad public purposes of the regulations. The work that Jere directed saved the private sector more than $20 billion in annual regulatory costs, and it cut a wide swath across many types of businesses – including mining, fishing, telecommunications, transportation, financial services and agriculture. He has testified before Congress over 30 times and appeared in over 100 agency proceedings, including rulemakings, adjudications, and enforcement proceedings.

In the private sector, Jere previously was the CEO or principal of a biotech company, a medical technology company and a group of medical clinics. Since re-entering the private sector last year, he has become the managing director of another medical technology company and counsel to a variety of SBIR and technology companies.

Jere obtained his undergraduate and law degrees from the University of Memphis and an L.L.M. in Administrative Law and Economic Regulation from George Washington University.

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Annex 3: SBIR White Paper, by SBIR Founder Roland Tibbetts

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REAUTHORIZING SBIR: THE CRITICAL IMPORTANCE OF SBIR AND SMALL HIGH TECH FIRMS IN STIMULATING AND STRENGTHENING THE U.S. ECONOMY

Roland Tibbetts
SBIR Program Manager, 1976 -1996
National Science Foundation

The proposed Small Business Innovation Research (SBIR) reauthorizing legislation (H.R. 5819) is of great concern to thousands of small technology-based firms and should be of similar concern to Congress.

The bill would significantly weaken the basic elements of the SBIR program by

(1) Cutting the number of awards, probably in half. Far larger SBIR awards would be allowed. Companies could receive multiple development awards. Agencies could waive even the higher award caps. Yet the overall size of the program would not be increased. Together, these steps would eliminate funding for a large number of innovative and breakthrough ideas.

(2) Allowing firms to avoid SBIR's competitive "proof of concept" step and move directly to much larger "development" awards. This is an irresponsible policy for a program that is funding very high-risk ideas. The "proof of concept" requirement, Phase I of SBIR, is necessary to weed out ideas that are not feasible, so that large sums of taxpayer dollars aren't wasted on them.

(3) Substituting SBIR's R&D funding for private investment capital in the commercialization phase of SBIR (Phase III). Phase III is a market-based reality check. A project that can't attract private-sector funding or mainstream government procurement contracts at that point should not be pushed forward with more R&D funding from SBIR.

(4) Threatening the integrity of SBIR as a small business program by weakening the safeguards against large business access to SBIR funds.

With each of these changes, the needs of the SBIR Program, and the history of its best practices, call for doing exactly the opposite of what the bill proposes.

What SBIR Is Designed to Do

SBIR was created to address a need that is still critical: to provide funding for some of the best early-stage innovation ideas – ideas that, however promising, are still too high risk for private investors, including venture capital firms. As happened with Microsoft, Apple and hundreds of other firms, technology innovations can mushroom into major products and businesses once private sector investors make a commitment. But they'll only make that commitment once the innovation is well along. In 2005 only 18 percent of all US *venture* capital invested went to seed and early stage firms while 82 percent went to later stages of development that are lower risk.

The positive role of innovative small technology firms in the economy is evident not only in the dozen or so geographic strongholds of tech entrepreneurship across the nation, but also in the increased productivity of the companies that buy and use the innovations. That is perhaps the most compelling reason to maintain a strong, effective SBIR Program.

SBIR addresses a paradox at the heart of innovation funding: capital is always short until the test results are in. At the idea stage, and even the early development stage, the risks are too great for all but a few investors. But innovations can't get beyond that stage without funding.

There is another paradox, too. The federal government has R&D needs that, for a variety of reasons, will never interest private sector investors. The business models of most investors focus on generating many sales to many customers. When the government is the only buyer, and buys on a one-time or very occasional basis, investors get skittish.

Large government contractors typically aren't interested in such R&D, either. The amounts involved are too small, and most large contractors don't have early-stage R&D capabilities anyway.

So needed innovations in fields like defense, space exploration and homeland security may not occur. The same can be true for innovations in science, especially the health sciences, when the projected patient populations are small or the innovation may only be needed once per person (such as with a vaccine).

SBIR was designed specifically to solve both of these paradoxes:

First, it provides a transparent, competitive and reliable source of early-stage funding for R&D, based entirely on scientific merit. Today, SBIR is the nation's largest source of such funding.

Second, it allows the government itself to obtain needed R&D that the private sector could not otherwise provide.

Why SBIR Has Been Successful

SBIR's success, as recently documented by the major National Research Council / National Academy of Sciences study, is rooted in a number of the program's characteristics.

Drawing on small business scientific talent. SBIR draws on the six million scientists and engineers that are now employed by small firms. That compares to the five million employed by medium-sized and large firms. In fact, small business employs more scientists and engineers than large business, universities, federal labs, or nonprofit organizations. A great many of these small business scientists and engineers are entrepreneurial. To see the entrepreneurial zeal of these technology-based small companies, one has only to look at the extent to which the SBIR Program and the nation's venture capital companies – the only important sources of risk capital for such companies -- are swamped with proposals. Or one can look at patents granted. The SBIR Program accounts for more than 50,000 of them. Currently, it accounts for an average of seven patents a day, which is more than all U.S. universities combined. SBIR has given us Qualcomm, Symantec and dozens of other highly successful technology companies.

Providing the primary source of government R&D funding for small business. Despite their huge numbers of scientists and engineers, and despite their well-documented science and technology successes, small businesses have virtually no access to federal R&D contracts outside of the SBIR Program. According to the National Science Foundation's annual *Science*

Indicators report, large firms receive 50.3 percent of federal R&D, universities receive 35.3 percent, non-profits 10 percent, and small businesses just 4.3 percent. SBIR accounts for over half of that 4.3 percent. This is an astonishingly small figure for a nation that expects technological innovation to lead it to new economic heights, but there it is. For small companies, SBIR remains the only game in town, just as it was in 1983, when it began.

Adopting best practices.

In designing the SBIR program, I drew on my own experience as a founder, director and treasurer of Allied Capital here in Washington and as operational VP for two small tech firms, one of which grew to 600 employees before being sold to TRW. I read about 50 articles on innovation and R&D management. I talked with a few dozen economists and directors of research in large firms and universities. I met with ten or so venture capitalists. I asked them, and others like the DuPont R&D advisory committee, about best practices.

Best practices 1: managing portfolio risk. One thing everyone agreed on was the need to manage R&D portfolio risk through diversification. With the high risk involved in early-stage R&D, there is need to diversify the federal investment by betting on many, rather than fewer, technologies and ideas. (The R&D risk is high not only because of the technical challenges but also because cutting-edge R&D requires expensive equipment. Such R&D is the furthest away in time from the market, and the market may change during that period.)

The size of SBIR awards and thus the dollars at risk per innovation was therefore a major topic. Most of those I worked with in developing SBIR agreed that the technologies involved were such inherently high risks that smaller bets should be made on many projects before making a few larger bets.

Best practices 2: making the largest number of awards possible. Making many smaller awards was not only good risk management practice. Virtually everyone I spoke with argued, and my own 20-year experience as an SBIR Program Manager subsequently confirmed, that the economic payoffs would be higher this way. Many smaller awards mean that more ideas can be evaluated for their potential. More and better choices for further development become available.

Probably a few thousand CEO's of small tech firms have talked with me about SBIR over the years. In general, they liked almost everything about SBIR, except the terrible odds against winning an award. Many no longer submit proposals because of the large investment of time and cost required to prepare a competitive proposal when only one in 15 -20 receive the larger Phase II funding. Others still compete because there are almost no alternative sources of such funding.

If there are fewer SBIR awards in the future, not only will fewer technologies get evaluated and funded. Fewer companies will compete, because the odds against winning will get even higher. I believe we have been seeing some of this occur already at the National Institutes of Health, where larger award sizes and fewer awards have been accompanied by a fall off in applicants.

Best practices 3: creating scientific gates and milestones. Another best practice that we adopted for SBIR was the use of science-based gates and milestones before letting projects obtain more funding. Often an idea can be found to be infeasible through the Phase I "proof of concept" process. Other ideas show only a low probability of success. No further expenditures should be made on such technologies.

Unfortunately, some companies always came to us seeking to obtain as much SBIR funding as possible in both Phases I and II. Indeed, during my 20 years as an SBIR program manager, we

frequently heard such requests from both the companies and the agency scientists and engineers. However, no proposer was ever allowed to go directly to Phase II. Even if they had done relevant work earlier, we expected Phase I to show further progress. Our strict policy on this point proved to be a good thing. The companies that argued that they had already done the early R&D, and therefore should be able to go directly into Phase II, almost always were unsuccessful when faced with competition. Their requests had been sales ploys. A company's success on earlier projects was no guarantee that its newest idea was competitive.
It is important to always remember that SBIR provides funding for *ideas*, not for *companies*. Competitive, science-based gateways are vital for identifying the best ideas.

Best practices 4: making SBIR a powerful economic development tool.

The past. The roots of SBIR actually go back to Congress' concern over the "Rust-Belt Recession" of the 1970's. Unemployment in Detroit was high, due to the growing sales of new smaller automobiles and machine tools from Japan and Germany. The question was asked whether National Science Foundation research was focused on economic needs. The result was a new NSF program in applied research called "Research Applied to National Needs" or RANN. For the first time in NSF history, ten percent of a program budget – the RANN program budget -- was set aside for small business. This was the basis for the design and initiation of the Small Business Innovation Program at NSF in 1977. That program grew each year. Its successes led to legislation in 1982 that required all agencies with an extramural R&D budget over $100 million (today 11 such agencies) to participate. There were some early successes, such as Symantec, that gave us confidence in the basic design of the program.

A little background here: Individuals and small firms are the primary source of category-creating inventions and technical breakthroughs. It is not the successful wagon company that invents the automobile. And it's not the large business that risks upending its business model and its product lines. Small company major economic breakthroughs include the digital computer, microchips, the personal computer, software, the successful cell phone, the internal combustion engine, diesel engine, steam turbines (steamships and railroads), the electric motor, typewriter, telephone, refrigerator, electric transmission, phonograph, incandescent lights, vulcanized rubber, pneumatic tire, photo plate, airplane, motion picture, anesthesia, x-ray MRI; and even earlier the cotton gin, power looms, the sewing machine, the mechanical reaper, and other agricultural machines.

Fast forward a few generations: The great technology-based economic successes of the late 1970's and 1980's – along the Route 128 corridor near Boston and in Silicon Valley – as well as the communications and information technology companies that have proliferated since the 1990's, were the result of tens of thousands of scientists and engineers annually opting to start or join small firms. Often this included many of the best and brightest, the most creative, the most entrepreneurial, and the shrewdest risk takers: exactly the qualities that private sector investors, particularly venture capital companies, were looking for.

Think about what happened as Internet-based businesses grew in the 90's. It wasn't all boom and bust. The core of the "dotcom" era was a series of rapid and related breakthroughs in new and emerging technologies. Most of the breakthroughs came from startup companies. Five "dotcom" era startups are now in the "20 Most Widely Held Stocks in the U.S": Intel (microchips), Microsoft (software), Apple (personal computers), Oracle (relational databases) and Cisco Systems (networks). In 2007 alone, their combined sales were $166 billion and they employed 221,000. Add to this the thousands of smaller new firms with directly related new products and services, both in the U.S. and worldwide. Overall, the "dotcom" era was probably the largest economic growth breakthrough in history.

The future. Just as we have seen small-business-driven technological breakthroughs throughout our history, we can see them again in the future. There are a whole series of new and emerging technology areas where innovations could have powerful economic impacts. They include:

- global warming and other environmental areas, such as water purity;
- alternative energy and energy conservation;
- all kinds of security -- national, military, commercial, and economic;
- ever-changing communications;
- health care improvements and cost reduction measure;
- disease prevention;
- more effective education;
- improved transportation;
- agricultural challenges addressed;
- nano- and miniaturization technology;
- automated manufacturing; and many more.

All of these needs represent potentially large markets. Today, the technological risks are still too great for most private investors. But the technologies still need funding. SBIR is perfectly situated to explore ideas in these areas.

SBIR funding is necessary because large firms, despite their public relations, do not in fact invest extensively in these areas. Big companies do not take major risks on unproven technologies, except with massive government funding, such as in defense, NASA, and nuclear power. Large firm R&D budgets focus on improving product competitiveness and the processes for fabricating their goods, solving specific problems, and overall growth in sales and profits. Universities and non-profits also cannot raise high risk money for private sector technological innovations.

The mechanism. Generally only small high-tech firms can raise sufficient amounts of high risk capital to pursue commercially and economically relevant innovations. The key reason for this is that only small companies can realistically offer the promise of their stocks multiplying dozens of times. It's the prospect of that exponential growth in stock value which makes the rewards worth the risks to investors.

When SBIR is guided well, it fosters breakthroughs by such small companies. These breakthroughs get the technologies to the point where they can deliver great economic benefits.

At that point, when the scientific evidence is starting to come in, innovations attract not only additional VC investments, but also investments by individual "angels," mutual funds, insurance companies, endowment funds, and others. Longer-term bank lending becomes possible. All of that financing lays the foundation for stock offerings. Then these stock offerings attract more capital. This business growth, plus the revenues from subsequent product sales and spin-offs, is the money that stimulates the economy.

Successful SBIR-funded technologies can thus generate many multiples of their federal investments, often in a much shorter time frame than traditional investments.

Again, the key steps are: casting the net as widely as possible, attracting entrepreneurial individuals and small companies, insisting on technical feasibility in a competitive and transparent environment, and then moving to a commercialization phase that requires private sector investment equaling or exceeding the federal investment.

What To Avoid in the Future

Avoid needless disruptions to the SBIR Program.

SBIR has proven itself over 25 years. It is known and understood by hundreds of thousands of scientists and engineers, most of them in small firms, but many of them also in the 11 participating federal R&D agencies, in universities, in venture capital companies, in larger firms, in Congress and in other parts of government, including the 50 state governments and a number of foreign countries. SBIR is successful. The National Research Council / National Academy of Sciences comprehensive assessment of the SBIR program last year confirmed the effectiveness of SBIR along the broad general lines that it exists today. Other studies, too, such as those by GAO and by Professor Josh Lerner of Harvard Business School have been highly favorable. No reputable independent study in the past 25 years has called for major changes in SBIR.

Rather than implementing the constructive recommendations offered by the NRC/NAS study, the House-passed bill (H.R. 5819) mandates a vast upheaval in SBIR. Such a re-write of the program would make the NRC/NAS changes far more difficult to execute. How, for example, can the agency Advisory Committees that the study recommends do their work when agencies in the program would be spending the next few years redrafting all their SBIR program rules and retraining all their personnel?

Worse, the extensive reworking of the program would confuse everyone who uses the program – all those people in the small firms, universities, VC firms, large companies, state programs, and Congress that tap into the program. It would lead to lengthy award delays as the program is re-tooled in one agency after another.

Small technology-based companies will suspect, probably correctly, that all these changes will self-destruct and that SBIR will have to be re-tooled again in a few more years. So they'll hold back and shift to other activities. This will intensify the upheaval.

And for what? H.R. 5819 is designed to sharply increase the amount of SBIR funding that goes to maybe half the current number of companies, and to explore perhaps half as many promising ideas. This bill is more like special interest legislation than national interest legislation.

All available evidence suggests the major changes proposed by H.R. 5819 would be highly detrimental to SBIR's mission and effectiveness. Congress has never examined the full implications of these changes and should not embark on them without doing so. Unraveling SBIR now, at a time when the nation urgently needs the economic boost that the program can provide, would be a national tragedy.

Avoid excessive increases in award sizes.

SBIR is not intended to pay for the entire R&D costs required for every project. Some ideas could require tens of millions and even hundreds of millions of dollars ultimately. The purpose of SBIR, as stated earlier, is to lower the R&D risk to the levels that can attract private investment.

H.R. 5819 triples the Phase II award cap, making it $2.2 million. The bill would also allow agencies to make multiple Phase II awards, and even to waive the $2.2 million cap. One effect of doing all this will be to divert tremendous amounts of energy to negotiations about how much of an award each project will get. It is difficult, unwise and unfair to most small firms and program officers to have to judge how much to request or award over such a vast range of dollars. Determining the award size will become a time consuming negotiation, complicated by questions

of fairness to other participants. Those other applicants often will be equally qualified, and their projects will always be in need of more money. Ultimately, the size of many awards will end up being decided by salesmanship and personal connections, not by science. This will be a very corrosive influence on SBIR.

Just as important, larger awards reduce the number of ideas that can be funded. An $8 million Phase II award, if cut back to $1 million, could free up funding for seven other $1 million Phase II awards. Or, that $7 million difference could fund ***35*** "proofs of concept" ideas at $200,000 each. Similarly, a $1 million Phase I "proof of concept" award eliminates the possibility of four others at $200,000 each. We need to remember that research on innovative ideas at the idea stage is often primarily a one person job.

Avoid bypassing Phase I.

The foundation of the SBIR program is competition and openness. Take away the need to prove an innovation against other worthy innovations, in an above-board competition, and SBIR will degenerate into salesmanship and influence-peddling. Its genuine scientific accomplishments will diminish, year by year. If companies are allowed to apply directly for Phase II funding, SBIR will become little more than a traditional procurement program, not an innovation program. Phase I must not be by-passed; it is the seed bed of the entire SBIR Program.

Avoid using SBIR funds for commercialization.

If an SBIR firm cannot obtain a commercialization commitment from private sources, or from federal agencies (using non-SBIR funds), that at least equals the SBIR investment in an innovation, then SBIR's involvement in that innovation should end. The far more pressing public need is to fund additional recommended early-stage innovations, not to keep projects afloat that cannot attract financial support from the government or the private sector.

If SBIR award levels rise moderately to keep pace with inflation, an approach that the NAS/NAS study recommended, and that I agree with, then the SBIR investment in an early-stage technology idea should not exceed $1.2 million ($200,000 for Phase I and $1 million for Phase II). An innovation that cannot match or exceed that $1.2 million in the commercialization phase (Phase III) of SBIR, using non-SBIR funding, should not be rewarded with more SBIR funding.

In other words, no SBIR funds should be spent for Phase III. SBIR dollars are urgently needed to support additional promising ideas and to keep the high-risk SBIR portfolio diversified. If an agency feels that an innovation deserves financial support beyond a single Phase II award, then it can provide this further investment with non-SBIR funding. An agency that lacks that much faith in an innovation developed under its own guidance should not expect the taxpayers, via the SBIR program, to supply that faith.

Avoid steps that would diminish the small business character of the program.

Large companies view innovation much differently than small companies. A large company wants to protect its product lines and its customer bases. It looks for incremental innovations that make those existing products a little better and a little cheaper to produce. It looks for new products that are familiar and comfortable. For large companies, "re-defining" types of innovations are

frightening. They upset settled ways of doing business. The nation needs both incremental innovations and quantum-leap innovations, but right now and for the foreseeable economic future, it needs those out-sized innovations the most. SBIR can deliver sweeping innovations, but to do so it must avoid taking on the coloration and biases of large companies.

Even if there were only a modest national need for "out-of-the-box" innovations, there would still be a powerful need for SBIR, because nothing else in the country, and certainly nothing else in the federal government, supports early-stage innovation by small companies. Despite having more scientists and engineers than large business, universities, nonprofit organizations, or the federal government itself, small business gets only 4.3 percent of federal R&D dollars. And SBIR accounts for over half of that. Those other institutions draw more than 90% of federal R&D dollars. And here's the rub: there aren't any other sources of that early-stage innovation funding for small business. Capital for small business innovation research is so short in the United States that SBIR rapidly became, and remains, the largest source of it.

I come from a long and deep background in venture capital and I am a great believer in it. SBIR won't be nearly as successful unless VC's can participate in it. But VC's that directly or indirectly report back to large companies shouldn't be in Phase I or Phase II of the SBIR program. Nor should VC's that are big companies themselves.

VC's that are large firms in fact or spirit will inevitably focus on companies more than innovations. That's fine in Phase III, but not earlier. If big VC's get into Phase I and Phase II, they will push for bigger bets on fewer companies. They will want to shift SBIR funding away from high-risk Phase I ideas and toward Phase II development, which is closer to market and therefore less risky for them. Sooner or later, they will back SBIR funding for Phase III, which will also offset some of their risk. And the kind of innovations they ultimately favor will be those that big companies favor – safer and more familiar ones, incremental rather than quantum leap. SBIR can do much more than this. SBIR's current restrictions on big VC's are therefore wise. By contrast, H.R 5819's approach to this issue is dangerously unwise.

What to Do in the Future

We must meet the competitive challenge.

We are currently the world leader in small high tech firms, in venture capital, and in basic research. These strengths are critical to our future economic growth. But others are catching up.

China, Japan, and Western Europe are rapidly increasing their investment in all three areas.

In a recent Harvard Business School Bulletin article, Jim Breyer, founder of Accel Partners and past chairman of NVCA, stated that there are now 6,000 venture-backed companies in Beijing alone! Accel has recently closed its second Chinese venture fund for $510 million. "Many of the very best [VC] firms in Europe and in Asia are affiliated with firms here in the United States," he notes.

The UK has just announced a new innovation program. Dozens of countries, notably including those that came here to study the SBIR program, are now increasing their investment in innovations by small technology firms, venture capital development, business schools, and basic research.

Seeking out technology breakthroughs should be a far more important objective of government R&D than ever before. The single most important initiative we could mount would be to increase the SBIR to 5 percent of extramural federal R&D in a series of steps.

Such an initiative would be opposed by the current recipients of over 90% of federal R&D, like large companies, universities, nonprofits, and the organizations representing them, but these were the same groups that opposed the creation of SBIR in the first place and have opposed every modest increase in the program ever since. The NAS/NAS report clearly shows that SBIR can successfully deploy additional funding.

Think what the Internet and the telecommunications revolution have done for our economy. This was accomplished primarily by small, high-tech firms with major VC support. Now the investment risk is even higher for initial funding. Seed-stage and early-stage VC support has plummeted. If there are only rare investments at the idea stage, there will be no storehouse of proven ideas ready for later development funding. As bad as our economic problems are today, with budget deficits, trade deficits, a shaky dollar, and so on, where would our tax revenues, our productivity, and our technology leadership be today if we had not had that technological revolution?

The SBIR program should be carefully strengthened.

The following are my recommendations to Congress about some specific issues in the SBIR reauthorization:

1. Small firms with 500 or fewer employees should remain eligible for SBIR awards as long as one or more large firms, including large venture capital firms, do not acquire a majority of ownership. Broad eligibility is necessary to identify and accelerate those innovations that can lead to technical and market success and superior economic growth. The nation needs these potentially fast-growing firms far more than those that do not grow. Outside investors can, and often must, obtain more than 50 percent of the stock to protect their investment. That should be acceptable in SBIR as long as these investors are individuals and as long as the companies that they represent are small, as is required today. However, these investors must not be controlled, directly or indirectly, by large businesses. SBIR was created to provide small companies with innovation funding. The program remains too small to allow funds to be siphoned off by large companies, which already receive over half of federal R&D.

2. There should be a set review period for Phase I results, as well as a set period for Phase II proposals, based upon Phase I results. Some firms are obtaining early reviews, before other firms. That is not fair to others and should not be allowed.

3. Agencies should not allow companies to extend the break between Phase I and II except for illness or similar reasons. On the other hand, agencies themselves sometimes need to extend the breaks between Phase I and Phase II due to budgetary issues. This should be allowed when truly necessary, despite justifiable company concerns about cash flow. In the end, SBIR's purpose is to fund ideas, not to support a company's financial picture.

<u>4. SBA is still the proper organization to manage SBIR, not the Department of Commerce</u>. Criticism of SBA over the years has been due in great part to significant understaffing by SBA management that should not have been allowed. SBA's SBIR staff is less than half the level any evaluator would recommend. When SBIR was a much smaller program, SBA had eleven staff members assigned to it. Today, there are only four. This headquarters staffing crisis is responsible for many complaints. But some agencies, such as DOE, also grossly under-staff SBIR. This leads to reductions in the number of award topics, in order to reduce agency workloads, and to the temptation to use jumbo awards, far in excess of the program's legal guidelines. I suggest some kind of a brake on agency proposal cutbacks and stricter enforcement of the caps.

5. Breakthroughs occur in new and emerging areas that cannot be predicted. I suggest that all agencies should allow innovation proposals in all areas that are relevant to their R&D programs. This openness to innovation proposals should be outlined in agency solicitations. Many agencies think in terms of relatively few topic areas. The original interagency innovation program essentially opened entire agency R&D programs for proposals. Solicitations now have become far more restrictive, which cuts against the national economic interest. Breakthrough ideas that are relevant to an aspect of an agency's R&D should be invited.

6. The commercial results of SBIR need to be strengthened. Awards should not be made by agencies solely on the basis of technical merit and without any consideration being given to downstream commercial potential. Unfortunately, some SBIR firms favor agency approaches that minimize commercial potential, because the firms are really only interested in having their R&D ideas funded, not in commercializing the results. I suggest that proposers and agencies require a commercialization plan in both phases with a more detailed and specific plan in Phase II. Reviewers should consider both technical and commercial merit in their recommendations. This would include the proposer's plan for obtaining non-SBIR funding for Phase III. I would also support an SBIR funding cutoff for firms that win many Phase I awards without advancing any of them to Phase II, along the lines of what H.R. 5819 proposes. SBIR was specifically designed to force the small firm to focus on innovation, technology breakthroughs, and commercialization for their economic benefits to the nation. Defense and NASA should also seek SBIR projects that have potential Phase III follow-on funding from non-SBIR sources. SBIR funds should not be used for mainstream procurement.

7. Award sizes should be increased in size in this reauthorization, to keep pace with inflation since the last adjustment in 1992. I recommend increasing Phase I awards to a $200,000 cap and Phase II awards to a $1 million cap. These are both substantial amounts of risk capital to explore technical feasibility. SBIR is not intended to build up the capabilities of a company, based on considerations like its other projects, but to explore the promise of the specific idea proposed. And SBIR's budget must fund as many ideas as possible.

8. The SBIR set-aside should doubled as soon as possible. SBIR is a major national asset. It accelerates technological innovation and technology breakthroughs. It helps attract private sector investment to the most promising innovations. It increases economic growth. We need to reinvigorate the economy, and we need more technological innovation. Yet despite the history of small company innovations, notably relating to the Internet and to telecom, and despite the fact that there are six million scientists and engineers employed by small firms, over half of the government's external R&D, (50.3 percent) goes to large firms, 35.3 percent to universities, and 10 percent goes to non-profit institutions. Small business firms received only that 4.3 percent. (2005 figures from NSF.) Even a modest increase in the award caps, such as I recommend, will diminish the number of SBIR awards and companies unless Congress takes the sensible step that it took last time award steps were increased – increasing the program size by a large enough amount to offset the larger awards. Shrinking SBIR would be exactly the wrong thing for Congress to do at this point in our economic history.

Finally, I must say that as I review the SBIR recommendations made to Congress by the Biotechnology Industry Organization (BIO) and by my former VC colleagues in the National Venture Capital Association (NVCA), I am deeply troubled. It is mainly these two organizations that are calling for the far-reaching changes in the program. Many of the changes they are proposing would, in my judgment, significantly and perhaps irreparably harm the program. I can understand the desire of any organization to represent its members and prospective members, but this is a case when we must think of the broader national interest.

Without open and competitive early R&D efforts, spread as widely as possible, innovations will never reach the level of maturity that can draw in venture capital or other follow-on funding. BIO and especially NVCA should understand this. The need is to explore as many ideas as possible and lower the risk as much as possible to attract follow-on Phase III investment. There will be no shortage of great new innovations to invest in if we allow SBIR to do its work in supporting truly innovative small companies by objectively assessing which ideas are wheat and which ones chaff.

Congress supported the current SBIR objectives with the first SBIR legislation in 1982. The program is working well, but can be improved, as stated in the comprehensive NRC/NAS report. SBIR can stimulate thousands of high-risk, economically promising ideas like no other program. Given the opportunity to work as designed, and as proven, SBIR can make a major contribution to the national economic welfare.

May 28, 2008

JERE W. GLOVER
Executive Director
Small Business Technology Coalition

Jere is an attorney with the Brand Law Group in Washington, DC representing small businesses on SBIR related issues. Jere Glover also serves as the Executive Director of the Small Business Technology Council (SBTC), a group of small high tech companies most of who are involved in the Small Business Innovation Research (SBIR) program. Jere is currently on the board of Homeland Ventures Partners. In 2006 Jere was selected as SBIR Man of the Year.

Jere's experience with the SBIR is extensive, as he is one of the fathers of the program. As counsel to the House Small Business Committee, he directed an extensive set of hearings on small business and innovation that laid the ground work for the SBIR in 1978. He was also the lead-off witness before Congress in 1982 when the SBIR was first proposed. Throughout the laws existence, he has been one of its most active supporters. Jere was also on the board and the investment committee of the Telecommunications Development Fund. Jere also was counsel to the Senate Small Business and Entrepreneurship Committee in 2001 and work on STTR Reauthorization.

Jere has a unique blend of private and public sector experience. A former CEO and attorney in private practice, Jere also spent many years in government service, most of it focused on minimizing the regulatory burden on business. For more than six years, he was the federal government's lead defender of small businesses in the regulatory process. In that capacity, he systematically analyzed hundreds of regulatory actions by federal agencies, identifying flaws and shortcomings in many of those actions and helping the affected businesses seek relief. Information developed by Jere's team led to rollbacks of dozens of regulations and formed the basis of a number of successful lawsuits. The work that Jere directed saved the private sector more than $20 billion in annual regulatory costs, and it cut a wide swath across many types of businesses – including mining, fishing, telecommunications, transportation, financial services and agriculture. He has testified before Congress over 30 times and appeared in over 100 agency proceedings, including rulemakings, adjudications, enforcement proceedings and others.

In the private sector, Jere previously was the CEO or principal of a biotech company, a medical technology company and a group of medical clinics. Since re-entering the private sector last year, he has become the managing director of another medical technology company and counsel to a variety of SBIR and technology companies.

Jere obtained his undergraduate and law degrees from the University of Memphis and an L.L.M. in Administrative Law and Economic Regulation from George Washington University.

Jere can be reached at 202-662-9700 or Jereglover@brandlawgroup.com. His address is Brand Law Group, 923 Fifteenth St. NW, Washington, DC 20005

111th Congress. House Science Committee. Sub-Committee Technology and Innovation.

Data Relevant to Extent and Form of SBIR Participation by Awardees in the Congressional District of Sub-Committee Members: Numbers of SBIR-STTR Awardees, Awards (Phases I and II), and Dollars awarded to date (April 2009)

Sub-Committee Members			SBIR-STTR Data over life of program 1983-present				Currently Active*			
	State	District	Total # Awardees	Total SBIR-STTR Awards Phase I	Total SBIR-STTR Awards Phase II**	Total SBIR-STTR Dollars***	Total # Awardees	Total SBIR-STTR Awards Phase I	Total SBIR-STTR Awards Phase II**	Total SBIR-STTR Dollars***
David Wu ***Chair***	OR	1st	85	254	85	$82,945,465	30	131	53	$51,720,289
Donna F. Edwards	MD	4th	129	869	316	$280,325,752	37	672	245	$225,196,410
Ben R. Luján	NM	3rd	63	304	105	$84,169,744	22	234	77	$65,275,117
Paul D. Tonko	NY	21st	80	438	172	$149,437,341	34	327	141	$123,205,055
Daniel Lipinski	IL	3rd	5	10	3	$2,574,236	0	0	0	$0
Harry E. Mitchell	AZ	5th	72	274	118	$104,418,354	25	170	85	$76,620,615
Gary Peters	MI	9th	50	108	46	$36,729,170	18	31	17	$15,942,755
Bart Gordon *ex officio*	TN	6th	7	11	4	$2,884,167	4	6	3	$2,383,077
Adrian Smith *Ranking Member*	NE	3rd	6	59	23	$21,295,288	2	55	22	$20,854,588
Judy Biggert	IL	13th	58	222	65	$56,242,476	7	63	30	$26,861,453
W. Todd Akin	MO	2nd	33	78	24	$24,022,914	12	43	16	$16,268,818
Paul Broun	GA	10th	24	43	10	$8,879,328	6	15	4	$4,097,700
Ralph M. Hall *ex officio*	TX	4th	11	22	7	$6,559,353	3	11	3	$3,196,411
		Totals	*623*	*2692*	*978*	*$860,483,588*	*200*	*1758*	*696*	*$631,622,288*

* In compilation of these type of aggregate data analyses, "Currently Active" refers to any firm in receipt of an SBIR-STTR Phase I award in period since 2004. It is common that a project may convert to Phase II up to three-four years following the Phase I award. In practical yerms, there may be any number of reasons why a particular company may not in fact be considered currently SBIR-involved. They applied for - but were not selected - fo Phase II; they have outgrown SBIR employment limitations; ben acquired etc. Nontheless, as an indicator of the Exent and Form of SBIR participation in a particular region, this aggregate approach is useful

** Later year projects (post 2004) should properly be considered as still part of the SBIR-STTR active pool. It can be assumed that in the next year or two, several more Phase I projects will continue into the more sophisticated work that is Phase II

*** Always in NIH, but to a lesser extent also in DOD, Phase II dollar are allocated incrementally over two-three years. It can be assumed that, even with no more Phase I or Phase II awards made - not alikely prospect, total award dollars will increase, probably quite substantially.

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SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
AZ	298	1,415	526	$451,127,095	119	405	139	$141,427,259
GA	264	775	279	$244,752,579	113	258	82	$80,898,537
IL	469	1,362	492	$415,514,121	193	441	139	$136,626,663
MD	905	4,073	1,477	$1,301,997,446	331	1,132	325	$344,019,750
MI	449	1,572	640	$538,096,278	198	542	181	$187,069,940
MO	160	423	137	$121,933,905	73	143	35	$38,792,430
NE	46	128	51	$56,039,628	17	43	8	$10,841,625
NM	269	1,429	517	$410,966,134	92	342	91	$98,407,761
NY	890	3,519	1,385	$1,209,357,487	334	1,024	345	$359,553,589
OR	240	952	422	$354,994,290	95	256	81	$87,934,701
TN	201	708	304	$215,150,316	70	139	58	$52,201,905
TX	773	3,178	1,175	$1,107,069,558	284	1,033	336	$364,426,216
Totals for these 12 states	4,964	19,534	7,405	$6,426,998,837	1,919	5,758	1,820	$1,902,200,376
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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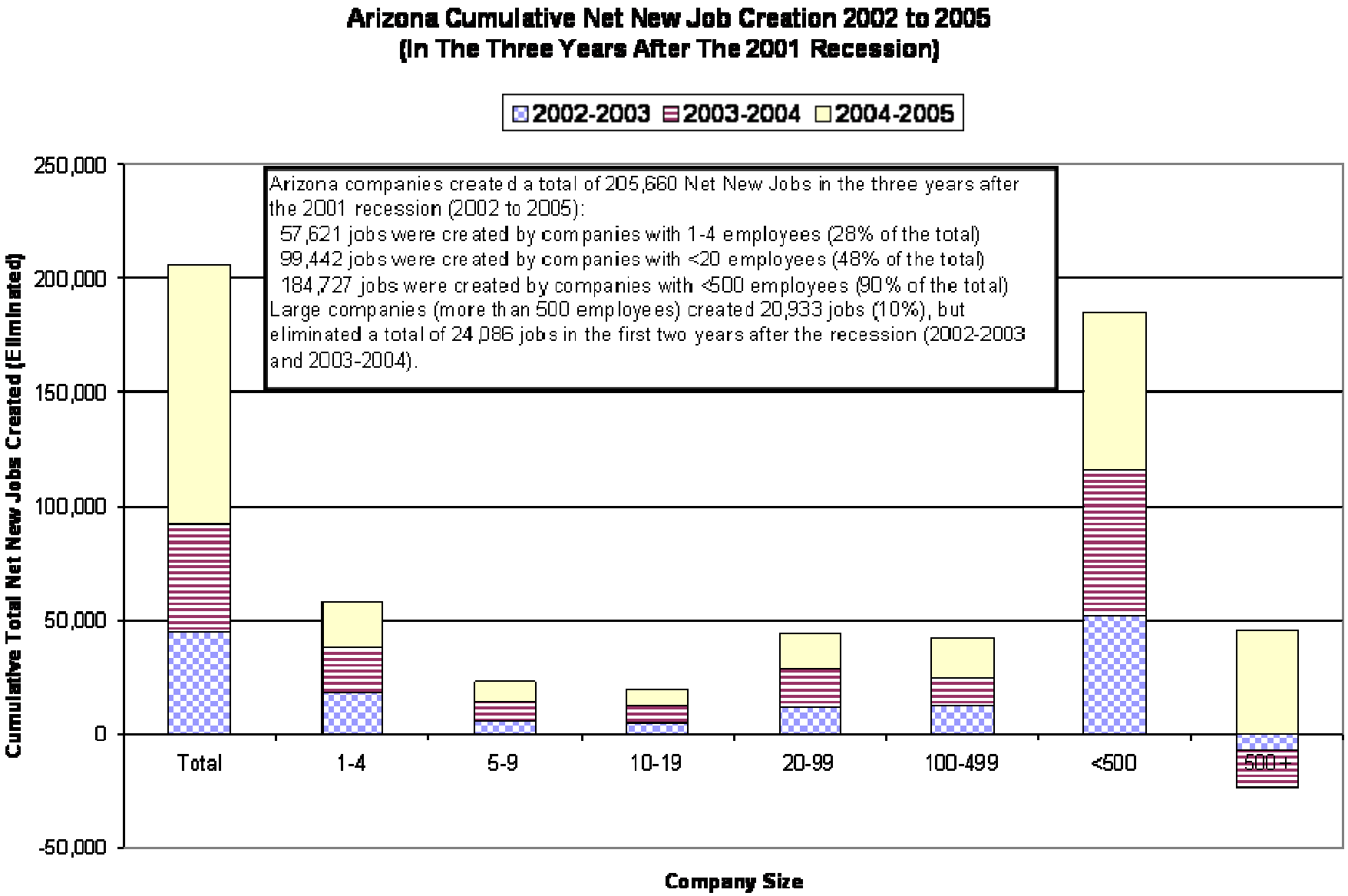
Arizona


Arizona Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Arizona companies created a total of 205,660 Net New Jobs in the three years after the 2001 recession (2002 to 2005):
57,621 jobs were created by companies with 1-4 employees (28% of the total)
99,442 jobs were created by companies with <20 employees (48% of the total)
184,727 jobs were created by companies with <500 employees (90% of the total)
Large companies (more than 500 employees) created 20,933 jobs (10%), but eliminated a total of 24,086 jobs in the first two years after the recession (2002-2003 and 2003-2004).
250,000
200,000
150,000
100,000
50,000
0
-50,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500 +
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
AZ	298	1,415	526	$451,127,095	119	405	139	$141,427,259
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Arizona

High Tech Jobs (2006)	111,623
Estimated SBIR employment	7,772
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	6.79%

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Patent Information on SBIR-STTR Awardees in the State of Arizona

- Of the 5,893 SBIR-STTR firms having patents, 86 are from the State - 1.46%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	950
Percentage of SBIR-STTR Patents to the State	1.40%

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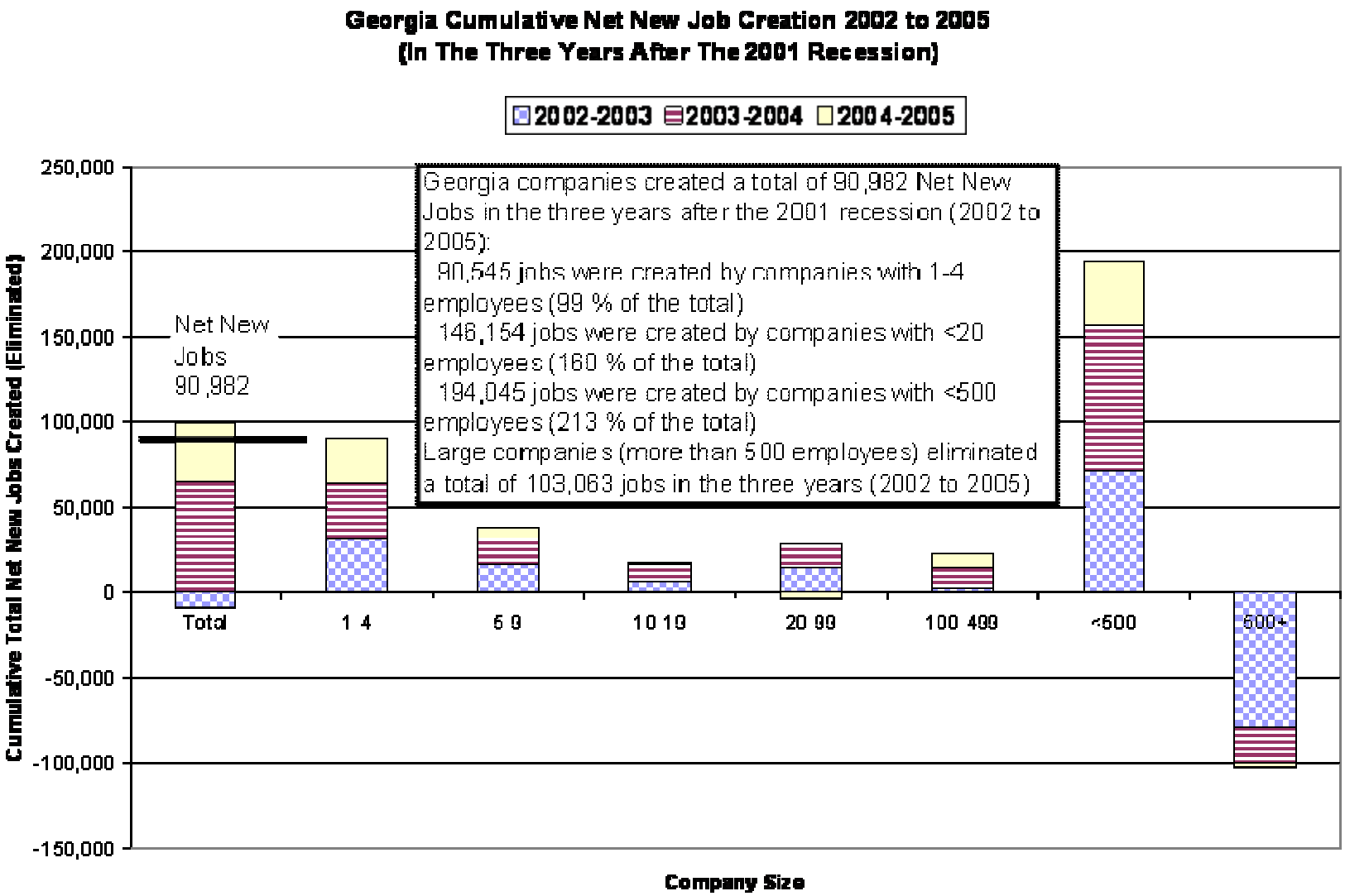
Georgia


Georgia Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Georgia companies created a total of 90,982 Net New Jobs in the three years after the 2001 recession (2002 to 2005):
90,545 jobs were created by companies with 1-4 employees (99 % of the total)
146,154 jobs were created by companies with <20 employees (160 % of the total)
194,045 jobs were created by companies with <500 employees (213 % of the total)
Large companies (more than 500 employees) eliminated a total of 103,063 jobs in the three years (2002 to 2005)
Net New Jobs 90,982
250,000
200,000
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1 4
5 9
10 19
20 99
100 499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: *Technology and Innovation*. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
GA	264	775	279	$244,752,579	113	258	82	$80,898,537
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Georgia

High Tech Jobs (2006)	162,497
Estimated SBIR employment	4,825
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	2.97%

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Patent Information on SBIR-STTR Awardees in the State of Georgia

- Of the 5,893 SBIR-STTR firms having patents, 65 are from the State - 1.10%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	631
Percentage of SBIR-STTR Patents to the State	0.93%

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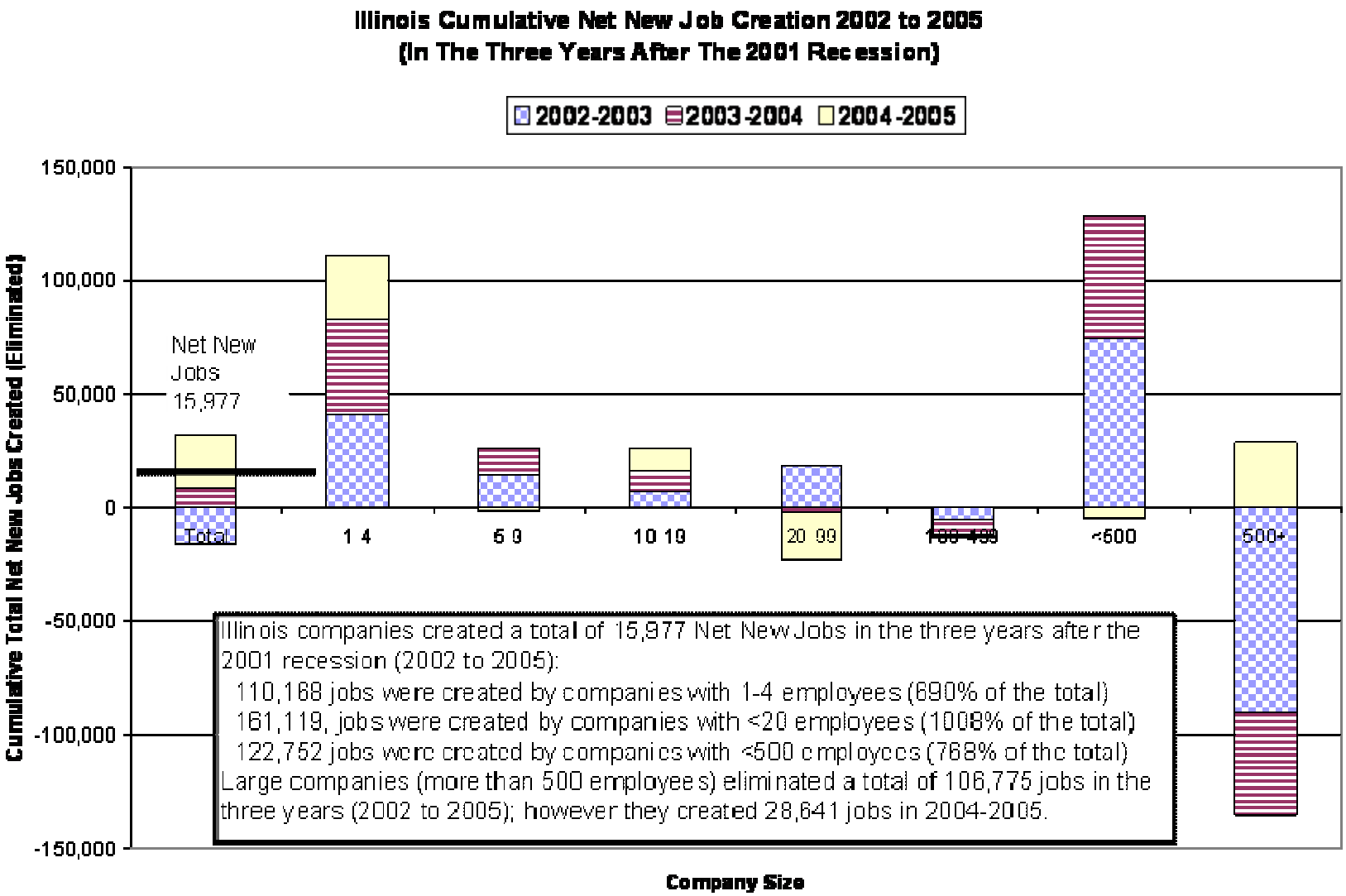
Illinois


Illinois Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
Cumulative Total Net New Jobs Created (Eliminated)
Net New Jobs 15,977
Total
1 4
5 9
10 19
20 99
100-499
<500
500+
Company Size
Illinois companies created a total of 15,977 Net New Jobs in the three years after the 2001 recession (2002 to 2005):
110,168 jobs were created by companies with 1-4 employees (690% of the total)
161,119, jobs were created by companies with <20 employees (1008% of the total)
122,752 jobs were created by companies with <500 employees (768% of the total)
Large companies (more than 500 employees) eliminated a total of 106,775 jobs in the three years (2002 to 2005); however they created 28,641 jobs in 2004-2005.

SBIR-STTR Data by State of Member of House Science Sub-Committee: *Technology and Innovation*. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
IL	469	1,362	492	$415,514,121	193	441	139	$136,626,663
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Illinois

High Tech Jobs (2006)	205,702
Estimated SBIR employment	5,771
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	2.81%

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Patent Information on SBIR-STTR Awardees in the State of Illinois

- Of the 5,893 SBIR-STTR firms having patents, 138 are from the State - 2.34%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	1,017
Percentage of SBIR-STTR Patents to the State	1.50%

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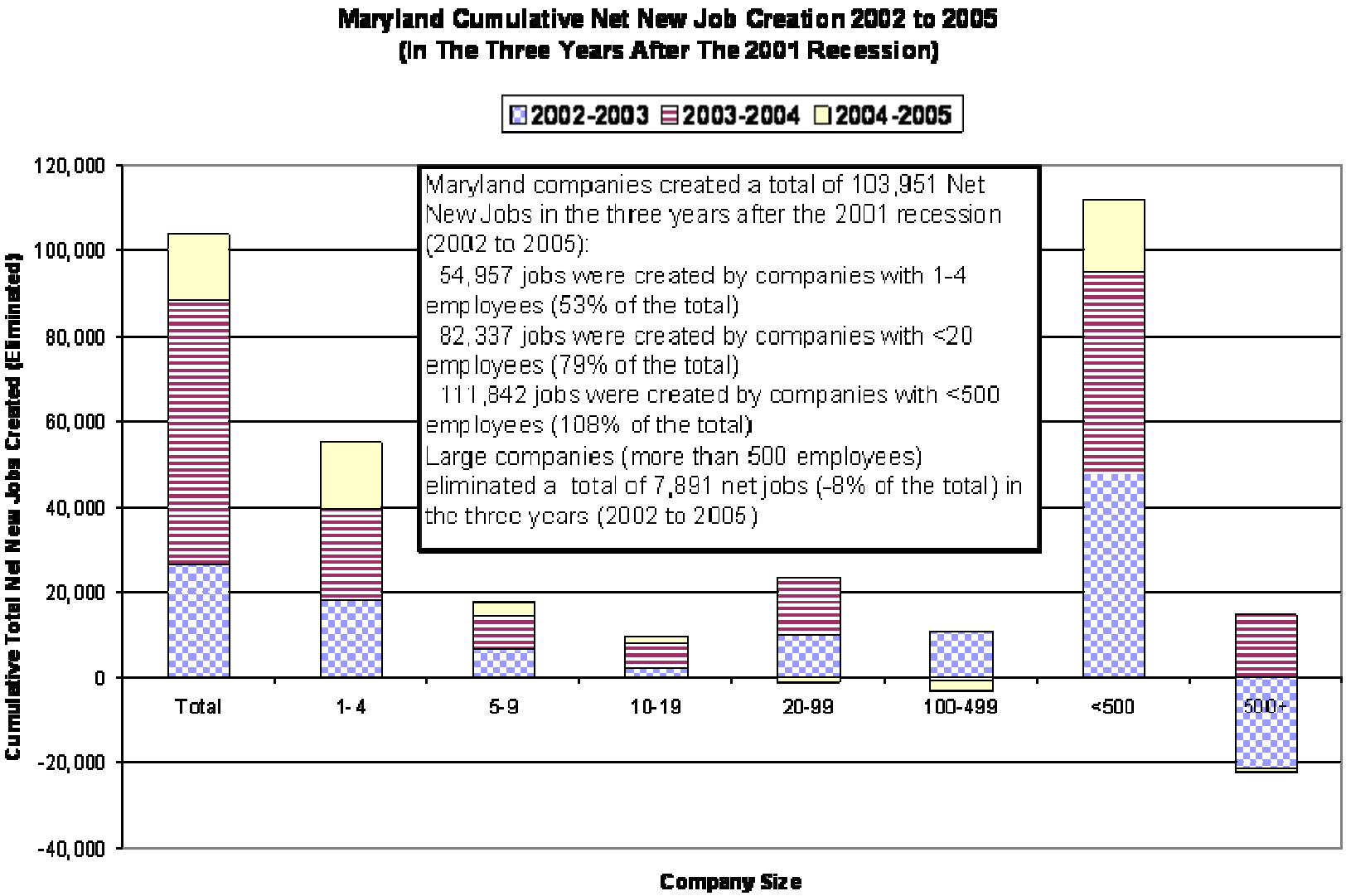
Maryland


Maryland Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Maryland companies created a total of 103,951 Net New Jobs in the three years after the 2001 recession (2002 to 2005):
54,957 jobs were created by companies with 1-4 employees (53% of the total)
82,337 jobs were created by companies with <20 employees (79% of the total)
111,842 jobs were created by companies with <500 employees (108% of the total)
Large companies (more than 500 employees) eliminated a total of 7,891 net jobs (-8% of the total) in the three years (2002 to 2005)
120,000
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
MD	905	4,073	1,477	$1,301,997,446	331	1,132	325	$344,019,750
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Maryland

High Tech Jobs (2006)	162,230
Estimated SBIR employment	28,172
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	17.38%

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Patent Information on SBIR-STTR Awardees in the State of Maryland

- Of the 5,893 SBIR-STTR firms having patents, 281 are from the State - 0.90%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	2,578
Percentage of SBIR-STTR Patents to the State	3.80%

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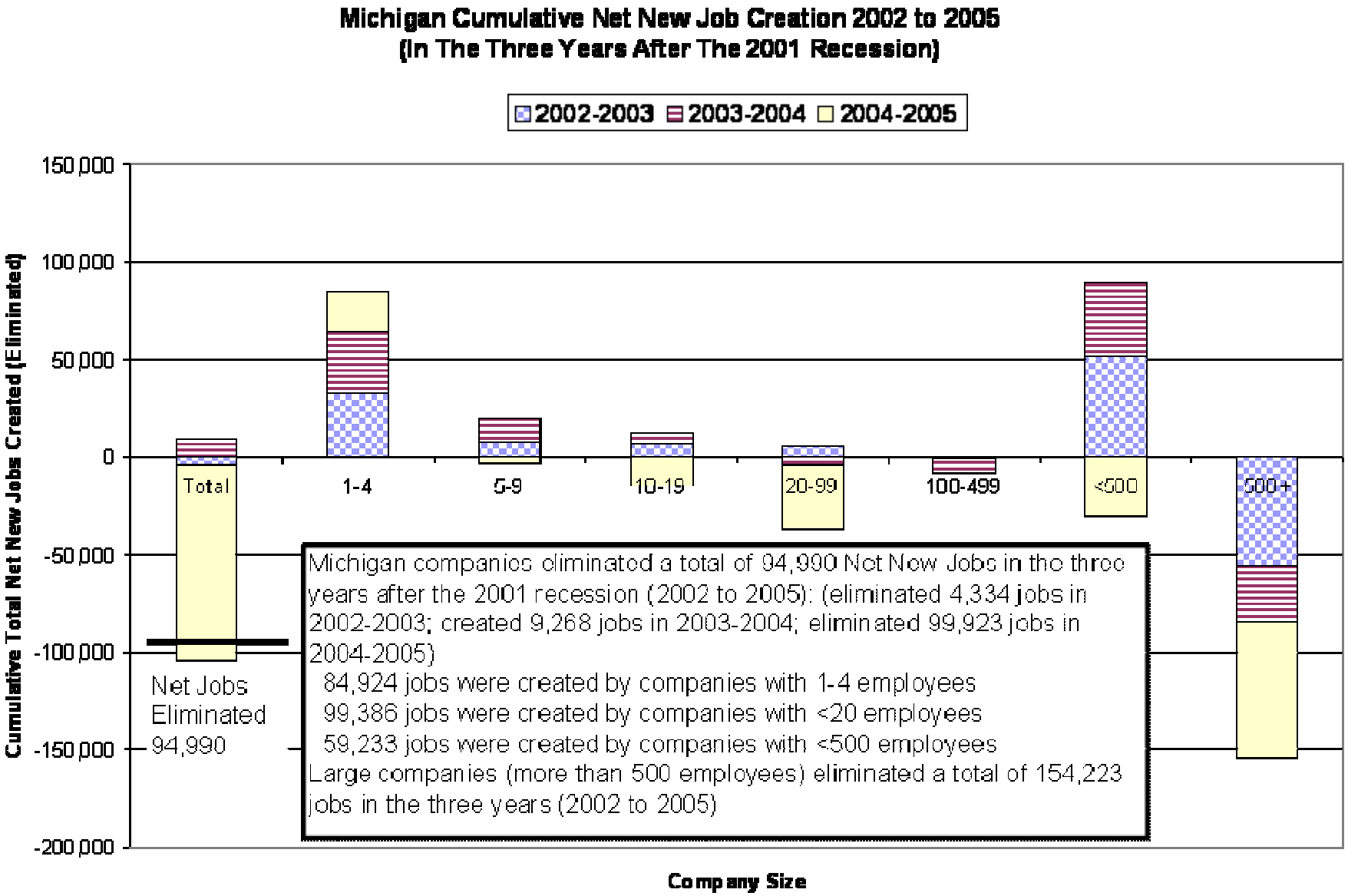
Michigan


Michigan Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
-200,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Net Jobs Eliminated 94,990
Michigan companies eliminated a total of 94,990 Net New Jobs in the three years after the 2001 recession (2002 to 2005): (eliminated 4,334 jobs in 2002-2003; created 9,268 jobs in 2003-2004; eliminated 99,923 jobs in 2004-2005)
84,924 jobs were created by companies with 1-4 employees
99,386 jobs were created by companies with <20 employees
59,233 jobs were created by companies with <500 employees
Large companies (more than 500 employees) eliminated a total of 154,223 jobs in the three years (2002 to 2005)
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: *Technology and Innovation*. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
MI	449	1,572	640	$538,096,278	198	542	181	$187,069,940
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Michigan

High Tech Jobs (2006)	177,163
Estimated SBIR employment	10,683
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	6.03%

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Patent Information on SBIR-STTR Awardees in the State of Michigan

- Of the 5,893 SBIR-STTR firms having patents, 142 are from the State - 2.41%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	1,655
Percentage of SBIR-STTR Patents to the State	2.44%

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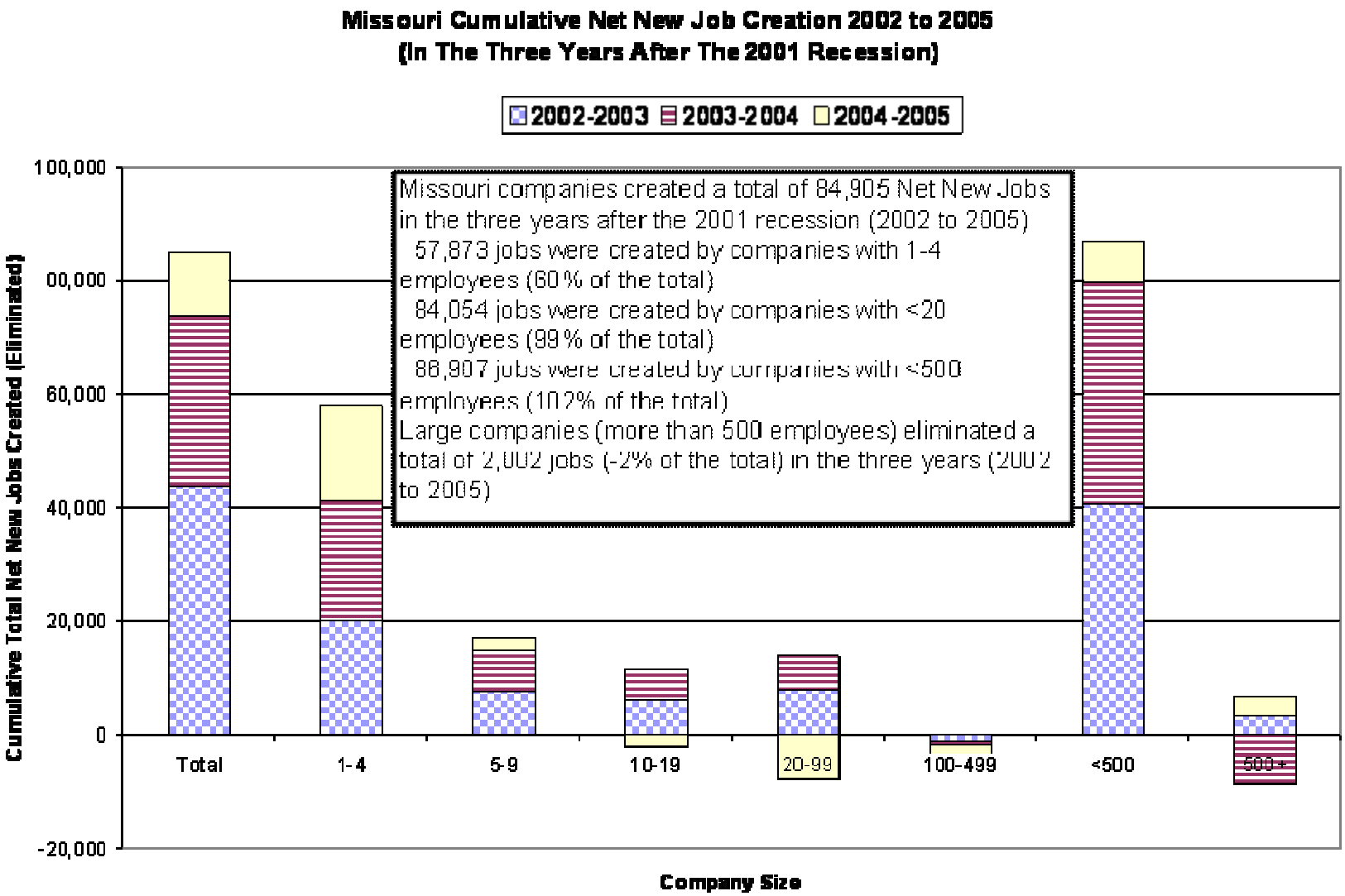
Missouri


Missouri Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Missouri companies created a total of 84,905 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
57,873 jobs were created by companies with 1-4 employees (60% of the total)
84,054 jobs were created by companies with <20 employees (99% of the total)
88,907 jobs were created by companies with <500 employees (102% of the total)
Large companies (more than 500 employees) eliminated a total of 2,002 jobs (-2% of the total) in the three years (2002 to 2005)
100,000
00,000
60,000
40,000
20,000
0
-20,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
MO	160	423	137	$121,933,905	73	143	35	$38,792,430
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Missouri

High Tech Jobs (2006)	88,326
Estimated SBIR employment	4,039
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	4.57%

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Patent Information on SBIR-STTR Awardees in the State of Missouri

- Of the 5,893 SBIR-STTR firms having patents, 48 are from the State - 0.81%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	415
Percentage of SBIR-STTR Patents to the State	0.61%

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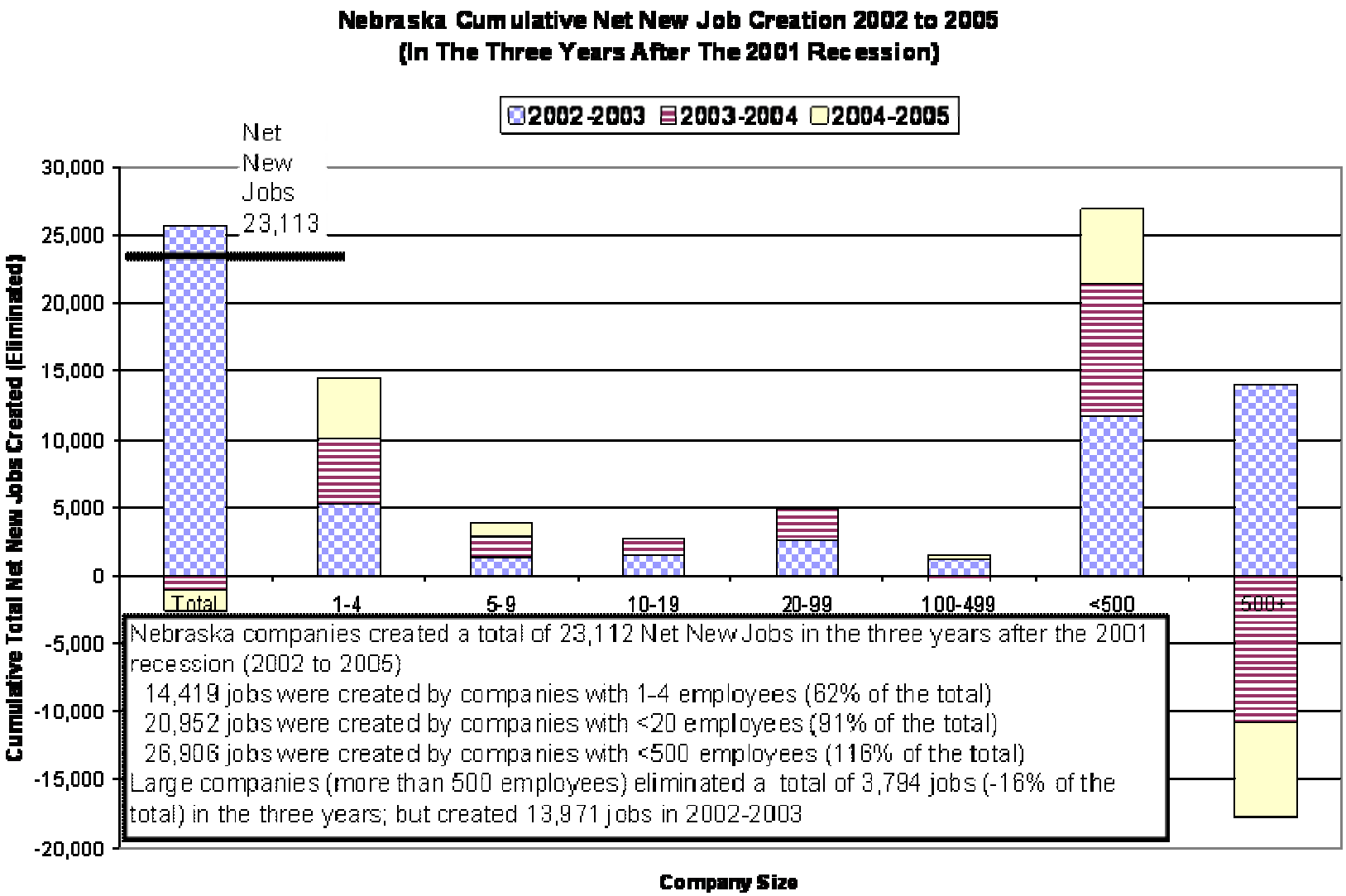
Nebraska


Nebraska Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Net New Jobs 23,113
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
-10,000
-15,000
-20,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Nebraska companies created a total of 23,112 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
14,419 jobs were created by companies with 1-4 employees (62% of the total)
20,952 jobs were created by companies with <20 employees (91% of the total)
26,906 jobs were created by companies with <500 employees (116% of the total)
Large companies (more than 500 employees) eliminated a total of 3,794 jobs (-16% of the total) in the three years; but created 13,971 jobs in 2002-2003
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
NE	46	128	51	$56,039,628	17	43	8	$10,841,625
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Nebraska

High Tech Jobs (2006)	30,034
Estimated SBIR employment	951
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	3.17%

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Patent Information on SBIR-STTR Awardees in the State of Nebraska

- Of the 5,893 SBIR-STTR firms having patents, 18 are from the State - 0.31%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	300
Percentage of SBIR-STTR Patents to the State	0.44%

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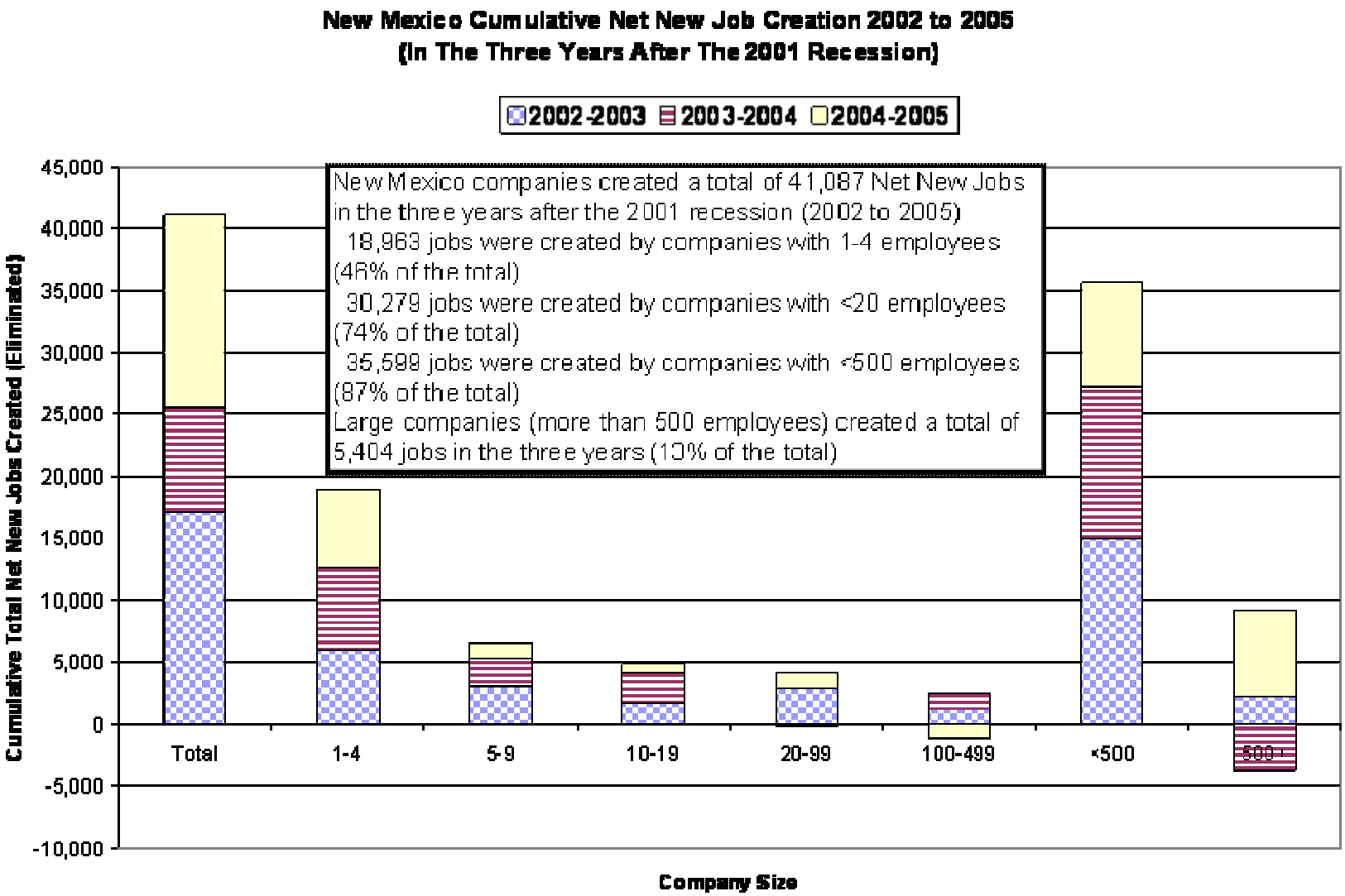
New Mexico


New Mexico Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
New Mexico companies created a total of 41,087 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
18,963 jobs were created by companies with 1-4 employees (46% of the total)
30,279 jobs were created by companies with <20 employees (74% of the total)
35,589 jobs were created by companies with <500 employees (87% of the total)
Large companies (more than 500 employees) created a total of 5,404 jobs in the three years (13% of the total)
Cumulative Total Net New Jobs Created (Eliminated)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
-5,000
-10,000
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
NM	269	1,429	517	$410,966,134	92	342	91	$98,407,761
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of New Mexico

High Tech Jobs (2006)	42,872
Estimated SBIR employment	7,650
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	17.88%

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Patent Information on SBIR-STTR Awardees in the State of New Mexico

- Of the 5,893 SBIR-STTR firms having patents, 76 are from the State - 1.29%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	603
Percentage of SBIR-STTR Patents to the State	0.89%

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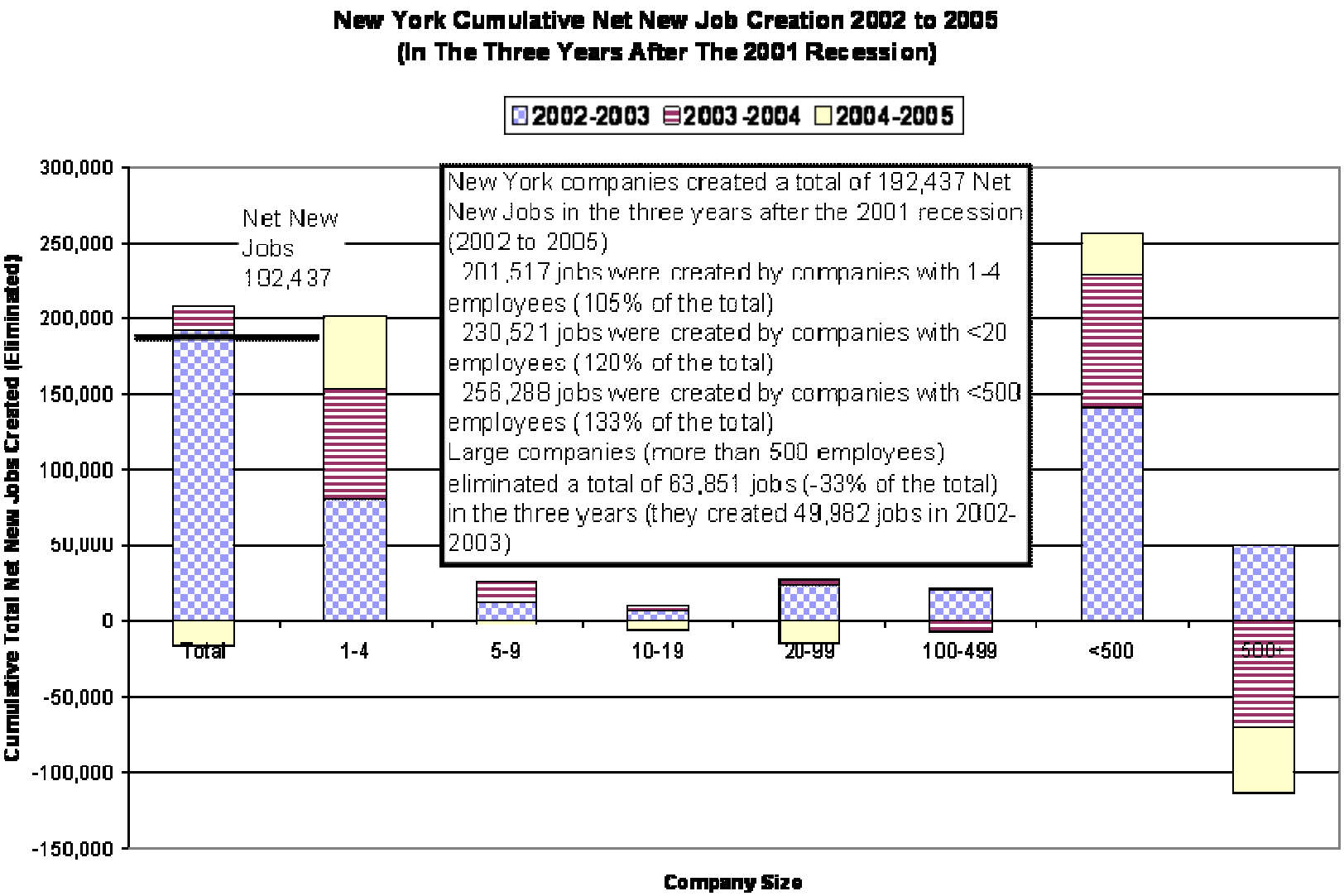
New York


New York Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Net New Jobs 192,437
New York companies created a total of 192,437 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
201,517 jobs were created by companies with 1-4 employees (105% of the total)
230,521 jobs were created by companies with <20 employees (120% of the total)
256,288 jobs were created by companies with <500 employees (133% of the total)
Large companies (more than 500 employees) eliminated a total of 63,851 jobs (-33% of the total) in the three years (they created 49,982 jobs in 2002-2003)
300,000
250,000
200,000
150,000
100,000
50,000
0
-50,000
-100,000
-150,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
NY	890	3,519	1,385	$1,209,357,487	334	1,024	345	$359,553,589
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of New York

High Tech Jobs (2006)	299,921
Estimated SBIR employment	25,938
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	8.65%

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Patent Information on SBIR-STTR Awardees in the State of New York

- Of the 5,893 SBIR-STTR firms having patents, 293 are from the State - 4.97%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	3,431
Percentage of SBIR-STTR Patents to the State	5.06%

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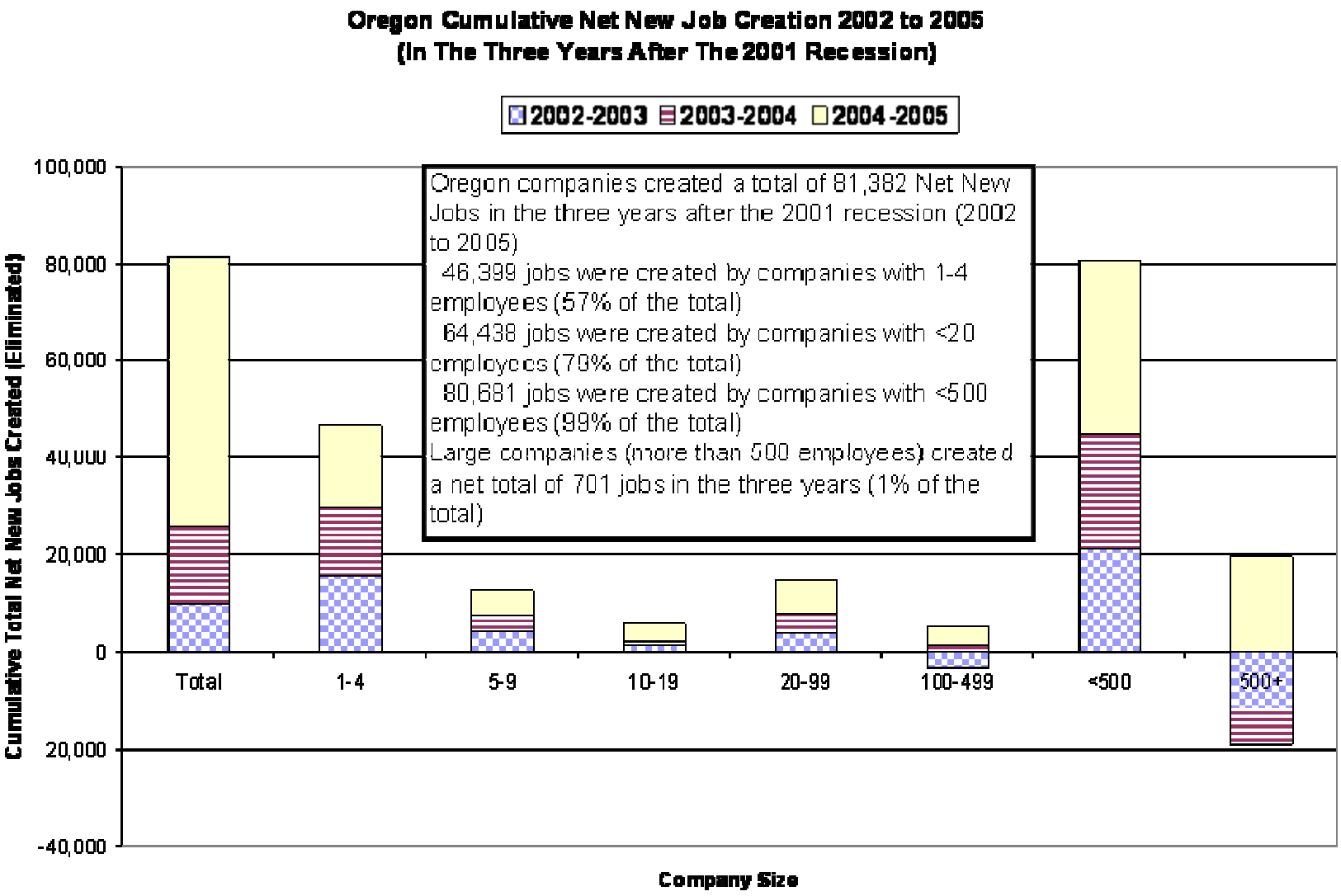
Oregon


Oregon Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Oregon companies created a total of 81,382 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
46,399 jobs were created by companies with 1-4 employees (57% of the total)
64,438 jobs were created by companies with <20 employees (79% of the total)
80,681 jobs were created by companies with <500 employees (99% of the total)
Large companies (more than 500 employees) created a net total of 701 jobs in the three years (1% of the total)
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
OR	240	952	422	$354,994,290	95	256	81	$87,934,701
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Oregon

High Tech Jobs (2006)	83,091
Estimated SBIR employment	9,537
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	11.48%

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Patent Information on SBIR-STTR Awardees in the State of Oregon

- Of the 5,893 SBIR-STTR firms having patents, 72 are from the State - 1.22%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	1,084
Percentage of SBIR-STTR Patents to the State	1.60%

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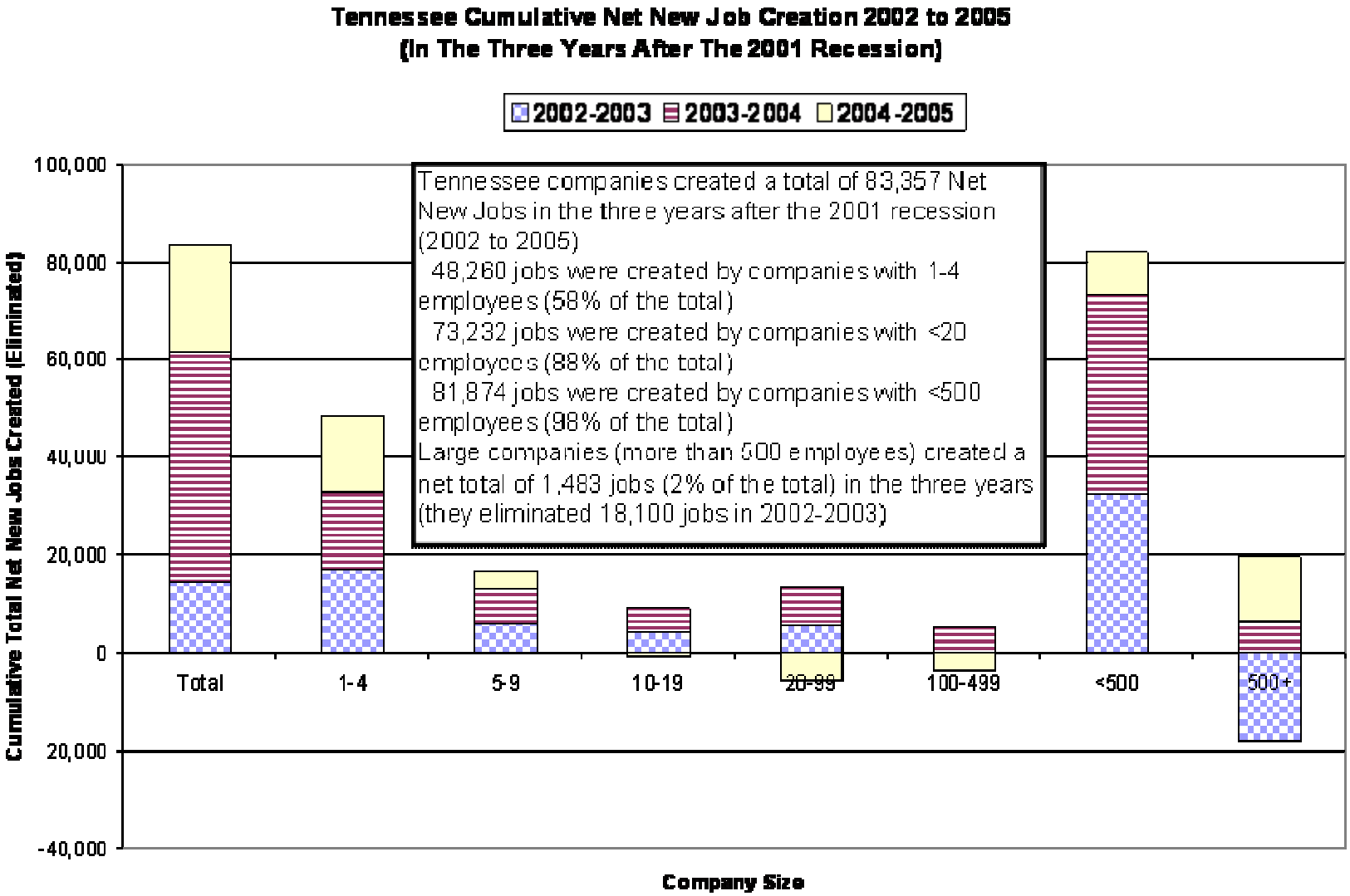
Tennessee


Tennessee Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Tennessee companies created a total of 83,357 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
48,260 jobs were created by companies with 1-4 employees (58% of the total)
73,232 jobs were created by companies with <20 employees (88% of the total)
81,874 jobs were created by companies with <500 employees (98% of the total)
Large companies (more than 500 employees) created a net total of 1,483 jobs (2% of the total) in the three years (they eliminated 18,100 jobs in 2002-2003)
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
TN	201	708	304	$215,150,316	70	139	58	$52,201,905
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Tennessee

High Tech Jobs (2006)	63,089
Estimated SBIR employment	6,153
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	9.75%

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Patent Information on SBIR-STTR Awardees in the State of Tennessee

- Of the 5,893 SBIR-STTR firms having patents, 58 are from the State - 0.98%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	275
Percentage of SBIR-STTR Patents to the State	0.41%

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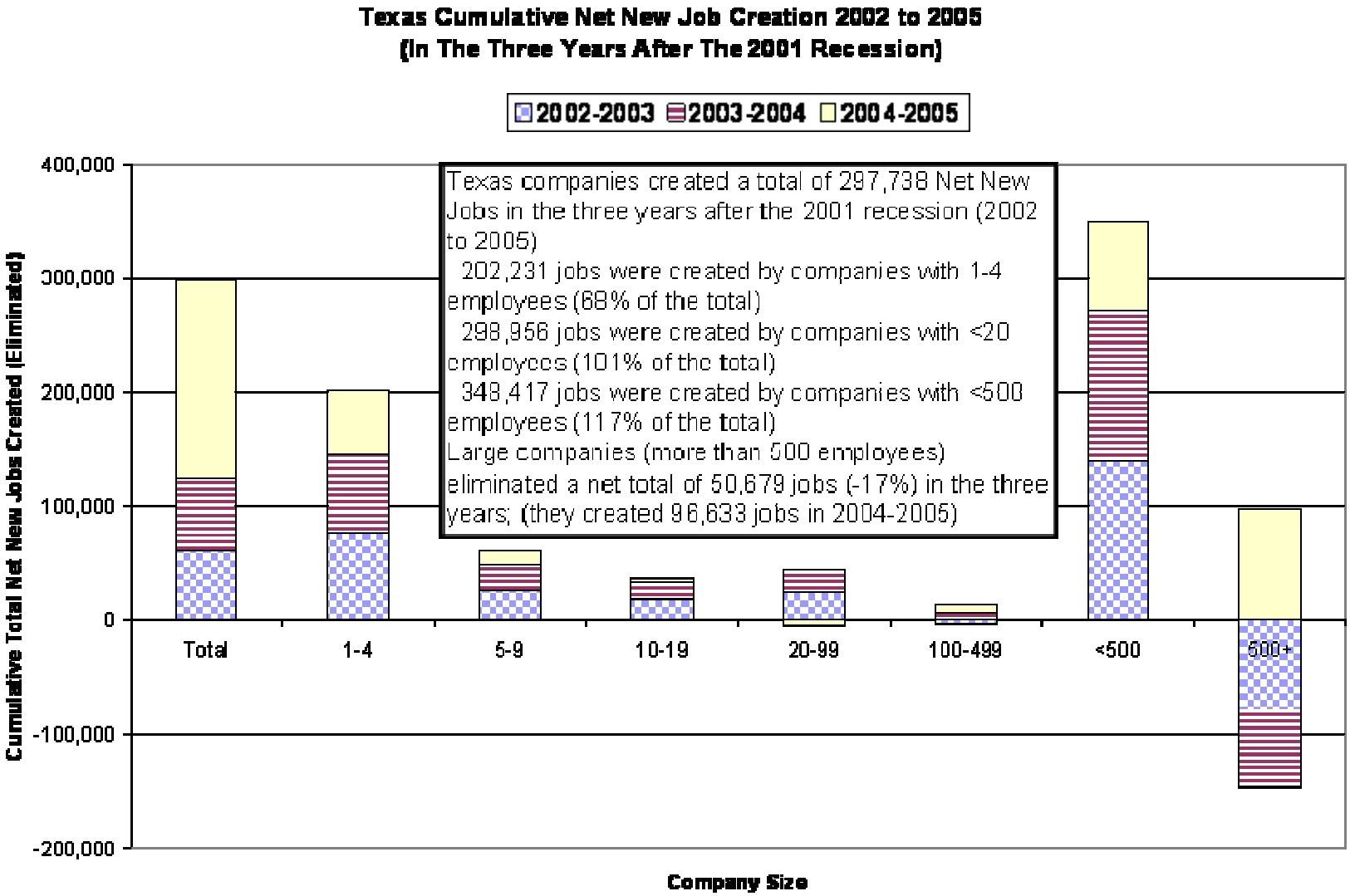
Texas


Texas Cumulative Net New Job Creation 2002 to 2005
(In The Three Years After The 2001 Recession)
2002-2003
2003-2004
2004-2005
Texas companies created a total of 297,738 Net New Jobs in the three years after the 2001 recession (2002 to 2005)
202,231 jobs were created by companies with 1-4 employees (68% of the total)
298,956 jobs were created by companies with <20 employees (101% of the total)
348,417 jobs were created by companies with <500 employees (117% of the total)
Large companies (more than 500 employees) eliminated a net total of 50,679 jobs (-17%) in the three years; (they created 96,633 jobs in 2004-2005)
400,000
300,000
200,000
100,000
0
-100,000
-200,000
Cumulative Total Net New Jobs Created (Eliminated)
Total
1-4
5-9
10-19
20-99
100-499
<500
500+
Company Size

SBIR-STTR Data by State of Member of House Science Sub-Committee: Technology and Innovation. Total Numbers of SBIR Awardees, Phase I-II and Total Dollars (April 2009)

State	Life of Program: 1983-present (to include FY 09 announcements so far made- April 2009)				Current SBIR-Activity: relevant data for the FIVE year period 2004-present			
	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars	Total # Awardees	Total SBIR-STTR Awards		Total SBIR-STTR Dollars*
		Phase I	Phase II			Phase I	Phase II*	
TX	773	3,178	1,175	$1,107,069,558	284	1,033	336	$364,426,216
Totals for whole program	*18,073*	*81,139*	*31,416*	*$27,227,402,761*	*6,920*	*22,801*	*7,339*	*$7,683,661,597*

* There is a considerable time-lag between a Phase I and the onset of a Phase II.It Is not unusual to see a Phase II begin 2,3,4 or even 5 years after the Phase I award. Similarly, especially in in NIH, Phase II award segments are awarded and reported incrementally (usually annually). Consequently, one can properly assume that Phase totals and Phase II dollars on current projects will continue to increase, sometimes substantially.

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Contribution of SBIR-STTR Involved Firms to High Tech Employment in State of Texas

High Tech Jobs (2006)	445,785
Estimated SBIR employment	24,432
Estimated percentage of High Tech Jobs in State Resident in SBIR involved firms	5.48%

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Patent Information on SBIR-STTR Awardees in the State of Texas

- Of the 5,893 SBIR-STTR firms having patents, 223 are from the State - 3.78%

Patenting Activity in SBIR-STTR Program	
Total Number Patents program-wide	67,859
Total Patents in State	2,620
Percentage of SBIR-STTR Patents to the State	3.86%

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