Testimony of

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BEFORE THE SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION
COMMITTEE ON SCIENCE AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES

Reauthorization of the Small Business Innovation Research Programs And "Unleashing American Innovation"

26 April 2007

On behalf of

The Small Business Technology Council *(202) 785-4300* www.sbtc.org

and

The National Small Business Association *(202) 293-8830* www.nsba.biz

SBTC is the nation's largest association of small, technology-based companies in diverse fields, and the largest concentration of companies active in the federal Small Business Innovation Research (SBIR) Program. SBTC is proud to serve as the technology council of the National Small Business Association.

This year celebrating its 70th birthday, 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, Representative Gingrey, members of the Subcommittee, good afternoon. Thank you for inviting me to appear here today. I am Bob Schmidt, founder and President of Cleveland Medical Devices, Inc. and of Orbital Research, Inc. CleveMed makes brain monitoring devices that we sell all over the world. Orbital Research makes microelectomechanical (MEMS) systems and is developing third-generation flight control technologies for the U.S. military. My two companies employ about 70 people, and we train about a dozen students each semester. We have researched, developed, and commercialized new technologies through the Small Business Innovation Research (SBIR) Program.

Harvard University and *Inc.* Magazine, among others, have recognized the companies' rapid growth. And we have received two Tibbetts Awards, which are given annually to outstanding companies in the SBIR Program.

I am also here today on behalf of the Small Business Technology Council, the nation's largest organization of small, technology-based companies in diverse fields. Over 250 SBTC companies have won SBIR contract awards, from all eleven issuing agencies, making SBTC also the largest concentration of SBIR award winners from across the government.

SBTC serves as the Technology Council of the National Small Business Association, and I am appearing here today on NSBA's behalf as well. NSBA is a nonprofit small business organization that serves over 150,000 companies. NSBA is the nation's oldest small business advocacy group and was the founder of the "small business movement" in the United States. It celebrates its 70th anniversary in two weeks.

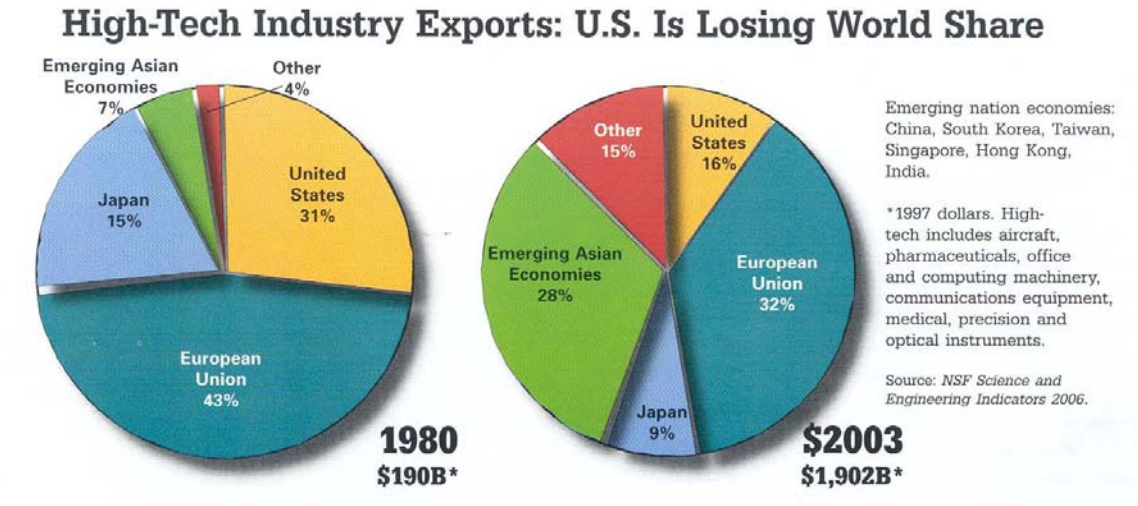
Two months ago, NSBA's biennial "Small Business Congress" selected the reauthorization of the SBIR Program as one of the top four small business legislative priorities for the 110th Congress – right behind taxes and health care.

Today, as the Subcommittee considers reauthorizing the SBIR Program, we would like to offer our views and address the questions that the Subcommittee posed of us.

I. THE U.S. AS A GLOBAL TECHNOLOGY COMPETITOR

This Subcommittee, as well as the full Science and Technology Committee, have had longstanding concerns about our nation's standing as a global leader in technology. While the U.S. currently remains the acknowledged front-runner in technological innovation, there are a number of indications that our global leadership is in jeopardy.

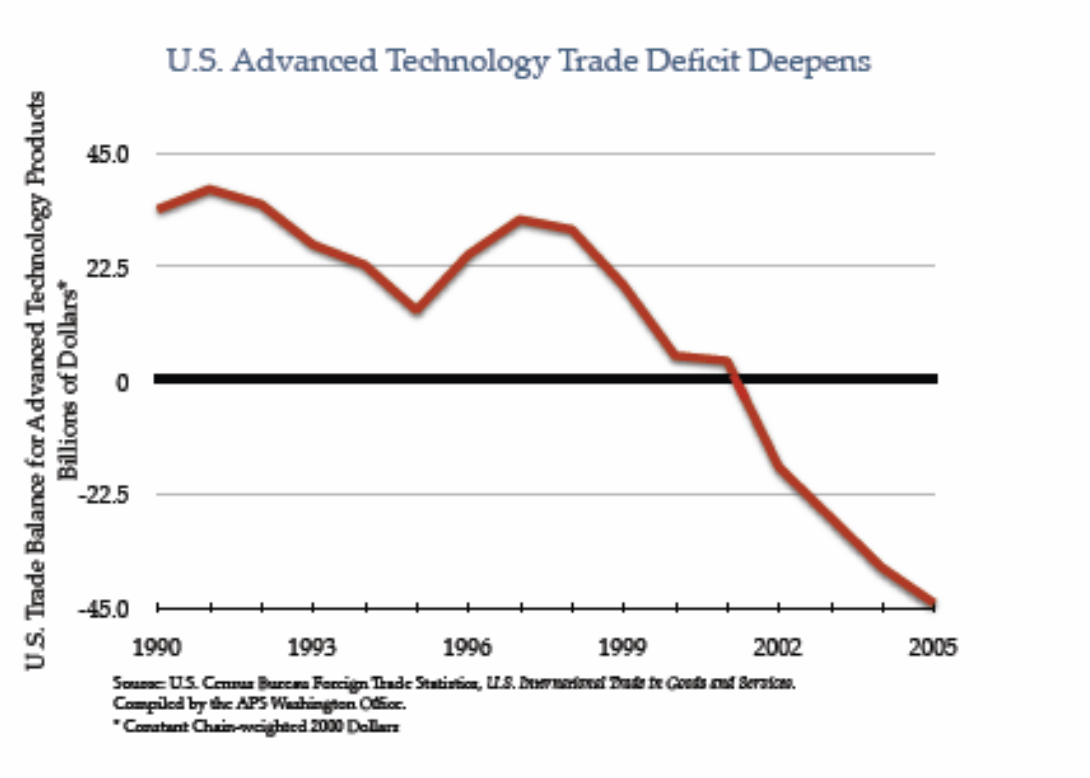
Consider the status of U.S. technology products in international trade.[1]



While the overall pie has gotten bigger, the U.S. share has been cut in half.

A parallel development has been the shift of the United States from a technology-exporting nation to an importing one.

Ten years ago, the U.S. had about a $30 billion trade surplus in high technology exports. By 2005, as the chart below shows, that had fallen precipitously to a $45 billion trade ***deficit***.[2]



These trends are in part due to the success of some of our global competitors in copying U.S. innovation-promotion programs like SBIR, the Advanced Technology Program (ATP) and the Manufacturing Extension Program (MEP). SBIR variants are now in use in at least twenty countries. SBA reports that delegations from other countries appear regularly to inquire about how SBIR is organized and administered.

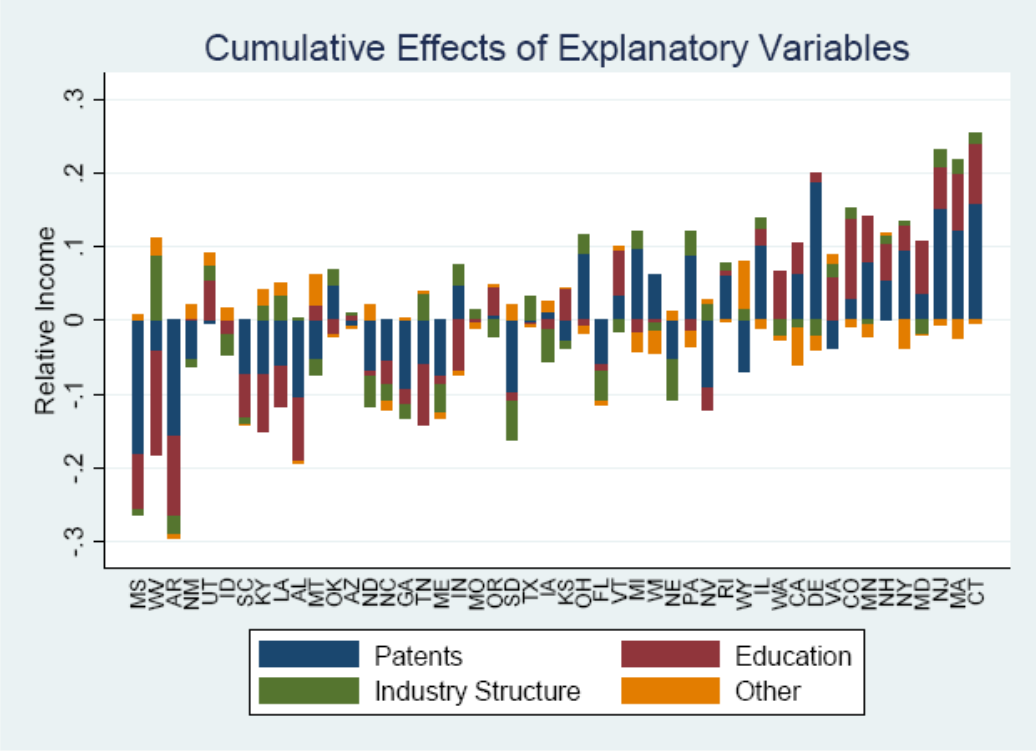
Overall, many countries are more active than our own in targeting and promoting innovation as a national economic strategy. So in addition to improving and expanding the SBIR program, Congress should consider strengthening ATP and MEP. Science and engineering studies at our high schools and universities should be enhanced, as well.

The declining shares of technology exports – and rising technology imports – by the U.S. also represent a threat to economic growth at the regional and local level, where wealth creation is increasingly linked to the ownership of knowledge.

For a striking illustration of this relationship, we can turn to a recent economic study by Paul Bauer, Mark Schweitzer and Scott Shane.[3] The authors measured eight determinants of personal income growth per capita, in the 48 contiguous states of U.S., from 1939 to 2004. (Each determinant had been highlighted in previous studies.) Among these were: the size of private financial markets, tax burdens, public infrastructure, business failure rates, industry structure, climate, bank deposits, and knowledge stocks.

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.*

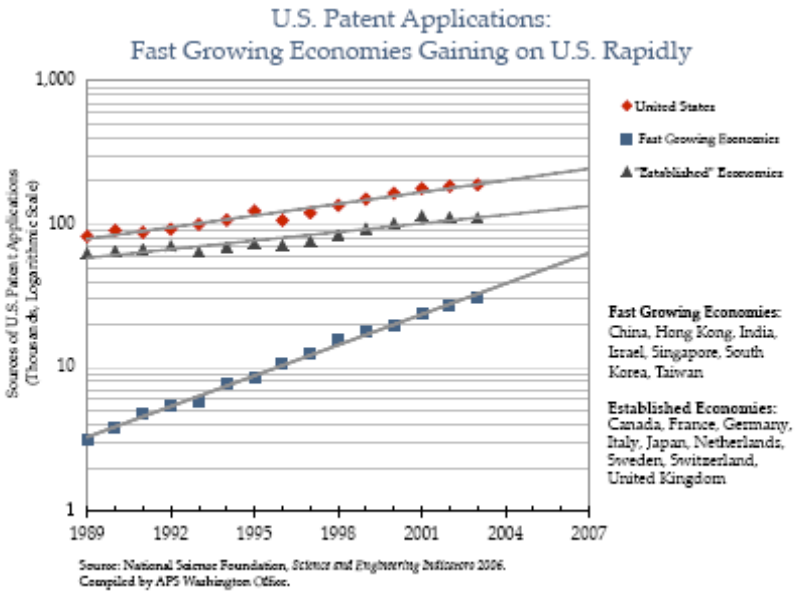
The chart[4] below shows the power of this indicator in each of the 48 states studied:



Broadly speaking, the above chart can be read from left to right. States with lagging growth are on the left; those with higher growth, on the right. The remarkable aspect of the patent indicator is that it correlates strongly with *both* the poorer states *and* the wealthier ones – and does so more than any other indicator. A lack of patents per capita is a leading indicator of relative poverty; a profusion is strongly associated with relative affluence.

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

The importance of patents is also well understood globally.[5]



II. CONSIDERATIONS FOR POLICYMAKERS

All of this leads to an obvious question: what can policymakers do to encourage a climate conducive to patenting?

The surprising answer is that Congress has *already taken* two of the most important steps possible in promoting the growth of patents: First, by means of the Bayh-Dole Act,[6] Congress assured innovators that they could maintain control of the intellectual property that they developed while working in conjunction with the federal government.

Second, and perhaps most important, Congress enacted the Small Business Innovation Research Program in 1982, and has since reauthorized it five times.

SBIR – and the subsequent Small Business Technology Transfer (STTR) Program -- put the creativity of technology-based small businesses to work in supplying the federal government's technology innovation needs. This was the first step in "Unleashing American Innovation."

Competitive, transparent, and focused, SBIR established a three-step process for stimulating innovation that was aligned with the natural evolution of an innovation through research and development to commercialization.

SBIR Program explicitly recognizes the different research styles and capabilities of large and small businesses.[7] Phases I and II of SBIR are reserved for small business. In the commercialization phase of SBIR, Phase III, where large company financial support, manufacturing expertise and marketing muscle is vital, such companies are welcomed into the Program. Indeed, they are indispensable to its success.

No innovation stimulation program in our nation's history has received such high marks from independent, third-party assessments.[8]

And none can point to such a stellar list of "graduates," including

Qualcomm
Symantec
Amgen
Biogen
Genzyme
Chiron
Titan
Nanosys
American Biophysics
Luna Innovations
JDS Uniphase
iRobot, and
Armorworks

to name but a few.

SBIR has delivered not only innovations and new companies – but also *patents*.

Throughout the 1980's and early 1990's the volume of patents produced by SBIR rose steadily. A tipping point came in 1997. For the first time, the number of SBIR-related patents exceeded the number of university-related patents. Since then, SBIR's lead has widened.

Today, the SBIR program is delivering about 50% more patents than *all U.S. universities combined*. In 2006, for example, there were 4588 patents issued to SBIR-related companies. Just over 2900 patents were issued to Universities.[9]

Not only are SBIR's patents plentiful. They are also produced very efficiently and are exceptionally valuable.

- SBIR's vast output of patents -- which now exceeds an average of 7 patents a day, and has surpassed 60,000 patents over the life of the program, with about 8,000 patents pending -- is being generated on ***one-twelfth*** the federal R&D funding that U.S. universities receive.[10]

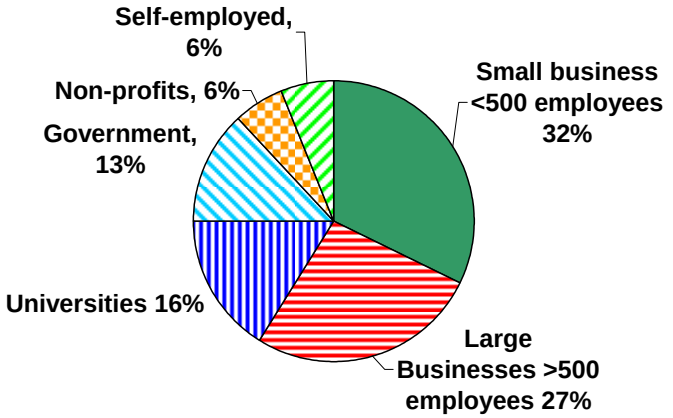
- Overall, smaller companies produce about ***13 times*** more patents per employee than large patenting firms.[11]

- These small company patents are twice as likely as large firm patents to be among the one percent most cited in scientific and technical literature and in subsequent patent applications.[12]

- And small firm innovation is twice as closely linked to current scientific research as large company research, on average, and is thus substantially more "high tech" or "leading edge."[13]

For scientists and engineers, the opportunity to own this valuable intellectual property has been one of the principal attractions of working in a small company setting. Indeed, so many scientists and engineers have migrated into smaller companies in recent years that these companies now have the nation's largest concentration of science and engineering talent.[14]

Figure 1. Percentage of Scientists and Engineers Employed In Government, Academia and Business (NSF 2003)



Put differently, *over half* the scientists and engineers in the private sector now work for smaller companies.

Together, these statistics tell an important story. It's this:

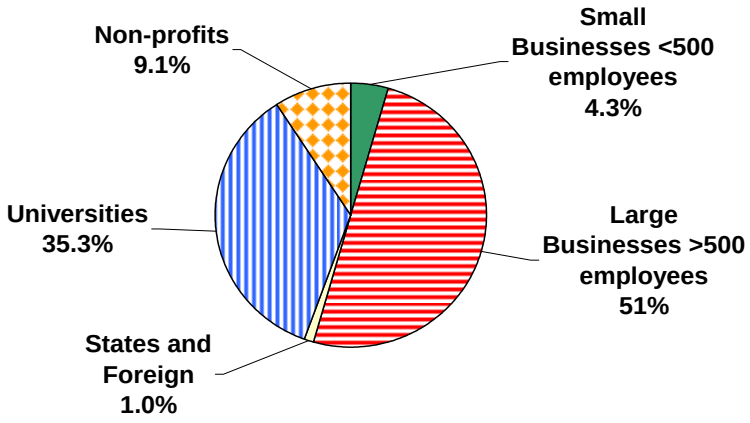
- Patents, and the technologies they represent, are strongly linked to both local economic growth and global competitiveness.

- Awarding competitive federal R&D contracts to small, technology-based businesses, in a rigorous and disciplined manner like that used by the SBIR Program, produces a very large number of high-quality patents.

But there's one problem.

Only ***4.3%*** of federal R&D dollars go to small companies -- and the SBIR and STTR Programs account for most of that.[15]

Figure 2. Percentage of Total Extramural Federal R&D Expenditures Received by Academia and Businesses $81.7 Billion (NSF FY-2005)



Thus, with one-third of the nation's scientists and engineers,

with a set of companies that is already producing 50% more patents than all the nation's universities combined – at one-twelfth the cost in federal R&D dollars –

with a track record of leading-edge patents and technologies,

and with the nation in need of accelerated technological advances to compete globally,

small technology-based companies still are obtaining less than one dollar out of every twenty that the federal government spends on extramural R&D.

Overall, extramural federal R&D spending is highly concentrated. In FY 2005, at the National Institutes of Health, one university received 1299 awards, valued at more than $600 million.[16] This exceeds all SBIR awards at NIH in FY2005.

The same situation prevailed at DoD, where one company's RDT&E awards greatly exceeded all SBIR awards.

In fact, RDT&E awards to the top ***three*** companies at DoD, in FY2005 alone, exceeded every dollar that has been spent on the SBIR Program – government-wide -- in the entire 25 year history of the Program. [17]

III. SBIR AND THE UNIVERSITIES

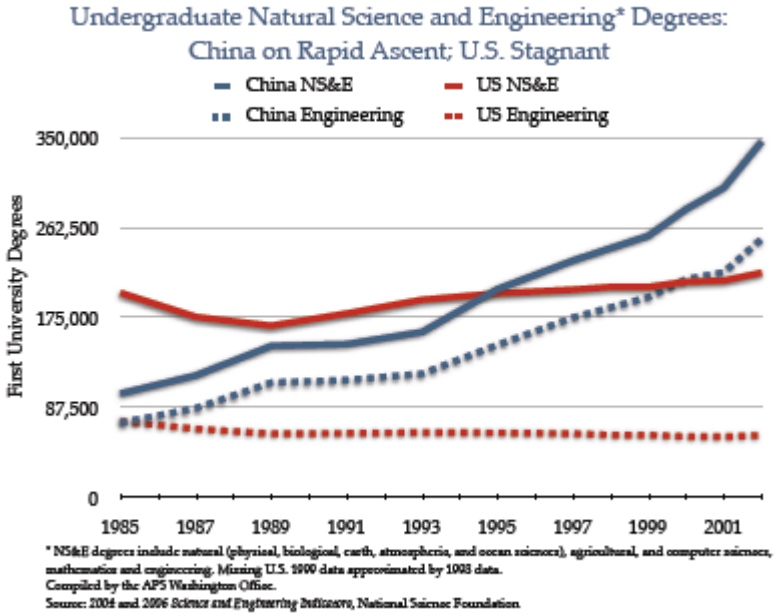
SBIR and STTR make an important contribution in another way, too. The Programs offer an especially important venue for public-private, and nonprofit-private, partnerships with Universities. SBIR researchers often have ties to universities, and STTR researchers always do. In my own two companies, I have used researchers from **Case Western Reserve, Cleveland State, Johns Hopkins, Michigan Tech, Notre Dame, Ohio State, University of Alabama-Huntsville, University of California Los Angeles, University of Michigan, University of Southern Florida, University of Toledo, and Washington University in St. Louis**. We have also partnered on projects with a number of universities, such as **Colorado State, the University of Utah and the University of Idaho.** And we provide internships for about a dozen university students every year

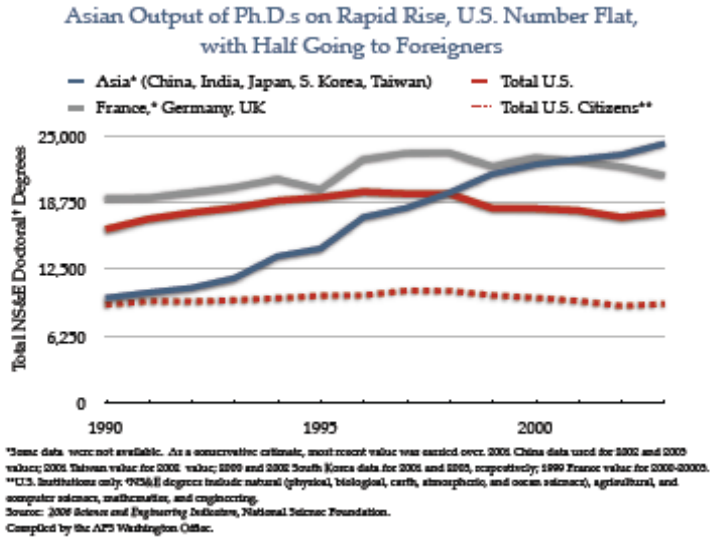
Together, SBIR/STTR companies and the Universities can:

- 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.

But there is an even more important reason why Universities and SBIR/STTR companies are natural partners. Just as SBIR/STTR companies need the flow of scientific and engineering graduates from the schools, so also Universities need the availability of attractive yet realistic private sector job opportunities to attract students in the first place. For many prospective science and engineering students, the challenges, relative freedom, and upside income potential of working in a leading-edge small company will be exactly what they are seeking.

With numerous studies suggesting that the nation urgently needs to graduate more scientists and engineers, Congress should enhance this important symbiosis between Universities and SBIR/STTR companies.[18]





The trend shown below is especially disturbing. In the past 4 years, the number of degreed scientist and engineers in the U.S. increased by less than 20,000 graduates per year. India, by contrast, is graduating 78,000 more scientist and engineers than four years ago -- almost doubling their output.

Four-Year Bachelor's Degrees in Engineering, Computer Science, and Information Technology Awarded in the United States, India, and China[19]

Country	2000-1	2001-2	2002-3	2003-4	2004-5	2005-6
United States	108,750	114,241	121,263	134,406	137,437	133,854
India		82,107	109,376	129,000	139,000	170,000
China				282,610	361,270	

IV. COMMERCIALIZATION OF SBIR TECHNOLOGIES

The SBIR Program is divided into three Phases that correspond to the *research*, *development*, and *commercialization* of an innovation. Since the Program's inception, Phase I (initial research) and Phase II (development of prototypes) in general have been handled well by the participating federal agencies.[20]

Where SBIR has needed improvement is in the commercialization phase (Phase III). Since it requires agencies to either find outside funding to commercialize an innovation, or to use non-SBIR agency funds to acquire the innovation for the agency itself, Phase III has been more challenging for agencies than simply using SBIR Phase I and Phase II to obtain desired R&D work.

Congress focused considerable attention on SBIR commercialization in the 2000 reauthorization. Since that time the rate of commercialization has steadily increased. As part of the SBIR solicitation process, companies must report their rate of success in commercialization, using published agency criteria. Today over 40% of all SBIR technologies reach the marketplace. This is truly a remarkable result.

And thanks to commercialization successes in some units within the Department of Defense,[21] Congress was able to advance Phase III broadly within DoD under legislation that was approved in 2006.

Called the Commercialization Pilot Program (CPP), the new law[22] is helping bridge a gap between promising defense R&D and the mainstream DoD acquisition system that has long been known colloquially as "the Valley of Death."

The new CPP Program suggests ways that commercialization might be improved across the government.

While the CPP has only been in place at DoD only since 2006, it has greatly increased the focus on SBIR insertion in the DoD procurement process. Actions taken by key officials during the past six months strongly suggest that a surge of SBIR technology insertion is ahead in the next 1 to 2 years.

V. REPLIES TO QUESTIONS POSED BY THE SUBCOMMITTEE.

1. SBIR Program effectiveness and recommendations.

The SBIR/STTR Programs have succeeded in the goal of recruiting smaller technology-based companies to help address federal R&D needs. Over 16,000 companies have participated in the SBIR program, and over 6,000 are currently active in it.[23] All available evidence indicates that the SBIR/STTR Programs are working as well as, if not better than, other federal R&D programs. As noted above, although the SBIR/STTR programs receive about one-twelfth as much federal R&D funding as that allocated to universities,[24] SBIR and STTR companies generate about 50% more patents annually than all U.S. universities combined.[25]

It would be hard to overstate the financial significance of SBIR / STTR to small, technology-based businesses. The Programs are by far the nation's largest source of capital for early-stage R&D, particularly for high-risk projects.

It is not at all clear what would replace these Programs if they were to disappear.

- Banks typically will not lend to early-stage technology companies, especially over the time horizons that the companies would need for repayment.

- Smaller technology companies tend to be fueled by the dreams of their initial owners and investors. These individuals resist yielding equity – especially controlling equity -- to venture capitalists and other "outsiders." Even if the companies welcomed such equity participation, it would be hard to find.

- Venture capital tends to cluster in specific sectors and specific geographical areas; relatively little of it is available for early-stage technology firms like most SBIR/STTR firms, particularly those outside of the Boston and San Francisco Bay areas.

The core issue in SBIR/STTR reauthorization is that ***historically, nothing else has worked*** in drawing small, technology-based companies into the task of addressing federal R&D priorities.

Untapped small business technology capabilities are growing, as evidenced by their quantity and quality of patents as well as by the increased concentration of R&D talent in the sector.

The only ***proven, effective*** way to bring more of this capability to bear on the federal government's R&D needs is to gradually increase the percentage of federal R&D allocated to the SBIR and STTR Programs.

Agency flexibility. Agencies in the SBIR/STTR programs have diverse missions, and have been given considerable flexibility by Congress in administering their programs. SBTC agrees with this general orientation. However, certain basic rules do need to be observed and SBA does needs to function effectively as an effective Program coordinator and impartial adjudicator.

Definition of a small business. The most important rule for the program is that participation is statutorily limited to companies with fewer that 500 employees, including affiliates and subsidiaries. This requirement is derived not only from Congress' long-standing mandate that a small business must be one that is "independently owned and operated,"[26] but also from the need to avoid the "capture" by larger enterprises of the resources that Congress intended for small business.

There are occasional efforts to breach SBIR's statutory maximum of 500 employees; doing so would undermine both the central purpose of the program and the key ingredient of its success.

It is also appears totally unnecessary. If SBIR accounts for 2½% of extramural federal R&D, then the other 97½% is available for entities that are ***not*** small businesses.

Technologies developed by other agencies. An area where agency flexibility should be continued and expanded is encouraging agencies to fund Phase II awards, or promote the Phase III commercializations of, technology initially developed by other agencies in the SBIR/STTR Programs. Overlapping agency missions in fields like defense and homeland security, and science and life sciences, suggest that agencies should have be able to take advantage of technological breakthroughs in any part of the SBIR/STTR Programs. This type of sharing is in the public interest and has been occurring for several years. Congress should encourage it.

SBA management. SBIR and STTR are critical national R&D programs providing scarce dollars for early stage technologies of potentially great importance. The interests of the taxpayers in assuring the effective management and oversight of these programs and these dollars must be respected. SBA needs to strengthen its Office of Technology to provide this guidance and leadership to the participating agencies.[27]

Award levels. SBIR Phase I and Phase II award level sizes have not been adjusted since 1992. Inflation and other cost factors in the intervening years have made an upward revision necessary. At the same time, some agencies have simply "taken the law in their own hands." A GAO Report in 2005 found that more than half of NIH's SBIR awards in recent years exceeded the Program Guidelines agreed upon by Congress, SBA and OMB and published in the *Federal Register*.[28] The 2006 Senate Small Business and Entrepreneurship Committee report on SBIR reauthorization cites a $6.5 million Phase II award by NIH.[29] Such an award displaces almost *seven* Phase II contracts that could have been awarded if the Congressionally mandated cap of $750,000 had been observed.

Congress must be clear about this. Either SBIR/STTR Programs should grow by several orders of magnitude, or agencies must stop using the Programs as "piggy banks" to finance projects that should be funded from other agency sources.

SBTC generally agrees with the award size revisions contained in S. 3778 from the last Congress, which was approved by the Senate Small Business and Entrepreneurship Committee. The Committee bill raised Phase I awards caps from $100,000 to $150,000 and Phase II award caps from $750,000 to $1,250,000. However, SBTC would caution Congress that such increases in the caps will result in a significant reduction in the number of total SBIR awards (and therefore the number of companies participating in the Program) if overall SBIR dollars remain constant.

Depending on how awards were distributed between Phase I's and Phase II's within each agency, as many as 40% fewer companies could end up in the SBIR Program. This could represent a devastating loss of technological talent to the government. It is another compelling reason for increasing the percentage of federal R&D allocated to SBIR/STTR.

Of course, the SBIR/STTR dollar level might not remain constant. If the higher levels of R&D funding recommended by the President's Competitiveness Initiative were to be so allocated by Congress, the dollar size of the SBIR/STTR Programs would grow in tandem. But this is difficult to predict, and, in any event, future years could just as easily witness a *decline* in federal R&D spending.

The Senate bill also anticipates an opportunity for agencies to "override" the caps by 50%. The Phase I "override" would be $225,000; the Phase II, $1,875,000. This would obviously exacerbate the foregoing problem. SBTC would like to see clear conditions imposed on the agencies for any such "overrides." But again, those conditions could become more flexible if the allocation of funds going to the SBIR and STTR Programs is increased in the manner that we have recommended.

Commercialization funding gaps. Perhaps no subject is more important for this reauthorization than the effective transitioning of technology from the working prototype stage to production and utilization by the agencies or the private sector. Agency efforts like NIH's Phase IIB, NSF's Phase II+, and DoD's Commercialization Pilot Program are pointing the way. Successes like those experienced by the Navy show that such transitioning can be accomplished in ways that benefit the government and the taxpayers. SBTC urges Congress to incentivize agencies to match the successes of SBIR Phases I and II in SBIR Phase III. One key to this will be the expenditure of additional dollars on testing and evaluation.

Program administrative costs. SBTC is aware that strengthening the SBIR and STTR Programs in the ways we recommend will place additional administrative responsibilities on the participating agencies. Although SBTC has long opposed the transfer of dollars from contract awards to administrative overhead, we would, as we told the Senate last year, consider re-allocating no more than 1% of SBIR's total dollars to ***new*** agency administrative costs. We recommend that this funding increment be used strictly for strengthening commercialization of SBIR technologies, and that agencies be required to report on how any expenditure of these funds directly supports this objective.

Venture capital company participation in the SBIR Program.

Background. Since the SBIR Program is intended for small businesses, Congress made it a part of the Small Business Act and set a statutory cap of 500 employees for participating companies.

The Small Business Act defines a small business as one that is "independently owned and operated."[30]

Charged with implementing this mandate,[31] SBA promulgated the "affiliation rule,"[32] which states that in determining whether a business is small, all of the business' subsidiaries and affiliates will be counted, including any company controlling, controlled by, or under the mutual control of, the business claiming to be small. (Likewise, under the commercial codes of all 50 states, a firm that controls more than 50% of another company is treated as owning the company.)

This legal framework has not been challenged in over half a century. Tampering with it would set legal precedents affecting a large body of laws and regulations, ranging from tax laws to small business lending to the regulations and procurement policies affecting small businesses at dozens of federal agencies.

Under the SBIR rules, a venture capital company that is ***small*** by SBA's standards may hold a controlling interest in an SBIR company, as long as the combined entity is still small and is owned by individuals. A venture capital company that is ***large*** by that standard may hold a minority (less than 50%) interest in an SBIR company. The only prohibition is on ***control*** of an SBIR company by a ***large*** VC.

Current controversy. We are now in the fifth year, and third consecutive Congress, that elements of the biotechnology and venture capital industries have petitioned Congress and the Small Business Administration to override the SBA's legal framework for determining what is a small business.

The focal point of this dispute is a small group of large-VC-controlled firms that are seeking access to SBIR awards at the National Institutes of Health and perhaps other agencies.

The fact that the firms involved, and their VC backers, have spent this long unsuccessfully promoting these changes in Congress and at SBA should suggest that their arguments are far from persuasive when closely examined.

The fact that the firms and the VC's are back again in this Congress is linked, in SBTC's view, to a number of misleading or incorrect assertions about the issue.

We looked at these assertions very carefully in our Senate testimony last year;[33] here we will simply summarize some of them.

1) Let us start with the most emotional assertion. It is sometimes stated that the prohibition on SBIR access by large VC-controlled firms is denying patients with life-threatening diseases the "important, life-saving" medications they need. Various patient groups, among others, have been told this.

The simplest and most logical response is that if NIH funds proposals by these large venture-backed companies, then other “important, life-saving” proposals will *not* be funded.

Most proposals that NIH considers have life-saving implications. Until the NIH budget is large enough to fund every proposal, the competitive awards process will always yield winners and losers. For their part, SBTC members that are active in the NIH SBIR Program *also* fear that their “important, life saving” innovations will lose out -- to the large venture-backed companies.

They may well have more to fear.

Thanks to their deep-pocket backing, the companies that the VC's fund will be able to submit *multiple proposals* per solicitation. They won’t necessarily be more life-saving, but they will be more polished. They will also have features that do well under NIH’s scoring system -- like impressive looking "teams" and extensive preliminary research. It costs money to submit multiple proposals, to make them polished, to keep impressive teams on hold until an award decision is reached, and to conduct preliminary research. That is exactly where large VC-backed companies will have the edge.

Proposals that won't have that edge will be those from companies whose research interests don't fit the large VC business model, and who therefore don’t have that backing. Examples of research that generally doesn’t fit the model are treatments for orphan diseases, (which don’t generate a lot of cash flow), bioterrorism defenses (only one buyer, the federal government), and vaccines (patients only take the drug once, not daily). Yet a key reason for *creating* NIH was to address public health challenges such as these -- challenges that are often outside the normal commercial nexus of medicine. SBIR should support that mission, not attempt to distract the agency from it.

Whether or not large VC’s are interested in such areas, small companies are.

2) For some reason, the VC’s and their allies continue to state that “SBA changed the rules” on them. As noted, the Small Business Act and the affiliation rule are more than 50 years old. GAO looked at this “changed the rules” allegation in 2006 and correctly stated that SBA had *clarified* long-standing rules.[34] It may well be true that some large VC backed firms were obtaining SBIR awards prior to the clarification; it does not mean that SBA, having had that fact drawn to its attention, should have allowed it to continue. Nor does it mean that the large VC’s now have some “right” to demand such treatment.

3) Companies and associations seeking this change say that the SBIR Program at NIH will be strengthened by having the big VC backed companies in it.

The problem with this assertion is the disconnect between Phases I & II as they are intended to work in the SBIR Program and what VC’s prefer to fund. In VC terminology, Phase I represents “seed or startup” R&D and Phase II “early stage” R&D. Neither is much of a focus of VC’s.

Trends in Institutional Venture Investing by Stage of Development

	Startup/Seed		Early Stage		Expansion		Later Stage		Total*
1995	$1,313	**17%**	$ 1,684	**21%**	$ 3,681	**47%**	$ 1,198	**15%**	$ 7,879
1996	$1,492	**14%**	$ 2,744	**25%**	$ 5,143	**47%**	$ 1,632	**15%**	$ 11,014
1997	$1,310	**9%**	$ 3,450	**24%**	$ 7,592	**52%**	$ 2,259	**15%**	$ 14,612
1998	$1,751	**8%**	$ 5,421	**26%**	$ 10,434	**50%**	$ 3,194	**15%**	$ 20,811
1999	$3,275	**6%**	$ 11,701	**22%**	$ 29,848	**56%**	$ 8,652	**16%**	$ 53,476
2000	$3,094	**3%**	$ 25,573	**24%**	$ 59,979	**57%**	$ 16,054	**15%**	$104,701
2001	$ 730	**2%**	$ 8,961	**22%**	$ 23,024	**57%**	$ 7,989	**20%**	$ 40,703
2002	$ 290	**1%**	$ 3,927	**18%**	$ 12,320	**57%**	$ 5,160	**24%**	$ 21,697
2003	$ 357	**2%**	$ 3,454	**18%**	$ 10,100	**52%**	$ 5,674	**29%**	$ 19,585
2004	$ 407	**2%**	$ 3,987	**18%**	$ 9,257	**43%**	$ 7,985	**37%**	$ 21,639
2005	$ 736	**3%**	$ 3,396	**16%**	$ 7,821	**36%**	$ 9,727	**45%**	$ 21,680

* in millions of dollars

source: Venture Economic/NVCA/Pricewaterhouse Coopers 'Money Tree'

Seed capital currently accounts for a minuscule $3 out of every 100 that large VC's invest, and early stage capital only 16%. A large VC presence in the NIH SBIR Program seems likely to inexorably draw the Program away from its mission to provide scarce R&D dollars for high-risk, early stage R&D.

There is another problem as well. Congress intended for the SBIR Program to harvest innovations from across the country, even in areas not known as technology centers. That is why the Federal and State Technology (FAST) Program and Rural Outreach (RO) Program were developed by Congress as adjuncts to SBIR. They have been fairly successful. In the "best practice" FAST and RO state programs, more than one out of every three companies receiving the training goes on to obtain an SBIR award.

By contrast, venture capital investors generally operate out of a headquarters in a technology center and try to invest in companies that they can personally visit on a regular basis. This is perfectly reasonable, but it is a far different model than SBIR. The different outcomes can be seen in the contrasting distribution of dollars, in the chart below.

SBIR Program Compared to Venture Capital Investment

Concentration of Dollars By State, 2004

Measure	SBIR Contract Awards	Venture Capital Disbursed
Total dollars	$2.0 billion	$20.9 billion (10 x SBIR)
Percentage of dollars going to top 5 states	45%	70%
Percentage of dollars going to "middle 20" states (ranked 15-35)	24.3%	5.9%
Percentage of dollars going to bottom 5 states	2.1%	.002%
States receiving ***less than*** $1 million	4	7
States receiving ***less than*** $4 million	9	15
States receiving $10 million to $100 million	26	13
States receiving ***more than*** $1 billion	0	3

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

Note: both sets of figures include the District of Columbia and Puerto Rico

So apart from the damage that the intrusion of large companies would do to the integrity of SBIR as a *small business* program focused on *very early-stage* R&D, the rise of large VC's in the SBIR Program will shift the distribution of SBIR's dollars more toward the relative handful of cities and states that the VC's focus on.

Recall the chart on patents and wealth creation at the beginning of my testimony. Then reflect on what a shift in SBIR toward the VC model would mean for large swaths of the nation.

An SBIR Program that is not truly a small business program, and not truly national, would soon be curtailed by Congress, and deservedly so.

There is a vital and necessary place for large VC's in the SBIR Program.

It is in Phase III.

Companies entering the commercialization phase of SBIR urgently need to partner with outside investors – and this is precisely the stage of R&D development that VC's prefer in the first place. Thus neither Congress nor SBA sets any restrictions on the size of companies that can participate in Phase III of SBIR.
If this does not meet the needs of large VC's, SBTC would be willing to work them to craft another program that does – an offer we have made repeatedly over the years.

Now would be a good opportunity to create such a program. It could be tied in to the strengthening of ATP and MEP, two important innovation programs for companies of all sizes that SBTC strongly supports.

But SBIR needs to stay focused on the core issue that we have outlined -- that the nation still is receiving only a fraction of the innovation benefits it could –- if the growing number and capabilities of small technology companies were better utilized. Efforts to correct this problem should not lose their focus or become diluted.

VI. SBTC'S RECOMMENDATIONS TO CONGRESS

In my opinion, SBIR appears to be the most successful program that Congress has ever devised to stimulate innovations; now is the time to expand the Program and make it permanent.

SBTC recommends that Congress:

1. Make the Program permanent. SBIR is the largest single source of patents in the United States. 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. It should not have to justify its existence every few years. Delays in Congressional approval of reauthorization, 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 permanent, 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.

To further 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% on FY2008 and 0.9% in FY2009 and thereafter.

3. Strengthen commercialization of SBIR. SBTC suggests that Congress take several new actions that will help "Unleash American Innovation."

First, if the funding for SBIR and STTR is increased as suggested above, allowable Phase I and Phase II SBIR and STTR funding should be increased during 2008 and 2009 to $150,000 for Phase I and $1,250,000 in Phase II, and indexed to inflation, to allow more work to be performed under the initial two phases of the program.

Second, starting in 2009, one third of the increased funding in the SBIR and STTR programs over the 2007 funding levels should be set aside for funding "Phase 2c" type initial manufacturing prototypes and testing by the agency and other commercial clients or for clinical trials deemed important to the agency's mission.

Third, a "CPP" ***type*** program should be formed in the NIH, NASA, and DoE. Additional funding should be provided, and the Program opened up to companies that have received VC funding from all sources.

4. Reinforce the intellectual property rights of SBIR companies. In a recent decision involving the intellectual property rights of an SBIR company, the court appeared to misinterpret longstanding Congressional intent on the issue.[35] SBTC would like to work with Congress in rectifying this problem.

We believe that these actions will allow more new companies to be formed, SBIR and STTR companies to grow faster and larger, and encourage venture capital flows to those SBIR companies that are ready to enter the next stage of their growth.

The gap in funding the growing number of innovative small companies, and the scientific and technological innovators who work for them, has potentially important consequences for the nation. As Harvard economist Dale Jorgenson has noted about IT companies:

Since 1995, information technology industries have accounted for 25% of overall economic growth, while making up only 3% of GDP. As a group, these industries contribute more to economy-wide productivity than all other industries combined.[36]

[1] This table is taken from *Measuring the Moment*:: *Innovation, National Security and Economic Competitiveness*, a report of the Task Force on the Future of American Innovation, November 2006, p. 14. The Task Force members included: Agilent Technologies, Alliance for Science & Technology Research in America, American Chemical Society, American Chemical Society, American Electronics Association, American Institute of Physics, American Mathematical Society, American Physical Society, American Society for Engineering Education, Association for Computing Machinery,

Association of American Universities, Battelle, Business Roundtable, Computing Research Association, Computing Technology Industry Association, Council on Competitiveness, Electronic Industries Alliance, Google, Inc., Intel Corp., Luna Innovations, Inc., Microsoft Corp., National Association of Manufacturers, National Association of State Universities and Land-Grant Colleges, Northrop Grumman Corp., The Science Coalition, Semiconductor Industry Association, Southeastern Universities Research Association, Technology CEO Council, Telecommunications Industry Association, Texas Instruments Incorporated. http://futureofinnovation.org/PDF/BII-FINAL-HighRes-11-14-06_nocover.pdf

[2] *Ibid*., p. 13.

[3] See Federal Reserve Bank of Cleveland, "Altered States: A Perspective on 75 Years of State Income Growth," *Annual Report 2005*. 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

[4] *Ibid*., p. 46

[5] *Measuring the Moment*, *op.cit*., p.15

[6] 35 USC 200-212

[7] See William J. Baumol "Entrepreneurship, Innovation and Growth: the David-Goliath Symbiosis", *Journal of Entrepreneurial Finance and Business Ventures*, Vol. 7, Issue 2, Fall 2002, pp. 1-10.

[8] See for example the various GAO assessments*: 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; *Federal Research: Observations on the Small Business Innovation Research Program*, GAO Report GAO-05-861-T, June 28,2005. See also*: Small Business Innovation Research Program: Challenges and Opportunities*, Board on Science, Technology and Economic Policy, National Academies of Science and Engineering, 1999, *Conflict and Cooperation in the National Competition for High Technology Industry*, National Academy of Sciences, 1996; *SBIR: Assessment of the Department of Defense Fast Track Initiative*, STEP Board, National Academies of Science and Engineering, 2000. Another National Academy of Sciences study of the SBIR Program is ongoing, with a final report expected later in 2007.

[9] Source: SBIR patent database, Innovation Development Institute, www.inknowvation.com

[10] *Science and Engineering Indicators 2006*, National Science Foundation.

[11] *Small Serial Innovators: The Small Firm Contribution To Technical Change*, CHI Research, Inc, under contract to the U.S. Small Business Administration, March 2003, www.sba.gov/advo/research/rs225tot.pdf.

[12] Ibid.

[13] Ibid.

[14] *Science and Engineering Indicators 2006*, *op. cit.*.

[15] *Ibid.*

[16] See: http://grants2.nih.gov/grants/award/trends/Rnk_05_All.xls

[17] See: http://siadapp.dior.whs.mil/procurement/historical_reports/statistics/p02/fy2005/P02_05.pdf

[18] The two charts which follow are taken from *Measuring the Moment, op.cit*., pages 24 and 26.

[19] Vivek Wadhwa, Gary Gereffi, Ben Rissing, Ryan Ong. *Where the Engineers Are, Part 2*, Duke University School of Engineering Management, 2006

[20] See the studies cited in endnote 8, above.

[21] SBTC White paper, "Mining the Small Business Resource: Issues and Recommendations" vol. 1, No. 4 www.nsba.biz/docs/sbir_white_paper_iv_final_11_jan_07.pdf

[22] National Defense Authorization Act of FY2006, PL109-163, Sec. 252

[23] Source: SBIR patent databases, Innovation Development Institute, www.inknowvation.com, and U.S. Small Business Administration Office of Technology

[24] Source: National Science Foundation, *Science Indicators, 2006*

[25] See: www.inknowvation.com/PatentGraphsShow.html?graph=SBIRvsUnivPatents.gif

[26] This legal stipulation has been included in the Small Business Act (15 USC 632) since the Act was passed in 1953. It is the foundation of much subsequent small business law and a large body of federal rules.

[27] For a more complete discussion of this point, see the Small Business and Entrepreneurship Committee, U.S. Senate, *Small Business Reauthorization and improvements Act of 2006, Report Number 109-361*, p.46.

[28] *Small Business Innovation Research: Information on Awards Made by NIH and DOD in Fiscal Years 2001 through 2004*, GAO Report GAO-06-565.

[29] Small Business and Entrepreneurship Committee, U.S. Senate, *Small Business Reauthorization, op.cit.,* p.45.

[30] 15 USC 632(a) (1)

[31] 15 USC 623(a)(2)

[32] 15 CFR 121.103

[33] Accessible at: www.nsba.biz/docs/squillante_testimony__ssbec__july_12__2006_final.pdf

[34] *Small Business Innovation Research*…, *op.cit*., p. 1

[35] United States Court of Appeals for the Federal Circuit. Opinions, Decisions & Orders... 2006/11/22, 06-5048.pdf, CFC, Night Vision Corp. v. U.S

[36] Dale Jorgenson, *Moore's Law and the Emergence of the New Economy,* Semiconductor Industry Association, 2005.