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FULL COMMITTEE HEARING ON SBIR: AMERICA'S NATIONAL TECHNOLOGY DEVELOPMENT INCUBATOR

COMMITTEE ON SMALL BUSINESS UNITED STATES HOUSE OF REPRESENTATIVES

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CONTENTS

OPENING STATEMENTS

	Page
Velázquez, Hon. Nydia M.	1
Chabot, Hon. Steve	2

WITNESSES

Doerfler, Douglas, MaxCyte, Inc.	3
Beall, Robert, Cystic Fibrosis Foundation	5
Borrus, Michael, X/Seed Capital Management	7
Farrell, Lt. General Lawrence Doerfler, USAF (Ret.), National Defense Industrial Association	9
Bean, William, The College of William and Mary	11

APPENDIX

Prepared Statements:	
Velázquez, Hon. Nydia M.	27
Chabot, Hon. Steve	29
Altmire, Hon. Jason	30
Doerfler, Douglas, MaxCyte, Inc.	31
Beall, Robert, Cystic Fibrosis Foundation	39
Borrus, Michael, X/Seed Capital Management	46
Farrell, Lt. General Lawrence Doerfler, USAF (Ret.), National Defense Industrial Association	52
Bean, William, The College of William and Mary	64
Attachments to testimony of Lt. General Lawrence Doerfler, USAF (Ret.), National Defense Industrial Association	78
Letter to Chairwoman from Mr. William Bean, The College of William and Mary	210

FULL COMMITTEE HEARING ON SBIR: AMERICA'S NATIONAL TECHNOLOGY DEVELOPMENT INCUBATOR

Tuesday, January 29, 2008

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SMALL BUSINESS,
Washington, DC.

The Committee met, pursuant to call, at 10:06 a.m., in Room 2360, Rayburn House Office Building, Hon. Nydia M. Velázquez [chair of the Committee] Presiding.

Present: Representatives Velázquez, Cuellar, Braley, Clarke, Ellsworth, Johnson, and Chabot.

OPENING STATEMENT OF CHAIRWOMAN VELÁZQUEZ

Chairwoman VELÁZQUEZ. I call this hearing to order. This morning the Committee begins the process of reauthorizing the Small Business Innovation Research Program. This public/private partnership is key to the United States remaining a global leader in innovation and creating new jobs through all parts of the Nation. In fact, just last year, 5,000 small research firms, companies located in every State in the Nation received awards that total more than $2 billion.

As recent data demonstrate, the current economy is showing signs of a potential recession. During the last slow down, it was the technology sector, led by small firms, that provided a foundation for stronger growth. SBIR, with its emphasis on next-generation products, can help us emerge from this weak economic time stronger than before. In order to play this role however, the initiative must stay in sync with the very technology it seeks to promote.

When the Committee last authorized a program in 1999, the term Google was an obscure mathematical concept. Today, Google is one of the most well-known and largest companies in the United States. As technology changes, this program has to keep face. During this modernization effort, the Committee will make certain that the SBIR program is providing the resources for economically valuable technologies and not wasting its effort on second-rate science fair projects.

In order to ensure the full development of promising new product, the program should be given the capability to provide larger amounts of capital. For businesses facing difficulties going to market, the necessary assistance should be made available. New efforts must also be taken to reach the next generation of small companies, whether they are located in Silicon Valley or rural America.

Reducing the regulatory burden associated with the program and streamlining the application process is essential to increasing the competition for these important awards.

Finally, Federal agencies need more flexibility to implement the program both in terms of being creative but also in using what they have learned. These improvements will ultimately benefit the taxpayers in terms of greater competition for awards and higher levels of innovation. Together these changes will create an SBIR program that is responsive to today's economic environment. This includes creating more high-paying jobs; reducing our trade deficit; and emphasizing the importance of math and science education to American students. If we are able to promote these very goals in the program, then we will be successful in our reauthorization efforts.

Our Nation now more than ever needs a vibrant small business foundation to secure our economic future, and it is programs like SBIR that support this vision. With the prospect of a recession before us, entrepreneurial activity can provide a pathway to growth. It has done so before, and it will do so again. I want to thank all the witnesses for traveling here, and I look forward to your testimony. I now recognize Ranking Member Chabot for his opening statement.

OPENING STATEMENT OF MR. CHABOT

Mr. CHABOT. Thank you very much, Madam Chairwoman.

Good morning, and I want to welcome all of you to this hearing on the small business innovation research or SBIR program. I would like to extend a special thanks to each of our witnesses who have taken the time to provide the Committee with their testimony here this morning. We are anxiously waiting to hear from them. And a special welcome to Bill Bean, a professor and the director of Technology and Development Center at my alma mater, the College of William & Mary in Williamsburg, Virginia.

So we especially welcome you, Mr. Bean.

Today's hearing represents the beginning of the Committee's work to reauthorize the SBIR program which was last fully examined by this Committee back in 1999 and reauthorized in 2000. Created in 1982, the SBIR program offers competition-based awards to stimulate technological innovation among small private-sector businesses while providing government agencies new cost-effective technical and scientific technologies to meet their diverse mission needs.

The development of this program is not only critical to the unique needs of each of the participating Federal agencies but also to our national economy. Small businesses renew the U.S. economy by introducing new products and lower-cost ways of doing business, sometimes with substantial economic benefits. They play a key role in introducing technologies to the market, often responding quickly to new market opportunities. Some of the great technological innovations in this country came about from small business owners tinkering in their workshops, including two very famous people from Ohio, my State, the Wright brothers.

Several congressionally mandated and independently conducted research projects have closely examined the program to determine

how well it is performing in relation to congressional dictates. A study by the National Research Council found that the SBIR program is performing well in the Federal agencies required to operate the program. According to the National Research Council Study, the SBIR program provides entrepreneurs with funding to investigate and commercialize new technologies without diluting ownership through equity investment or taking on additional costly debt. Since one of the purposes of the SBIR program is to serve the mission needs of Federal agencies, the process can also lead to greater Federal procurement opportunities for participants. In turn, it will accelerate growth of these small businesses.

The SBIR program, as the National Research Council demonstrates, also provides significant benefits to Federal agencies by providing additional opportunities to solve operational needs. A program officer can post a solicitation that describes a particular problem and invites small businesses to propose research that will solve it. This contrasts with other Federal research awards where a researcher provides a proposal of personal interest. The nationwide scope of the program also ensures that the agency will investigate various research avenues.

Finally, the program, by leading to commercialization of the research, diversifies the Federal Government's industrial base. Competition among suppliers will lower prices to the government and save tax dollars. That said, this study does point to some weaknesses within the program and makes several recommendations for the Committee's jurisdiction to consider as we reauthorize the program this year. As we continue this process, we must consider topics such as examining cycle times from solicitation through phase three; understanding and managing firms; winning multiple awards; and increasing and improving oversight and program evaluations by the agencies involved. We will also need to scrutinize the current award size and administrative costs of the program as we move forward with the reauthorization.

Madam Chair, I look forward to working with you on this important issue. And again, I thank each of the witnesses for being here today, and I yield back the balance of my time.

Chairwoman VELÁZQUEZ. Thank you, Ranking Member Chabot.

Chairwoman VELÁZQUEZ. Our first witness is Mr. Douglas Doerfler. Mr. Doerfler is the President and CEO of MaxCyte, Inc., based in Gaithersburg, Maryland. Mr. Doerfler is testifying today on behalf of the Biotechnology Industry Organization. It represents more than 1,100 companies and organizations in the research and development of innovative health care, agricultural, industrial and environmental biotechnologies.

Mr. Doerfler, welcome. There is a timer, and you will have 5 minutes. When it is green, you can start. And then when it is red, your time is up. Welcome, sir.

STATEMENT OF DOUGLAS A. DOERFLER, PRESIDENT AND CEO, MAXCYTE, INC., GAITHERSBURG, MD, ON BEHALF OF THE BIOTECHNOLOGY INDUSTRY ORGANIZATION

Mr. DOERFLER. Thank you, Chairwoman Velázquez, Ranking Member Chabot, and Mr. Johnson. Thank you for your time this morning. I am the president and CEO, as mentioned, of MaxCyte.

I formed the company in 1999. I have about a 25-year career in developing biotech companies and biotech products around the world. My company is a small company. We are 20 employees. And what we do is we create drugs out of human cells, and we are involved in treating diseases like leukemia.

We have a clinical trial going on right now at Baylor College of Medicine. We also have a clinical trial treating pulmonary arterial hypertension in treating humans. This is high blood pressure of the lungs, a very serious disease. We also have a number of pre-clinical programs for treating such diseases as cancer, cardiovascular disease and infectious disease. We also collaborate with major universities around the world, including Baylor, the University of Pennsylvania, Duke, Stanford, among others. And we were a proud recipient of a 2003 SBIR-1 grant, and we are still eligible for the SBIR program in its current state.

As you mentioned, I am testifying on behalf of the Biotechnology Industry Organization. I am on the board of BIO and involved in a number of their other programs. My oral comments are a summary of the written testimony that I presented to the Committee. Like my company, the majority of biotech companies are small companies. They are less than—there are 50 employees. And what is typical is we have a lead product, one single lead product that we are developing. And behind that, there are two or three other, maybe five other products that are in pre-clinical testing, being tested in animals or maybe still on the lab bench prior to going into human testing.

In my company, we raised about $5 or $6 million through friends and family until we were able to find large-scale venture funding. During that period, we also became eligible for SBIR. We put in an application with a very rigorous study section through NIH to get our program approved. And the program was a very risky project, and it is around using our technology to develop potential rapid deployment vaccines for biodefense applications. None of the venture capitalists would touch that.

But when we went to the VC community, and we talked to them about what we were doing, they were really taken by the rigor of our science being able to get an SBIR award. That was issued in 2003. We received funding in 2004.

The way the funding work, just a few minutes on this. We went out and went to a number of investors. They liked what we were doing. And we put together a group of investors that eventually owned, in total, slightly more than 50 percent. This was my doing. I went out and formed this group of investors. They want to have multiple investors in the deal because of the risk in our kind of a company. And I want additional investors in on my deal because I need to raise a lot more money to develop a product. These products take anywhere from 8 to 15-plus years to develop. It is commonly held that it can cost anywhere from a half a billion dollars to a billion dollars to get a product to market. And what is amazing about this business—and I have to wonder why I am in it sometimes—is that 95 percent of the projects fail; 95 percent of the projects fail, so it is a very, very high risk endeavor. The SBIR program has been essential to companies like mine and quite frankly essential to the biotechnology community. This is the one—one of

the industries that we really do excel in around the world. When the best and newest treatments for cardiovascular disease, cancer, HIV—they are invented and developed by companies in this country. And of the couple hundred products that were developed and approved by the FDA in the last 20 years, the companies who were involved in that, about a third of those companies received SBIR or STTR funding. So this is a vital piece of the foundation of this industry.

And what has happened since I think 2003 or 2004, when there was a change in the regulations or the interpretation, a number of our companies are no longer eligible to participate. And what that does is it really eliminates a number of the companies who are best served to solve some of the Nation's problems that are directed by NIH to participate in this program. So we are very, very focused on regaining eligibility. We are not here asking for more money which might be something that is different from a lot of committees. We want to be eligible. We want to make this more competitive because more competition brings stronger companies to develop better therapies that will eventually help this Nation move forward.

So thank you for your time.

[The statement of Mr. Doerfler may be found in the Appendix on page 31.]

Chairwoman VELÁZQUEZ. Thank you, Mr. Doerfler.

Our next witness is Mr. Robert Beall. Mr. Beall is the president and CEO of the Cystic Fibrosis Foundation. The foundation is a nonprofit organization dedicated to the cure and control of the disease and to improve the quality of life for those with the disease. Research developed through the SBIR program could prove invaluable to this effort.

Welcome, sir.

STATEMENT OF ROBERT J. BEALL, PH.D., PRESIDENT AND CEO, CYSTIC FIBROSIS FOUNDATION

Mr. BEALL. Thank you, Congresswoman Velázquez. And thank you other members of the Committee.

It is very important for me to have this opportunity to speak to you not only on behalf of the Cystic Fibrosis Foundation but on behalf of other patient advocates. In your introduction, you spoke about the important contributions that the SBIR programs are making to innovation and to jobs and technology. But the other thing that it does is it saves lives. And I think we can prove that great innovations in the SBIR and support of the SBIR program has served to save lives. The Cystic Fibrosis Foundation is a multifaceted research program. It has a multifaceted research program that strategically invests in basic research and in companies that are developing new therapies to treat cystic fibrosis.

Our research model is described as venture philanthropy. This means that the foundation invests as much as venture capitalists would in very early stages of drug development. We have invested over $600 million in research and drug development. And this year alone, we will invest $28 million in biotechnology companies to bring new developments to cystic fibrosis. Other foundations are clearly moving in the arena of venture philanthropy, but they do

not have the resources that are necessary to fill the gap that is so critical for us if we are going to be able to develop new therapies to treat the various diseases. The SBIR program reflects a fundamental philosophy of creating viable and creative partnerships to accelerate the development of new therapies, not just for cystic fibrosis but for many other diseases as well. SBIR grants are particularly important for companies that are pursuing early discovery phase of drug development, the most difficult kind, as Mr. Doerfler has just described, to secure funding.

Let me give you an example of our experience. PTC Therapeutics is a New Jersey company and is one of our great partners in our efforts to develop new treatments for cystic fibrosis. The company has a promising new therapy. It is called PTC 124. And it is an innovative oral drug that treats the basic defect in cystic fibrosis. The company has other drugs that are in the pipeline, very important drugs that could treat disorders like Duchenne Muscular Dystrophy and Parkinson's disease. The company, like several of our partners, received early SBIR support for the discovery stages of the drug. The development of this groundbreaking therapy is dependent upon the SBIR program. In its earlier stages, the technology that they are using today was too risky to get venture capital. The SBIR program has certainly catapulted this into the mainstream and allowed it to become a potentially effective therapy in cystic fibrosis.

SBIR grants, much like our own venture philanthropy efforts, provide the critical support companies need to approve their research concept. And it is with initial support of the SBIR program, the proof of concept that these companies are more willing and more likely to get capital funding necessary to move their products forward to development. For people with cystic fibrosis, this model allows us to continually add new drugs to our pipeline. We now have nearly 30 products that are in our pipeline.

We urge that the SBIR program be reauthorized with minor but important modifications so that it can continue to foster the involvement of small businesses in research and development. There are substantial risks in any kind of research and development. We just talked about 95 percent of the programs fail. But for orphan diseases, the barriers are even greater because orphan diseases, by the way, are for those 200,000 patients and less. The obstacles are greater because the rewards for the developer are certainly less because it is determined by patient size.

This combination of factors in terms of small patient numbers, the cost of developing new drugs, presents a barrier, and we lose incentives for the creation for these small companies. The venture philanthropy efforts of the foundation and the SBIR programs are very important in attracting companies to CF research and other kinds of diseases. However, from our point of view, our support alone cannot make all this happen. And we have to continue to sustain the involvement of other individuals and other companies in cystic fibrosis research as well as other orphan diseases. I really want to emphasize that I spoke about the fact that we are going to be spending $25 to $30 million this year alone to put drug development in the biotechnology companies. But not all diseases have those kinds of resources to make those kinds of investment. We are

very fortunate, and I really speak here from the orphan diseases community because there are so many orphan diseases that we know so much about at this point that will never be able to cross the finish line unless we continue to have the SBIR support.

So the CF Foundation urges the Committee to set aside a portion of the SBIR funds at the National Institutes of Health for support of biotechnology companies that are focused on these orphan diseases and for the development of new drugs to be able to attack these important orphan diseases. We would recommend a set aside of 10 percent of SBIR grants for NIH for orphan diseases. This approach, we feel, is fully consistent with the fundamental goals of the SBIR program to increase the commercial application of federally supported research and to stimulate technology innovation in the private sector and at the same time attacking the diseases that have a very profound impact on our society. We also believe that the modest targeting of these funds to rare diseases might have the added benefit of encouraging applications for small business entities that have specific interest in rare diseases but have never applied for SBIR support.

I want to return briefly to the PTC Therapeutics, the company I spoke about earlier. As its innovative PTC 124 drug moved through the development pipeline, the company applied for and received SBIR support, as I mentioned. However, they have subsequently applied for another grant, but they were not allowed to continue it because of the reinterpretation of the 51 percent owner rules. As a result, the efforts in cystic fibrosis were curtailed for a short period of time until they were able to receive other sources of support, including those from the Cystic Fibrosis Foundation. We urge the Congress to rethink the current ownership rules to ensure that companies with the right capabilities, the right capacity and the right talent and a proven track record can pursue innovative projects with SBIR support grants.

In conclusion, the CF foundation lends its strong support for the reauthorization of the SBIR program. This program clearly facilitates partnerships that are critical to the development of new therapies and new treatments for all Americans. In an age of limited Federal resources, we applaud the SBIR program for facilitating collaboration between the public and the private sectors. Thank you very much.

[The statement of Mr. Beall may be found in the Appendix on page 39.]

Chairwoman VELÁZQUEZ. Thank you, Dr. Beall.

Our next witness is Mr. Michael Borrus. Mr. Borrus is the founding general partner of X/Seed Capital, an early stage venture fund based in California's Silicon Valley. Mr. Borrus is also the author of three books and more than 70 articles on topics including management of technology, high technology competition and financial strategy for tech companies.

Welcome.

STATEMENT OF MICHAEL BORRUS, GENERAL PARTNER, X/SEED CAPITAL MANAGEMENT

Mr. BORRUS. Thank you, Madam Chairwoman, distinguished members of Congress.

In addition to founding X/Seed Capital, I currently serve on the National Academies' Steering Committee on SBIR which, after nearly 5 years of work and 9 of these rather weighty tomes, has produced the first comprehensive assessment of SBIR in the program's near two and a half decade existence.

In the interest of full disclosure, you should also note that at least two of X/ Seed's portfolio companies have received phase one SBIR awards, and several other applications are in process. In a sense, then, I wear multiple hats today. Except where I explicitly call out findings and recommendations of the Academies' SBIR studies, the views I express here and in my written testimony are my own.

I have four points to make. First, as the Chairwoman's opening remarks and as both of the prior witnesses suggested, the SBIR program plays a specific role in promoting innovation by small businesses for which other sources of capital are usually unavailable, inappropriate or inadequate. It fills several major gaps in funding. Even in my own backyard, Silicon Valley, arguably the 50 or so most overcapitalized square miles on earth, even there SBIR dollars matter. They help seed new businesses. They help seed or advance innovative new ideas or approaches within established small companies. They help, very often, to sustain the very survival of innovative small businesses until they can find that, as I think almost all entrepreneurs would affirm, that often tortuous path toward commercial success.

Let me don my National Academies' Steering Committee hat for my second point. Mr. Chabot did a very good job of summarizing many of the findings. The Academies' study of SBIR has concluded on the whole that the program is meeting its congressionally mandated objectives. There is a laudable inventiveness and diversity across the program within and between individual agencies, a laudable diversity that includes many best practices that ought to be emulated more widely across the program. The study also suggests program improvements which are necessary if the program's performance to congressional objectives is to be optimized. Some of those recommendations are spelled out in my testimony, like the need to eliminate the overly long processing delays between phases in the program, like the need for increased commercialization support. Many more are spelled out in these studies.

If the Committee permits, I would like to incorporate, by reference here, as in my written testimony, the Academies' findings and recommendations, particularly of the summary study.

Third point, among the most significant issues flagged by the Academies' studies is this: The SBIR program is insufficiently data-driven in the committee's view. It generates little hard data that would permit Congress to quantify and measure the program's performance to the various congressional objectives it serves. Because of this fact, it is really difficult to answer questions you may have, questions like to what extent the program ought to have a preferential claim on scarce Federal technology R&D resources. In my personal opinion, the program needs to be better quantified and measured. Improvements to that end are essential if Congress is to have a more objective basis on which future decisions about allocations of funds to SBIR can be made.

Finally, taking off my Academies' hat and donning that of a venture investor, let me address one last issue. It is this: Should the SBIR program exclude small businesses that are majority-owned by venture capital investors? My answer, for reasons spelled out in my written testimony is this: If one of the most significant of Congress's goals for the SBIR program is to stimulate increased innovation by small business, innovation that can achieve commercial success and help to meet agency missions, then small businesses that otherwise meet all of the program's criteria should not be denied SBIR simply because they are majority owned by venture investors. I am happy to elaborate on all of these points and any other issues as the Committee members desire.

Madam Chairwoman, thank you for your time and attention.

[The statement of Mr. Borrus may be found in the Appendix on page 46.]

Chairwoman VELÁZQUEZ. Thank you, Mr. Borrus.

Our next witness is Lieutenant General Lawrence Farrell. Mr. Farrell is the president and CEO of the National Defense Industrial Association. NDIA represents nearly 1,400 corporate members, almost 50,000 individuals from the entire spectrum of the defense and national industrial base.

Welcome.

STATEMENT OF LIEUTENANT GENERAL LAWRENCE P. FARRELL, USAF (RET.), PRESIDENT AND CEO, NATIONAL DEFENSE INDUSTRIAL ASSOCIATION

General FARRELL. Thank you, Ms. Velázquez and Mr. Chabot. It is an honor to be here. NDIA, first of all, is passionate about the SBIR program because of its impact on our industry and the Department of Defense. We exist to advocate the best possible systems to be placed in the hands of our soldiers, sailors, airmen, Marines, coast guardsmen, and the SBIR program is integral to that mission.

I have submitted comments for the record, and I have also given my notes to your counsel, but just briefly I would like to emphasize a couple of points. Number one, the SBIR program is highly leveraged. If you look at the statistics, over 45 percent of the SBIRs in phase one transition into phase three, which is some sort of a commercialization. And that process only takes 2.5 years. It is a very small amount up front, $100,000 for phase one and $750,000 for phase two, but it enables these companies to leverage their private funds, and in many cases, it multiplies that manyfold. It really pays for itself. It is also important to the country. We know that small business is the most efficient at job creation, the most innovative and the most agile and the most efficient at value creation. We and the Department of Defense are most interested in the innovation part of that and the agility part. It is important to the Department of Defense because the Department of Defense basic research budget is about $1 billion. The SBIR portion of another $1 billion for the Department of Defense essentially doubles the basic research budget of the Department of Defense. Very important. We see lots of phase three successes.

I have in this book before me Army, Navy, Air Force and Department of Defense success stories. And when you see this very im-

pressive tome that the National Research Council has produced, and if you go through that, you stand back and you say, wow, this is a really, really important program. The R&D of the Department of Defense is increasingly squeezed. We have seen consolidation of the large primes, and where do the enabling technologies from supplier base come from? Increasingly they are coming from small business. The DOD share of SBIR, as you know, is over 50 percent, and it is about $1.3 billion. That is very important.

Now, why is it important to small business? If you look at small business, 42 percent of the phase one awards are to firms with less than 9 employees. And 25 percent of those receiving phase ones are startup companies. In other words, these are new companies entering the space. So it is leveraging their R&D capital, and it is making them attractive as suppliers to large primes and takeover candidates. And indeed it is life for small businesses. There are lots of successes. And if you go through all of the documentation, you stand back and you really are amazed at the high tech nature of what comes in.

Just a few examples. Cybernet Systems, a woman-owned business, is providing an automated tactical ammunition sorting and classification system in Iraq today. The Army is really excited about this program. They think it is one of the best things they have ever seen. It takes the manual sorting of ammunition out of the soldiers' hands and puts it into something automated. The Small Arms Protective Inserts, the SAPI plates that you see our soldiers wearing, that comes from an SBIR project out of Armor Works, Inc.

The Phraselators, these automatic translation devices that you see in Iraq and Afghanistan today, come out of a veteran-owned company from an SBIR project, Marine Acoustics, Inc. There are over 5,000 of those in use today in Iraq and Afghanistan. This happened to be in phase two. When the Army saw a need for it, they asked them to accelerate it. In just a few weeks, they accelerated it from phase two into a commercial product and put it in the hands of the soldiers.

The last example, Microphase Coatings, Inc., a small company, only seven employees, they make specialty coatings for all of the Department of Defense. But one of the specialty coatings is for the B-2 stealth bomber. As you know, that requires a lot of maintenance to maintain the stealth on the B-2. That product is coming from a product with seven employees, SBIR.

So if you look at the examples—there are many more. There are thousands. If you look at the United States Navy, a lot of their SBIRs result in advanced acoustics for sonar, advanced communications technologies, and you just can't say enough about the technologies that are coming out of this.

We in NDIA are asking for four things: Number one, the reauthorization of the program; number two, we would like to see an admin fee above 1 percent, because we don't think 1 percent is enough; number three, we would like to see that you don't change the set aside fee without talking to the Department of Defense, because that is a sensitive issue, not only in industry but with the department; And number four, we would like to see some flexibility in the award amounts. Right now they are $100,000 and $750,000.

In some cases you need more than $100,000 and more than $750,000. We would like to see legislation give some flexibility to the program managers in using that. Thank you very much for your time, ma'am.

[The statement of General Farrell may be found in the Appendix on page 52.]

Chairwoman VELÁZQUEZ. Thank you, Lieutenant General Farrell.

And now I recognize Mr. Chabot for the purpose of introducing our next witness.

Mr. CHABOT. Thank you, Madam Chairwoman. I am pleased to introduce William E. Bean, who graduated from Oregon State University with a degree in electrical engineering. For over 30 years he has been associated in various roles with technology-based organizations ranging from startups to Fortune 1,000 companies. His responsibilities have included those of engineering, sales and marketing management, general manager and president for domestic and international divisions of large international corporations, among other things. He later formed his own consulting company, R.B. Associates, which specialized in serving small technology companies.

Mr. Bean has served on several boards of directors. He is currently the director of the Technology & Business Center at the College of William & Mary in Williamsburg, Virginia. He is on the executive Committee of the Hampton Roads Technology Council, and he chairs the HRTC Censor Science and Technology Forum and the Hampton's Roads research partnership's Censor Cluster Program.

And we welcome you here, Mr. Bean.

STATEMENT OF WILLIAM E. BEAN, DIRECTOR, TECHNOLOGY & BUSINESS CENTER, DEPARTMENT OF ECONOMIC DEVELOPMENT, THE COLLEGE OF WILLIAM & MARY

Mr. BEAN. Thank you so very much. It is a pleasure to be here. Chairwoman Velázquez, Representative Chabot and members of the small business Committee, it is a pleasure to be here and have the opportunity to speak to you today. An exciting opportunity I must say.

The Technology & Business Center at the College of William & Mary is part of the Department of Economic Development. And as such, we are the college's primary outreach with the community. We spend a lot of time working with area technology companies trying to help them grow, provide jobs for graduating students, link the faculty into these companies to help with projects, vice versa. So we spend a lot of time working with SBIR oriented type companies.

And having worked with those companies, it is clear to us that the SBIR program has had a major influence on the growth of technology in Hampton Roads. And so that leads to several recommendations that we would make with regard to this program given its local success and major success within the State of Virginia. I think Virginia is number three in awards received over the life of the program. Over $1.2 billion has gone into the community of Virginia. I think the number is somewhere around 40,000 people

in this State are employed by companies that have won SBIR rewards. So it has been extremely important here.

One issue is the program itself. It seems kind of odd that something that has been as successful as this still has to go up for renewal. Therefore it seems to me that making this a permanent program would be a smart thing to do. It certainly has proved itself time and time again.

The next two things are intertwined. It was just mentioned that the caps are $100,000 and $750,000, for phases one and two. Those caps were assessed in 1992. So certainly the ravages of inflation have driven down the amount of value that you are going to get from that amount of money. It has been recommended by the Senate Committee to increase that to $150,000 for phase one and to $1.25 million for phase two; we strongly recommend that this be done.

Another issue is the ratio. With the phase one, not phase two but phase one, SBIR, the current ratio is two-thirds/one-third. That means that the contractor that gets the award must keep two-thirds. They can if they want subcontract one-third. Again, given the current caps, one-third of $100,000 is $33,000, which is not much to do some kind of sophisticated feasibility study. Remember phase one is looking at really advanced state of the art. So you need enough money to be able to do that. And $33,000 is not much. Furthermore, if you are going to do that with a college, the college has to take out overhead, leaving only about $21,000 for professors. That is true at every college in the United States, essentially. William & Mary is not unique there. That does not leave very much money for the professors to work on. So we would recommend taking a look at that split. I am not quite sure where those numbers came from; change it to 55 percent/45 percent.

If you then combine that with increasing the cap, now you have a reasonable amount of money to do some very serious research. In particular that comes into play when you have to use more than one collaborator. Sometimes there may be two collaborators with the prime contractor on a project. So that would be a very useful thing.

In addition, it has been recommended by several bodies that the overall funding of the program be increased to 5 percent. It would seem reasonable to increase funding from its current 2.5 percent of extramural funds to 5.5 percent in half percent increments over a period of years to get it up to a higher funding level. However, if you increase the current cap, the funding has to come out of somewhere. If you don't increase program size, ultimately you will reduce the number of awards. So increasing the total amount of money in the program would help offset that. And the next one is a recommendation that is a little exterior to the program but I think really important. There is a lot going on right now through a program called Commercialization Pilot Program. That is a program that is instructing the agencies to implement commercialization projects to help get from phase two into the commercialization phase. And some of those are very, very good projects, especially the one that is being done by NIH. John Williams, who runs the Navy program, has done an excellent job on that.

But to my mind, that is not quite the issue, and of course we look at this from a college perspective. What we have found with the companies that we work with is that the issue is at the front end. It is really the phase one end. These are entrepreneurs. These are the high tech people, technologists, scientists. When they start their company, their real education in the process of business is minimal. And so many of them struggle mightily to try to get to a phase two. And when they ultimately get a phase two, they again struggle mightily to perform it. A very major reason for this is just a flat lack of real business education. We implemented at William & Mary what we call a modular education program. We ran it for eight companies last year. Six of them were SBIR winners. It went through five basic areas of business with them, and gave them access to professors following the program. We found it to be enormously successful. It gives them basic education so at least they know what they need to know. And when they get to the point where they are ready to start implementing more complex things, not only are they better able to do that but they now have a little bit of background on the right questions to ask and they have also built a link into the university so they can ask the professors to help them.

That program can be funded through the FAST program which is the Federal and State Technology Partnership Program. I do not believe it is funded at the moment. That program, by the way, was instrumental in helping the Center for Innovative Technology (CIT) for the State of Virginia, which is our technology secretariat to implement their SBIR program and indeed allowed them to hire a fellow named Robert Brook, who is here today, who now runs that program very successfully for us. So we have seen the FAST program work. That is part of what helped drive this program that we implemented through CIT last year. I think that something could be implemented fairly simply and quickly through just about every college in the United States.

So, again, thank you very much. There are other comments in the testimony that I have submitted to you, and I appreciate the opportunity to be here today. Thank you.

[The statement of Mr. Bean may be found in the Appendix on page 64.]

Chairwoman VELÁZQUEZ. Thank you, Mr. Bean.

Mr. Borrus, I would like to address my first question to you. A recent study concluded that more than 20 percent of companies that receive a phase two were funded entirely or in part due to the prospect of an SBIR award. This suggests that the SBIR awards have a strong effect on business formation. To what extent does this business formation translate to job creation?

Mr. BORRUS. Well, small businesses typically are a source—a large source of new job creation. It is pretty clear that the program fills an important funding gap that permits small businesses to exist and then eventually to expand, and after that, if they are successful, to prosper. That progression leads to new job-creation.

Chairwoman VELÁZQUEZ. Mr. Doerfler, one challenge associated with the program is the need to increase the number of small businesses that are applying for SBIR awards. The NIH reports that the SBIR applications has been decreasing since 2005. Agencies

will need to grow their applicant pools in order to keep the awards as competitive as they have been in previous years. What steps can be taken to encourage more individuals and firms to apply for SBIR awards?

Mr. DOERFLER. Thank you. A couple of things, I believe. One is that—I think that the agencies can get the word out and tell more about what their goals are. Secondly, this rolling around majority ownership over 51 percent is eliminating a number of companies from even trying to participate. Thirdly, there is another—there is called the affiliation role where there is more than 500 employees in an affiliation. We have venture capital investors. Many of these investors invest in literally tens of companies at one time. And right now if—the way the rule is written is, if a venture capitalist—if they invest in another company, the number of employees in that company would count against our 500 employees. In the biotech space, we have—I have 20 employees. That same venture capitalist could have invested in 5 or 6 or even 10 different startups, and maybe one is a retail company where they have several hundred employees. It is virtually impossible for me to understand what our investors, who they are invested in and how many employees they have. So another critical part of this would be to fine tune that affiliation role so that it is easier for us to know when we can participate, because it does take time for us to focus in on this program, and we need more certainty around the application process.

Chairwoman VELÁZQUEZ. Mr. Bean, do you have any more recommendations as to how we can get more individuals to apply?

Mr. BEAN. To encourage companies to apply for the SBIR program? Again, I think a lot of that can be done through local programs. The Center For Innovative Technology does multiple training programs throughout the State. They have an annual conference that is available to companies and that has been quite successful. What we have been able to do is to educate throughout the communities in Virginia, through the local technology councils and other organizations like the Hampton Roads Research Partnership. I don't know how other States may be organized, but certainly through programs where you push it out through area technology councils and other economic development agencies, even town economic development agencies would help. I think you would find that they would be more than happy to support seminars and training programs to let companies know that these SBIR programs are available.

Chairwoman VELÁZQUEZ. Dr. Beall, I know that you mentioned you have a $600 million foundation.

Mr. BEALL. We have invested $600 million in medical research.

Chairwoman VELÁZQUEZ. From your testimony, it is apparent that the SBIR program is playing a critical role in developing potential cures for cystic fibrosis. Without this funding, where will the progress stand in the fight against the disease?

Mr. BEALL. Well, clearly it would not be where we are today. I say we have 30 products that are currently in clinical trials or late stage development for cystic fibrosis. I just reviewed—we have about 10 of these products that have received SBIR support in various stages over the years. I mention PTC directly. This is an oral

drug that would not be where we are today that is treating the basic defect in cystic fibrosis. This is incredible. We wouldn't have an opportunity to have an effort in the area of gene therapy with a company in Ohio called Copernicus. We have another product that is in clinical trials that is also treating the basic defect with support to Parion pharmaceutical company. So all of these things are really important in our effort. We try to pick up as much of these things as possible. Many of the things that support—that SBIR supports in the early stage, we then come along and then hopefully it is leveraged to other companies. Again, the important thing to recognize—and I want to emphasize to you—is that we are fortunate, we can make these kind of investments and create this pipeline. But we have an incredible opportunity in biomedical research today. We know the genes—so much about the genes, the basic defect of so many things. And unless we take this opportunity and use the SBIR programs to translate the information that we know at the basic research level to finding new therapies and move forward, this is what the SBIR does. It is really following with what the Congress has asked Dr. Zerhouni to do, and it is a perfect example of how we can take basic research and leverage it to new therapies. That is what the SBIR program does.

Chairwoman VELÁZQUEZ. Thank you.

Mr. Doerfler, for life science firms undertaking such research, SBIR is often only one component of their funding. Given the high cost of developing and testing a health related product or technology, how important is it that life science firms have access to as many sources of funding as possible?

Mr. DOERFLER. It is very important. As I mentioned in my testimony, it is a very risky endeavor. It is a very expensive endeavor, and we need to be accessible to all forms of funding. We also want to ensure that the agencies have a certain amount of flexibility, for instance, NIH. We are not looking for any dollar hard caps. We think that, again, these programs need to be judged upon their merits. There have been some programs that actually got higher levels of funding because they were so profoundly important to moving some of these cures against some diseases. So, again, I think it is important that we have SBIR both one and two. In most cases if you get through a phase two SBIR, you can find and leverage that with private capital, which is a great thing for companies and great things for developing new medicines.

Chairwoman VELÁZQUEZ. Thank you. General Farrell, NASA and DOD have developed initiatives within their agencies, SBIR programs, to help facilitate partnerships, and in some cases mentoring between prime contractors and small firms that have received SBIR awards. How can we encourage more partnerships between prime contractors and firms that have been awarded SBIR contracts?

General FARRELL. Number one, everybody in the Department of Defense, in the industry and for NASA as well recognizes the power of the SBIR and the small firms that are part of that. So what you need is a lot more bringing together the large and the small firms and giving them the opportunity to have a conversation about what is going on inside the industry. In my association, as an example, we have a national small business conference once a

year where we bring large and small firms together in a kind of match making. We also this last year for the first time got together with the Department of Defense and put on an SBIR conference where the subject of the conference was the SBIR program, and a lot of small companies with SBIR capabilities came, and they exhibited and we also had the large companies there. And in addition, the Department of Defense was there. We don't do—my association doesn't do that much with NASA, but those are the kinds of things that we need to do to get the word out. Also, one of our recommendations has to do with the admin fee. To the extent that somebody is managing an SBIR project, 1 percent admin fee doesn't allow you to do very much. But if you had a higher admin fee, it gives you a capability as a project manager to reach out more. And so that is one of the things that we think needs to be done.

Chairwoman VELÁZQUEZ. Thank you.

Now I recognize Mr. Chabot.

Mr. CHABOT. Thank you, Madam Chair.

Mr. Doerfler, I will begin with you. If bringing a biotechnology drug to market can cost, I understand, upwards of $1.2 billion sometimes, how does the $750,000 maximum phase two award in the SBIR program provide the needed capital for small biotech firms?

Mr. DOERFLER. It is a spark that allows this to happen. In many cases, if you have a lead program that is funded by a company, by a group of investors, it is very typical that that money is allocated solely for that one drug. If I wanted to work on another application of my technology for—in the case of orphan diseases, which aren't that well fundable because of the patient populations, I have to find financing for that. NIH has a list of diseases that they want companies like mine to try to get a spark, to try a new discovery. So it is critically important because it allows us to do the initial bench work. It allows us to do the initial proof of concept. It allows us to do the experiment and create the data that we can then convince investors to invest in the next stage of development. I believe frankly that without that initial money for sparking these innovations, that many of these diseases will not get the attention that they deserve.

Mr. CHABOT. Thank you very much.

Dr. Beall, I will turn to you next if I can. I might just note that we—and I am sure the Chairwoman finds this as well—we are inundated over time by many groups who come to our offices talking to us about various diseases, advocating funding for NIH and others for funding, and I know the cystic fibrosis folks have been in my office many times. And I happened to read a book many, many years ago by Frank Deford. I think it was called, ″Alexandra: Life of a Child,″ which was a very moving book that I have never really forgotten. And so I always kind of look with a special kind of open mind when they come in to advocate on behalf of the folks that they try to help. So thank you for your work in that field.

My question would be, did—some firms would argue that small businesses owned by venture firms don't need the capital infusion because to continue their research, they can rely on the venture firms for their capital. What would be your viewpoint on that?

Mr. BEALL. My reaction goes back to the concept, they need the spark. One thing that has happened in the last 10 years is that the window for venture capital has dramatically changed; 10 years ago, if you had an idea, you could get venture capital support. Now, with the disappointments in biotech and the return on the investments and the fact that 95 percent fail, that window has moved up. It needs a product—or a product needs to be almost in phase two clinical development or phase three before venture capital is—is willing to make its investment. So you have what is frequently called the valley of death. It is that very idea of a proof of concept, phase one, very early stage issues. And that is where the SBIR program, that is where our venture philanthropy, we are filling in that particular gap. I will tell you that one of our programs that is in phase three, not the PTC—excuse me. It is in phase two. We had to put in $2 million the first year, but we got enough data that was leveraged eventually by venture capital support that originally went to $120 million and then the product was just purchased by another major pharmaceutical company for $350 million. But it all started out with that spark, that one investment for us of a couple million dollars just to have the proof of concept. And that is what is so critical. That is what SBIR does. And that is what venture philanthropy is doing.

Mr. CHABOT. Thank you very much.

Mr. Borrus, do you think that a venture fund owned by, say, Paul Allen, who is one of the co-founders of Microsoft, should they be allowed to own SBIR awardees? And if not, what would you consider to be the appropriate cap for allowing venture firms to own SBIR awardees.

Mr. BORRUS. I don't think it makes sense to exclude any class of venture-owned or financial investor-owned small businesses so long as they otherwise meet the program's criteria. Most of Mr. Allen's money—I don't want to speak for him—but let's imagine that most of his money is going to be deployed well past the phase where an SBIR would help to initiate something new—that spark that these gentlemen are talking about—and that much of his money will be directed to a particular outcome. If the entrepreneur, in a firm that he is backing, chooses to spend that money in, say, searching for something new that is not on the critical path for which his fund provided money, he is not going to be happy about it, the board is not going to be happy about it. The team is probably not going to be allowed to spend the money in search of that something new. SBIRs fund not just the new spark that initiates the new business, but in fact, very frequently, the critical spark that takes a company down a path that was unexpected, that was not in the original plan, and for which there is no existing available capital. Although there might be a lot of capital in the company, it just can't be spent pursuing this new direction. And it is often that new direction that actually leads to the breakthrough which leads to commercial success.

Mr. CHABOT. Thank you very much.

General Farrell, you recommend that up to 3 percent of the SBIR funds should be set aside for managing the program. Would that not reduce the availability of funds for distribution of small businesses to perform research? How would you comment on that?

General FARRELL. Yes, sir, you are exactly right. It does reduce the amount of funds which it provided. However, we think at 1 percent—there are a lot of inefficiencies on how the program is being managed, outreach and things like that. We think we could be much more efficient in the way we manage the program with a little bit higher admin fee. I don't think it is unreasonable to go from 1 percent to 3 percent. That is an amount of money that would be subtracted, but it is not a large amount of money. But it is essential to the management of the program. So we think that overhead is needed. Thank you.

Mr. CHABOT. Thank you very much, General.

And finally, Mr. Bean, some would argue that the Government should fund the best research proposals without regard to the size of the entity submitting the proposal. What would your argument be to support setting aside research money to specifically small businesses?

Mr. BEAN. Now, when you say ″small businesses,″ are you referring to that definition of small business which is 500 or less, or the really small businesses which are the 25-to-30-type size or less, which is by far the bulk?

Mr. CHABOT. I would say either, whichever way you feel most comfortable answering the questions.

Mr. BEAN. Again, if you look at the greater Hampton Roads area, which is where we are, there is absolutely no question that this research money which is set aside for investment into the SBIR program has been enormously successful. There are many cases of companies that have been started up by scientists and researchers coming out of NASA or local colleges, our own Old Dominion University, Norfolk State, so forth, that have started up companies either by themselves or maybe with one partner, and through the SBIR program have been able to start, as you said, that spark, and using that spark to be able to create the path of both technology and their business process for their companies. We have seen them grow, you know, from 1, 2 people up to 25, 30, 40. And as the SBIR program continues to invest in them, what it allows them to do is create an initial platform, expand that platform, expand that platform, and to continue to expand that platform.

To give an example, there is one local company that has developed a virtual reality engine primarily on an Army SBIR program. They have been able to take that development and move it into the community college sector for job-training programs, workforce development-type projects that are becoming extremely successful. There are multiple examples like that.

I think that in my mind there is certainly no doubt that taking that amount of money, that very small amount of money, it is 4.3 percent of total Federal investment, or 2.5 percent in Federal research investment, that produces something like, what, 40 percent of all of the patents that come out of the U.S. Therefore, just about any way that you look at that, there is a huge benefit to the SBIR program.

Mr. CHABOT. Thank you very much, and I thank all the witnesses for their response to my questions.

Yield back.

Chairwoman VELÁZQUEZ. Mr. Johnson.

Mr. JOHNSON. Thank you, Madam Chair, for holding this hearing, and thank you, panel members, for preparing and your testimony and coming to present it today.

To go back to the question Mr. Chabot asked of Mr. Bean, I would ask you to comment on whether you think that the smaller businesses, 25 to 30 people, those businesses have been underserved by the SBIR program. Would that be your opinion?

Mr. BEAN. No. You know, I don't think so. It certainly allows the awards to go to larger programs. But if anything, on the front end, and we were talking earlier about how to help companies and get them involved, it is often difficult for small companies to find help on how do you actually write an SBIR that would be acceptable to an agency. So the number of small companies that would be winning these various awards would go up if there were more such help like that available.

I think the other issue is early stage education to help them go forward.

Mr. JOHNSON. A mentoring program?

Mr. BEAN. Kind of a mentoring program. It could be involved even in the modular program that I discussed earlier where you could include as a portion of that perhaps sessions on how do you prepare SBIR-type responses.

The other issue that comes to mind with that is a little bit tricky. There are a lot of topics published. I don't know the total number of topics that are issued by all of the agencies, but it is huge. The Department of Defense comes out with three listings a year. There is one STTR release; in fact, it came out this week. And there are hundreds upon hundreds of topics. So one of the issues is trying to find enough reviewers that are actually qualified enough to review what the submissions are. And when you are looking at phase 1, what this is for is really high-risk-type ventures. In fact, that is why DARPA is there. So if you are submitting something to DARPA, you can assume that it is some technology that is way out there, and trying to find reviewers that are really capable to understand what the submittal is is difficult.

So part of the strengthening of the program would be to tighten up a little bit on how these ultimate proposals are reviewed. And I believe if that was done, you would increase the number of really small businesses that are successful in this program.

Mr. JOHNSON. Yes, Mr. Farrell.

General FARRELL. Yes. Just to add to that, I said previously that about 42 percent of the phase 1 awards go to companies with less than 9 people. If you take it out to companies with less than 24 people at DOD, 70 percent of phase 1 awards go to companies with less than 24.

Mr. JOHNSON. Thank you.

Mr. Borrus, in your written testimony, you make the point that inclusion of small businesses that receive venture capital investments doesn't come at the expense of those that don't. Can you explain how the Academy conducted this evaluation?

Mr. BORRUS. I mentioned also that the program doesn't generate in and of itself a lot of data that would permit one to reach these conclusions. One of the reasons it took the Steering Committee approximately 5 years to generate this amount of work was that we

had to conduct original research. The Committee staff and the consultants to the Committee painstakingly assembled a wide range of data sets examining all of the issues that comprise these and the other five studies that the Academy has produced on this subject. Somewhere in all that data gathering is data that suggests, number one, that—

Mr. JOHNSON. I won't ask you to pull it right now.

Mr. BORRUS. Please don't, because I am not exactly sure where I would find it. I would refer, though, refer the Congressman to it. First, throughout the program's almost 24-, 25-year history, majority venture-owned small businesses have participated in the program. In fact, really, if you look at the life cycle of a venture-backed startup, over its life at some point in time while it still qualifies as a small business, it is likely to be majority-owned by its financial investors. And that is especially true for extraordinarily risky research like that financed by the National Institutes, by Dr. Beall's foundation, by members of BIO, that often literally require hundreds of millions of dollars to get to a product—or more these days—and 12 to 15 years to get a product eventually to market through FDA approval. Equally true these days in energy, where hundreds of millions of dollars are required if you are actually going to go into the production of a biofuel or if you are going to build a solar process production facility.

So, you know, it is not at all surprising that eventually as they go down new pathways searching for new products, that venture-backed start-ups will be majority-owned by financial investors. Such companies have participated in the program historically, number one.

Number two, throughout this extraordinary amount of evidence gathering, over 5 years, no evidence whatsoever was turned up that there was any crowding out of any other small businesses.

Mr. JOHNSON. I got you.

Let me ask a question, Dr. Beall or Mr. Doerfler. Actually, Mr. Doerfler, you are the one who spoke of the orphan diseases.

Mr. DOERFLER. We both did.

Mr. JOHNSON. Dr. Beall, what are some of these orphan diseases, these rare diseases with 200,000 or less cases, and is that throughout the world?

Mr. BEALL. No. That is throughout the United States. It is cystic fibrosis is one of those. There are a number of blood disorders that exist, or rare disorders. Some of them don't even have names, quite frankly. They are syndromes and just—you know, I think they estimate that there is about over 2,000 rare disorders that exist.

And again, the most important thing is that a few years ago, in 1999, when the human genome, the great accomplishment of Francis Collins and others, when we identified the genes, we really got clues on how to attack some of those other kind of orphan diseases that exist out there. And the important thing is that, you know, unless we start to get an infusion of dollars to those diseases, they are not going to ever be able to cross the finish line to find therapies. And I think the SBIR program is a great way to leverage our Federal investment in basic research in finding the gene, I think it is a great opportunity for us, take it and start to translate it to new therapies for these diseases, because many of

those diseases just don't have the resources, like fortunately we do and so you have, to make that happen.

And so I really do feel that it is very important that the SBIR program really be looked at, and Mr. Doerfler can probably add to that.

Mr. DOERFLER. There are a number of genetic diseases that are very, very rare that would never get the attention of any financial investor because it may only affect 100 people. Of course, there is a real passion in what we do. Many of us start these companies surely to make a living, but we are really passionate about developing new medicines to treat diseases that can't be treated any other way. And Biotech is uniquely in a position to do things like HIV/AIDS is a chronic disease now; 20 years ago it wasn't. Arthritis, now people with severe arthritis can be treated with these biologics. I am one of those patients, frankly. I wouldn't be here without those kind of drugs. Cardiology drugs. A number of cancers, now it is a chronic disease; it is not a death sentence anymore. And these are the kind of diseases that are being attacked and driven by the biotechnology industry, and, again, that spark is critically important.

Chairwoman VELÁZQUEZ. The time is expired.

Ms. Clarke.

Ms. CLARKE. Thank you, Madam Chairwoman and Ranking Member Chabot, for holding this important hearing this morning, and I want to thank all the witnesses for testifying today. After hearing all of your testimony, I have a much better understanding of the overview and priorities of this program. I would like to highlight, however, a recommendation by the National Academy of Sciences, which is that I would like to see improvements in outreach efforts to women- and minority-owned firms.

My question is to Mr. Bean, and I think that there are a number of you here who can answer them. I am going to put all of them out there because time is of the essence here.

Mr. Bean, according to a recent EPA press release, there are approximately 22 million small businesses in the United States that have more than 50 percent of their employees in the private workforce, and they develop the Nation's new technologies. The expectation is that many of these new technologies being developed will improve our environment and quality of life.

Can you tell me what types of innovative, environmentally friendly technologies are being developed today and that may create jobs and economic growth in the low-income, working-class, urban communities similar to my district? I come from Brooklyn, New York. And as a follow-up, how can we encourage the SBIR program to develop partnerships between biotech companies and State university medical schools and hospitals such as the incubator campus that has been created in my district, which is the SUNY downstate medical center? I heard discussion from Mr. Bean about Norfolk State. And how does this promote more economic development?

Mr. BEAN. Let us see. Do we have about an hour for this answer? That is a very big question with a lot of moving parts to it.

One of the more interesting companies that are in the State of Virginia is a company recalled Luna Innovations. They have been

able to build multiple platforms. They have come up with some very clever nanotechnology using carbon tubes that can be used to help with medical analysis, because these tubes, as I understand, don't stay in the body following X-ray, or radiographs, which is a dramatic improvement. They have developed some other technology that has to do with helping clean up Chesapeake Bay, a way of treating algae blooms and things like that.

There are any number of companies out there doing technologies like that. At Virginia Institute of Marine Science, which is a campus of William and Mary, there is some technology being developed to measure really foul toxins that unfortunately are found around here because of the shipbuilding industries. It helps assess what the toxic levels are and can clean them up. They are in the process of commercializing that product. So there is any number of programs that are going on like that.

With regard to programs of Norfolk State, for example, there is an effort going on right now to stand up a center that is going to specialize in transportation and other technology issues. We anticipate that that center will be a place where small companies can come to get support with the research that they need done, which, again, ultimately leads to commercialization, hopefully hiring of graduate students, providing them opportunities for employment once they leave the university.

So there is any number of things that are going on locally that help support technology development. That was a fairly long question. Did I address all the parts, or is there something additional you would like to know?

Ms. CLARKE. I think Dr. Beall and other—

Mr. BEALL. One of the great things about Biotech is they are really experts at identifying things that develop academics and try to commercialize it. That is really one of the great resources that Biotech really has in terms of moving forward ideas that come out of academics.

I am just looking at our pipeline. I refer to Copernicus, which is in Cleveland, that came out of Case Western Reserve University, the technology, they have licensed it to Copernicus. Obviously if it is marketed, funds will go back to the university, and this will be leveraged into a continuing investment into the infrastructure of the university. That is only going to leverage itself to more employees and continue to grow. And I think this happens all across our spectrum.

Just looking here, of the seven or eight products that have got SBIR support, they originally were in academic institutions, identified by the biotech companies, and then commercialized through that process. So I think that is one of the real benefits of the SBIR program.

Mr. DOERFLER. Biotechnology Industry Organization represents companies outside of health care. We are actively involved in safe foods, bioremediation, biofoods, and all these companies are actively involved in developing these new technologies to solve some of the very problems you brought up. And again, these companies are small, they are 40, 50, 70 people, and because of the capital structure, we can't participate in this program.

Chairwoman VELÁZQUEZ. Mr. Braley.

Mr. BRALEY. Thank you, Madam Chairwoman, and thank you to all the members who came to our panel today.

I chair the Contracting and Technology Subcommittee, which has specific jurisdiction over the issues we are talking about here today, and it has been very illuminating to hear you put a human face and voice on some of these important issues we are talking about.

Lieutenant General Farrell, I want to start with you. One of the things we talk about frequently in this Committee is the disproportionate geographic allocation of Federal dollars to small businesses through a variety of different programs that the Small Business Administration offers. I am fortunate that the Rock Island arsenal is not technically in my district, but it is right in the middle of the Mississippi River between my district and Representative Hare's district, and it served as a great economic incubator for small business development. But when we look at the rest of the country, we see large pockets where Federal contracting dollars don't go, and specifically in DOD programs.

So as someone who is very interested in thinking outside the box on what we can do to stimulate small business development through the SBIR program in areas of the country that don't have a major DOD installation near them, what types of creative things have you seen from members of your association given the fact that the technology that exists today should allow small businesses to provide services and goods and compete for these Federal contracts with the assistance of an SBIR program?

General FARRELL. That is an excellent question. When you see the lay down of DOD dollars, it tends by and large to follow large programs, like the B-2 program or the F-22; or shipbuilding programs tend to be scattered, too, but not as scattered as airplane programs or vehicle programs so that the dollars tend to follow the large programs, and large companies, large primes that do this. They make an overt attempt to spread the money around the country to make sure they got support for that program.

So I think that is working pretty good. However, the problem with that is that the R&D dollars that go into those large programs are not the SBIR kinds of things, which is what you are interested in. Those R&D dollars go to develop that particular program. They don't go to the creative ideas that come out of phase 1s. But I think if we just look at large programs, we are missing the boat, because there is lots of manufacturing around this country, you know, basic manufacturing processes that we are kind of overlooking. So if we could kind of focus some of the SBIR into the manufacturing processes, I think you will do a lot.

And if you look around the country, there is a thing up in Pittsburgh called the National Center for Defense Machining and Manufacturing. It is a not-for-profit, started with a little bit of money from Congress, but now they are getting money from industry to develop advanced manufacturing processes. And so I think you need to kind of stimulate and look at certain things like that. You got CTC up in Pennsylvania as well.

There are certain parts of country that are kind of hotbeds for manufacturing right now, some places in Ohio, some places in Pennsylvania, Massachusetts, and we need to stimulate that more.

But the kind of money that does that is really not recognized, like the manufacturing technology money coming out of the Department of Defense budget is very small right now. I think you need—personally I think you need kind of a national investment program that would address some of these. If you had a national program, then you could spread it across the country.

Mr. BRALEY. Thank you.

Mr. Borrus, I want to follow up on that, because part of the materials we received is the analysis of the State-by-State distribution of Federal program dollars, and I was very, very disturbed to see my State of Iowa ranked 43rd on this list despite the fact that we have a major research institution at the University of Iowa, we have lots of Department of Agriculture programs in our State. And as part of the ongoing work that the academies did, did you focus at all on this geographic disproportionality, and how we can try to look at ways of improving the program and make sure that it is actually having a positive impact throughout the country?

Mr. BORRUS. There was great variety across the various agencies, and some of them did a much better job of geographic outreach than others. One of the academies' conclusions is that it is really critically important to take approaches that work to solve problems, such as geographic outreach at one agency, and generalize them across the agencies to the extent possible, while maintaining the laudable flexibility in the program itself.

The second recommendation was to experiment. Sometimes you don't know what works until you try it. And so another recommendation was a series of pilot programs that on a small scale could test new approaches that could address, for example, Representative Clarke's question about community outreach to her district. If those pilot programs work, generalize them and spread them more widely across the program as a whole. I am a fan of experimenting, trying by doing, learning by doing. Then, as long as you are generating the data that suggests you are performing, generalizing that and spreading the successful practices. That would, I think, benefit the program as a whole, including the geographic outreach.

Mr. BRALEY. Did you become aware of any particular agencies that were, for example, pushing the envelope in that area and trying to do a better job of geographic outreach that may have fallen outside of their traditional areas of emphasis?

Mr. BORRUS. You know, the studies generate so much data, I can't, without possibly mis-quoting, point to specific agencies. It is somewhere in these reports, I promise you. I might recognize my fellow committee member, Ty Taylor here, who may have some input on that issue.

Mr. BRALEY. I will have my legislative assistant contact you after the hearing, and maybe we could get some information.

I want to talk to our two health care innovators that are here and talk a little bit about the importance of this program. In this same vein that I have been talking about, there is a lot of health care facilities around the country doing research. What more do we need to be doing to make sure that there are opportunities available to people under this program in parts of the country that have the ability to participate in research and development but maybe

are not getting the same piece of the Federal pie right now? Do you have any thoughts that you can share on that?

Mr. DOERFLER. I think the first up, again, is clarity around some of these rules that have been preventing companies from getting involved in the program. Again, it takes a lot of preparation work to do so, and if your capital structure changes, you are no longer eligible, and that is a problem. So I think that is a great degree.

I think a lot has to do with the agencies themselves. NIH is very aggressive across the country. Our organization represents biotechnology companies in all 50 States. So this science is, and in particular biotechnology, it is a very attractive industry. And so economic development groups across the States in almost every city is looking to bring our kind of companies into their geographic areas. It is a very attractive industry.

Chairwoman VELÁZQUEZ. Time has expired. Thank you.

Mr. Chabot, do you have any questions?

Mr. Ellsworth?

I do have two other questions.

Dr. Beall, your testimony suggests that small firms can make important contributions to advances in medical research because the firms are willing to explore new approaches. Given the SBIR programs' emphasis on commercialization, are you concerned that participating Federal agencies may not have an adequate incentive to fund high-risk research projects?

Mr. BEALL. You know, if you had asked me that question 20 years ago, I would say I would have grave concern about that, because I think fortunately the NIH has done a terrific job in making sure that they have developed review processes that are set out to identify opportunities and new technologies and move forward. Initially when they had their review processes, it was mixed up with the regular peer-review process of regular research grants, and I think it provided some confusion to the reviewers. Now they have specialized panels that are looking at looking for innovation and new technology.

So the fact that we have PTC 124 suggests to me the system is working. Nano particles, to look at gene therapy, suggests to me that the SBIR system is working at the NIH.

So, again, we always have a concern at the NIH whether we are looking for innovation and so forth, but I really believe—and I really commend Dr. Zerhouni and the staff for making sure they put mechanisms for being able to look for innovation and new opportunities.

Chairwoman VELÁZQUEZ. Mr. Doerfler, can we talk about the application process? Your company has applied for SBIR and won SBIR awards. Do you have any recommendations about how this process can be improved?

Mr. DOERFLER. Yes. I have been saying it several times. The key one is consistency and clarity in terms of who is eligible. And it is not around the change in your capital structure, which I think is an artificial way of judging a company's size. When we raised our money, we still are about 20 people, so we didn't change.

I think the process is quite good, as Dr. Beall said. The peer review at NIH is superb. The people who are reviewing in those study sections really understand the area. They understand the

mandate that NIH has to improve public health. So we are very comfortable. The only thing I would also add is that perhaps more flexibility at the agency level for them to provide different amounts if they feel that the science, again, and the opportunity warrants a larger amount.

Chairwoman VELÁZQUEZ. Do any of the other witnesses have any recommendations regarding the application process?

Yes, Mr. Borrus.

Mr. BORRUS. Again, I would refer you to the Academy's findings. There were a number of programs at some of the agencies that involved electronic submission, electronic evaluation, which seemed to speed up the process significantly, and could be more widely adopted.

Chairwoman VELÁZQUEZ. Let me take this opportunity again to thank all the witnesses, and I know how important this program is for small businesses, for innovation and technology in our country and our economy, and for small businesses in particular. We will continue to give serious consideration to the reauthorization process.

With that, I ask unanimous consent that Members would have 5 days to submit statements and supporting materials for the record. Without objection, so ordered.

Chairwoman VELÁZQUEZ. This hearing is now adjourned.

[Whereupon, at 11:35 a.m., the Committee was adjourned.]

NYDIA M. VELAZQUEZ, New York
Chairwoman

STEVE CHABOT, Ohio

Congress of the United States
U.S. House of Representatives
Committee on Small Business

2361 Rayburn House Office Building
Washington, DC 20515-6315

STATEMENT
of the
Honorable Nydia M. Velázquez, Chair
Committee on Small Business
Full Committee Hearing Entitled "*SBIR: America's National Technology Incubator*"
Tuesday, January 29, 2008

This morning the Committee begins the process of reauthorizing the Small Business Innovation Research program. This public-private partnership is key to the United States remaining a global leader in innovation and creating new jobs throughout all parts of the nation. In fact, just last year, 5,000 small research firms – companies located in every state in the nation – received awards that totaled more than two billion dollars.

As recent data demonstrates, the current economy is showing signs of a potential recession. During the last slowdown, it was the technology sector – led by small startups – that provided the foundation for stronger growth. SBIR – with its emphasis on next-generation products – can help us emerge from these weak economic times stronger than before.

In order to play this role, however, the initiative must stay in synch with the very technology it seeks to promote. When the Committee last authorized the program in 1999, the term googol was an obscure mathematical concept. Today, Google is one of the most well-known – and largest – companies in the US. As technology changes, this program has to keep pace.

During this modernization effort, the Committee will make certain that the SBIR program is providing the resources for economically viable technologies – and not wasting its efforts on second-rate science fair projects. In order to ensure the full development of promising new products, the program should be given the capability to provide larger amounts of capital. For businesses facing difficulties going to market, the necessary assistance should be made available.

New efforts must also be taken to reach the next generation of small companies, whether they are located in Silicon Valley or rural America. Easing the regulatory burden associated with the program and streamlining the application process are essential to increasing the competition for these important awards.
Finally, federal agencies need more flexibility to implement the program, both in terms of being creative, but also in using what they have learned. These improvements will ultimately benefit the taxpayer in terms of greater competition for awards, and ultimately higher levels of innovation.

Together, these changes will create an SBIR program that is responsive to today's economic environment. This includes creating more high-paying jobs, reducing our trade deficit, and emphasizing the importance of math and science education to America's students. If we are able to promote these very goals in the program, then we will be successful in our reauthorization efforts.

Our nation, now more than ever, needs a vibrant small business foundation to secure our economic future – and it is programs like SBIR that support this vision. With the specter of a recession before us, entrepreneurial activity can provide a pathway to growth. It has done so before, and it will do so again. I want to thank all the witnesses for traveling here and I look forward to your testimony.

U.S. House of Representatives
SMALL BUSINESS COMMITTEE
Tuesday, January 29, 2008
Representative Steve Chabot, Republican Leader

Opening Statement of Ranking Member Steve Chabot

SBIR: America's National Technology Development Incubator

Good morning. I would like to welcome all of you to this hearing on the Small Business Innovation Research, or SBIR, program. I would like to extend a special thanks to each of our witnesses who have taken the time to provide the committee with their testimony. And a special welcome to Bill Bean, a professor and the Director of the Technology and Development Center at my alma mater, the College of William and Mary. Welcome to the Small Business Committee, Mr. Bean.

Today's hearing represents the beginning of the Committee's work to reauthorize the SBIR program, which was last fully examined by this committee in 1999 and reauthorized in 2000. Created in 1982, the SBIR program offers competition-based awards to stimulate technological innovation among small private-sector businesses while providing government agencies new, cost-effective, technical and scientific solutions to meet their diverse mission needs.

The development of this program is not only critical to the unique needs of each of the participating federal agencies, but also to our national economy. Small businesses renew the U.S. economy by introducing new products and lower cost ways of doing business, sometimes with substantial economic benefits. They play a key role in introducing technologies to the market, often responding quickly to new market opportunities. Some of the great technological innovations in this country came about from small business owners tinkering in their workshops, including two very famous Ohioans – the Wright Brothers.

Several congressionally mandated and independently conducted research projects have closely examined the program to determine how well it is performing in relation to congressional dictates. A study by the National Research Council found that the SBIR program is performing well in the federal agencies that are required to operate the program.

According to the National Research Council study, the SBIR program provides entrepreneurs with funding to investigate and commercialize new technologies without diluting ownership through equity investment or taking on additional costly debt. Since one of the purposes of the SBIR program is to serve the mission needs of federal agencies, the process can also lead to greater federal procurement opportunities for participants. In turn, it will accelerate growth of these small businesses.

The SBIR program, as the National Research Council study demonstrates, also provides significant benefits to federal agencies by providing additional opportunities to solve operational needs. A program officer can post a solicitation that describes a particular problem and invite small businesses to propose research that will solve it. This contrasts with other federal research awards where a researcher provides a proposal of personal interest. The nationwide scope of the program also ensures that the agency will investigate various research avenues. Finally, the program, by leading to commercialization of the research, diversifies the federal government's industrial base. Competition among suppliers will lower prices to the government and save taxpayer dollars.

That said, the study does point to some weaknesses within the program and makes several recommendations for the committees of jurisdiction to consider as we reauthorize the program this year. As we continue this process, we must consider topics such as examining cycle times from solicitation through Phase III, understanding and managing firms winning multiple awards, and increasing and improving oversight and program evaluations by the agencies involved. We will also need to scrutinize the current award size and administrative costs of the program as we move forward with the reauthorization.

Madame Chair, I look forward to working with you on this important issue. Again, I thank each of you for being here today and I yield back.

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Statement of Rep. Jason Altmire
Committee on Small Business Hearing
"SBIR: America's National Technology Development Incubator"
January 29, 2008

Thank you, Madam Chairwoman, for holding today's hearing to discuss the Small Business Innovation Research (SBIR) Program. Since its inception in 1983, SBIR has been key to American competitiveness, providing quality research for the U.S. government and spurring technological innovation. The program is set to expire at the end of September, giving this Congress the unique opportunity to evaluate and reauthorize the program. Overall SBIR has enjoyed positive feedback, however, changing times require us to strengthen and modernize the program to bring it into line with today's technological realities.

Last year, I introduced the Small Business Investment Expansion Act (H.R. 3567) which, among other provisions, would ensure that venture-backed firms are not disqualified from participating in government programs like SBIR simply due to their financial structure. The reality of today is that new, innovative products take years of research and development before they are viable and ready for commercialization and often times venture capital is the only funding available. So long as a small firm meets the definition of a small business, there is no reason it should be precluded from participation in SBIR just because of its financial backing.

As the Chairwoman mentioned, this is the first in a series of hearings this committee will have on SBIR as we ready ourselves to reauthorize the program. I look forward to the testimony the witnesses will provide us with today and I am hopeful that we will gain a better understanding of how SBIR can be improved and updated to meet today's challenges.

Madam Chair, thank you again for holding this important hearing today. I yield back the balance of my time.

# # #

HEARING TESTIMONY
DOUGLAS A. DOERFLER
PRESIDENT AND CHIEF EXECUTIVE OFFICER
MAXCYTE, INC.

ON BEHALF OF
THE BIOTECHNOLOGY INDUSTRY ORGANIZATION (BIO)

BEFORE THE HOUSE OF REPRESENTATIVES COMMITTEE ON SMALL BUSINESS

"SBIR: AMERICA'S NATIONAL TECHNOLOGY DEVELOPMENT INCUBATOR."

JANUARY 29, 2008

Chairwoman Velázquez , Ranking Member Chabot, and Members of the Committee:

Thank you for providing the opportunity to testify before you today regarding the reauthorization of the Small Business Innovation Research Program (SBIR).

My name is Doug Doerfler and I have been President and Chief Executive Officer of Maxcyte, Inc. in Gaithersburg, MD since 1999. Currently, I serve on the Biotechnology Industry Organization's (BIO's) Board of Directors, the Executive Committee of the Emerging Company Section Board of Governors and am co-chair of the Capital Formation Committee.

I have led the development of global biotechnology companies and products for more than 25 years. MaxCyte currently has approximately 20 employees who are developing novel therapeutics using cells that have been modified by our process to treat serious diseases. We have one product in Phase I/II clinical human testing for the treatment of patients with Leukemia, a product in Phase IIa human clinical trials for the treatment of Pulmonary Arterial Hypertension and additional products in pre-clinical development for the treatment of cardiovascular disease, cancers and infectious disease. These programs are partnered with commercial partners and major Universities, including Baylor, the University of Pennsylvania, Duke University and Stanford University. MaxCyte was the proud recipient of Phase I SBIR grants in 2003.

Today I am testifying on behalf of BIO, an organization representing more than 1,000 biotechnology companies, academic institutions, state biotechnology centers and related organizations in 50 U.S. states and 31 other nations. BIO members are involved in the research and development of health care, agricultural, industrial, and environmental biotechnology products. The overwhelming majority of BIO member companies are small, early stage research and development oriented companies pursuing innovations that have the potential to improve human health, expand our food supply, and provide new sources of energy.

SBIR'S CRITICAL ROLE IN COMMERCIALIZATION OF BIOTECHNOLOGY INNOVATIONS

Biotechnology Company Profile and Path to Product Development

Before discussing the critical role of the Small Business Investment Research (SBIR) program in the commercialization of biotechnology innovations, I would first like to provide a description of a typical biotechnology company and the capital required for research and development. BIO has over 600 emerging companies in its membership. In a recent survey conducted by BIO, 80 % of respondents had fewer than 50 employees.[1]

Promising biotechnology research by these companies has a long, arduous road from preclinical research, through Phase I-safety, Phase II-efficacy, and Phase III-broader population clinical trials, and ultimately, to FDA approval of a therapy. It is estimated it takes between 8 and 12 years to bring a biotechnology therapy to market and costs between $800 million and $1.2 billion.[2] In the absence of product revenue biotechnology companies are almost entirely reliant on capital markets or other sources of financing to fund research and development. This is particularly challenging at the earliest, highest-risk stages of research and development. The majority of biotechnology companies are without any product revenue for a decade or more. As a result, significant capital requirements to advance a new therapy to the market necessitate fundraising through a combination of angel investors, venture capital firms and occasionally other investors. The role and importance of venture capital fundraising cannot be understated. In 2006 alone, venture capital investment in the life sciences and medical devices industry totaled $7.2 billion in 2006, up from $2.8 billion in 1998.

Biotechnology companies are generally a collection of research projects with one lead product and an average of 5 other therapies or candidates in early stage/pre-clinical research.[3] Typically, a biotechnology company will begin fundraising for its lead product in development. Companies generally raise between $5 million and $15 million in their first round of venture financing, an amount that usually results in multiple venture capital

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[1] BIO sponsored, third-party administered, survey of 144 BIO emerging companies' Chief Executive Officers and Chief Financial Officers, March-April 2007

[2] Tufts Center for the Study of Drug Development http://csdd.tufts.edu/NewsEvents/NewsArticle.asp?newsid=69

[3] BIO sponsored, third-party administered, survey of 144 BIO emerging companies' Chief Executive Officers and Chief Financial Officers, March-April 2007

companies collectively owning more than 50 percent of the company. This is especially the case with very young companies whose valuation may reflect their high-risk, early stage nature. However, it is typically the case that no single venture capital company will own more than 25 to 35 percent of the equity.

Despite the extensive fundraising a biotechnology company undertakes for the lead product, these funds are not interchangeable, that is they are tied to very specific milestones to support the lead product's development. As such, in order to develop secondary or tertiary candidates/therapies a company has to find secondary sources of fundraising capital. At the very earliest stages of development other sources of financing, like Small Business Investment Research (SBIR) grants, have been instrumental in advancing research and development in biotechnology.

Mission of SBIR: Bringing Innovation to the Public

Congress created the SBIR grant program in order to utilize the capabilities of small, innovative, domestic companies to fulfill federal research and development needs. In the early 1980's there was growing concern the United States federal research and development spending was not improving the health and well being of the citizenry through the development and commercialization of new products and therapies. Furthermore, it was recognized that some early stage, promising scientific research failed to be funded through the markets because it was viewed as too high risk. This failure of the markets is often referred to as the "valley of death." In biotechnology, the "valley of death" delays potential therapies for HIV, cancer, and infectious diseases from reaching patients, who often lack other comparable alternatives.

For these reasons, in 1983, Congress authorized the SBIR program. When the program approached reauthorization in the early 90's a report by the National Research Council discussed continued concerns that *"U.S. technological performance is challenged less in the creation of new technologies than in their commercialization and adoption."*.[4] Currently, these grants set aside 2.5% of certain departments and agencies extramural research budgets for innovative research grants with an aim towards commercialization.

Historical Success of SBIR Program

For twenty years small, domestic biotechnology companies competed for SBIR grants. In addition to providing critical funding, these grants were a powerful signal to the private sector that company's research was compelling and possessed scientific and technical merit. In biotechnology, the SBIR program has played a role in advancing the science and research of companies that have ultimately brought a product to market. For example, there are 163 companies and affiliates involved in the development of the 252 FDA approved biologics, 32% of those companies and affiliates have received at least one SBIR/STTR award. These grants have helped make the U.S. the world's leader in biotechnology by providing critical early-stage funding for innovative research.

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[4] (National Research Council, *The Government Role in Civilian Technology: Building a New Alliance*, Washington, D.C.: National Academy Press, 1992, pp. 29).

IMPACT OF RECENT CHANGES TO SBIR PROGRAM

Unintended Consequences of the SBA's Domestic Company Proxy

On April 7, 2003, the Small Business Administration (SBA) Office of Hearings and Appeals (OHA) arbitrarily ruled that a biotechnology firm, Cognetix, did not meet the SBIR size standard because it had venture capital investment in excess of 50%. This ruling is base upon SBA regulations, not underlying statute, by which a small business concern (SBC) for the SBIR program is defined as having fewer than 500 employees, including affiliates, and is at least 51% owned by U.S. citizens.

SBA has stated the ownership rule is meant to be a proxy for determining that a company is domestic.[5] However, the use of capital structure as proxy for determining domesticity and the subsequent OHA ruling has had the unintentional consequence of excluding a sizeable portion of the biotechnology industry that would otherwise be eligible to participate in the program. These are companies that have participated in the SBIR program for 20 years prior to this ruling and were a fundamental part of the aforementioned success of the SBIR program. Moreover, these companies are solely based in the United States and are majority-funded through a combination of U.S. based venture capital companies and citizens. The result is that many emerging biotechnology companies are ineligible to compete for SBIR grants.[6] Perhaps, more importantly, this ruling has the potential of negatively impacting the competitive pool of SBIR applicants and the program's ability to award projects with the highest scientific merit and commercialization potential.

My own company, MaxCyte was in the fundraising process in 2003, when we submitted a proposal to NIH to do basic research in our technology and expand its capability so one day it may be used for biodefense or pandemic influenza vaccine development. Venture funds were not interested in this project as it was too early and risky but were clearly motivated by our team's ability to obtain attractive scores for our program through the NIH study section process. We received $95,000 in funding for our Phase I and subsequently closed on a $20.0 million venture round. We were able to satisfy the rigorous milestones of our project including breakthrough science to prove general concept. Although we are currently eligible for follow on SBIR funding, our eligibility may change with another needed financing.

There are numerous examples of promising discoveries that have been shelved or delayed as a result of the recent interpretation of ownership. I will mention just a few examples.

1. Intronn Inc. (Gaithersburg, MD) won SBIR grant for Phase I and II study to advance research in treatment for Cystic Fibosis. They were awarded a second

[5] (54 Fed. Reg. 5264 (Dec. 21, 1989) Interim Final Rule on defining a business concern for the purposes of the SBIR program.)

[6] BIO sponsored, third-party administered, survey of 144 BIO emerging companies' Chief Executive Officers and Chief Financial Officers, March-April 2007

Phase II grant in 2003 but the award was rescinded due to the new rule on venture capital investment. The project was shelved.

2. Paratek Pharmaceuticals (Boston, MA) won a Phase I SBIR grant in 2001 to research antibiotic therapies for things such as malaria and anthrax. In 2003, due to changes in SBIR rules, Paratek was forced to turn down a Phase II grant and their antibiotic therapy research program was shut down.

3. Xcyte Therapies (Seattle, WA) received a Phase I SBIR grant in 2002 to develop new treatments for cancerous tumors in the kidney and prostate. In early 2004 Xcyte Therapies received a Phase II SBIR grant to help fund clinical testing but was unable to use the funds as they were deemed ineligible.

These are ironic outcomes considering that venture capital is a necessary part of the ability to achieve SBIR's mission of supporting commercialization. It is unfortunate that venture capital invested with the goal of bringing new therapies to the market has, in many instances, caused SBIR funding to be pulled and research projects to shelved. This is exactly the opposite of what Congress had in mind when they created SBIR.

OPPORTUNITY TO STRENGTHEN/RESTORE SBIR PROGRAM

I appreciate the opportunity to discuss changes to the SBIR program that I believe would strengthen the program and make it more effective in the years to come. My recommendations can be grouped under four general goals for SBIR Reauthorization. First, increasing competition for SBIR grants and, as such, improving science and fostering innovation and commercialization by small companies. Second, clarifying SBIR eligibility rules to make them easier to understand and increasing transparency regarding the program's operation. Third, maintaining agency flexibility so as to make certain the SBIR program continues to serve the needs of individual agencies. And fourth, making certain that the SBIR guidelines appropriately safeguard taxpayer funds.

I will touch briefly on each of these important goals.

Increase Competition and Foster Innovation and Commercialization

SBA's 2003 ruling that excludes majority venture-backed companies inhibits the SBIR program from receiving the most competitive pool of applicants possible and stifles the ability of SBIR to carry out its mission to fund projects that will improve public health and have the most commercial potential. It is vital to the American public to ensure they realize the benefits not just of products with commercial potential but the benefits of projects funded based on scientific merit and deemed to be of value to promoting our citizens public health.

The current SBA interpretation would deem eligible a public company with 300 employees as well as a private company with 400 employees, $200 million in venture

capital from multiple venture capital firms that equal 49% of equity with additional angel investment dollars. However, a private company with 20 employees, $50,000 in annual revenue and $8 million in venture capital by multiple venture capital funds equaling 56% of equity – even though no one venture capital firm has more than 35% of total equity – is ineligible. .

The National Institutes of Health (NIH) have documented disturbing trends since the 2003 ruling. Applications for SBIR grants at NIH have declined by 11.9 percent in 2005 and by 14.6 percent in 2006, and 21 percent in 2007.[7] Additionally, the number of new small businesses participating in the program has decreased to the lowest proportion in a decade.[8]

The Director of the National Institutes of Health, Dr. Elias Zerhourni, wrote in a letter to SBA Administrator Barreto dated June 28, 2005: *"NIH believes that the current rule undermines the statutory purposes of the SBIR program.... It undermines NIH's ability to award SBIR funds to those applicants whom we believe are most likely to improve human health."* (emphasis added). I would like to submit this letter for the record.

BIO respectfully requests the Committee recognize the necessary and complex involvement of venture capital in small biotechnology companies. As stated previously, small biotechnology companies have high and intense capital needs (up to $1 billion) and an unusually long development time of 8-10 years. The vast majority of biotechnology companies raise between $5 million and $15 million in their first round of venture financing for their lead product(s), an amount that usually results in the venture capital firms collectively owning more than 50% of the company. However, the investment group usually consists of several firms, the largest of which owns no more than 25-35% of the company. SBIR plays a critical role in aiding small biotechnology companies in their early stage research to navigate through the "valley of death" where the concept is too high-risk for private market support.

BIO respectfully asks the Committee to reinstate the eligibility of small, majority venture-backed firms into the SBIR program. This will ensure the most competitive pool of applicants and that grants awarded will be based on projects that show the most promise in bringing breakthrough therapies to the public.

Clarify SBIR eligibility rules to make the application process more straightforward and user-friendly

It is equally important the reauthorization clarify SBA affiliation regulations. Under current SBA regulations, when determining the size of a business, the SBA considers the number of direct employees at the business as well as affiliated businesses' employees.

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[7] The National Institutes of Health

[8] Testimony from Jo Anne Goodnight, SBIR/STTR Program Coordinator for NIH to the House Subcommittee on Technology and Innovation, Committee on Science and Technology: *The SBIR and STTR Programs at the National Institutes of Health – How are Programs Managed Today;* June, 26, 2007).

Businesses are affiliates of each other if the SBA determines that another business has either affirmative or negative control. Currently the regulations state that a venture capital company which holds a minority share in another business can be considered an affiliate of that business. If the SBA determines a venture capital company is affiliated with the business, not only are the employees of the venture capital company included in the size determination but so are the employees of all other businesses in which the venture capital firm is invested.

As a result of these affiliation rules, a small company with 50 employees could be deemed to be affiliated with hundreds of employees of companies with which the small company has no relationship whatsoever, just because the companies share a common investor. It is important to note that this can be the case where the venture capital investor owns a minority stake in the small business applying for SBIR.

Not only are these affiliation rules non-sensical, the manner in which they are applied is often a mystery to the small business applying for the SBIR grant. As a result, a small company may certify in good faith that it is eligible for an SBIR grant, only to later find out that the SBA has affiliated it with a large number of employees at unrelated companies, thus making the small business ineligible. BIO recommends the reauthorization bill provide language to clarify that investment by a venture capital operating company does not make that company an affiliate of another company for the purposes of determining size. This is a common-sense measure that will provide clarity and peace of mind for small business entrepreneurs looking to participate in the SBIR program.

Maintain Agency Flexibility

BIO also supports maintaining agency flexibility in the SBIR program. One of the great strengths of the SBIR program is that Congress provided the affected departments and agencies with flexibility in establishing the program. Maintaining flexibility in the program is also supported by a National Research Council 2007 report which states, *"...flexibility is a positive attribute in that it permits each agency to adapt its SBIR program to the agency's particular mission, scale and working culture."* [9]

The reality is that various government agencies may structure their SBIR program in different ways to meet differing agency needs. This is a good thing, so long as the original goals of the SBIR program are preserved. Certain agencies, for example, may need the flexibility to award larger grants, if the project they are funding is in an area where research is typically more expensive. This is sometimes the case for biotechnology companies researching therapies that are especially novel or cutting-edge. For this reason, BIO does not believe that a hard dollar cap should be applied to the SBIR grant amounts. Agencies should be the best judge of how to use their SBIR funds to advance science and commercialize new innovations.

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[9] National Research Council, *An Assessment of the Small Business Innovation Research Program at the National Science Foundation*: Washington, D.C.: National Academy Press, 2007. pp 21 (www.nap.edu/catalog/11929.html)

Additionally, any award guidelines on SBIR grants, if imposed, should apply to particular SBIR award periods or years of support in the particular phase and should not apply to the entire amount that the agency spends on a particular project. The NIH, for example, has chosen to implement a Phase II Competing Renewal award for those companies who may need extra funding to meet certain FDA milestones before they can attract private dollars. A hard dollar cap in the SBIR program could threaten such a program and this would be, in BIO's opinion, very unfortunate.

Appropriately safeguard taxpayer dollars

As with any government program, Congress has the obligation to ensure that taxpayer funds are being used in an efficient and effective manner. The SBIR program is not a basic research program, it is about developing new products for the benefit of society. There has been some concern expressed over the number of grants an individual company may receive from the SBIR program. While BIO supports some agency flexibility in these decisions, we would support reasonable limitations, such as capping the number of awards per company to 5 -10 awards per company/per year.

No company should make SBIR grants the basis of its business model. SBIR exists to fill the funding void for companies who are raising private capital to do their research and development. SBIR plays the very important role of funding early-stage research, research that might not otherwise be funded or whose development would otherwise by significantly delayed. Any company that receives excessively large numbers of SBIR grants year after year, without commercializing technology, is probably not the type of company into which the federal government should be investing taxpayer resources. BIO believes it is appropriate to include safeguards in the SBIR reauthorization bill to ensure that firms are applying for SBIR grants as a supplement to the private capital they have raised and are not trying to "game" the program.

CLOSING REMARKS

Congress can continue to support the United States biotechnology community by allowing the government to partner with small biotechnology companies that have promising science but need critical resources at key stages of development not readily available in the private capital markets. SBIR should be an aggressively competitive program that fulfills important federal research and development goals, such as bringing breakthrough health discoveries to the public.

Again, thank you for providing me the opportunity to testify today before the Committee.

...adding tomorrows every day.

STATEMENT OF ROBERT J. BEALL, Ph.D

PRESIDENT AND CEO

CYSTIC FIBROSIS FOUNDATION

BEFORE THE HOUSE COMMITTEE ON SMALL BUSINESS

ON THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM

JANUARY 29, 2008

Thank you, Chairwoman Velazquez and members of the Committee, for the opportunity to testify today. I am Robert J. Beall, President and CEO of the Cystic Fibrosis Foundation.

More than twenty-five years ago, when I served at the National Institutes of Health, I had the opportunity to award Small Business Innovation Research (SBIR) grants to pioneering companies. Today, at the CF Foundation, I continue to work with many small businesses who benefit from this successful program. I am pleased to appear before the Committee today on a topic of central importance to me and the Foundation.

We at the CF Foundation are dedicated to utilizing innovative strategies for the development of new therapies for cystic fibrosis (CF), including encouraging partnerships among diverse research and development entities in the public and private sectors. We consider small business entities key players in the fight against cystic fibrosis, and their participation in our efforts has been facilitated by the Small Business Innovation Research (SBIR) program. On behalf of the CF Foundation, I appreciate the opportunity to comment on how the SBIR program can be more effective for the development of new therapies for CF and other serious and life-threatening diseases, including those that are also considered orphan diseases.

The Research and Development Mission of the CF Foundation

The CF Foundation has a multi-faceted research program that strategically invests in basic research and in companies that are engaged in the development of new CF therapies. Through this aggressive approach, we have contributed to a significant improvement in the survival of those with CF. Because of research supported by the CF Foundation, the median age of survival for people with CF has increased dramatically from less than six years in 1955 to 37 years today.

This achievement is obviously not adequate for those with CF, who face a disease that requires rigorous daily treatments and that has a profound impact on quality of life.

The CF Foundation is supported by the community of individuals with CF and their families and friends and by many other committed individuals and organizations who contribute generously to the mission to find a cure.

We have developed an innovative research model that is described as venture philanthropy. This means that the Foundation directly invests, much as a venture capitalist would, in research and development of new CF therapies. We have invested over $660 million in our research and medical programs, and in 2008, we will invest $27 million in CF research at biotechnology companies for the development of new drugs.

Our program is multi-faceted and comprehensive because we collaborate with many different partners in the public and private sectors. It is also complex because we are focusing on a wide range of research issues and potential products to address the many ways in which CF affects patients. Our research and development pipeline includes efforts related to gene therapy, efforts to modify the defective gene and its protein that cause CF, ion transport restoration, mucus regulation, anti-inflammatory therapy, anti-infectives, transplantation, and nutrition.

We are fortunate to have so many therapeutic targets to pursue, yet we are racing the clock to develop new CF therapies. Despite our successful fundraising efforts, we cannot pursue all of the promising research opportunities before us without help and without partners.

The SBIR program reflects our fundamental philosophy of creating viable and creative partnerships to accelerate the development of new therapies. SBIR grants are particularly important for companies pursuing the early discovery phase of drug development – the most difficult time to secure funding.

SBIR grants serve as an incubator for innovative early-stage research, much like our own venture philanthropy model. Like our model, SBIR grants provide the critical support companies need to prove their research concept. Once a company passes this hurdle, investors are more willing to invest to bring therapies to market. For people with cystic fibrosis, this model continually adds new drug candidates to the development pipeline, increasing the chances of producing effective therapies and finding a cure for this disease. It also shortens the time it takes to bring a new drug to market. In the past 14 years, four cystic fibrosis therapies have been made available with the support of the CF Foundation to treat this disease: Pulmozyme®, TOBI®, azithromycin, and hypertonic saline. The time taken for the Foundation to help develop Pulmozyme® – five years from test tube to cystic fibrosis patients – was less than half the industry average.

We urge that the SBIR program be reauthorized, with minor but important modifications, so that it can continue to foster the involvement of small businesses in research and development.

Create a Set-Aside for Rare Disease Research

Twenty-five years ago, Congress recognized the need to encourage research and development related to rare diseases – those affecting fewer than 200,000 Americans – by passing the Orphan Drug Act. In the years since the law was enacted, Congress has reaffirmed its commitment to research on rare diseases. Although the existing federal programs have had a positive impact on private sector involvement in rare disease research and development, there is still significant reluctance to be involved in orphan disease research.

There are substantial risks related to research and development of any new therapeutic product. For orphan diseases, the obstacles that apply to developing all new therapies are even higher, and the rewards for development of an orphan drug are limited by the size of the market. This combination of factors argues against industry involvement in orphan drug research, so incentives must be created for these companies.

The venture philanthropy efforts of the CF Foundation have been essential in attracting companies to orphan drug research or keeping those companies in the field. Our support alone, however, is not adequate to retain the attention of those who have shown interest in CF research, and to encourage new entities to join the effort. I also want to emphasize that there are many diseases that do not enjoy the strong private sector support and the venture philanthropy support that the CF Foundation provides for cystic fibrosis.

The CF Foundation urges the Committee to set aside a portion of SBIR funds at the National Institutes of Health (NIH) for support of biotechnology companies that are focused on orphan disease research and development. We would recommend a set-aside of 10 percent of SBIR funds at NIH. This approach is fully consistent with the

fundamental goals of the SBIR program to increase the commercial application of federally supported research and to stimulate technological innovation in the private sector. We also believe this modest targeting of funds to rare diseases might have the added benefit of encouraging applications from small business entities that have a specific interest in rare diseases but have never been SBIR applicants.

Address Ownership Limits

We note with great concern that in recent years there has been a decline in the applications to NIH for SBIR grants. We understand that this decline is generally attributed to the impact of an eligibility standard that requires companies to be at least 51 percent owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States. The standard has resulted in the disqualification of small business entities that have succeeded in attracting venture capital investment and, therefore, cannot meet the individual ownership rule.

Although the Foundation supports efforts to prevent abuses of the SBIR program, we fear that the individual ownership rule is having an unintended and regrettable impact by disqualifying small business entities that could play an important role in research and development of new therapies for CF and other diseases.

The current ownership rule, in effect, winnows out many of the successful, proven companies that have demonstrated the ability to develop innovative research into therapies for patients. It would seem this is the type of success that a governmental program should reward and invest in, rather than disqualify. Much as our own venture philanthropy model opens a successful company's eyes to the possibility and promise of cystic fibrosis therapeutic development as a valuable asset for their business and our patients, a SBIR grant can enable a company – with the right capabilities and a proven track record – to pursue a project they might otherwise not consider because of its initial risk.

PTC Therapeutics is one of our great partners in the effort to develop treatments for cystic fibrosis. The company has multiple promising CF therapies in development, including PTC-124, an innovative oral drug to treat the basic genetic defect of cystic fibrosis, and potentially 2400 other genetic disorders. The company, like several of our partners, received an SBIR grant for the early discovery phase of the drug that ultimately became PTC-124. The development of this ground-breaking therapy depended on the SBIR grant as it was considered too risky to be funding by private venture capital funding.

As PTC-124 moved through development, the company applied for and received a larger SBIR grant to continue the work. Unfortunately, they could not accept the funding because of the current ownership rules and had to find other funding sources, including the Cystic Fibrosis Foundation as well as others. In this case, the current ownership rule slowed this innovate research and placed this promising drug at risk of derailment.

As a Foundation dedicated to investing in the best opportunities for research at innovative companies, we consider the interest of other venture capitalists in a company as a signal of ability and a vote of confidence. It is a marker that the company may have the personnel, skills, and competence to function as a good research and development partner. We think the SBIR program would do well to rethink the ownership rules to ensure that it can attract the widest possible range of competent SBIR applicants.

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The Cystic Fibrosis Foundation lends its strong support to reauthorization of the SBIR program. This program facilitates partnerships that are critical for development of new treatments for CF and hundreds of other diseases. In an age of limited federal resources, we applaud the SBIR program because it facilitates collaboration between public and private sectors in an efficient manner.

We would recommend two minor modifications of the program: 1) a modest targeting of NIH SBIR funds to rare diseases research and development, and 2) changes in the individual ownership rules so that successful research and development companies will not be disqualified from SBIR eligibility because they have attracted venture capital funding.

Testimony of Michael Borrus, Founding General Partner, X/Seed Capital
before the U.S. Congress, House of Representatives, Committee on Small Business

January 29, 2008

Summary Testimony of Michael Borrus

Distinguished members of Congress:

I am Michael Borrus, founding General Partner of X/Seed Capital, a seed-focused early stage venture fund based in California's Silicon Valley. I have been asked to give my views on the Small Business Innovation Research (SBIR) program. I currently serve on the National Academies' steering Committee on SBIR which is wrapping up almost five years of painstaking, detailed work, the first comprehensive assessment of SBIR in the Program's 24 year history. Our efforts have produced nine book-length Academy publications that examine all major elements of the SBIR program, culminating in a set of recommendations currently available on the Academies' web site[1] and to be published later this year, certain highlights of which I will detail in this testimony.[2] Unless explicitly called out as a conclusion of the National Academies' studies, the views expressed in this testimony are my own. Finally, you should also note that at least one of X/Seed Capital's portfolio companies has received a Phase I SBIR award and several other portfolio companies are in the process of applying or have already applied for SBIR awards.

Summary Conclusions

- The SBIR program is an important part of the complex ecosystem comprising private and public sources of capital by which innovation is financed and brought to market in the U.S. By and large, the many elements of this ecosystem are complements rather than substitutes. On balance, the SBIR program plays an important role in promoting innovation by small businesses for which other sources of capital are usually unavailable, inappropriate or inadequate.

- The National Academies' SBIR study has concluded that, on the whole, the program is meeting its Congressionally-mandated objectives. The Program operates differently at different agencies. This diversity is an asset of the program as a whole and should be maintained because the different agencies have very different needs. However, there is also widely varying performance across the Program as a whole, both between and within individual Agencies. The Committee identified numerous operational improvements that can and should be made to advance the overall Program's performance to Congressional objectives.

- Most significant, in my view, the SBIR Program generates little hard data that would permit Congress to *quantify and measure* the Program's performance to

[1] See http://www.nap.edu/catalog.php?record_id=11989#toc
[2] See Appendix for a complete list of the nine Academy publications

Congressional objectives. This needs to be done so that Congress can better evaluate program performance and have a base on which decisions about allocation of resources to SBIR can be made.

- For reasons detailed below, if one of the most significant of Congress's goals for the SBIR Program is to stimulate increased real commercial innovation by small businesses, then otherwise qualified small businesses should not be denied SBIRs simply because they are majority-owned by venture investors.

Let me now touch on key aspects of these summary points.

SBIR and Early-stage Innovation.

A complex and, frankly, not terribly coherent ecosystem supports the financing and commercialization of small business innovation in the US – a subset of the numerous public and private mechanisms that comprise the larger US innovation system.[3] As a source of nearly $2 billion annually, the SBIR program is one of the largest parts of this ecosystem.

Given the diversity of small businesses and the differing objectives of the many public institutions and private market actors in the ecosystem, it is appropriate and necessary that multiple funding mechanisms coexist. By and large, these disparate funding mechanisms are complements rather than substitutes. This is particularly so at the most formative stage of a small business's efforts to innovate, the so-called seed stage, when a good idea is being transitioned out of research toward the market.

As I have detailed in prior Congressional testimony, there remains an acute need for multiple funding mechanisms at the seed stage.[4] Most small business innovation does not attract venture capital because it is not likely to generate the kinds of returns that venture investors seek. Conversely, for a variety of reasons that range from fund sizes and manpower constraints to the difficulty of accurate risk assessment, most current venture capital investors do not deploy capital into seed stage investments[5] – funds like X/Seed that are seed-focused are a rarity in the venture world. Even small businesses that do attract enough capital from public and private sources to get started find that additional capital resources are usually essential to pursue risky innovative ideas across

[3] There is an enormous academic literature on national innovation systems. Representative is Richard Nelson, ed., National Innovation Systems: A Comparative Analysis,(New York: Oxford University Press, 1993). On the US system, see the chapter therein by Professors David Mowery and Nathan Rosenberg.
[4] See http://gop.science.house.gov/hearings/ets07/February%2015/Borrus.pdf
[5] Data compiled for the National Venture Capital Association confirm this assertion. See, e.g., the last five years of the annual PricewatcrhouseCoopers/National Venture Capital Association *MoneyTree™ Report*. See also, National Research Council, *SBIR and the Phase III Commercialization Challenge*, Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007.

the classic market failure in early stage innovation that analysts dub the "valley of death."[6] In each circumstance, SBIR provides a viable funding alternative.

The bottom line: Because it is a source of sustained funding for seed-stage innovation, the SBIR program plays an important role in promoting innovation by small businesses for which other sources of capital are usually unavailable, inappropriate or inadequate.

The National Academies' SBIR Assessment

The National Academies' SBIR study has concluded that, on the whole, the program is meeting its Congressionally-mandated objectives to stimulate technological innovation by small businesses, increase private sector commercialization of small business innovations, meet federal research and development needs, and provide opportunities for participation by minority and disadvantaged persons in technological innovation.
It is equally important to note that Congress did not ask for comment on whether the SBIR program should exist at all, nor to assess what an optimum funding level for the Program might be. The full Summary Findings and Recommendations are hereby incorporated by reference. Here I call attention to a few of the most significant.

The different agencies that implement SBIR have quite different needs and objectives. Consequently, there is a rich diversity in program features and operations across the funding agencies as a whole. Program diversity is, by and large, an asset of the program as a whole and should be maintained. There is, however, widely varying performance across the Program, both between and within individual Agencies. Best practices obtaining at one agency are rarely if ever emulated by other agencies even where it would be exceedingly opportune to do so. No one agency has a monopoly on best practices and most are equally at fault for operational deficiencies. All would benefit from more attention from senior Agency management and more resources to manage the Program.

Among the significant operating issues are the size of current program awards, overly long processing periods and delays between Phase I and subsequent grant phases, the need for a renewed commitment to participation by women and especially minority-owned small businesses, the need for a stronger focus on commercialization, and a glaring lack of program self-assessment at all of the Agencies.

For example, given both inflation since the last Program adjustment in 1995 and the increasing costs of risky technical innovation, the size of Phase I and II awards can be usefully increased -- the study's recommendation is to $150,000 and $1 million, respectively. Similarly, given the need for predictability in financing of small business innovation, too long processing periods between Phase I and II can damage, delay and occasionally kill otherwise promising innovative projects – a concerted effort to shorten decision cycles and eliminate delays is essential.

[6] See, e.g., Lewis M. Branscomb and Philip E. Auerswald, "Valleys of Death and Darwinian Seas: Financing the Invention to Innovation Transition in the United States," The Journal of Technology Transfer, Volume 28, Numbers 3-4 / August, 2003, and sources cited there.

Best practices obtaining at some of the agencies that should be more widely adopted to help address some of the operational problems include, inter alia:

- Digital tools for processing, review, decision and communication on SBIR applications
- Multiple annual solicitations with opportunities for proposal resubmission
- Rapid review and decisions on applications
- Fast Track mechanisms that eliminate funding delays
- Continuous cycle time improvements
- Programs for commercialization assistance and tracking
- Senior leadership attention to bias elimination

Program Self-assessment

Most significant, the Academies' review concludes that the SBIR Program is not sufficiently evidence-based. It points to extremely limited collection of data on Program performance across all of the Agencies and to limited tracking of program outcomes. There is limited analysis and even less use of hard metrics in performance monitoring or to provide a basis for performance improvements. It recommends regular program evaluations, both internal and external, and increased senior oversight. This absence of adequate data collection and analysis is linked to the dearth of management resources. Some allocation of additional resources to effectively solve these problems is essential.

I want to underscore these points. In my view, the SBIR Program generates essentially no hard data that would permit Congress to *quantify and measure* the Program's performance to Congressional objectives. Because of this fact, it is effectively impossible to answer such questions as whether or to what extent the Program ought to have a preferential claim on scarce federal technology R&D resources (had Congress chosen to ask such a question of the Academy study). Quantification of Program performance, metrics and measurement, and even an attempt to assess return on investment, are essential so that Congress can have a more objective basis on which future decisions about allocation of resources to SBIR can be made. Indeed, I personally would not support committing additional resources to the Program unless and until the Academy's recommendations to improve and accurately measure performance were implemented.

Exclusion of some Small Businesses?

Finally, should the SBIR Program exclude small businesses that are majority-owned by venture capital investors? If one of the Congressional goals of the program is to stimulate increased real innovation by small businesses, then otherwise qualified small businesses should not be denied SBIRs simply because they are majority-owned by venture investors. I hold this view for several reasons.

Throughout the SBIR program's history, and prior to the current controversy, majority venture-owned small businesses have applied for and received SBIR funding. This actual historical experience strongly suggests that their participation has generated no harm either to the program or to other small businesses. Indeed, the Academy studies' painstaking data collection turned up no evidence that other small businesses have ever been crowded out by the participation of small businesses that are majority-owned by venture investors.

As important, if it is still the intent of Congress that the SBIR Program generate significant commercial impacts, it makes no sense to exclude any class of venture-backed small businesses because they are empirically among those small businesses most likely to have significant commercial success. Similarly, I believe that innovative new technologies developed by venture-backed small businesses are an increasing source of potential spin-on technologies essential to accomplishing the mission of DOD and other funding agencies. Excluding such firms from SBIR participation could damage achievement of Agency missions.

As detailed earlier, both venture dollars and SBIR dollars play largely complementary roles in financing innovation. One is rarely if ever a substitute for the other. Venture-backed companies seek SBIR dollars because they are needed to help finance especially risky or especially early small business innovation. The process of getting SBIR money is sufficiently time-consuming and potentially distracting that venture-backed small businesses would not seek SBIR funds if such funds were not essential to reach important innovation milestones, to launch new innovative ideas and, quite often, to the survival of the small business -- exactly what the SBIR program intends. This is especially true for small business innovation in industries like pharmaceuticals and healthcare and, increasingly, in energy and other sectors of paramount importance to the nation's long-term strategic and economic success – where an individual company may consume hundreds of millions of dollars over very long-time frames to bring an innovation to market.

In this context, it is simply inaccurate to analogize venture investors to large corporate owners – the ban on majority large corporate ownership of SBIR-funded small business is appropriate since SBIR dollars are supposed to go to small, not big businesses: By definition and practice, venture investors are financial investors who share the same goal as SBIR, i.e., the desire to generate successful small business innovation.

Appendix: Published Output of the Academies' SBIR Evaluation

National Research Council, *Capitalizing on Science, Technology, and Innovation: An Assessment of the Small Business Innovation Research Program—Project Methodology,* Washington, D.C.: The National Academies Press, 2004

National Research Council, *SBIR: Program Diversity and Assessment Challenges,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2004

National Research Council, *SBIR and the Phase III Challenge of Commercialization,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007

National Research Council, *An Assessment of the Small Business Innovation Research Program,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007 (Prepublication)

National Research Council, *An Assessment of the Small Business Innovation Research Program at the Department of Defense,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007 (Prepublication)

National Research Council, *An Assessment of the Small Business Innovation Research Program at the National Institutes of Health,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007 (Prepublication)

National Research Council, *An Assessment of the Small Business Innovation Research Program at the National Science Foundation,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, 2007 (Prepublication)

National Research Council, *An Assessment of the Small Business Innovation Research Program at the Department of Energy,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, Forthcoming

National Research Council, *An Assessment of the Small Business Innovation Research Program at the National Aeronautics and Space Administration,* Charles W. Wessner, ed., Washington, D.C.: The National Academies Press, Forthcoming

Testimony

Of

Lt. General Lawrence P. Farrell, Jr. (USAF Ret)

President and CEO

National Defense Industrial Association

The House Committee on Small Business

U.S. House of Representatives

January 29, 2008

Chairwoman Velázquez, Ranking Member Chabot, I am Larry Farrell, President and CEO of the National Defense Industrial Association and on behalf of our 1,416 corporate members, and just over 53,000 individual members, I'm pleased to appear before you today to discuss the Small Business Innovation Research program, which we regard as the nation's most viable tool in leveraging a small business resource that employs about half of the US workforce and about one-third of our degreed scientists and engineers according to the Small Business Administration. Small Business represent about two thirds of NDIA's total membership, it is therefore fitting and proper that you have invited NDIA to provide the Committee with its views on the critically important reauthorization of the Small Business Innovation Research (SBIR) program. In fact, during the past five years we have demonstrated our support of the SBIR program, by highlighting it as an important initiative in our Top Issues report presented to Congress and the Department of Defense, (DoD) annually. Moreover, beginning with our initial National Small Business Conference meeting in 2003, we have had significant participation by the DoD SBIR community and the National Reseach Council.

With respect to your leadership and the Committee's interest in reauthorizing and improving this driving force in technology innovation to support American competitiveness, I will address four questions:

- Does the SBIR program generate the desired results?
- Is the SBIR program evolving to advance American competitiveness?
- How do we know SBIR works? -- are we measuring what we manage?
- Is Congressional leadership needed to assert and grow the US innovation franchise?

Does the SBIR program generate the desired results?

As you know, SBIR has received consistently favorable statistical reviews in independent evaluations by the General Accountability Office (GAO), the RAND Corporation, the National Bureau of Economic Research, and most recently, in the voluminous five-year study completed by the National Research Council (NRC). In addition, I have attached numerous Department of Defense (DoD) SBIR success stories. In its lengthy, detailed ***Assessment of the SBIR Program at the Department of Defense***, the NRC found that SBIR meets the Congressional mandates for innovation, commercialization, and mining the small business resource to meet federal R&D needs. The NRC recommends SBIR expansion to improve these outcomes, and included a wealth of data to support its findings and recommendations.

I should also note that the SBIR program includes three of the seven DoD Acquisition, Technology and Logistics goals. DoD is on record stating that "small businesses are critical for the Department of Defense to provide future technologies to enable priority-critical war fighting capabilities".

NDIA believes declining defense research and development dollars places an even greater importance on achieving success from this program. Members in our regional Chapters that contain small defense technology firms are beginning to learn to work hand-in-hand with our large corporate members in a synergy designed to field optimal, innovative and affordable technology solutions to American defense and security needs. These solutions, as I am certain you know, have long been coming. However, I am highly encouraged by the trends and know DoD is striving to make every effort to develop ways to increase the number of technologies developed from the SBIR program and transition them into the defense industry.

As industry stakeholders, NDIA has a laser focus on American competitiveness in a global defense industry that increasingly challenges our members for primacy. Because we have concluded that small business resources offers our defense industry competitive advantages, we are building a substantial NDIA Small Business Division which has led to increased small business membership at our regional chapters.

A concrete measure of NDIA's commitment to the SBIR program was the participation of our Chair of our Small Business Division, who was a principal on the Committee for Capitalizing on Science, Technology and Innovation, which supervised the NRC SBIR study. During the critical two-year period of drafting its ***Assessment of the SBIR Program at the Department of Defense***, this committee constantly scrutinized the reams of DoD SBIR data and interviews, and held staff drafts up to a high standard of data veracity regarding program results. Why did we play that role? Because we felt that American defense industry competitiveness depends, in part, on small business performance through SBIR. But in that regard, more needs to be done, and can be done through SBIR reauthorization.

Is the SBIR program able to evolve to meet national needs?

Under the twin pressures of competitiveness and innovation, Congress has helped the SBIR program evolve through increased focus on commercialization of SBIR's innovative technologies in private industry – biotech, telecom and information security are prominent as well as federal defense and security programs. Recent evidence includes the 2006 Congressionally-mandated DoD SBIR Commercialization Pilot Program (CPP), which is pulling Army/Air Force/Navy command and R&D communities closer to each other. These efforts are beginning to show results (especially

in the Navy) in accelerating transition of SBIR technologies into defense Programs of Record by increasing boots on the ground in the complex work of managing small business/large business/defense program office technology partnerships. In FY 2006, 68 percent of Phase I contracts were awarded to firms with fewer than 25 employees, while over 42 percent were awarded to firms with fewer than 10 employees. This shows that to a great extent, the Department taps into small entrepreneurial firms. Entrepreneurial firms tend to offer the most ground-breaking, potentially disruptive innovation—the type that fundamentally changes how a capability is provided. Also importantly, the DoD SBIR Program is an entry point for firms new to the defense business—those seeking to develop a military customer base. Consequently this program has become a critical means for small firms with emerging technologies to work with DoD to address their mission requirements and help the nation maintain a vibrant and diverse industrial base.

But continued SBIR evolution to meet innovation and competitiveness needs in our defense and security world will need Congress to address some stubborn commercialization issues.
First, as the NRC, GAO, RAND and other independent observers have found, the present SBIR program terminates its projects after about 30 months of Phase I and II effort, when technologies – however promising – are just not mature enough for successful commercialization. Phase III technology maturation through the testing-evaluation-improvement cycle is drastically under funded; the need for such an incentive should be addressed in SBIR reauthorization.

Second, also as independent observers have concluded, increased successful SBIR commercialization will likely result from improved and required technology transition/technology insertion plans as part of every DoD Program of Record's Acquisition Plan. If such transition plans were paired with specified SBIR technology commercialization objectives in DoD – a natural

correlate to Congress' mandated SBIR commercialization goal – my estimate is that America would soon reap great competitiveness benefits. But in spite of these challenges, the SBIR program has yielded some very concrete successes which have benefited NDIA members and the defense industrial base. Examples include:

The Phraselator, a hand-held speech translation device developed by Marine Acoustics, Inc. (MAI), a veteran-owned small business based in Middletown, Rhode Island, which is now owned and marketed by Voxtec, Inc. Following the terrorist attack in September of 2001, just seven months into their Phase II contract, DARPA requested that MAI accelerate development of a prototype Phraselator. MAI proved quite capable, delivering 200 units in a matter of weeks to US military forces for use in Afghanistan during Operation Enduring Freedom. Over 5,000 Phraselators are now in use in Afghanistan, Iraq, and around the world, and they were used extensively in recent tsunami relief efforts. There is potentially a large commercial market for the devices, which are particularly helpful in law enforcement and medical applications where situational urgency may not allow time for an interpreter to arrive on the scene.

A second example is from Trident Systems, Inc. based in Fairfax, Virginia. Trident has been an active participant of the SBIR program, and as such credits the program with much of its success as a defense contractor. It received a not to exceed $25 million Phase III SBIR contract to further develop capabilities to develop radio frequency (RF) bridging equipment to move raw sensor data via legacy and emerging manned and unmanned RF communication nodes, correlating it, displaying it integral with command and control

software while providing the needed sensor data directly to the front line for our special operations command.

A third example highlights the ability of SBIR-funded technologies is Cybernet Systems in Ann Arbor, Michigan. Cybernet is a woman-owned business which has become the most successful SBIR firm in the state of Michigan. As such it is making enormous contributions to helping address the needs of our defense community. Cybernet created the Automated Tactical Ammunition Classification System (ATACS). The ATACS is a tactical small arms ammunition sorter designed to rapidly sort and inspect loose small arms ammunition ranging from 5.56 mm to 50 calibers at a rate of 12,500 rounds per hour. In contrast to traditional, time-consuming methods of hand sorting by military personnel, Cybernet's system has fully automated the classification process. The first ATACS tactical ammunition sorter was developed and deployed for the U.S. Army in Camp Arifjan, Kuwait. Cybernet is currently completing a second ATACS unit that will include some greater inspection detail. It is projected that the ATACS will enable the Army to receive consistent automated inspections for ammunitions thereby reducing manpower requirements and improving ammunition safety.

How do we know that SBIR works? – are we measuring what we manage?

Measuring what we manage is a standard industry function; it's the way that we identify and assess commercialization best practices and choke points alike. In terms of budget, the DoD program represents over 50 percent of the total federal SBIR budget, which exceeds two billion dollars. The DoD SBIR Program has experienced substantial growth in recent years, more than doubling in size from FY 1999 to FY 2005 to over one billion dollars, and it continued to grow through FY 2007 to

over $1.25 billion. This expansion is driven directly by growth in underlying RDT&E budgets, even as the set-aside percentage has remained constant over this period of time. In FY06, 883 topics attracted 13,253 Phase I proposals, a rate of 15 proposals per topic— about the average of the prior four years. The Department awarded 1,862 Phase I contracts and 1,172 Phase II contracts, and since the inception of the SBIR program in 1983, DoD has awarded nearly $11 billion to qualifying small firms through over 44,500 contracts. However, with a 1% SBIR administration cap, it's hard to see how DoD agencies can effectively measure and manage a DoD SBIR program currently tagged at almost $1.25 billion.

Although the NRC study staff found a surprisingly amount of SBIR data to evaluate SBIR management, the independent observers I've heretofore mentioned have also noted insufficient SBIR administration to support improved commercialization.

Another measurement of success of the SBIR program is the number of SBIR companies that have been acquired by large businesses. As shown on attachment two, nine of the very large defense corporations have together acquired 75 SBIR companies of the past few years, a positive indication of the value the defense industry sees in these innovative small businesses

The Defense Appropriations Act for FY 2008 provides $85 million of Research, Development, Test and Evaluation (RDT&E) funding for the insertion of technologies developed by small businesses. The funding provided is focused on the Future Combat Systems of Systems Engineering and Program Management, Surface Antisubmarine Warfare, New Design SSN and the Joint Strike Fighter. Although the law does not require that the small businesses supported with this funding be SBIR contract recipients, the DoD clearly recognizes that SBIR funded firms and technologies

represent ideal candidates. As such, the DoD has recommended its military departments and agencies examine their program needs, and to consider using the CPP program to help identify projects with the greatest potential to meet high priority requirements for the programs receiving this funding. This is yet another example of how the SBIR program is moving into the mainstream of Defense initiatives to provide timely and cost effective solutions.

A moment ago, I mentioned the 2006 Congressionally-mandated DoD SBIR Commercialization Pilot Program – or CPP --, which is challenging the Army, Air Force and Navy to use the SBIR program with its inventory of technology innovation to identify and implement best practices in commercializing SBIR product in DoD Programs of Record. In just two years, all three services have taken that task far down the implementation road, with careful measurement of what they are managing in their revitalized SBIR programs to ensure that the administrative improvements Congress demanded are working. Navy SBIR in particular sees their new SBIR constructs working, and has reported to the Secretary of Defense dozens of accelerated SBIR projects in both 2006 and 2007. I'll note here that one element all three services have identified as a best SBIR commercialization practice is the provision of special commercialization training to SBIR awardees on a discretionary basis. We would ask that you consider addressing that issue in your reauthorization efforts.

Overall, the key for the Committee's consideration is to require in any SBIR reauthorization a level of reporting sufficient for us to continually measure what we manage, and manage what we measure. That will require adequate administration – and I'll simply note here that federal management of similar contract programs average about 5% to 10% overhead, with industry

management of comparable programs running as high as 25% overhead. Current guidelines restrict SBIR administrative costs to 1 percent.

Is Congressional leadership needed to assert and grow the US innovation franchise?

Without question, Congressional leadership is needed to leverage the nation's small business resource through the SBIR program. It is also without question that without Congressional interest and leadership, especially your Committee, Madam Chairwoman, the SBIR program would have withered on the vine. There are several topics committee may want to consider:

1. Allowing up to 3% of the SBIR set-aside budgets to be used to fund administrative expenses. The most important activities requiring these resources are contracting, technical oversight, and program coordination with systems developers and end-users. Benefits derived from this change will ultimately manifest themselves in overall program performance, such as through the aggregate rate and magnitude of commercialization achieved. Modification of the current discretionary technical assistance authority (15 U.S.C. 638(q)), would provide ample resources for this task, particularly when combined with resources made available through the Commercialization Pilot Program (CPP) authority (15 U.S.C. 638(y))
2. We believe that flexibility is the key to contract award guidelines. In FY 2006, the average DoD Phase I award was $89,300 and the average Phase II was $720,800. Approximately 30 percent of these awards were modified due to participation in the Fast Track and Phase II Enhancement programs or to address technical or mission needs. Among this set of awards, the average contract award was about $135,000 for Phase I and $1.1M for Phase II.

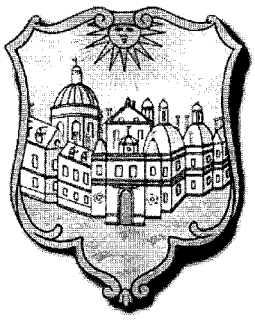
Current contract award guidelines are $100,000 for Phase I and $750,000 for Phase II. These have been in place since 1992 for the SBIR program and have not been increased to reflect inflation's impact on the price of research and development.

The cost of technology development and prototyping is part dependent on the type of technology being developed—some technologies are more expensive than others. For example, manufacturing-related initiatives can run into the millions of dollars to effectively prototype and demonstrate. Additionally, test, evaluation and validation can be quite expensive for technologies destined for military use. Thus, regardless of the level of the award guidelines, technology cost variability and the often high cost of bringing technologies to a transition-ready maturity level need flexibility in program execution. Therefore, flexibility is needed to judiciously go beyond the proscribed guidelines when necessary to be responsive to technology transition opportunities and produce successful outcomes.

3. Given the potential impact of the SBIR program on defense programs, we recognize that There is an on-going debate about raising the amount of the set-aside above the current 2.5 percent. We would encourage you to further examine the benefits of such a change in the context of the overall DoD science and technology investment strategy and meeting the ultimate needs of the warfighter.

Madam Chairwoman and Members of Committee, I'm honored to have had this opportunity to give you an insider's defense industry perspective on the SBIR program as my organization sees it. I encourage you and the Committee to work with us to take the SBIR program to new heights of

accomplishment in securing American competitiveness through technological innovation. In this tight, global economy, you could not leave a brighter legacy to our nation.



Testimony of

William E. Bean

Director, Technology and Business Center

College of William and Mary

Williamsburg, Virginia

BEFORE THE COMMITTEE ON SMALL BUSINESS
UNITED STATES HOUSE OF REPRESENTATIVES

"SBIR: America's National Technology Development Incubator"

29 January 2008

On Behalf of

The College of William and Mary

Testimony for: House of Representatives Committee on Small Business
Hearing entitled: "SBIR"; 29 January 2008

Provided by: Mr. William E. Bean
Director, Technology and Business Center
Department of Economic Development
College of William & Mary, Williamsburg, VA.

Introduction

Chairperson Velazquez, Representative Chabot, members of the subcommittee, good morning. Thank you for inviting me here and for this opportunity to provide testimony regarding the highly successful SBIR program.

I am William Bean, Director, Technology & Business Center, College of William & Mary (CWM) in Williamsburg, VA. My background includes considerable experience dealing with small companies as a small business consultant and in my current position. Prior to CWM, I held General Manager and President positions with Marconi Instruments in the Netherlands, France and in the USA, Schlumberger Smart Cards USA, and Wandle & Goltermann ATE Division. These cumulative experiences have served me well in providing the necessary background to understand the many issues facing small businesses and the types of services and programs that would help to assure their success. I have also been involved in the design of several start-up companies. My biography is included in the attachments.

The College of William & Mary is closely linked with the local community via the Department of Economic Development. The Technology & Business Center is a central component of the Department's outreach into the greater Hampton Roads community (comprising Williamsburg, James City County, York County, Newport News, Hampton, Virginia Beach, Norfolk, and Chesapeake). The Center provides valuable education programs for businesses via the College of William & Mary's (CWM) Mason School of Business, support services for two area technology business incubators and area businesses. I Chair two technology forums for sensor technology, and help link faculty, industry, and government for collaborative funding opportunities via various programs through the Hampton Roads Research Partnership. We also work closely with Virginia's Center for Innovative Technology. The SBIR program is vital to our regional efforts.

Background

The SBIR program, in my opinion, has been extremely successful. Given its huge size, with over $2 billion available for award, it has, in general, been well managed and has provided the participating agencies with critical technology and products. The Program has provided a valuable impetus to the participating small businesses in helping them to create their success path. In fact, many companies are founded upon receipt of a Phase I award. Their subsequent growth in jobs created, revenues generated, and hence taxes paid, have provided considerable benefit to their local regions, especially distressed areas, and to the nations economy. Academia has benefited as well through increased research funding and jobs for graduates. However, there are areas where the Program could and should be improved, both in output and efficiency.

This Testimony will primarily focus on Phase I Program issues, and will address a critical but so far largely ignored, issue concerning Phase I recipients. Some general comments on the overall Program will be included. An appendix of additional information is provided. Comments from two companies is included.

The SBIR Program, now 25 years old, was designed to stimulate high-risk technological innovation in the private sector; to strengthen the role of small business in meeting Federal research and development needs, and to increase the commercial application of these research results. Over 16,000 companies have participated; approximately 6000 companies are currently active in SBIR/STTR projects. It is the ONLY Federal program that uniquely addresses small businesses. There are three components of the Program: Phase I, Phase II, and Phase III. The Phase I (typically $70,000 to $100,000) & Phase II (typically $200,000 - $750,000) are funded; Phase III requires the company to find customers for the resulting Phase II technology. It should be noted that these levels were established in 1992. A Phase I project takes 6 months. A Phase II project is typically 18 – 24 months. However, the total cycle can take up to 42 months including award and assessment time.

The Program has been particularly successful in the State of Virginia, which ranks 3rd in Program awards. Since inception, over 4000 Phase I projects have been awarded to 816 companies. Approximately $1.24 billion has been awarded for Phase I and Phase II projects since 1983. Currently, there are 992 projects underway involving 276 firms. The DoD, in 2005, provided 75% of the awards with NASA second with 12%.

Approximately 40,000 people are employed by Virginia firms completing Phase I and Phase II projects.

In Hampton Roads, some examples include Applied EM, Echo Storm, AeroTech, Nascent Technology (now Luna Innovations), Abeo, Oceana Sensor, Par Technologies, Tao Systems, and many others. These companies all started with one or two employees and, helped with SBIR funding, have all grown to 10 – 40 employees and significant revenues.

Program Benefits

The program provides a very wide range of benefits. Some of these include:

- Considerable highly innovative technologies and products provided to the 11 participating agencies (over 60,000 patents filed and awarded).
- Fosters valuable linkages between Government and Small Businesses.
- Greatly expands government knowledge of and access to important technology.
- Provides critical financing for start-up and small companies (small businesses employ 39% of the Nation's engineers) and hence new jobs.
- Assists technology entrepreneurs to pursue their technology path to create products and services for government and the private sector.
- Provides a vehicle for the development of critical business skills.
- Contributes to regional economic development, especially in distressed areas.
- Creates valuable research opportunities for academia and jobs for graduates.
- Provides funding for graduate level and other students.
- Generates long-term relationships with government, industry, and academia.
- Encourages industry-academia collaboration.

- SBIR funding often creates opportunities with other funding sources, e.g. a corporate partner, customer, Angel Investor, CIT GAP Fund, etc.

Phase I Commentary

Phase I provides limited funding for a feasibility study of a potential new technology. Funding often occurs at the critical beginning stage of a start-up or small firm which should ultimately lead to a prototype and a saleable product. However, many early-stage technology entrepreneurs have yet to develop critical business skills. Therefore, while they may be extraordinary scientists and technologists, their lack of appropriate business skills potentially endangers the successful outcome of their SBIR (and other) projects. This will be most apparent during Phase II and Phase III projects where skill sets are insufficient to deliver the desired outcome.

Phase I Program Issues and Recommendations

- **Award Time**
  There are often considerable delays for proposal evaluation and award; sometimes over a year! CWM and a partner submitted two SBIR proposals to OSD over a year ago with still no answer.

  Solution:
  Establish and enforce a maximum 90-day evaluation and notice-of-award period.

- **Criteria for Evaluation and Evaluation Quality**
  Proposal evaluators often favor proposals that include a basic prototype even though Phase I is for research and feasibility studies to determine Proof-of-Concept and not for prototypes. Furthermore, many superior innovations are not funded because of a lack of understanding by the reviewer. This is a serious issue which discourages many competent companies from participation.

  Solutions:
  1. The SBA should clarify Phase I & II rules and enforce them.
  2. Ensure that proposal reviewers are properly qualified (enlist retired volunteer professional engineers, scientists, etc.) and that awards are let on merit and not "slick writing" or a lack of reviewer competence.

- **Funding Cap**
  The current recommended funding cap of $100,000 was established in 1992 and is woefully inadequate for today's businesses. The recommendation of the Senate Small Business and Entrepreneurship Committee to increase the Phase I and Phase II caps to $150,000 and $1,250,000 respectively (S. 3778) needs immediate 2008 implementation.

- **Contractor/Sub-Contractor 2/3 – 1/3 Ratio**
  Phase I criteria requires that the primary contractor retain a minimum of 2/3 of the contract, with 1/3 available for sub-contracting. Few small business firms possess the necessary project skills on staff, therefore frequently requiring subcontract arrangements with industry partners, academia, or both. Subcontracting with academia can be especially valuable because very deep and sophisticated skills can be accessed for complex research studies.

Furthermore, once established, academic relations can prove to be extremely useful to a company as they progress. In fact, HSARPA encourages companies to utilize academic participation in their SBIR program.

Modern industry favors collaborations as a way to improve and strengthen their respective competitive offering. Therefore, the SBIR program should encourage collaborative approaches where merited.

Issue 1
The current funding cap combined with the split policy creates a major limitation for academic involvement in the Program. Colleges/Universities must charge overhead, typically 50%, to federal grants. Therefore, a $33,000 award to a college will normally result in only $16,500 - $21,000 (depending on how the college computes its overhead) to the researcher. This may serve for minor requirements but certainly not for any meaningful research requiring employment of graduate students and reasonable professor time. Furthermore, many professors simply cannot engage in projects with such limited funding

Issue 2
The 33% will not go very far amongst one or more subcontractors, thus reducing the potential quality of the desired outcome.

Solutions:
1. Change the SBIR split ratio to 55/45.
2. Provide supplemental overhead funds to college/university proposals.

- **Company Mentoring**
The path from Phase I award to successful Phase III implementation is long and highly complex. Company founders and new managers, while often technically brilliant, usually fall well short of a decent grasp of business processes and therefore are highly prone to failure without effective guidance and mentoring. This knowledge gap will not always be evident during Phase I because it is primarily a technical engagement. However, Phase II demands sound business knowledge; serious finance knowledge, sales, marketing, marketing research, business plans, logistics, manufacturing, quality, and more all come into play. The lack of adequate knowledge is why so many firms struggle or fail during the Phase II and III processes.

Congress has emphasized the need for Phase III commercialization in recent years. As a result, approximately 40% of Phase II companies have achieved some degree of commercialization, a very good result. This result has been helped by several new programs, e.g. the excellent NIH Commercialization Assistance Program (CAP), Niche Assessment Program (NAP) for Phase I awardees, and the pilot Manufacturing Assistance Program (NAP). The new Commercialization Pilot Program (CPP) is beginning to help bridge the gap between promising defense R&D and the DoD acquisition system. The Navy program seems particularly responsive, and their Dawnbreaker Program provides some structured process education but is not closely coupled to the real needs of companies.

However, **Commercialization is At the End of the Process**! No current programs specifically address the core issue: the skills and competencies of small company management and their ability to move through all phases of company , and hence product, development. It is a well know statistic that companies engaged in good incubator programs or other formal mentoring programs have a far better chance of survival (the National Business Incubation Association reports that 85% of incubated business survive over 5 years; over 75% of non-incubated companies fail within 5 years.)

Therefore, Phase I, Phase II, and Phase III performance could increase dramatically if management tutoring programs were introduced at the Phase I stage instead of focusing only on specific tasks of late stage Phase II and Phase III assistance, which is largely technical and not managerial in nature. Risk assessments are mostly based on technology and not management. Funding sources, Venture Capitalists, Angels, strategic partners, always look for management first, products second. Furthermore, superior business skills will lead to faster growth, more jobs, more taxes paid, and a better return on the SBIR investment dollar due to superior company performance.

Many colleges and universities have educational and entrepreneurial programs to help entrepreneurs. For example, The CWM Mason School of Business and the TBC has developed and presented a rigorous five-module business education program to the two area technology incubators. The majority of the program's funding came from Virginia's Center for Innovative Technology (CIT). Several of the companies are SBIR Phase I and Phase II awardees. All have commented on the values of the program. Another important benefit is that through such programs, companies develop valuable college/university relationships which will help them throughout their company-building careers. Most importantly, the SBIR/ STTR program will benefit from the superior performance of properly mentored companies.

The TBC has also provided training workshops for NASA-Langley SBIR Phase II awardees.

A description of the Mason School of Business/TBC Business Education Module Program is provided in the Appendix.

Solutions:

1. Through academia, establish mentoring training programs for Phase I awardees and continue through Phase II and III.
2. Reinstate the SBA FAST (Federal and State Technology Program and RO (Rural Outreach) programs. These funds could be utilized to establish mentoring – training programs. The CIT Federal Funding Program was initially funded by the FAST program. Their SBIR support programs have been extremely successful in helping Virginia become #3 in overall SBIR funding.
3. Consider taking 1% of total SBIR dollars to support early stage mentoring programs as recommended by the SBTC (Small Business Technology Council) to the Senate in 2007.

General Comments

- **Increase Funding**
  Increase overall program funding from the current 2.5% to 5% in yearly increments of 0.5%. Currently only 4.3% of federal R&D dollars go to small companies, in spite of the fact that they produce patents at a rate of 5:1 over large companies and that they employ 39% of the nation's engineers. Therefore, federal funding for small businesses should better reflect their superior performance.

- **Make the Program Permanent.**
  The program has reached over 16,000 companies throughout America. It has stimulated the creation of thousands of companies and new, high-paying jobs. It has provided vital technology to government agencies from the military to life sciences; and has resulted in literally billions of dollars of economic activity. This should not be subject to justifying its existence every few years. Instead, spend the review energy on ways to improve and add even more value to the program.

- **Program Expansion**
  The SBA should assist communities to develop infrastructures that would enhance SBIR success. An example of such an infrastructure is the Hampton Roads Research Partnership (www.hamptonroadsrp.org). This organization is a consortium of area colleges/universities, federal laboratories, industry and regional organizations that fosters collaborations for funding opportunities. As the Chair of its Sensor Cluster program, I routinely send out notices regarding current SBIR opportunities and help find appropriate collaborators where needed.

  Additionally, the SBA should continually appraise local economic development agencies of successes in their regions and encourage them to assist companies to engage in the SBIR program.

  The FAST and RO are possible vehicles to assist this process.

- **Website**
  Access to SBIR information is complex. The www.sbir.gov website should be made much more user friendly with more useful information. The previous www.sbirworld.com site was far more useable and informative.

- **Phase II to Phase III Path**
  Many SBIR projects are for very specific military or government needs with little or no external commercialization potential. Therefore, agencies need to take care that, for such projects, that there is either funding for the Phase III stage or requirements in other agencies for the technology. Increased inter-agency collaboration would be a big step forward.

  New Program additions such as Phase IB and Phase IIB certainly help, but agencies need to take responsibility for procuring successful Phase II products and services. And, additional monies must be added to the program to support these additions.

Conclusion

Thank you again for this opportunity to present some ideas and opinions concerning the SBIR program. My conclusion is that the SBIR program has been enormously successful. There can be no doubt that the 25 year old SBIR program should be continued permanently, provided increased funding, and be strongly promoted.

Appendix

College of William & Mary
Mason School of Business and Technology & Business Center
Technology Business Strategic Education Module Program

Introduction
The Technology Business Strategic Education Module Program (TESEMP) has been designed by the College of William & Mary's Technology & Business Center (TBC) in conjunction with the Mason School of Business. The TESEMP provides a very high level educational program designed to maximize the growth potential and sustainability of early stage technology businesses with high growth potential.

These technology businesses are generally pre-revenue start-ups or early stage companies founded by entrepreneurs who often have little business experience. While they may be technically brilliant, their real knowledge of critical business practices is limited. Unfortunately, their lack of knowledge greatly hinders their progress. This program is designed to provide a series of critical business education modules that will greatly enhance their knowledge of important business issues and processes.

The Technology Business Strategic Education Module Program
The TESEMP will provide a very high-level educational program to high potential early stage, young, high growth, and start-up technology companies. The program is particularly suitable for companies in SBIR programs. It is based on 5 educational modules that will be taught by Mason School of Business Professors with assistance from the Technology & Business Center.

The Modules include:

- Strengths Weaknesses Opportunities Threats Analysis (M1)
- Strategic Business Planning (M2)
- Essentials of Finance (M3)
- Sales and Marketing (M4)
- Operations and Business Processes (M5)

Module 1 is performed first for each client to establish a baseline of their status.
Modules M2 – M5, will be run as a sequence, typically over a 4 - 5 month period, or can be provided individually for other requirements.

The courses are taught by the following Mason School of Business Professors:
Dr. Hector Guerrero, Associate Professor, SWOT Module
Dr. Brent Allred, Associate Professor, Strategy Module
Dr. Vladimir Atanasov, Assistant Professor, Finance Module
Dr. Ronald Hess, Associate Professor, Sales/Marketing Module
Dr. James Bradley, Associate Professor, Operations and Processes Module

This Program will provide a superior level of educational and practical to high growth potential technology companies, especially SBIR awardees, and incubator clients and will create an integrated relationship between the Mason school of Business and the technology community.

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Following are comments from two Virginia SBIR companies

Luna Innovations, Roanoke, VA
Technology innovation is a key engine for growth in an increasingly global and competitive marketplace. According to the National Science Foundation, more than $340 billion was spent in research and development in the United States in 2006 as follows: 28% by federal agencies, 71% by the private sector, 1% by academic institutions and not-for-profit organizations.

However, the transition from technology discovery to commercialization is challenging, and government agencies, academic institutions and corporations frequently lack formal processes to enable timely commercialization of technologies in response to marketplace demands. One problem is that research and development is often done in isolation, without input or feedback from the marketplace. In addition, due to the inherent complexity of new technologies, cross-disciplinary and integration issues are often not addressed because researchers, engineers and product developers have very specialized areas of expertise. Moreover, research organizations may be unable to commercialize technologies because their networks may not be broad or deep enough to connect them expeditiously with partners, investors and customers. Development efforts can also fail for a host of other reasons, such as inability to manufacture at commercial scale, unanticipated competition or poorly understood customer needs.

Luna Innovations Incorporated is a top nationally ranked recipient of Small Business Innovation Research (SBIR) awards and a three-time award recipient of the Tibbetts Award, a highly prestigious, national award presented by the Small Business Technology Council that is given to companies judged to best exemplify the philosophy and doctrine of the SBIR program. By leveraging R&D performed through the SBIR/ STTR (Small Business Technology Transfer) programs, Luna has developed a disciplined and integrated process to accelerate the development and commercialization of innovative technologies. Our business model employs a market-driven approach and provides the infrastructure, resources and know-how throughout the process of developing and commercializing new products:

- Searching for emerging technologies based on market needs;
- Conducting applied research;
- Developing and commercializing innovative products; and
- Applying proven technologies and products to new market opportunities.

Specifically, the SBIR/STTR programs accelerate product development by adding resources which are utilized during applied research and development.

The strength of this business model is exemplified by our successful track record in taking innovative technologies from the applied research stage through product development and ultimately to the creation of independent businesses. For example, the following SBIR/STTR success stories illustrate some of these successes.

Luna's nanoWorks Division is developing carbon nanomaterials technologies for medical diagnostics, therapeutics and organic solar cells. This Division was made possible through a variety of federal funding awards including:

- NSF SBIR/STTR programs that focused on synthesis and purification; and
- NIH SBIR programs for targeted MRI imaging of blood clots and of the brain.

In 2002, Luna Innovations, using technology developed under U.S. Navy, Air Force and National Institutes of Health SBIR programs, launched Luna iMonitoring for remote asset management. By October 2003, IHS Energy was interested in the line of solar-powered, wireless sensing devices and acquired Luna iMonitoring. Luna's technology allowed IHS Energy to augment its popular Web-based well-data collection system with remote monitoring technology, making automation affordable for the oil and gas industry. After acquiring the company, IHS began full-scale production of 'iNodes" – a suite of wireless sensing devices helping the petroleum industry to optimize oil production.

Luna recently formed an IP licensing, development and supply agreement with Intuitive Surgical, Inc. the global technology leader in robotic-assisted minimally invasive surgery. Luna will develop and supply its fiber optic-based shape sensing and position tracking system for integration into Intuitive Surgical's products. Luna's shape sensing platform was developed using multiple SBIR contracts, which funded the fiber optic sensing technology and demodulation system design.

Lastly, Luna's EDAC® QUANTIFIER is an innovative medical device that applies quantitative ultrasound technology to non-invasively detect the presence of air emboli in an extracorporeal circuit during cardiopulmonary bypass surgery. Initial funding in development of the underlying technology came from a Navy SBIR, which proposed the use of Luna's ultrasound technology to monitor blood and tissue to prevent Decompression Sickness, a condition that is suffered by a person exposed to a sudden change in barometric pressure, such as the decrease in pressures during underwater ascent. The EDAC® received an FDA Clearance letter in May 2007.

Opportunities exist to improve the SBIR/STTR program. Initially, we need to reauthorize funding for continuation of this important program while revaluating possible funding levels for appropriateness. We should continue to identify the Federal end-users for the program topics to expand the program depth. Likewise, an increase in the participation of large prime contractors with the SBIR program will increase the rate of technology insertion. To summarize, Luna is focused on developing and commercializing a growing portfolio of innovative products with the assistance of the SBIR/STTR program.

In a 2006 interview with the Navy's *Transitions* newsletter, Kent Murphy, Chairman and Chief Executive Officer of Luna Innovations, said, "The SBIR program has been the foundation upon which we have built our business. It is very hard for a small, rural company to get the necessary resources to grow its business. SBIR contracts have provided Luna with the initial funding needed to develop more than a dozen products for use in industrial process control, energy production, life sciences and defense. To date, Luna and its subsidiaries have created more than 250 high tech positions throughout Virginia. Without the SBIR process, we probably wouldn't be here today."

MYMIC LLC, Portsmouth, VA
MYMIC LLC is an SBIR success story in progress. MYMIC is a HubZone certified, Service Disabled Veteran Owned Small Business located in Portsmouth Virginia. MYMIC started seven years ago and has grown to approximately thirty employees. MYMIC supports military, government and private sectors customers with knowledge and technology to enhance decision making and provides integrated capabilities using modeling, simulation, and visualization supported with analysis, assessment and training solutions.

MYMIC won its first two SBIR Phase I efforts in 2006. Since then, MYMIC has been a very active participant in the SBIR program, winning an additional six Phase I efforts and just recently winning a Phase II effort. Although MYMIC conducts non-SBIR efforts, the SBIR program has been essential to our success, which has included doubling our work force.

The advantages of the SBIR program to a small business such as MYMIC are numerous. The SBIR program allows MYMIC to identify and bid solutions for Government problems, expanding our understanding of the nation's needs and positioning us to fulfill those needs. It allows us to create inherent corporate capability and hire a work force with advanced skills. It fosters cooperation between us and other companies and academic institutions, spreading the program's benefits, while maintaining beneficial competition.

Our experience is that other small business programs do not provide the benefits of the SBIR program. We participate as sub-contractors on teams led by large businesses, but the role of small businesses under these contracts has generally been to provide individuals with expertise. This does not foster the creation of inherent small business capability. Small business set-asides are generally too large and wide for start-up small businesses and small businesses with specific capability to execute.

Most importantly, we believe the SBIR program provides tremendous benefit to the country, far exceeding its investment. The inherent benefits of a healthy small business community are obvious enough that we feel we do not have to repeat them. The perhaps less obvious benefit of the SBIR program is the harnessing of the expanse of the American free market for the generation of solutions to Government problems. If every SBIR topic generates only twenty Phase I proposals, those are twenty separate ideas from possibly the most creative and entrepreneurial minds of the country. The two to five companies selected for Phase I funding will report back on detailed and innovative advancements within the topic's field. The Phase II effort has the potential for creating a prototype solution that could revolutionize the field. We feel that our own Phase II effort, upon which we are embarking, will generate a product whose utility will go far beyond the limits of the associated SBIR topic.

As with all programs, however, we feel there is room for improvement. We have two recommendations. The first deals with the mandatory levels of effort by the small business. For an SBIR Phase I, this is two-thirds. We assume that this rule is in place to ensure the SBIR program is targeted towards small businesses and is not abused. However, this limit increases the difficulty of participating in the program. Our experience is that small businesses do not possess all the capabilities required to create a solution. The small business, therefore, has to team with other organizations to

access the requisite capability. We believe this is good; it helps the small business develop important strategic partnerships, maximizes the utility of proposed solutions, and spreads the benefits of the SBIR program. However, the one-third limitation on participation by team members generally restricts participation to only one partner, which in turn artificially restricts the overall capability that the small business can build to address the problem. We would recommend decreasing the minimum effort of the small business from the current two-thirds to half, matching the mandatory Phase II level of effort, or even matching the STTR limit of two-fifths.

The other recommendation is to shorten the time between submission of a proposal and the announcement of an award. We have experienced a ten month gap between submission of a Phase I proposal and the awarding of SBIR Phase I work. We have another proposal submitted nine months ago about which we are awaiting a decision. Small businesses are not in a position to absorb this level of uncertainty. It adversely affects cash flow and personnel plans. More importantly, the teams built to submit a solution, as discussed above, cannot sustain themselves over such long periods. In the case of the above mentioned SBIR with the ten month gap before award, a key academic participant has gone overseas on sabbatical. Had there been a timely award, we would have completed the six month Phase I prior to her travel. Now we are accomplishing the work but with the added difficulties of coordinating and collaborating via email while she executes her contribution around her sabbatical work.

MYMIC strongly believes in the SBIR program and whole-heartedly supports its continuation. MYMIC looks forward to growing under the program while providing great value to the Government.

Technology & Business Center at the College of William & Mary

The Technology and Business Center links companies to William and Mary resources. We are particularly interested in helping technology and other knowledge-based companies. We want to make it easy to get access to faculty who are interested in collaborative research and consulting.

We generally arrange an initial meeting with company representatives to help identify potential areas of collaboration. In subsequent meetings, we arrange discussions with faculty members who have skills in the targeted areas. Collaborations can include applications for grant funding or arrangements for faculty and students to pursue consulting projects. We have substantial experience in helping companies with Small Business Innovative Research (SBIR) proposals. We also have very active connections with programs in the School of Business including the CORP Program, the Entrepreneurship Center and the Field Consultancy Program.

Because of our extensive contacts, we can also provide connections with companies and other research organizations and universities in our region. For example, the Center plays a leadership role under the auspices of the Hampton Roads Research Partnership in promoting the development of a regional sensors cluster. The Center is also active in helping to identify new partners for the Virginia Institute of Marine Science, a William & Mary Campus VIMS-Industry Partnership Committee.

We are interested in working with you in virtually any area of technology or other knowledge-based applications. Recent projects have included collaborations in the areas of marketing, financial management, modeling and simulation, bioinformatics, marine science, homeland security, sensors, information technology, anthropology, psychology, aging and geriatric health, and clinical trials. Additionally, we have created with the Mason School of Business a series of educational models for businesses. These modules are particularly appropriate for small companies engaged in SBIR projects. If we do not have the appropriate resources available at William and Mary, we will be happy to help direct you to resources that may be available elsewhere.

Our staff includes a Director and two student interns. We also draw on the resources of the Office of Economic Development and the Technology Transfer Office. We receive advice and support from a group of CEOs of local knowledge-based companies.

Our primary funding support has come from an Economic Development Agency grant via the Hampton Roads Research Partnership. That funding supports our work with a number of clients, including those in the Hampton Roads Technology Incubator in Hampton and in its new branch in James City County. We have also received funding from the Crossroads Group, the City of Williamsburg EDA, James City County, and the City of Portsmouth. BB&T Bank provides funding for our student interns.

We look forward to the chance to work with you! Please contact us.

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs: Overview and Initiatives

Michael J. Caccuitto
DoD SBIR/STTR Program Administrator
Office of the Under Secretary (AT&L)
July 26, 2007

Outline

- The need for small businesses
- SBIR/STTR Overview
- Current Issues/Initiatives

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- SBIR/STTR Overview
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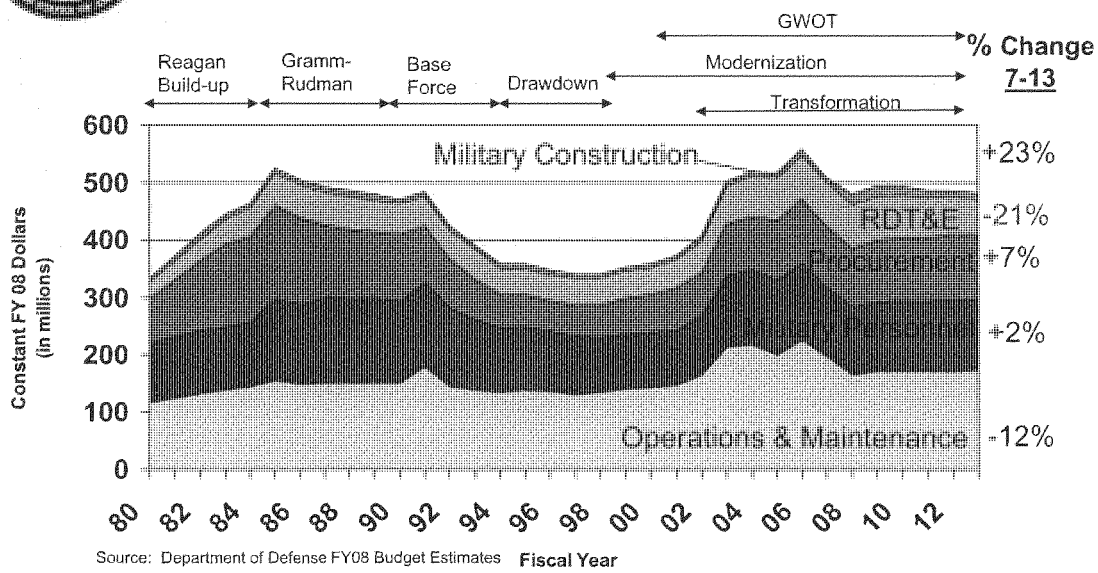
Imperatives demand technology… Challenges make it harder to get

- Need for speed & flexibility to address emerging and evolving threats
- Consolidating industrial base
- Budget pressures
- Less R&D investment in industry
- Increasing emphasis on/need for joint capability acquisition

The Central Challenge: Where will innovation come from and how will we get it?

Defense Budget Trends

DoD Budget Authority



Source: Department of Defense FY08 Budget Estimates

RDT&E gets increasingly crowded out through the FYDP.

Over Two Decades of Consolidation:

What were over 100 "name plate" primes in the1980s are now five firms…

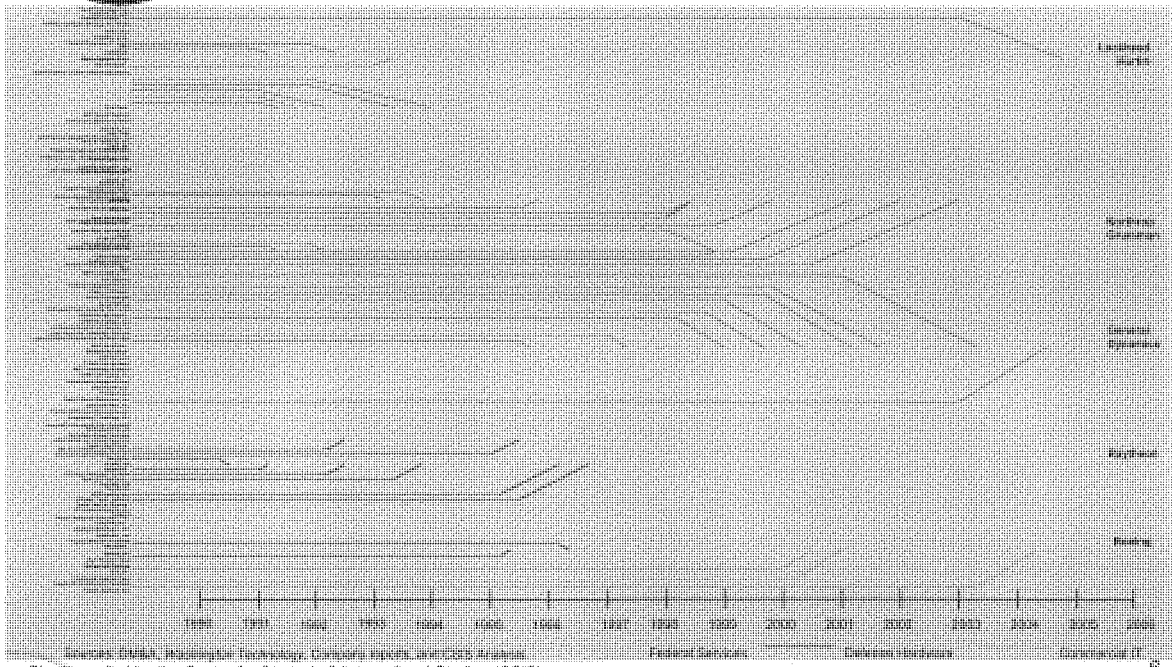


Chart supplied by the Center for Strategic & International Studies (CSIS)

6

Industry Use of Cash: Response to Policy and Market Realities

Defense Industry Cash Outflows (Percent)

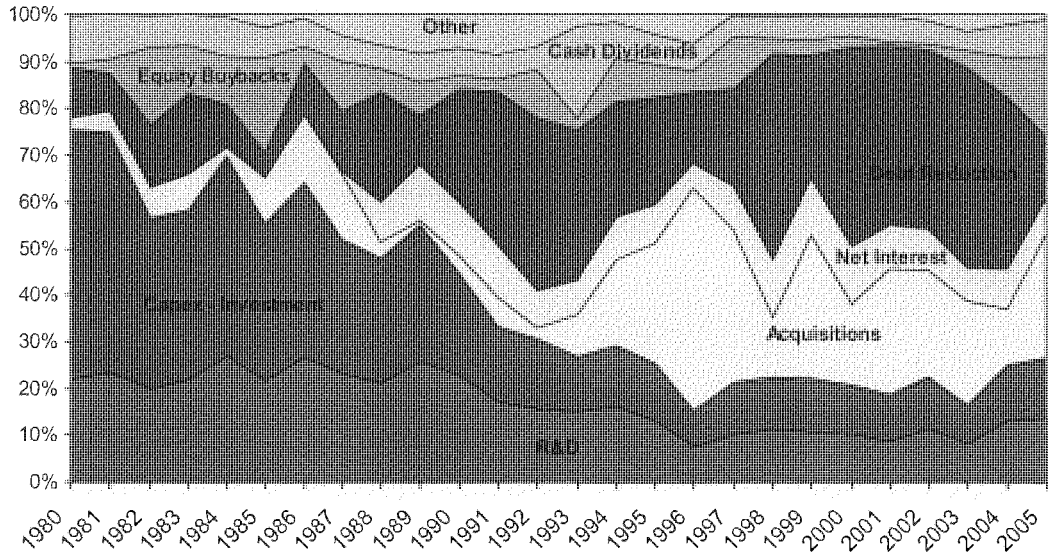


Chart supplied by the Center for Strategic & International Studies (CSIS)

Sources: FactSet, S&P Compustat, Energy Information Administration, Congressional Reports, CSIS Analysis

Large Firm Value Creation: Growth by Acquisition

ACQUIRING FIRM	# OF SBIR COMPANIES
L3 COMMUNICATIONS	15
TITAN CORPORATION	12
GENERAL ELECTRIC	8
JDS UNIPHASE	8
EDO CORP. (EDO)	7
INVITROGEN	7
BAE SYSTEMS	6
GENERAL DYNAMICS	6
JOHNSON & JOHNSON	6

Source: SBTC

Large Firm Value Creation: Growth by Acquisition, Cont'd

ACQUIRING FIRM	# OF SBIR COMPANIES
AMGEN, INTERMAGNETICS GENERAL, TYCO, GENZYME	5 EACH
CACI INTERNATIONAL, BECTON DICKINSON AND CHARLES RIVER	4 EACH
AFFYMETRIX, AGILENT, BECTON COULTER, BF GOODRICH, BIO-RAD, CORIXA, FLIR INTEGRA LIFE SCIENCES, MANTECH, MILLENNIUM, MSC, NANOGEN, NORTHROP GRUMMAN, NOVARTIS, OSI, PFIZER, PHOTON DYNAMICS, RAYTHEON, SCHERING-PLOUGH, SEROLOGICALS, SIEMENS, SIGMA ALDRICH CORP., THERMO-ELECTRON & VEECO INSTRUMENTS	3 EACH

Source: SBTC

Outline

- The need for small businesses
- SBIR/STTR Overview
- Current Issues/Initiatives

SBIR/STTR Legislative Background

- Small Business Innovation Research (SBIR) Program. Established by the Small Business Innovation Development Act of 1982 (P.L. 97-219)
  - Authorized through FY2008
- Small Business Technology Transfer Program. Established by the Small Business Research and Development Enhancement Act of 1992 (PL 102-564)
  - Authorized through FY2009

Broad purpose: Ensure small businesses receive share of federal R&D and leverage the unique innovative character of small business

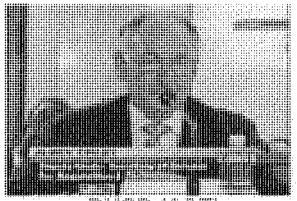
Program Eligibility Criteria

- SBIR
  - Organized for- profit U.S. business, located in the US
  - At least 51% U.S.- owned by individuals and independently operated
  - 500 or fewer employees
  - Principal Investigator's primary employment with small business during project
- STTR
  - Formal Cooperative R&D Effort (Minimum 40% by small business, 30% by U.S. research institution)
  - U.S. Non-profit Research Institution (College or University; other R&D center)
  - Intellectual Property Agreement - Allocation of Rights in IP and Rights to Carry out Follow-on R&D and Commercialization

Potential for ownership guidelines to change to allow majority ownership by Venture Capital Corporations.

USD(AT&L) Goals seek enabling technologies…and robust supplier base

Acting USD (AT&L)
The Honorable Mr. John Young



DUSD (A&T)
The Honorable Dr. Jim Finley

3 (of 7) AT&L Goals:

- Focused Technology
- Reliable and Cost-effective Industrial Capabilities
- Strategic & Tactical Acquisition Excellence

www.acq.osd.mil/goals

Small businesses are critical for the Department to provide future technologies to enable priority-critical warfighting capabilities.

SBIR/STTR Program Structure

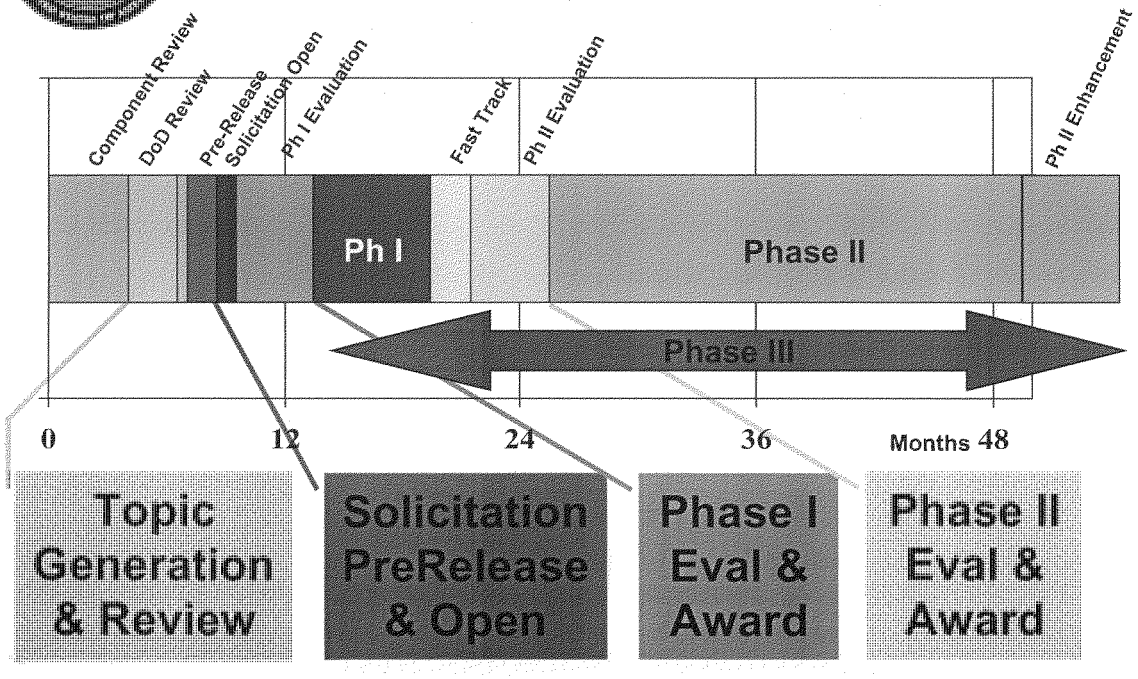
SBIR/STTR Funds:

- **Phase I:** Project Feasibility
  - Generally 6 months, not exceeding $100,000
- **Phase II:** Project Development to Prototype
  - Generally 2 years, not exceeding $750,000

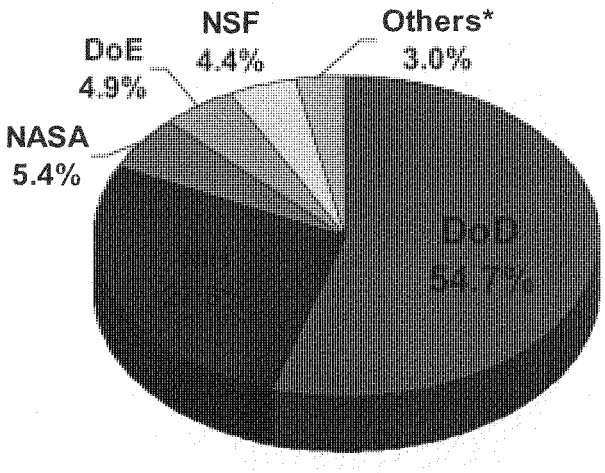
SBIR/STTR Does Not Fund:

- **Phase III:** Commercialization in Military and/or Private Sector
  - Sale of product or service
  - Additional R&D of technology
  - Manufacturing/production start-up
  - Marketing start-up/marketing
  - Training workforce to manufacture or sell new products

A Deceptively Complex Process



DoD is about Half the Federal SBIR Program



Largest of 11 Participating Federal Agencies

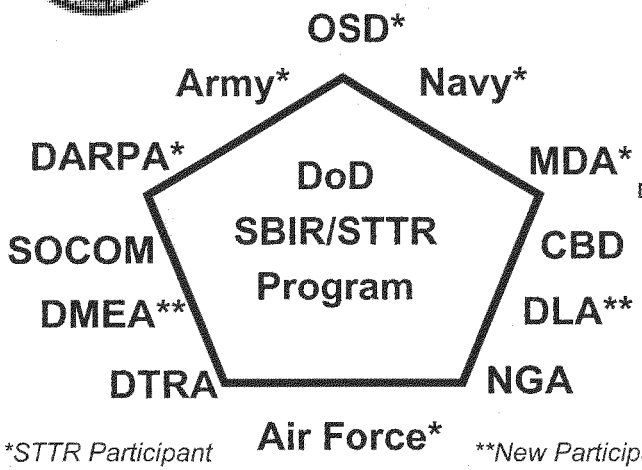
SBIR FY06 Budget

$1.13B

STTR FY05 Budget

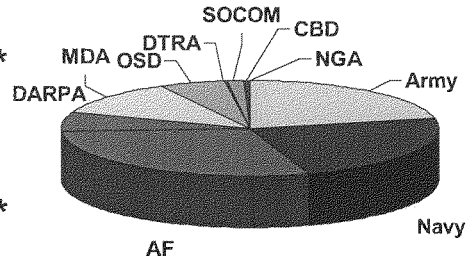
$130M

DoD SBIR/STTR Program Organization & Budget



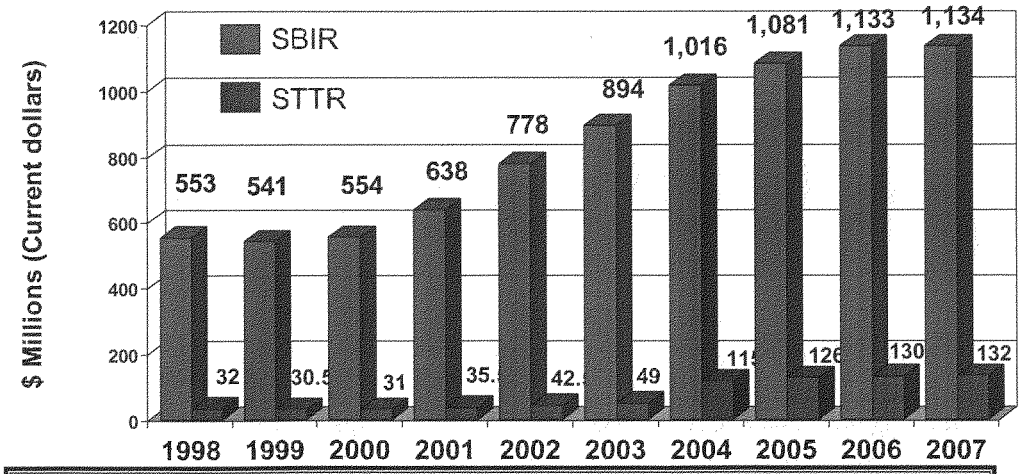
*STTR Participant

**New Participant in FY07



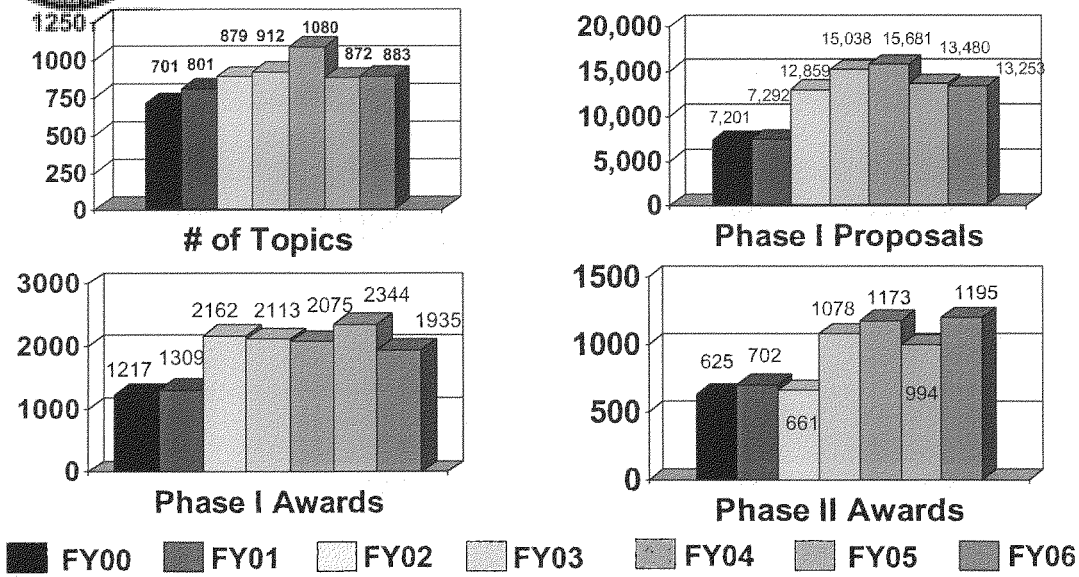
The DoD SBIR Program has twelve participating components, STTR has six.

SBIR & STTR Budgets Have Grown

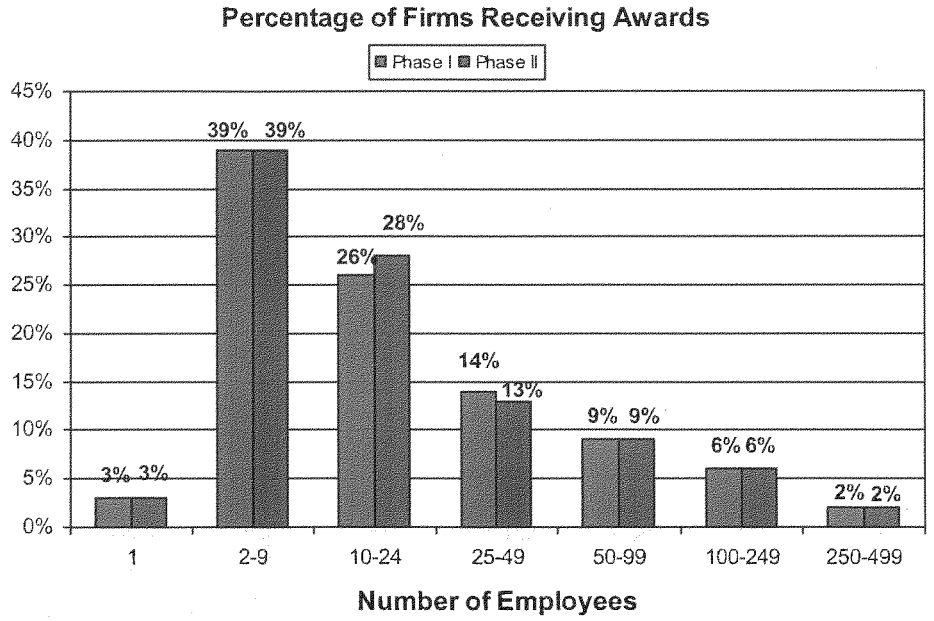


Increasing RDT&E appropriations have driven strong SBIR budget growth.

SBIR Program Activity Trends



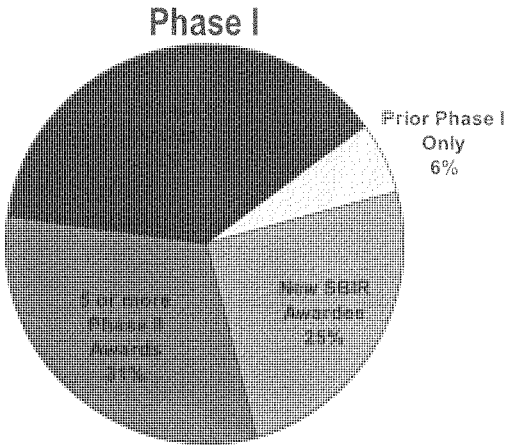
Firm Participation:
Phase I Awardees are typically small

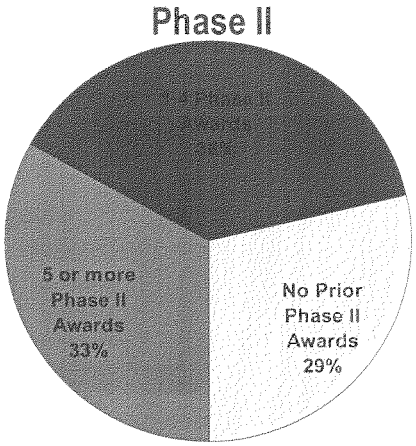


FY06 Annual Report, Firm Data as of March 2006

Firm Participation, Cont'd: Firms are often new to DoD

Percentage of Firms Receiving Awards

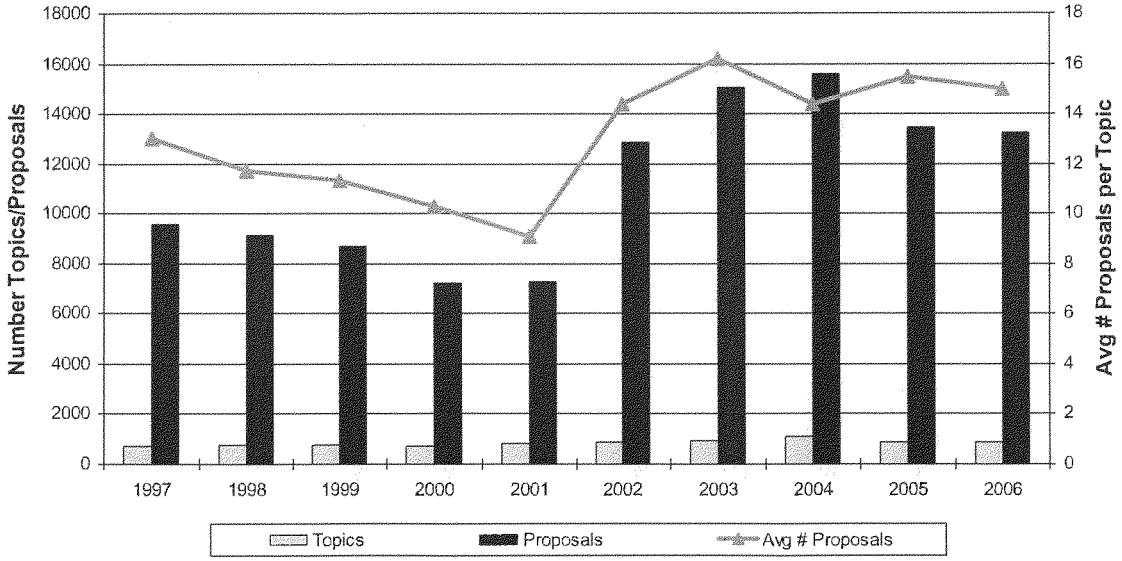




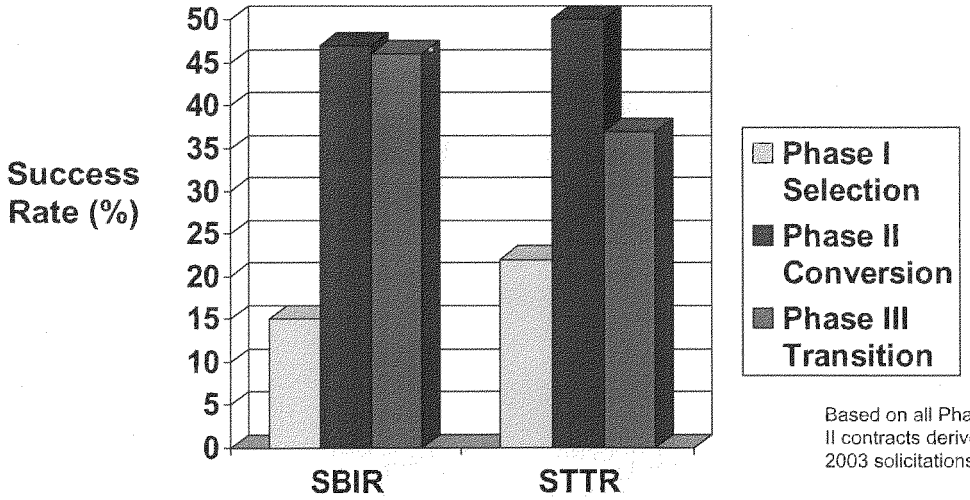
FY06 Annual Report, Firm Data as of March 2007

Topics and Proposals

✓ **Number of proposals per topic has remained steady**



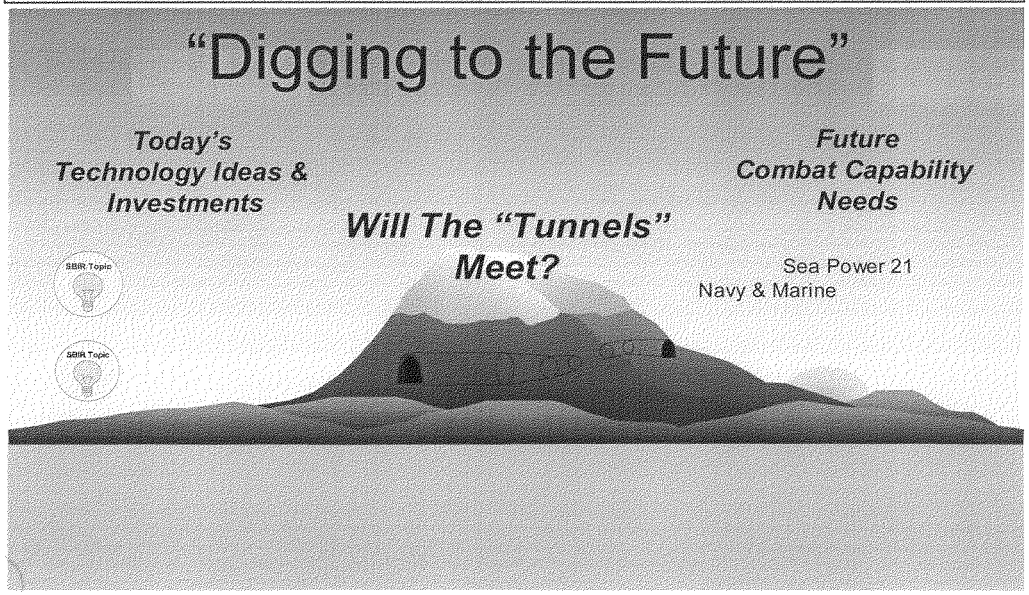
Historical Success/Transition Rates



Based on all Phase I and Phase II contracts derived from 1994-2003 solicitations

The Fundamental SBIR Management Challenge

Transition success hinges upon strategic technology investment focus and roadmapping towards future capability needs



The Fundamental SBIR Management Challenge

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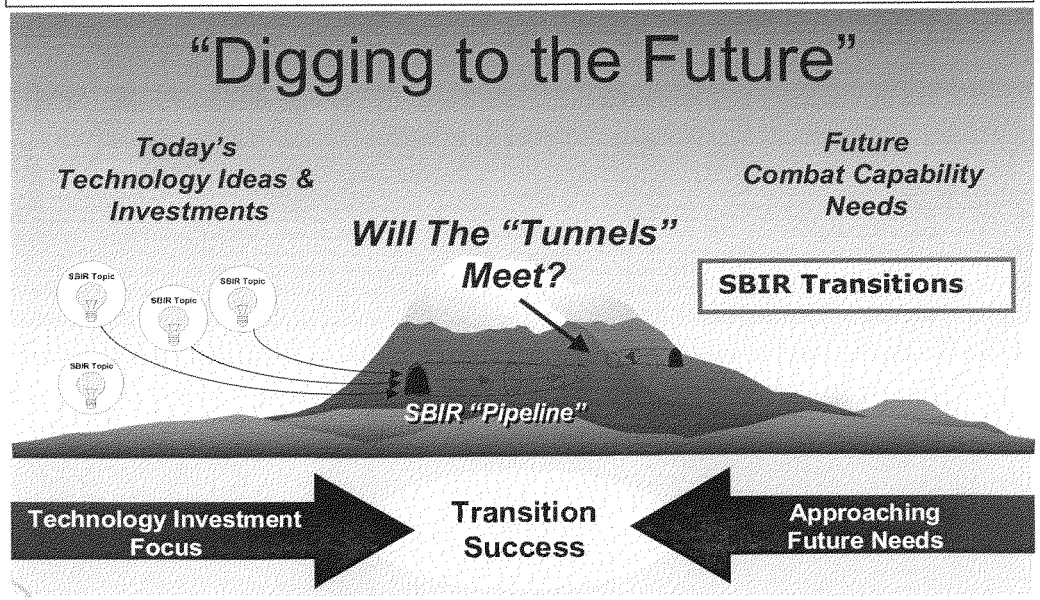
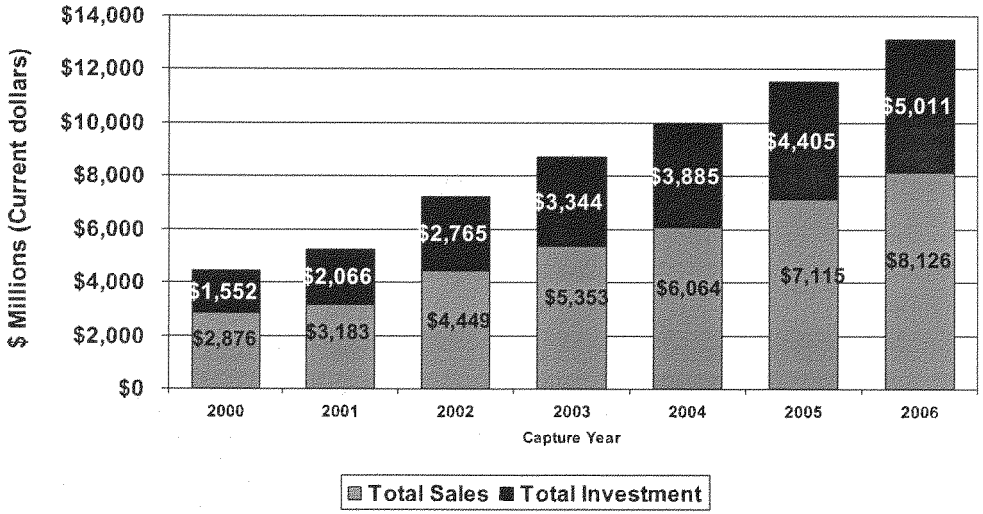


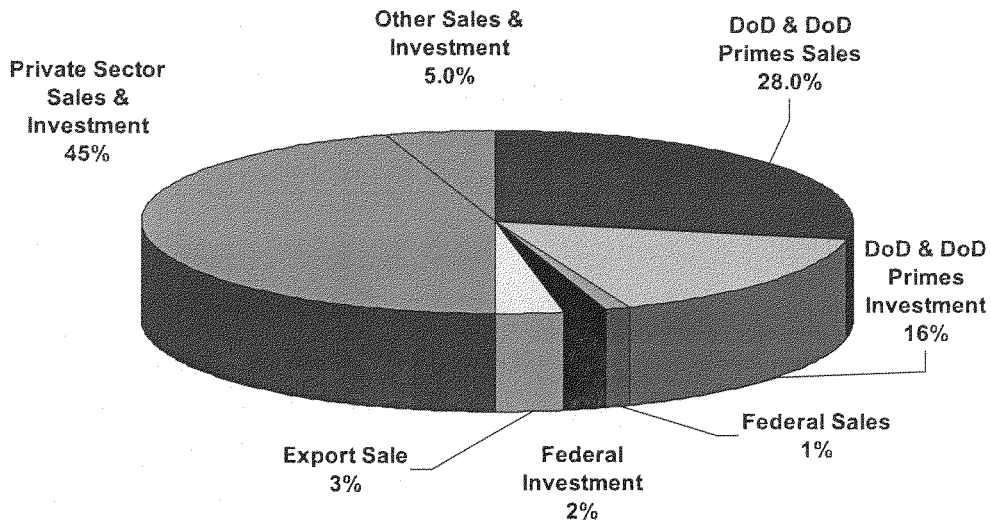
Total Commercialization Growth: Investments Producing Momentum



Source: DoD CCR Database, captured in October every year 2000-2006.
Data includes DoD phase II Awards reported at time of capture.

SBIR Phase III Commercialization Sales and Investment Breakout

DoD Phase II Projects Only



Source: DoD Company Commercialization Report Database, May 2007
Reported by firms submitting to DoD since 2000
Award Year 1983-2005

Outline

- Environmental Considerations
- SBIR/STTR Overview
- Current Issues/Initiatives

Current Issues/Initiatives

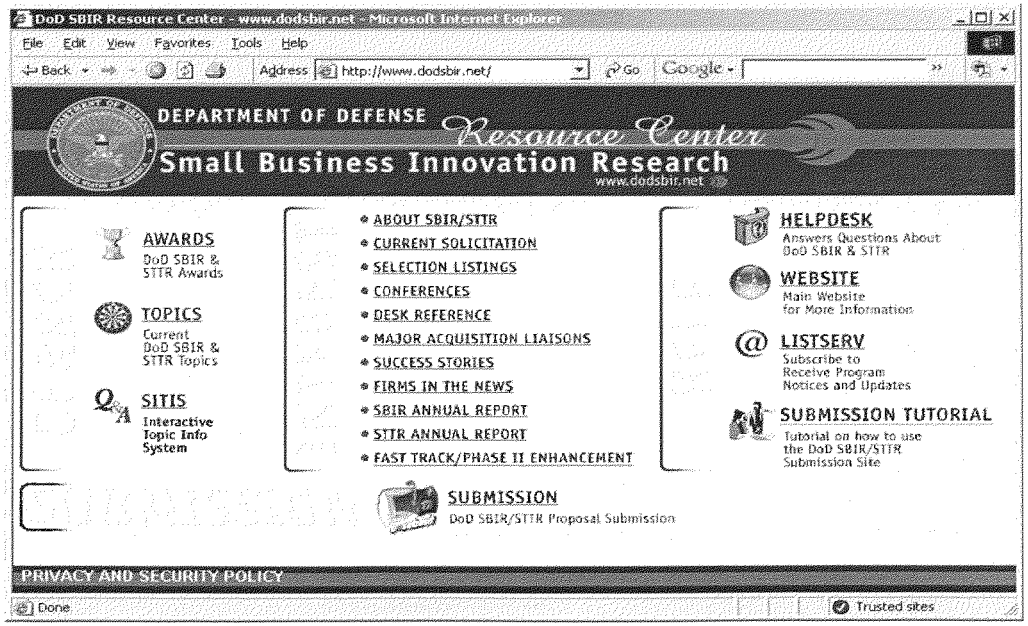
- Reauthorization
  - Set-aside percentage
  - Award Guidelines
  - Administrative expenses
  - Many other considerations
- Commercialization Pilot Program
  - Army, Navy, Air Force underway
  - Additional component efforts in work

Beyond SBIR Phase II: Bringing Technological Innovation to the Warfighter Conference

- August 21-23, 2007
  - Recent SBIR Phase II Award Winners
  - Major Prime Contractors
  - DoD systems developers and acquirers
- Pre-arranged 20-minute "Technology Matchmaking" meetings
- Panel discussions of advanced topics on transitioning into Phase III

Centerpiece DoD event to showcase SBIR technologies to enable technology transition.

SBIR Resource Center: www.dodsbir.net



FY07/08 Solicitation Schedule

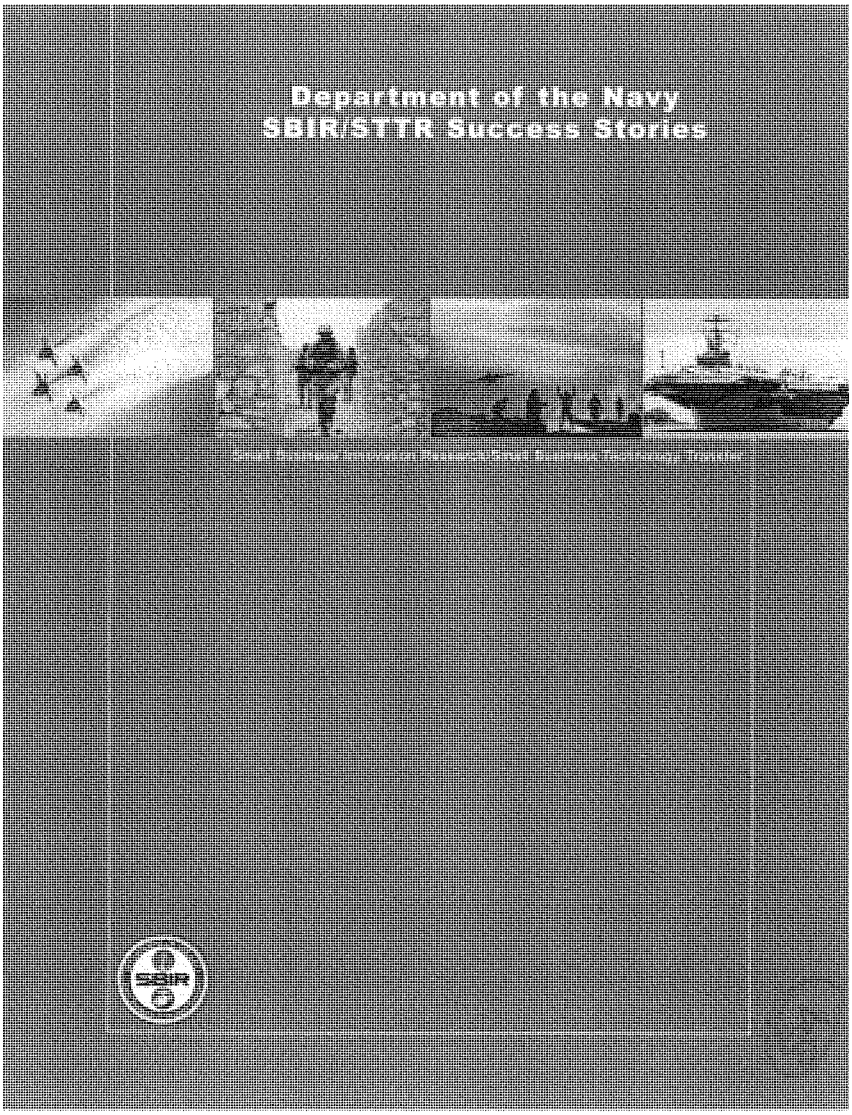
SBIR:

07.3 open: August 20, 2007
close: September 19 at 6 a.m.
08.1 open: December 10, 2007
close: January 9, 2008
08.2 open: May 19, 2008
close: June 18, 2008
08.3 open: August 25, 2008
close: September 24, 2008

STTR:

08 open: February 19, 2008
close: March 19, 2008

Solicitations are pre-released for Q&A 4 weeks prior to open date.
All closing times are 6 a.m. EST.


Department of the Navy
SBIR/STTR Success Stories
SBIR

Thanks to all the companies for their participation in this Navy SBIR/STTR Success Story publication.

We appreciate the time and effort it took to compile and share facts, details, and graphics for the stories.

For more information about this publication or additional copies, please contact:

Office of Naval Research
ONR 364, SBIR/STTR Program
800 North Quincy Street
Arlington, VA 22217-5660
www.onr.navy.mil/sbir

Department of the Navy SBIR/STTR Success Stories

Small Business Innovation Research/Small Business Technology Transfer

Dedicated to

VINCENT D. SCHAPER

for his exemplary contribution and service to the Navy

and to American Small Businesses

as the Navy SBIR Program Manager

from 1988 to 2004.

All of your associates, colleagues and friends thank you,

and wish you well in your retirement.

Letter from the Admiral

Foreword

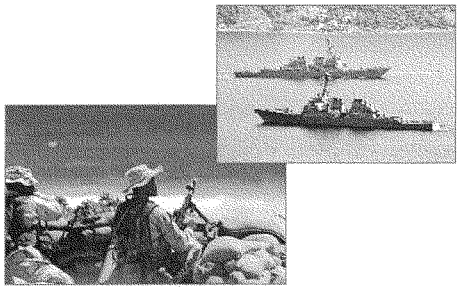
US small businesses provide innovative ideas and create many of the new technologies which drive the capabilities the Navy is seeking to maintain and modernize the naval fleet. The Navy's SBIR/STTR program is primarily a mission oriented program which affords companies the opportunity to become part of the national technology base that can feed both the military and private sectors of the nation. The goal is to transition the small business research into active naval systems. This is extremely difficult to accomplish. On the government side, priorities change, program funding evaporates, champions leave and funding for critical demonstrations may be hard to obtain. On the small business side, companies vary in their understanding of Navy protocols, in their ability to develop relationships with customers, in their potential to ultimately deliver products and in their understanding of the role that prime contractors play in the process.

This Navy SBIR/STTR Success Stories publication highlights a few of the many small businesses that have overcome the transition hurdles and made contributions to the military and private sector. These stories exemplify the value of the SBIR/STTR program and provide concrete examples of how small businesses have not only addressed the research and development needs of the government, but they have transitioned that technology into naval systems. It is essential that DoD acquisition offices, military prime contractors, and private industry continue to partner with small businesses and tap their reservoir of expertise, knowledge and ideas to create cutting-edge technologies, products, and processes for the next generation.

JAY M. COHEN
Rear Admiral, US Navy
Chief of Naval Research

Table of Contents

Dedication III
Letter from the Admiral V
Introduction VIII
Phase III Navy Contracts X



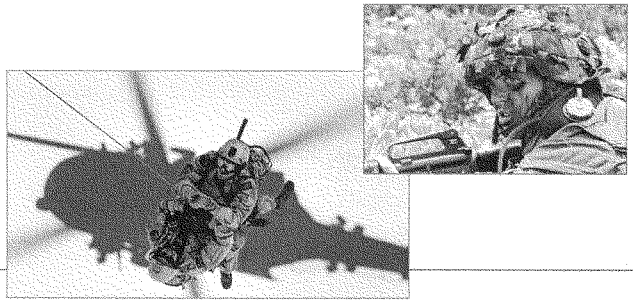
21st Century Systems, Inc. 1
Applied Hydro-Acoustics Research, Inc. 2
Applied Ordnance Technology, Inc. 3
Areté Associates 4
Argon Engineering Associates, Inc. 5
ATK Composites (formerly Composite Optics, Inc.) 6
Bodkin Design & Engineering, LLC 7
Coherent Technologies, Inc. 8
Combustion Research and Flow Technology (CRAFT Tech) 9
Diversified Technologies, Inc. 10
EIC Laboratories, Inc. 11
HYPRES, Inc. 12
Innovative Technology Associates 13
Makai Ocean Engineering, Inc. 14
Materials Systems Inc. 15
Mathtech, Inc. 16
Multispectral Solutions, Inc. 17

Table of Contents

Native American Technologies Company....18
Navmar Applied Sciences Corp....19
nGimat Company (formerly MicroCoating Technologies)....20
Noesis, Inc....21
Nova Engineering, Inc....22
Ocean Power Technologies, Inc....23
Page Automated Telecommunications Systems, Inc....24
Phoenix Integration....25
Phoenix Science & Technology, Inc....26
Physical Sciences, Inc....27
Planning Systems, Inc....28
Progeny Systems Corp....29
PROMIA, Inc....30
Scientific Research Corp....31
Smiths Detection - Pasadena (formerly Cyrano Sciences, Inc.)....32
Stottler Henke Associates, Inc....33
ThermoAnalytics, Inc....34
Touchstone Research Laboratory....35
Zeger-Abrams Inc....36

Navy SBIR/STTR Program Points of Contact....37

Index of Success Stories by Command....39



Introduction

The Department of Navy's SBIR/STTR Program

The SBIR Program was established by Congress to provide funding for small businesses to help facilitate technological innovation and to meet the research and development needs of the Federal government.

Since its inception in 1982, the SBIR Program has become one of the most effective technology development programs in the government and has earned the respect of those in the scientific, small business, and academic communities across the nation. Federal agencies that participate in the SBIR/STTR program report that the program has had a positive impact on their agencies' research program. The program's ability to help advance technology and propel economic growth has been cited in studies by the General Accounting Office and recognized by the Small Business Administration.

The Small Business Technology Transfer Program (STTR) was established in 1992 and is modeled and essentially executed in the same manner as the SBIR Program. Both programs involve small businesses with fewer than 500 employees that are engaged in federal research and development (R&D). The STTR Program is designed for companies to partner with researchers at not for profit research institutes, contractor-operated federally-funded R&D centers, or universities. Companies and research partners work as a team to turn ideas into technologies or products for the Naval Fleet.

The Navy's SBIR/STTR program is a highly competitive three-phase process that funds science and technology areas identified by the acquisition community that will enhance warfighting capabilities through innovations developed by small businesses. In order to increase the likelihood that the Department of Navy realizes a return on its SBIR/STTR investment in the form of products, processes, or services, it established the Transition Assistance Program (TAP). TAP works with Phase II companies to help them conduct preliminary strategic planning and assist with the marketing of their products to Navy and DoD program managers.

Navy SBIR/STTR Three Phase Program

Phase I determines the scientific and technical merit, the feasibility of the proposed innovation, and the quality of the small business' performance. This phase may also support small scale testing. Base awards are typically $70,000 with a $30,000 option that may be exercised if the project is selected for continuation into Phase II. The option bridges the gap between Phase I and Phase II awards. Phase I typically lasts six months and the option may extend the effort for an additional three months (see the current solicitation for specific details).

Phase II continues the Phase I effort and demonstrates the theory by building and testing a prototype. Base awards are typically $450,000 to $1,000,000 and may include options that can be exercised if the project shows strong Phase III transition potential. This phase typically lasts 24 months.

Phase III transitions the technology or product into a DoD application. Production or additional research and development efforts are supported by DoD, the Federal Government, defense prime contractors, or the private sector. The company can receive either government or private sector funds, but no longer receives SBIR/STTR funding.

Visit our website at www.onr.navy.mil/sbir

The success of the Navy's SBIR/STTR program is measured by the companies that transition their concepts into products, tools, or services that benefit the Navy acquisition community. The Navy's program has achieved the highest rate of transitioning technology back to the military of any DoD agency as evidenced by the data collected by DoD and shown in chart 1. The list of Phase III Navy contracts which are included in that data is shown on the following page. Expect to see these companies reported in future success editions.

The ***companies included in this Navy Success publication*** have all reached the Phase III level of the SBIR/STTR program. For each story, we have tried to describe:

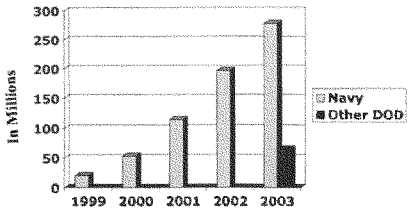
- The technology developed by the small business
- The military and commercial significance of the technology
- The application of the technology
- Additional information about the company
- A description of the SBIR/STTR investment and follow-on revenues
    - ***SBIR/STTR Investment*** – the dollar amount the SBIR/STTR program invested in the company to develop the technology
    - ***Project Revenue*** – non-SBIR/STTR dollars that were invested in the company for additional research and development or the result of product sales, i.e. Phase III.

If you would like to know more about the SBIR/STTR program, identify the latest technology advances, or participate in the SBIR/STTR solicitation, please visit our website at http://www.onr.navy.mil/sbir or contact one of the Navy program managers listed in the back of this publication.

CHART 1

Navy has the best record, relative to others in DoD, for Transitioning SBIR's and STTR's into DoD funded Phase III awards

SBIR/STTR DoD Phase III Contracts Funding from OSD DD-350 Reports



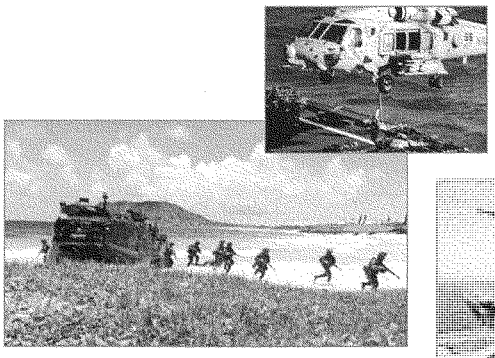
- DD-350 report for other DoD services available for FY 03 only
- Total FY 03 DoD Phase III funding was $342 M, Navy was $277.5
- In 03, Navy received 22% of SBIR/STTR funding but obtained 81% of Phase III dollars

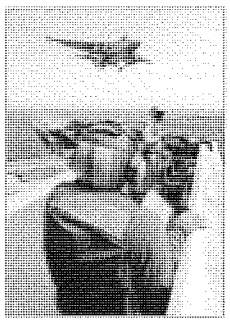
Phase III Navy Contracts

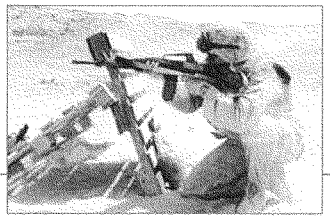
PHASE II SYSCOM	TOPIC NUMBER	COMPANY NAME	PHASE III SPONSOR	CONTRACT	$ OBLIGATED IN FY03
MARCOR	N99-037	ARETE ASSOCIATES	ONR (FNC/EFV)	N0001403C0301	$ 2,676,000
MARCOR	CB002-203	CYRANO SCIENCES, INC.	MCSC (AAAV)	M6700403C0018	$ 2,999,365
MARCOR	A96-032	OPTICAL AIR DATA SYSTEMS LP	MARCOR	M6700403C0013	$ 12,362,629
MARCOR	N99-200	SARA INC	MCSC (AAAV)	M6785403C1018	$ 599,959
					$ 18,637,953
NAVAIR	N00-013	APPLIED HYDRO-ACOUSTICS RESEARCH	NAVAIR	N6833502D0022	$ 516,956
NAVAIR	N90-074	ATK MISSILE SYSTEMS COMPANY	NAVAIR	N0001903C0353	$ 29,000,000
NAVAIR	N99-180	BARRON ASSOCIATES	NAVAIR	N6833503D0097	$ 199,996
NAVAIR	N00-099	COMPOSITE OPTICS	NAVAIR	N6833503D0104	$ 4,441,872
NAVAIR	AF93-158	CPU TECHNOLOGY, INC	NAVAIR PAX	N0042101D0300	$ 6,676,067
NAVAIR	N03-008; N03-009	DIGITAL SYSTEM RESOURCES, INC	NAVAIR	N6833503D0105	$ 183,890
NAVAIR	N98-043	ESSEX CORPORATION	NAWCLakehurst	N6833502D0009	$ 3,341,540
NAVAIR	N93-250; N96-020	FOSTER-MILLER	NAWCLakehurst	N6833503D0145	$ 4,200,000
NAVAIR	N01-010	INDIGO SYSTEMS CORP	NAVAIR	N6833503D0001	$ 750,000
NAVAIR	N90-264	ISERA GROUP, LLC	NAWCTSD	N6133997D0008	$ 3,008,087
NAVAIR	N92-136	ISOTHERMAL SYSTEMS RESEARCH	NAVAIR	N6833503D0149	$ 29,355
NAVAIR	N90-065	LOGIS-TECH, INC.	NAWCLakehurst	N6833501D0096	$ 599,108
NAVAIR	N98-149	MATERIALS RESEARCH & DESIGN, INC.	NAWCLakehurst	N6833502D0027	$ 751,071
NAVAIR	N92-170	NAVMAR APPLIED SCIENCES CORP	NAWCLakehurst	N6833500D0396	$ 13,004,518
NAVAIR	N91-346	OPTICS 1, INC.	NAWCLakehurst	N6833501D0293	$ 3,918,000
NAVAIR	N99-053	PHYSICAL SCIENCES	PMS-378	N6833503D0099	$ 699,240
NAVAIR	N96-209	POLATOMIC INC	NAWCLakehurst	N6833501D0237	$ 1,569,828
NAVAIR	N95-014	RDA INC	NAVAIR PAX	N0042199C1072	$ 2,829,560
NAVAIR	N90-074	SCIENCE & APPLIED TECHNOLOGY	NAVAIR PAX	N00019940078 N00019902C3010	$ 12,246,509
NAVAIR	N99-068	TECHNOLOGY SERVICE CORP	NAWCLakehurst	N6833503D0098	$ 429,704
NAVAIR	N99-193	TOYON RESEARCH	NAVAIR	N6833503D0147	$ 49,863
NAVAIR, NAVSEA	N99-054	MSE TECHNOLOGY APPLICATIONS	PMA-251	Expected 4/04	$1.5 (Apr '04)
					$ 88,424,984
NAVSEA	N99-198	21st CENTURY SYSTEMS, INC.	PEO IWS	N00178C03130	$ 3,017,700
NAVSEA	N98-106	ADVANCED ACOUSTIC CONCEPTS	NUWC	N66604D4218	$ 3,516,805
NAVSEA	N97-090	ADVANCED ACOUSTIC CONCEPTS	NAVSEA	N00024C8311	$ 15,401,672
	N92-077	ADVANCED OPTICAL SYSTEMS	NSWC DAHLGREN	N00178C3018	$ 250,000
NAVSEA	N98-114	AEPTEC MICROSYSTEMS, INC.	NSWC DAHLGREN	N00178D3052	$ 5,285,701
NAVSEA	N96-114	AEPTEC MICROSYSTEMS, INC.	NSWC CARDEROCK	N00167D0097	$ 8,562,185
NAVSEA	N96-114	AEPTEC MICROSYSTEMS, INC.	NSWC CRANE	N00164C0048	$ 3,473,473
NAVSEA	N98-114	AEPTEC MICROSYSTEMS, INC.	NAVSEA	N0024401D0036	$ 20,686,319
NAVSEA	N96-268	APPLIED ORDNANCE TECHNOLOGY	NAVSEA	N0002403C4020	$ 4,768,396
NAVSEA	N99-224	APPLIED HYDRO-ACOUSTICS RESEARCH	NAVSEA	N0002403C8302	$ 3,810,198
NAVSEA	N96-071	AVINEON, INC.	NAVSEA	N0002403C4049	$ 699,495

Phase III Navy Contracts

PHASE II SYSCOM	TOPIC NUMBER	COMPANY NAME	PHASE III SPONSOR	CONTRACT	$ OBLIGATED IN FY03
NAVSEA	Multiple Topics	CHESAPEAKE SCIENCES CORPORATION	NAVSEA	N0002400C6230	$ 5,069,298
	N93-084	DANIEL WAGNER	NSWC DAHLGREN	N0017898D3009	$ 179,994
NAVSEA	N94-203; N99-110	DARLINGTON, INC	SPAWAR	N6600103D7000	$ 2,470,384
NAVSEA	N93-027	MALIBU RESEARCH ASSOC. INC.	NSWC DAHLGREN	N0017802C3065	$ 1,087,324
NAVSEA	N01-077	MAYFLOWER COMMUNICATIONS CO.	NSWC DAHLGREN	N0017802C1053	$ 997,901
NAVSEA	N92-076	PHYSICS, MATHEMATICS, & COMPUTERS	NSWC DAHLGREN	N0017898D1083	$ 634,642
NAVSEA	N99-128	PLANNING SYSTEMS INC.	PMS262	N0002403R6227	$ 2,100,000
NAVSEA	N00-049	PROGENY SYSTEMS CORPORATION	PMS 4012B	N0002403C6219	$ 5,034,794
NAVSEA	N98-122	PROGENY SYSTEMS CORPORATION	PMS425	N0002403C6201	$ 6,384,126
NAVSEA	N98-278; N98-115	PROGENY SYSTEMS CORPORATION	PMS450/PMS425	N0002404C6201	$ 1,391,351
NAVSEA	N98-077; N98-072	SOLIPSYS CORPORATION	NAVSEA	N0002402C5108	$ 7,880,000
NAVSEA	N92-095	TPL, INCORPORATED	NSWC CRANE	N0016401C4701	$ 931,181
NAVSEA	N93-101	TRIDENT SYSTEMS, INC.	NSWC DAHLGREN	N0017800D3007	$ 5,685,873
NAVSEA	N99-144	TRITON SYSTEMS	NSWC DAHLGREN	N0017803D1014	$ 349,447
NAVSEA, NAVAIR	Multiple Topics	DIGITAL SYSTEM RESOURCES, INC	NAVSEA, NAVAIR	NUMEROUS	$ 40,735,591
					$ 148,423,853
ONR	N97-067	ADVANCED CERAMICS RESEARCH, IN	ONR	N0001403C0329	$ 2,039,920
ONR	N02-T015	ADVANCED CERAMICS RESEARCH, IN	ONR	N0001403D0247	$ 2,021,652
ONR	Multiple Topics	DIGITAL SYSTEM RESOURCES, INC	ONR	N0001401D0225	$ 3,598,654
ONR	N00-T001	HYPRES, INC	ONR	N0001403C0370	$ 7,979,860
ONR	N95-074	OCEAN POWER TECHNOLOGIES INC	ONR	N0001402C0053	$ 1,362,349
ONR	N98-136; N00-112	ORINCON DEFENSE	NAVAIR PAX	N0042102D3053	$ 6,999,909
ONR	N02-112	POLATOMIC INC	ONR	N0001403C0490	$ 250,000
ONR	N99-025	SCENPRO, INC	ONR	N0001403C0257	$ 455,145
ONR	OSD98-043	TOUCHSTONE RESEARCH LAB LTD	ONR	N0001402C0392	$ 2,269,802
ONR	N01-T001;N00-113	WEBB RESEARCH CORP	ONR	N0001403C0441	$ 293,987
ONR NAVAIR	N90-064; N96-209; N02-198	POLATOMIC INC	ONR	N0001403C0368	$ 950,297
					$ 29,021,455
SPAWAR	N94-203	DARLINGTON, INC	SPAWAR	N6523699D5831	$ 6,869,354
SPAWAR	N99-167	PROMIA INCORPORATED	SPAWAR	N0003901C3167	$ 4,274,988
SPAWAR	N99-172	SCIENTIFIC RESEARCH CORPORATION	SPAWAR	N0003903C0011	$ 497,095
SPAWAR	Multiple Topics	VIASAT, INCORPORATED	SPAWAR	N6600199D7000	$ 3,219,500
					$ 14,860,937
					$ 299,369,182







The Success Stories

21st Century Systems, Inc.

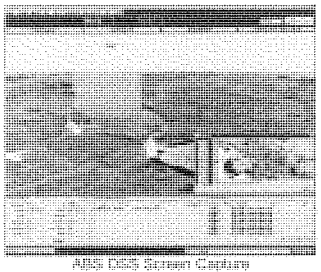
Advanced Battle Station with Decision Support System

ABOUT THE TECHNOLOGY

The Advanced Battlestation with Decision Support System (ABS/DSS), created by 21st Century Systems, Inc. (21CSI) uses intelligent agent-based software technology to provide a fused battlespace view and decision support for carrier Combat Direction Center (CDC) warfighters. In conjunction with advanced visualization techniques, the intelligent agent-based software combines, correlates, and fuses data from disparate sources, as well as offers viable tactical options to the warfighter in near-real time. The ABS/DSS provides the warfighter with integrated battlespace awareness and the ability to tailor an operational picture to specific mission needs. As a result, ABS/DSS is able to prioritize and re-configure the battle picture to display the tactical information in a manner more easily understood and more quickly absorbed by combat watchstanders.

MILITARY & COMMERCIAL SIGNIFICANCE

21CSI's DSS tools have wide-ranging applicability across warfare and operational user domains. ABS/DSS functions as a fully interactive system that presents relevant information when needed, where needed, and in the form needed. The warfighter gains in situational awareness through exploration of the integrated air, ground, maritime, and subsurface environments of the battlespace. ABS/DSS significantly contributes to the reduction in carrier CDC manning requirements.



ABS DSS Screen Capture

APPLICATIONS

- Multiple carrier combat system suites, including the Aircraft Carrier Tactical Support Center, Advanced Combat Directional System and Ship Self Defense System

ABOUT THE COMPANY

Founded in April 1996, 21st Century Systems, Inc. has pioneered intelligent agent-based real-time decision support systems for human decision makers operating mission-and life-critical applications. A number of 21CSI's tool components and systems have reached maturity and are now transitioning into stable, IT-21, DII-COE and otherwise software standard-compliant products. The AEDGE® (Agent Enhanced Decision Guide Environment) decision support software, developed by 21CSI, is a modular "toolkit" that provides the technical underpinnings for 21CSI's ability to rapidly prototype new applications for the Navy. AEDGE® is one of 21CSI's pioneer next generation commercially off-the-shelf products.

Topic Number: N99-118 (NAVSEA)
SBIR Investment: $1M
Project Revenue: $6.1M

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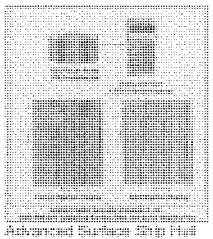
Applied Hydro-Acoustics Research, Inc. (AHA)

Advanced Concepts in Hull Array Beamforming



Advanced Surface Ship Hull Sonar Beamformer

APPLICATIONS

- NAVSEA PEO-IWS5 -AN/SQQ-89: Surface Ship USW Combat System
- Naval Surface Weapons Center/ Carderock: Noise Source Localization Analysis
- Workstation
- Towed array sonar
- Sonobuoy active receivers, multi-static systems

ABOUT THE COMPANY

Applied Hydro-Acoustics Research, Inc. (AHA), founded in 1972, is a privately owned defense contractor that addresses critical US Navy ASW needs. AHA combines systems engineering, software development, testing and evaluation, and installation, to develop innovative sonar software systems solutions. As a leader in real-time ASW system prototyping, AHA performs advanced research and implements unique, inventive solutions in the areas of sonar/acoustics beamforming, signal processing, modeling and simulation, and tactical decision aid development. Under the Navy SBIR program, AHA's annual sales in sonar have increased 200%. AHA is currently the beamformer functional segment developer and integrator, for three current surface ship sonar development and production programs. The technology is also used by NSWC-Carderock to provide an improved noise source localization capability.

ABOUT THE TECHNOLOGY

Applied Hydro-Acoustics Research, Inc. (AHA) has developed a new sonar beamforming technique for the Navy surface combatant hull-mounted array. The technique consists of a new method for adaptive beamformer (ABF). The Short-Time Adaptive Broadband Beamformer (STABB) algorithm differs from traditional ABF techniques by operating over a broad frequency range and having the ability to rapidly respond to changes in the acoustic noise field. The rapid adaptation characteristic enhances performance in the face of active reverberation and close-aboard fast moving targets.

MILITARY & COMMERCIAL SIGNIFICANCE

AHA's new ABF technology and commercial off the shelf implementation improves anti-submarine warfare (ASW) sonar performance and lowers operating cost. Maintenance expenditures are reduced due to the use of lower-cost symmetric-multiprocessor server hardware and the need for fewer replaceable components. The algorithm significantly increases the ship's sonar performance while the active sonar is in use and when operating in noisy acoustic environments. The technology raises hull array sonar gain, yields more accurate sonar target bearings, and increases target detection range and target holding time. It achieves better performance in automated active classification and tracking systems, and more robust performance in littoral water regions. The beamformer computing environment reduces system procurement and life-cycle maintenance cost of commercial Intel symmetric multi-processor servers, and substantially reduces the procurement cost of systems, in comparison to those procured in earlier years. Benefits of the ABF technology are applicable for towed array sonars, sonobuoy active receivers, and multi-static systems.

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Centreville, VA 20120
(703) 968-8040
www.aharinc.com
llew@aharinc.com
Llew Wood

Topic Number: N99-224 (NAVSEA)
SBIR Investment: $986K
Project Revenue: $3.71M

Applied Ordnance Technology, Inc.

Advanced Modular Gun Design

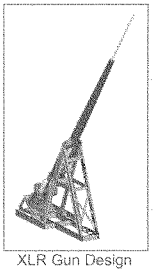
ABOUT THE TECHNOLOGY

Applied Ordnance Technology (AOT) has developed a high velocity, high pressure, large caliber test gun that incorporates a separable chamber using AOT's "eXtended Long Range" (XLR) gun design. AOT's objective is to provide the Navy with the Advanced Modular Gun Demonstrator, a test and evaluation gun based on the XLR design, that is capable of testing advanced gun technologies.

The XLR gun was developed in conjunction with Advanced Power Technology, Inc., and offers an innovative approach to loading, chamber sealing, chamber/barrel connection and recoil. The design consists of a high-velocity, smoothbore gun incorporating multiple separable large-volume chambers and a segmented barrel. The key innovation involves the use of a separable chamber bridged by a single-use chambrage sealing cartridge in a high pressure, large caliber gun. The development of the XLR Gun recently advanced with the successful evaluation of the chambrage sealing cartridge in a sub-scale Proof of Concept test at a 60,000 psi chamber pressure. AOT is currently working on a full-scale, full pressure test to evaluate the separable chamber in a relevant gun environment.

MILITARY & COMMERCIAL SIGNIFICANCE

DoD programs often require a gun system capable of firing projectiles at ever-increasing velocities and ranges. The versatility of the XLR test gun provides a means to evaluate many different gun subsystems, which helps to facilitate greater advancements in gun technology.



XLR Gun Design

APPLICATIONS

- DoD gun & gun subsystem evaluation (i.e. advanced projectiles, barrel wear/erosion, materials, propellants, etc)
- Aerospace (NASA) - hypervelocity testing
- Aerospace (Boeing, Lockheed, Pratt & Whitney) - scramjet testing
- Gun (launcher) design enabling industry to launch full caliber projectiles at high speeds

ABOUT THE COMPANY

Applied Ordnance Technology, Inc. is an employee stock owned engineering and professional support service business. AOT's staff of professional engineering, scientific, technical, and management experts are equipped to design and deliver tailored solutions for a wide range of tasks to a diverse customer base. Through excellent communication and close association with customers, AOT produces superior quality products with top-notch results. Consequently, customers recognize AOT as a leader in the field of engineering and management support services.

Topic Number: N96-268 (NAVSEA)
SBIR Investment: $708K
Project Revenue: $12.4M

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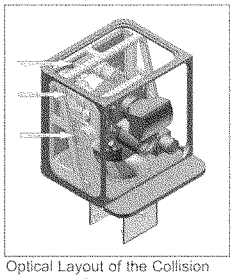
Wendy Hornbaker

Areté Associates

Collision Avoidance Systems for the Expeditionary Fighting Vehicle



Optical Layout of the Collision Avoidance Sensor

APPLICATIONS

- Marine Corp EFV
- High Speed Commercial Watercraft

ABOUT THE COMPANY

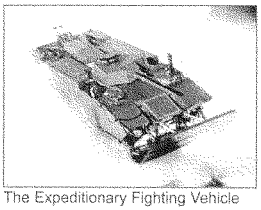
Since its inception in 1976, Areté Associates has grown to a staff of nearly 200 scientific and engineering professionals. Areté Associates has focused on providing comprehensive solutions to a wide array of issues faced by the defense and intelligence communities. The scope of company activities includes requirements analysis, conceptual design, system development, and comprehensive performance assessments.

ABOUT THE TECHNOLOGY

Enhanced maneuverability in the littorals in the presence of both natural and man-made hazards is an essential requirement for executing the Ship to Objective Maneuver. Maneuverability of the Expeditionary Fighting Vehicle (EFV) can be significantly enhanced by integration of an on-board, real time collision avoidance system (CAS). Areté Associates has demonstrated the utility of a grazing incidence lidar (optical radar) to detect floating obstacles, shallow bottoms, and submerged targets at significant standoff ranges. The CAS will be demonstrated on the EFV.

MILITARY & COMMERCIAL SIGNIFICANCE

The EFV was developed to be the primary combat vehicle to transport marines across the littoral. Its high-speed water operations provide significantly improved ship-to-shore movement, and allows marines to more effectively implement Operational Maneuvers from the Sea. An essential element of this capability is an integrated CAS that permits the EFV pilot to maneuver through obstacles in shallow water and the surf zone. By leveraging proven grazing incidence lidar technology, the collision avoidance capability will transition to the EFV at the conclusion of the Phase III.



The Expeditionary Fighting Vehicle

Areté Associates
P.O. Box 6024
Sherman Oaks, CA 91413
(520) 571-8660
www.arete.com
jmclean@arete.com
John McLean

Topic Number: N99-037 (MARCOR)
SBIR Investment: $850K
Project Revenue: $3.2M

Argon Engineering Associates, Inc.

Sensor Tasking Segment (STS)

SPAWAR

ABOUT THE TECHNOLOGY

Argon Engineering developed an innovative network-centric sensor tasking segment (STS) architecture using thin-tasking clients, server application, and sensor agents for information warfare sensor tasking and management. Argon analyzed the functions of the Cryptologic Resource Coordinator to develop tools for mission planning and resource optimization. The outcome was the universal tasking format using hypertext markup language (XML) to task a host of different cryptologic sensors. A shipboard demonstration of STS using automated mission tasking with network centric publish and subscribe actions was successfully conducted, allowing a remote land-based tasking authority to initiate operation of an at-sea sensor. The tasking process objective is to use spatial and contextual triggers as well as reporting feedback mechanisms to improve mission management of cryptologic resources.

MILITARY & COMMERCIAL SIGNIFICANCE

Argon Engineering's STS develops a universal signal description file that leverages the best of current and upcoming cryptologic systems. The STS addresses the issue of remotely tasking sophisticated shipboard cryptologic systems. These systems perform indications and warnings, specific signal collection and exploitation, and signal development within the full scope of information warfare. This allows tasking refinements from one cryptologic system to another and facilitates network centric command and control. The STS encompasses the capability to task all major, current and upcoming cryptologic systems for surface, subsurface, airborne, transportable, and fixed site installations. It provides a significant advance in the quality and timeliness of cryptologic intelligence through improvements in the management and adaptability of sensor tasking. STS will be the basis for the core of the next generation cryptologic system tasking and allows the scalability to address the evergrowing sophistication of communication signals and networks.

STS addresses remotely tasking shipboard cryptologic systems

APPLICATIONS

- Cryptologic unified build/global command and control system-maritime segment for use in U.S. and second party systems
- DoD: tasking sophisticated sensors
- Packaged into utilities and used in areas such as tasking distribution, resource optimization, exploitation optimization and feedback dissemination

ABOUT THE COMPANY

Argon Engineering is a rapidly growing systems engineering and development company providing full service information solutions to a wide range of customers. The business vision is to grow by providing unique state-of-the-art technology solutions to difficult system problems. Argon currently provides sensor development, data collection and decision support, analysis and design of information retrieval, and visualization techniques.

Topic Number: N00-031 (SPAWAR)
SBIR Investment: $850K
Project Revenue: $800K

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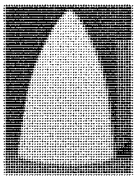
Robert L. Kellogg

ATK Composites (formerly Composite Optics, Inc.)

NAVAIR

High Speed, Dual-Mode Missile Radome (HiSMR)



High Temperature, Dual Mode Radome

APPLICATIONS

- High Speed, Dual-Mode Missile Radome (HiSMR)
- Weapons and Unmanned Air Vehicles
- AGM-88E Advanced Anti-Radiation Guided Missile (AARGM)
- Space launch and re-entry vehicles
- Jet engine exhaust nozzle flaps for both conventional jet engines & thrust vectoring engines
- Exhaust system components for helicopters
- Combustor liners for advanced gas turbine engines

ABOUT THE COMPANY

Composite Optics, Inc. doing business as ATK Composites, is a provider of advanced composite products for the space and aerospace markets. With over 27 years of space flight heritage in the design, manufacture and test of successful programs for customers around the globe, ATK Composites is recognized as a world leader. Its expertise covers a wide array of complementary disciplines and products, including antennas, ceramics, materials, structures, and instruments. The development of innovative new technologies and applications in these areas provides fuel for ATK Composites' continued growth as the space and aerospace markets undergo change. As a result of the progress made in developing CMCs for High Speed Missile Radome applications, ATK Composites has attracted interest from DoD and major prime contractors for several strategic applications, including the Missile Defense and Precision Global Strike Initiatives. This increased interest from DoD should result in a 5 to 10% increase in sales and as much as a 10% increase in personnel.

ABOUT THE TECHNOLOGY

As the Navy continues to make communications advancements, antenna bandwidth requirements increase. With the use of higher frequencies and higher missile speeds, the housing of the antenna, called the radome, must meet new materials challenges. The radome must maintain mechanical and electrical properties at higher temperatures. ATK Composites has developed Ceramic Matrix Composite (CMC) materials that show an excellent combination of electrical, mechanical, and erosion-resistance properties suitable for radome structures that can experience temperatures up to 2500°F.

MILITARY & COMMERCIAL SIGNIFICANCE

CMCs show great promise for achieving a successful high temperature, high frequency nose radome suitable for high speed missiles. CMC materials for high temperature antennas and radomes will be of great value on current and future commercial space launch and re-entry vehicles. The antennae and radomes on these vehicles (manned and unmanned) reach temperatures that exceed the capabilities of most available materials systems and must meet difficult dielectric and physical demands. The extended durability and increased performance of CMC components decreases the life cycle costs of commercial jet engines, exhaust system components, and commercial power gas turbine engines. ATK Composites is partnering with Siemens-Westinghouse to apply CMCs to their next-generation engine product lines.

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Topic Number: N00-099 (NAVAIR)
SBIR Investment: $70K
Project Revenue: $780K

Bodkin Design & Engineering, LLC

Low-cost Lightweight, Night Vision Capability for Hand Launched UAV System

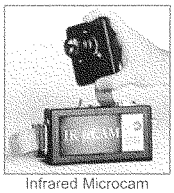
ABOUT THE TECHNOLOGY

Bodkin Design & Engineering, LLC (BD&E) developed the world's first miniature uncooled infrared camera. The Infrared Microcam provides high-resolution thermal images that equal those available from costly cryogenically cooled cameras. The lightweight sensor head (3" x 3.9" x 3.2" weighing 7.0 oz.) uses a high resolution (320 x 240 pixel) uncooled focal plane array. This microbolometer array operates at room temperature, eliminating thermal stress, and the cooler's power drain. The camera has no moving parts, making it highly reliable and compact. Its patented tethered sensor head permits it to be placed in smaller spaces than previously possible, thereby enabling new applications for thermal imaging.

Designed for and demonstrated on the Hand-Launched Pointer UAV (Unmanned Aerial Vehicles), the camera's compact rugged design, low power drain (4.5 watts), and wide operating temperature range (-20 to 60 °C.) enables its use across a wide range of demanding environments. The highly sensitive camera responds to temperature differences smaller than 0.1 °C, and captures video like imagery at high frame rates (30Hz) without blooming, blurring, or trails. BD&E's Infrared Microcam has become an integral part of the Pointer UAV system.

MILITARY & COMMERCIAL SIGNIFICANCE

The miniature UAV reconnaissance system provides the field commander with real-time video imagery. The infrared technology enables camouflage penetrating imagery during both day and night operations. The UAV camera supplies crucial high resolution thermal images needed to help make time critical strategic decisions. BD&E's Infrared Microcam greatly increases the military's ability to detect and discriminate targets from decoys and background.



Infrared Microcam

APPLICATIONS

- Cameras for surveillance, missile guidance and UAVs
- Hyperspectral imagers for target discrimination
- Mine detection cameras for soldiers
- Manufacturing process monitoring, non-destructive inspection/testing
- Power distribution inspection
- Border surveillance cameras for homeland security
- Thermal viewers for fire fighting

ABOUT THE COMPANY

Since 1992, Bodkin Design & Engineering, LLC (BD&E) has provided product development, innovation and engineering services to the industrial, commercial, military, and research communities. BD&E has had a prosperous career developing new technologies and devices based partially on the SBIR research program. BD&E formed the Microcam Corporation to manufacture and market the Infrared Microcam. The research and patents were subsequently purchased by its former research partner, Loral Infrared and Imaging Systems (now BAE Systems), and the UAV camera is now an important part of its uncooled business line. The SBIR program helped facilitate the launch of a second company, Ion Optics, which produces spectrally tuned single bolometer detectors and commercial gas analysis instruments.

Topic Number: N94-172 (NAVAIR)
SBIR Investment: $818K
Project Revenue: $5.2M

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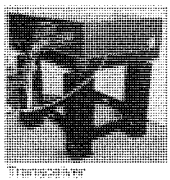
Andrew Bodkin

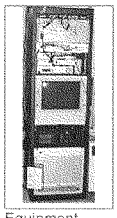
Coherent Technologies, Inc.

NAVAIR

Multiple Mode Noncooperative Hard Target Identification Ladar Systems



Transceiver



Equipment Rack

APPLICATIONS

- Kill chain prosecution (find, fix, track, target, engage, assess)
- 2D/3D imaging and coherent adaptive doublet waveform vibrometry
- DoD 1.5-micron wavelength laser transmitter for coherent Doppler lidar wind sensing

ABOUT THE COMPANY

Coherent Technologies, Inc. is a world leader in the development and demonstration of state-of-the-art laser radar technologies. It develops prototype custom systems and manufactures laser radar systems for military and commercial customers. CTI and its commercial products division, CLR Photonics, Inc. (CLR) is a full service company capable of generating new laser-based technology concepts from technology development and demonstration to product engineering and manufacturing. CTI is clearly a SBIR success story. It has leveraged extensive seed support from DoD, NASA, research institutions, and substantial internal investments to develop the product design and manufacturing mechanism necessary to convert technology breadboards to fielded products while maintaining a world class R&D capability.

ABOUT THE TECHNOLOGY

Coherent Technologies, Inc. (CTI) has developed a new laser source that identifies difficult targets at extended distances. This first-of-its-kind transmitter utilizes innovative 1.5 micron wavelength eyesafe laser technology. The transceiver architecture is best utilized in long range detection and noncooperative target identification (NCTID) via microDoppler vibrometry. An innovative compact diode-pumped solid-state laser is used to drive a coherent injection-seeded solid-state Raman ring resonator that produces adaptive waveforms to optimize sensor performance for a given target. The success of CTI's laser technology has resulted in multiple Air Force follow-on contracts to mature the technology and to provide comprehensive studies for advanced tactical airborne applications.

MILITARY & COMMERCIAL SIGNIFICANCE

Using sensors to enhance combat identification to improve fratricide avoidance and increase the ability to differentiate non-combatants from forces with hostile intent is of paramount military concern. At extended stand-off ranges, current sensors have difficulty achieving a combination of an operationally safe high probability of detection and a low probability of false alarm. CIT's laser technology provides a new long-range sensor that enables earlier identification of unknown targets in air-to-air engagements. The adaptive doublet pulse format provides superior range performance to continuous wave vibrometers with equivalent power-aperture products, while being uniquely compatible with other NCTID functions for tactical/strategic surveillance. Ancillary functions include precision rangefinding for trajectory state vector measurement and illumination for shape-echoes or multi-dimensional target images.

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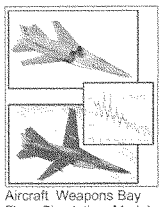
Topic Number: N96-207 (NAVAIR)
SBIR Investment: $700K
Project Revenue: $6.9M

Combustion Research and Flow Technology (CRAFT Tech)

Aircraft Weapons Bay Flow Simulation Model

NAVAIR



Aircraft Weapons Bay Flow Simulation Model

ABOUT THE TECHNOLOGY

An internal aircraft weapons bay, when exposed to freestream flow, experiences an intense aero-acoustic environment in and around the bay with loads as high as 160 to 180 decibel. High acoustic loads significantly reduce the life of aero-structures in the bay and damage sensitive electronic components. These loads disrupt the store separation process by inducing unfavorable moments on the store.

Aircraft design engineers have been challenged to develop innovative suppression methods to control the acoustic environment in the weapons bay. Further, control of the aero-acoustic environment surrounding cavities exposed to high-speed flows has been the subject of several recent investigations. CRAFT Tech has developed a Hybrid Reynolds-Averaged Navier-Strokes Large Eddy Simulation (RANS-LES) model for the prediction of weapons bay aero-acoustics. The technology has aided in the design of control systems to minimize dynamic loading on the weapons bay structures and ensure the safe separation of stores for naval platforms.

MILITARY & COMMERCIAL SIGNIFICANCE

The flexible Hybrid RANS-LES model enables the development of cost-effective control strategies for achieving successful store separation. It helps reduce the dynamic loading on the exposed weapons bay structures, thereby reducing the risks of fatigue-driven structural failure. The CRAFT Tech Hybrid RANS-LES model benefits any flow modeling efforts within the defense community. The basic technology uses a highly efficient parallel, portable, adaptive unstructured Computational Fluid Dynamics (CFD) framework, which permits the simulation of very complex problems. It predicts modes and amplitudes of oscillations, and models the effect of geometric variations for different aircrafts, without assumptions of simple rectangular bay geometries. The Hybrid RANS-LENS provides greater volume and detail of information, and its full scale simulations take the guess work out of the predictions.

APPLICATIONS

- Compressible and incompressible flow modules, advanced turbulence modeling, Reynolds Stress Models, Two-Equation Models, Large Eddy Simulation Models, & Hybrid RANS-LES models
- Noise reduction device for integration into the F404/414 engines
- CFD integrated optimization technique for the improvement of stern plane performance
- Analyze transport aircraft plumes; prediction of helicopter exhaust plumes in the presence of rotor downwash
- Moving body problems such as store separation applications

ABOUT THE COMPANY

Combustion Research and Flow Technology, Inc. was formed in 1994 from a nucleus of personnel with over 30 years of experience in flow modeling. CRAFT Tech provides consulting services and Computational Fluid Dynamics (CFD) software for the analysis and design of propulsive and industrial fluid systems. The company addresses all aspects of fluid analysis, including advanced topics such as turbulence modeling, reacting flow modeling, multi-phase flow modeling, cavitations modeling and cryogenic flow modeling. Concept–to-prototype transitioning is an emerging focus of their activities. The company has successfully transitioned a series of weapons bay related technology funded by the SBIR/STTR Program to a full scale flight test program for acoustic suppression technology demonstration.

Topic Number: N96-192 (NAVAIR)
SBIR Investment: $870K
Project Revenue: $587K

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Diversified Technologies, Inc.

Advanced Solid State High Repetition Rate Modulator

Upgraded AN/SPG-60 Radar Transmitter

APPLICATIONS

- AN/SPG-60 Radar upgrade (Mk 86 FCS)
- AN/SPS-49 Radar Transmitter
- Multi-Target Instrumentation Radar (MIR) upgrade
- COBRA JUDY X-Band Radar upgrade
- AN/SPQ-9A Radar upgrade
- Air traffic control radar
- Haystack Ultra-Wideband Satellite Imaging Radar (HUSIR)
- Semiconductor and metal surface treatment processes using ion implantation
- Medical accelerators for cancer therapy
- Pulsed electric field processing of juices and liquid foods
- High power X-ray systems for baggage/container inspection
- High energy physics research (particle accelerators, fusion research, etc.)

ABOUT THE COMPANY

Diversified Technologies, Inc. was founded in 1987 by graduates of the Massachusetts Institute of Technology. DTI designs, manufactures, and markets the patented PowerMod™ line of high-power, solid-state, modulators and control systems. The company's core expertise is in the application of solid-state devices for high power, high voltage opening and closing switches. PowerMod™ links these devices in series and parallel, ensuring that the load is shared equally and no single device experiences harmful or destructive voltages. PowerMod™ was selected twice by R&D Magazine as one of the 100 most significant products of the year.

ABOUT THE TECHNOLOGY

Diversified Technologies (DTI) adapted its patented high-power, solid-state, modulators and control systems to develop the Navy's AN-SPG/60 fire control radar upgrade kit. The kit modernizes the radar's transmitter section by replacing older vacuum tube devices with high voltage switching modules, gate drives, and interface electronics. The kits are currently installed and operating in the US Navy fleet with a similar program for the AN/SPQ-9A radar soon entering production.

MILITARY & COMMERCIAL SIGNIFICANCE

DTI's solid-state radar transmitter technology significantly increases reliability of critical weapon guidance/fire control systems. The mean time between failures of the AN/SPG-60 radar transmitter is predicted to significantly increase from 300 hours to 50,000 hours, reducing both repair costs and maintenance manpower. The system is easier to fix, replacement parts are less expensive, and electronic components are 40 - 90% more efficient. As a result of these improvements, operating cost for the upgraded transmitter is expected to drop by over 90%. Additionally, the upgraded transmitter can return to operational status in microseconds after a klystron arc, allowing the system to remain operational during target tracking periods. Transmitter testing and operation are now safer with the low-voltage control circuit that isolates operators from high-voltage components.

The AN/SPG-60 radar system developed as a result of this SBIR effort has enabled an entire class of radar upgrades, allowing the US Navy fleet and other services to extend the operational life of critical radar systems. The success of the program has directly led to initiation of upgrade programs for other critical weapon systems, such as the AN/SPQ-9A radar. The underlying technology has facilitated a new category of solid state pulse power systems for semiconductor fabrication, food processing, and medical systems.

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Michael Kempkes

Topic Number: N98-003 (ONR)
SBIR Investment: $556K
Project Revenue: $10.6M

EIC Laboratories, Inc.

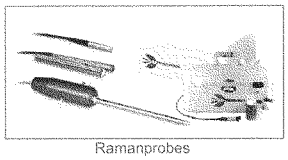
Remote Fiber Optic Sensors for Gaseous and Liquid Environments Based on Surface Enhanced Raman Spectroscopy

ABOUT THE TECHNOLOGY

Raman spectroscopy provides a unique fingerprint of the vibrational modes of a substance, and is similar to infrared spectroscopy in this regard. However, unlike infrared, Raman employs visible or near-infrared laser light to address the sample that is efficiently transmitted over conventional silica optical fibers. Cables up to 200 meters long have been employed with limited signal loss. This capability is a result of a compact sampling probe with microoptical components, developed and patented by EIC Laboratories. The RamanProbe™ probehead eliminates Raman scattering originating from the silica fiber optics and completely filters the laser wavelength prior to detection. A further feature of this probe is that it focuses the laser light several millimeters past the probe tip. This allows high quality Raman spectra to be obtained through the walls of transparent and translucent containers with little interference from the container materials themselves (e.g. glass, polyethylene, brown glass, etc.).

MILITARY & COMMERCIAL SIGNIFICANCE

The highly compact and versatile field portable RamanProbe™ instruments are used by DoD for a variety of chemical identification and analysis tasks. Using EIC's RamanProbe™ and Raman spectroscopy together permits the collection of a wide range of high quality Raman spectra samples. Tethering the sampling head to a flexible fiber optical cable facilitates the capturing of spectra located in difficult areas.



Ramanprobes

APPLICATIONS

- Identification of unknown and hazardous chemicals in sealed bottles
- On-site identification of chemical agents and toxic industrial chemicals in various sample formats, including spills in water and on equipment surfaces
- Real time monitoring of chemical reactions using industrial immersion probes
- Quality control measurements in chemical and pharmaceutical manufacturing facilities
- In situ detection and identification of corrosion within pipes and heat exchangers
- Using special Surface Enhanced Raman techniques, detection and identification of highly dilute chemicals in air and water

ABOUT THE COMPANY

In 1998, EIC Laboratories, Inc. spun off InPhotonics, Inc. to manufacture the RamanProbe™ along with high performance, portable Raman instrumentation. The new company is successful and self-sustaining from product sales. The original RamanProbe™ design has formed the basis of a complete product line to address many different market sectors: research, general analytical, real-time reaction monitoring, environmental/forensic, and on-line process monitoring. Over 400 probes have been delivered since initial development. Paired with InPhotonics' portable Raman spectrometer, the RamanProbe™ is a versatile sampling tool ideal for Homeland Defense applications.

Topic Number: N87-263 (ONR)
SBIR Investment: $550K
Project Revenue: $1.64M

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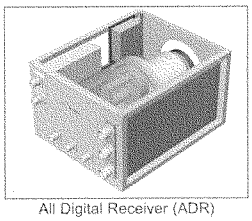
HYPRES, Inc.

All Digital Receiver



All Digital Receiver (ADR)

APPLICATIONS

- Army JTRS Cluster 1 Airborne and ground radio systems
- Air Force-Navy JTRS Airborne, Maritime & Fixed Station
- DoD SATCOM systems; Defense Communications Army Transmission System (DCATS)
- Commercial wireless base station infrastructure

ABOUT THE COMPANY

HYPRES, Inc. is engaged in the development and commercialization of Superconducting MicroElectronics (SME) technology. Superconducting integrated circuits (ICs) represent a significant advance over existing semi-conductor technologies. HYPRES has established world-leadership in superconducting technology and is the premier commercial supplier of primary voltage standard systems used in metrology laboratories worldwide.

HYPRES, Inc. was founded in 1983 and has since been active in advanced R&D programs while developing the second generation integrated circuits (IC) technology for superconductive electronics. This technology includes a reliable all-refractory niobium IC process that resolves the materials-related issues that limited success in the IBM Josephson computer program. In addition, a new logic family takes full advantage of the intrinsic properties of superconductors and enables gate speeds approaching 1,000 GHz.

ABOUT THE TECHNOLOGY

HYPRES has produced the world's first All Digital Receiver (ADR) based on Superconducting MicroElectronics (SME). ADR is designed to demonstrate the ability to directly digitize and process multiple Joint Tactical Radio System (JTRS) waveforms simultaneously from a single wideband digital sample, at an extremely high speed (40 GHz). HYPRES calls this process "Digital RF" as it combines for the first time, analog-to-digital and digital signal processing on the same device, running at the same 40 GHz clock speed. SME technology exceeds the processing capabilities of the best semi-conductor analog-to-digital technology and greatly improves the performance of the JTRS and other military communication systems. The research was accomplished in collaboration with the State University of New York at Stony Brook, and other leading universities.

MILITARY & COMMERCIAL SIGNIFICANCE

ADR provides critically needed transformational communications capabilities to Naval warfighters. HYPRES will use the ADR prototype to develop, in conjunction with the Army, Navy, and other DoD agencies, an All Digital Transceiver (ADT) product line for DoD JTRS and SATCOM. The ADT product, which has commercial wireless communication applications, combines reception and transmission in a compact, rugged form factor. The ADT dramatically improves transmission and reception performance. Its simplistic and efficient improvements substantially reduces cost, size, weight, and power consumption of JTRS and other systems. In addition to communications, applications in Signals Intelligence and Electronic Warfare are being pursued with various DoD agencies. HYPRES SME technology uniquely supports the high-speed wideband RF processing needs of emerging new DoD communications capabilities such as the Wideband Networking Waveform that is a critical innovation of the JTRS program.

Topic Number: N00-T001 (ONR)
STTR Investment: $850K
Project Revenue: $3.1M

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Richard Hitt

Innovative Technology Associates (ITA)

SPAWAR

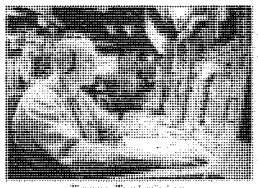
Broadband Signature Information Identification and Extraction

ABOUT THE TECHNOLOGY

Broadband feature extractors (BFE) were developed to assess the practicality of using high-order spectral analysis as discriminating signature components. An algorithm was developed to measure the non-Gaussian characteristics of a broadband signature. These properties discriminate man-made noise from natural sounds. A contact follower was devised to "scissor," beam formed data and produce a continuous signature of each contact as it moves in azimuth relative to the sonar array. The broadband feature extractors operate directly on the signature of each contact and develop a continuous history of the features of each contact. The extractor recognizes the characteristics of the contact and by comparing the signal with the history base presents information to the sonar technician.

MILITARY & COMMERCIAL SIGNIFICANCE

BFE offers superior performance for detecting and classifying undersea contacts over previous detection methods. BFE aids the operator in the assessment of the tactical situation by presenting likely threat information about the targeted contact. Innovative Technology Associates (ITA) uses color contact broadband encoding information to make operator classification simpler, which improves performance. This improved performance of detections has resulted in a system that is capable of better recognition of contacts that pose a threat to the Navy and offers high discrimination of non-threat contacts.



Sonar Technician

APPLICATIONS

- SQQ-89A(V)15 Torpedo Recognition and Alerting Functional Segment (TRAFS)
- X-rays, magnetic resonance images (MRIs), and astronomy

ABOUT THE COMPANY

Innovative Technology Associates was a supplier of specialized software, complex processing algorithms, and advanced systems in support of defense applications. ITA processes allow rapid insertion of commercial off-the-shelf technologies, which has become a hallmark of ITA. The company has been purchased by General Dynamics.

Topic Number: N97-160 (SPAWAR)
SBIR Investment: $850K
Project Revenue: $1.23M

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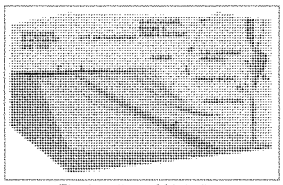
William Mahood

Makai Ocean Engineering, Inc.

SPAWAR

Near Real Time Installation of Cables and Sensor Arrays Deployed from a Towed Body



Final testing of Makailay

APPLICATIONS

- The military version of this technology is being used on ASW training ranges and in SPAWAR's Advanced Deployable System (ADS) program.
- Makai developed two commercial products based on this technology: MakaiPlan Pro and MakaiLay. They are being used by several telecommunication companies in the planning and real-time control installation of submarine cables from surface vessels. There are also some commercial geo-technical surveying applications.
- Makai received a $100K award from the National Defense Center of Excellence for its innovative research in ocean science related to this project.

ABOUT THE COMPANY

Makai Ocean Engineering, Inc. was established in 1973 as a diversified ocean engineering and naval architecture company providing service in Hawaii and the Pacific. Today, Makai provides ocean engineering services worldwide and is a major supplier of submarine cable installation and planning software.

ABOUT THE TECHNOLOGY

The ability to simulate, monitor, and control complex at-sea cable and array installations from a towed body has been a costly problem for the Navy and commercial ventures. The technology to solve this problem has been developed by Makai through its element location prediction (ELP) model. The ELP computes the position of the submarine relative to a very lightweight array deployed from an underwater towed body. Through numerical and computational evaluations of input data from deployed instrumentation, the ELP enables the cables to be laid accurately and straight, using relatively low-skilled personnel.

MILITARY & COMMERCIAL SIGNIFICANCE

The Navy's computer model was slow, complicated to use, and costly. Makai has developed a more rigorous program that is 150 times faster than current Navy software, more accurate, provides useful solutions, is easy to use, and has the ability to operate on a standard PC. The ELP model has immediate access to deployed array and has improved array element placement accuracy. Makai provides SPAWAR and the Navy with the only model that achieves all of the desired technical requirements.

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Jose Andres

Topic Number: N99-171 (SPAWAR)
SBIR Investment: $901K
Project Revenue: $6.74M

Materials Systems Inc.

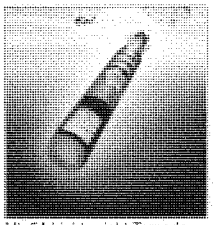
Low Cost Broadband Mk 54 Torpedo Arrays

ABOUT THE TECHNOLOGY

Naval operations in littoral waters can be much more challenging than those taking place in deeper waters. In shallow water, reverberation and noise from obstacles and nearby commercial shipping limits the ability of existing sonar to warn surface ships of sub-surface threats, such as mines and enemy submarines, and reduces the clear targeting of threats by the ship's torpedo defenses. However, broadening the sonar bandwidth by using broadband transducers and arrays increases the sonar's search ability. In order to upgrade weapon performance in the difficult littoral environment, Materials Systems Inc. (MSI) is developing, based on its advanced piezocomposite transducer technology, a broad bandwidth sonar array for the Mk 54 Lightweight Torpedo.

MILITARY & COMMERCIAL SIGNIFICANCE

The Mk 54 Lightweight Torpedo is the primary defense for Navy surface ships and airborne anti-submarine warfare platforms against enemy submarines. The upgraded Mk 54 sonar homing array is expected to substantially improve the ability of the Mk 54 Lightweight Torpedo to find its target in shallow waters. In addition, MSI's piezocomposite sonar array manufacturing technology should reduce the cost of the Mk 54 array by about 50% over the existing system. MSI is also developing broadband sonar arrays for a variety of other Navy and commercial undersea systems and is expanding its current markets in piezocomposite undersea survey sonar array products to include transmit arrays.



Mk 54 Lightweight Torpedo in Action

APPLICATIONS

- Mk 48 ADCAP heavyweight torpedo arrays
- In-stride mine avoidance sonar
- Mine detection and classification sonar
- WSQ-11 torpedo defense sonar and AUV sonar
- Industrial ultrasound uses
- Commercial sonar uses

ABOUT THE COMPANY

Founded in 1991 and headquartered in Littleton, Massachusetts, Materials Systems Inc. develops and manufactures advanced materials and custom components for defense and commercial systems customers. MSI products range from acoustic transducers for underwater sonar and industrial ultrasound to large sapphire windows for transparent armor and infrared surveillance. MSI's pioneering development of low cost injection molding for manufacturing piezocomposite opened the way for application of this powerful acoustic transducer material in sonar and ultrasound. During the past 12 years, MSI has become the recognized leader in providing high performance piezocomposite transducers to the US Navy, and for a variety of other applications beneficial to the defense and commercial industries.

Topic Number: N02-066 (ONR)
SBIR Investment: $370K
Project Revenue: $8.6M

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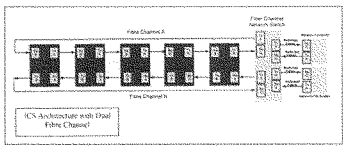
Les Bowen

Mathtech, Inc.

NAVAIR

Development of the Advanced Intercommunications Systems (AICS)



ICS Architecture with Dual Fibre Channel

APPLICATIONS

- Multi-place aircraft: E-2C Inter-Communications System

ABOUT THE COMPANY

For more than 40 years, Mathtech, Inc. has combined analytical thinking with leading-edge technology to help clients solve complex problems. The company equips government, business and legal clients with quantifiable answers that keep them out in front of changing times and challenges. Recently, Mathtech was awarded a $16.8 M contract from Northrop Grumman to supply the ICS for the Advanced Hawkeye aircraft. The award is the single largest contract that Mathtech has received in its forty year history and affords the company the ability to develop new product lines and expand services.

ABOUT THE TECHNOLOGY

The Advanced Intercommunications Systems (AICS) is a digital intercommunications system (ICS) designed for airborne use in multi-place aircraft. The AICS was developed by Mathtech, Inc. for a retrofit to the Navy E-2C Hawkeye aircraft. It has an embedded PC-based system that runs real-time voice over a dual Fibre Channel. Mathtech's technology offers a distributed digital approach. The AICS has one Weapons Replaceable Assembly (WRA), a Crew Station, and no other active circuitry. The Crew Station WRA incorporates the interface with all audio sources for each crew member. Mathtech's Crew Station is a lighter, smaller, and less expensive version of the CrewComm unit that is packaged without communications interface circuitry. The AICS can be mixed with the CrewComm in any installation.

MILITARY & COMMERCIAL SIGNIFICANCE

Mathtech's AICS is less expensive than similar ICSs. The system is suitable for military and government use on any multi-place aircraft. The AICS offers its users a customizable front panel and an open architecture for the data bus. The design avoids the drawbacks of a central hub WRA, such as single point of failure, added weight, and increased system cost. It distributes the radio and other audio inputs such as warning tones over all Crew Station WRAs. The small, lightweight system was designed for performance, versatility, manufacturability, and supportability. The AICS provides real distributed processing capabilities. Unlike other ICSs, AICS does not depend on any central communications processing hub. Each "intelligent" AICS WRA has its own processor. Each Crew Station can interface with up to three analog audio sources, digitizing each and placing the audio on the Fibre Channel that is accessible to all crew positions. This facilitates each Crew Station access to all 15 analog audio sources.

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Greg Federline

Topic Number: N92-067 (NAVAIR)
SBIR Investment: $974K
Project Revenue: $17.1M

Multispectral Solutions, Inc.

Aircraft Wireless Intercommunications Systems (AWICS)

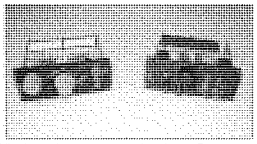
NAVAIR

ABOUT THE TECHNOLOGY

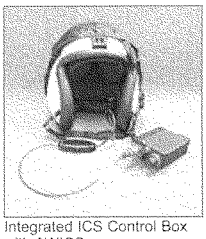
Multispectral Solutions, Inc. (MSSI) has developed an Ultra Wideband (UWB) technology that employs ultra short radio frequency (RF) bursts. The technology solved a major challenge for RF communications - the interference caused by the reflection of RF energy known as "multipath". A particularly severe condition of multipath occurs inside the metal shell of aircraft and helicopters, an environment where the bounce and reflection of RF signals inhibit the ability to establish reliable wireless communication. By employing its UWB technology, MSSI successfully created a wireless intercommunications system that addresses the crucial RF wireless communication problem of multipath interference.

MILITARY & COMMERCIAL SIGNIFICANCE

The excellent performance of the UWB wireless intercom system while operating in severe multipath environments has been clearly demonstrated in numerous field tests onboard a variety of Navy/Marine Corps helicopters and fixed wing platforms. The system allows crews to untether from aircraft ICS long cords, improving mobility, flight safety and emergency egress. Further, replacing the communication cord with the a covert UWB RF link dramatically improves operational effectiveness without exposing the crew to electronic warfare threats. UWB technology can also provides industry and consumers with an interference-free method of communicating higher-quality audio for business, home, and office.



Aircraft Wireless Intercommunications Systems (AWICS)



Integrated ICS Control Box with AWICS

APPLICATIONS

- Aircraft Communication Systems for CH-53D/E, MH-53E, CH-46E, and C-2A aircraft
- Ships/boats communications
- Ground Vehicles Communication Systems (Tanks, HUMMVs, fire operations, ambulances)
- Ground Control Stations
- Portable radios
- Home/office intercom
- High fidelity infant / baby monitor
- Professional level audio systems

ABOUT THE COMPANY

Multispectral Solutions, Inc. is recognized worldwide as the industry leader in Ultra Wideband (UWB), an emerging wireless technology for communications, precision localization and radar applications. Founding Multispectral Solutions, Inc. in 1988, President and CEO Dr. Robert J. Fontana (Ph.D. Stanford), has lead MSSI for the last 16 years, developing a strong reputation for quality and innovation. Clientele includes a wide variety of Government agencies, military organizations and commercial corporations.

Topic Number: N99-055 (NAVAIR)
SBIR Investment: $1.1M
Project Revenue: $25M

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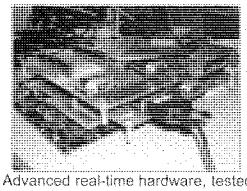
Robert Mulloy

Native American Technologies Company

Metal Plate Forming



Advanced real-time hardware, tested and verified, for defense manufacturing

APPLICATIONS

- ONR DD21: ship hull production
- Jet engine repair
- Armor and artillery systems, remote minefield neutralization
- Spacecraft performance, component production
- Rapid prototyping for crash and safety testing
- Storage and safety of spent fuel and transportation containers

ABOUT THE COMPANY

Native American Technologies Company provides advanced software and engineering solutions for welding and manufacturing processes via its standard software and hardware products. About fifty percent of sales are in the welding industry, with products for process modeling, optimization, process monitoring, process control, and quality control. N. A. Tech offers products and services for CAD-based robot operations and programming, metal forming, metal alloy design, and general materials and metallurgical consulting. The company's client list includes Ford Motor, General Motors, Caterpillar, Daimler-Chrysler, Johnson Controls, Tower Automotive, Boeing, Lockheed-Martin, Trico Products, Delphi, and Hydro Automotive.

ABOUT THE TECHNOLOGY

The current method of producing three dimensional shapes for Navy ship hulls and other structures consists of manual thermal forming by skilled labor that uses oxy-acetylene torches and water hoses. The process is very costly, labor intensive, inaccurate, and slow. Native American Technologies Company (N.A. Tech) has developed the Light Induced Thermal Shape Forming (LITS-Form) process to address this problem. The LITS-Form process uses advanced high-energy heat sources, automated manipulators to position the heat at precise locations, intelligent controls, and computerized off-line planning. The process is cost effective, uses minimal labor, produces highly accurate parts, and is up to 100 times faster than manual plate forming.

MILITARY & COMMERCIAL SIGNIFICANCE

Ship hull plate shaping is critical in NAVSEA's DD21 program. Manual forming, roll forming, and break press forming is very slow and tedious work. A typical Navy destroyer requires many thousands of man hours and up to 18 months or more to produce just the 3-D ship hull plate shapes. Jigs and templates are produced from CAD lofts, then using oxy-acetylene torches and water hoses a 1" thick steel plate is coaxed into shape.

The LITS-Form process uses automated and robotic forming to reduce cost, improve speed, enhance accuracy, and enable better plate shape consistency and quality. The LITS-Form process forms the three-dimensional plate shapes of a destroyer in about 1-2 months, thus reducing the production process by ninety percent and labor cost by at least fifty percent. Since the LITS-Form process is completely automated, adding the plasma cutting option to the system eliminates two other inefficiencies: manual pre-cutting of the parts before forming and final manual trim cutting of components after forming. N.A. Tech's LITS-Form process and automated cutting option improves the speed and accuracy of ship hull plate shaping, and reduces cost for a host of other military and commercial endeavors.

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Dr. Jerry Jones

Topic Number: N98-001 (ONR)
SBIR Investment: $595K
Project Revenue: $14.7M

Navmar Applied Sciences Corporation

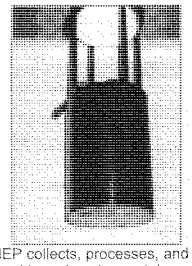
Air-Deployable Expendable Multi-Parameter Environmental Probe (AEMEP)

ABOUT THE TECHNOLOGY

Navmar Applied Sciences Corporation (Navmar) has developed critical environmental sensor technology that can be adapted into the design of an air-deployable, expendable, multi-parameter environmental probe (AEMEP). Specifically, Navmar has produced several innovative sensor technologies useful in an air deployable, expendable sensor buoy released to monitor the dynamic open ocean and littoral environments. The AEMEP has the ability to collect, process, and remotely transmit via IDIRIUM SATCOM environmental acoustic data required by the US Navy to enhance anti-submarine warfare operations.

MILITARY & COMMERCIAL SIGNIFICANCE

NAVMAR has successfully adapted the AEMEP concept to meet the Navy's requirements for the Tactical Acoustic Measurement Decision Aid program, whose goal is to create a next-generation "environmental store" of oceanographic acoustic data. Navmar's AEMEP unit has became the basic building block system for the development of the sonobuoy sensor probe, with recent tests demonstrating the ability to collect oceanographic data over long periods of time. Since the sensor probe is airborne deployable, it allows for a rapid response to worldwide threats. The AEMEP is efficient and cost effective, while traditionally ocean survey efforts have been expensive and time consuming. The AEMEP's multiple parameter measurement and reporting capability eliminates the need for multiple sensor probes and so saves money. By employing this inexpensive, expendable, autonomous buoy system, the oceanographic community greatly reduces the cost and duration of surveying and exploration.



The AEMEP collects, processes, and transmits oceanographic and environmetal acoustic data

APPLICATIONS

- Sea bed classification technology for long term, littoral bottom sediment surveys
- Moored buoy applications for oceanography, environmental and weather research
- Ocean optical properties sensors for fishing industry
- Commercial oil industry site survey and exploration

ABOUT THE COMPANY

Navmar Applied Sciences Corporation, a professional engineering services firm, has assisted clients over the past 20 years in meeting the challenges of an ever-changing national and international environment. The engineering disciplines encompass systems engineering, system design, systems integration, life cycle management, operations research/cost analysis, software development, test/evaluation, and training system development. Its subject matter expertise includes: air vehicle, material sciences, avionics, air crew, electro-optics, acoustic sensor, radar, communication and navigation.

Topic Number: N94-178 (NAVAIR)
SBIR Investment: $1.2M
Project Revenue: $572K

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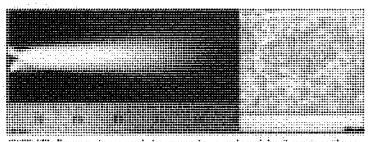
nGimat Co., (formerly MicroCoating Technologies, Inc.)

Embedded Capacitors for Multichip Modules and Printed Circuit Boards



CCVD flame is used to create embedded capacitors

APPLICATIONS

- High-density microelectronic packaging and power electronics
- Solar cells
- Broadband, electronics
- Superconductors, barrier coating

ABOUT THE COMPANY

Since 1994, nGimat has demonstrated the ability to establish successful customer relationships and effectively use SBIR funding. Based on technical success from funding by the Navy, nGimat negotiated a multi-million dollar long-term development and license agreement in partnership with Rohm & Haas to develop advanced materials for electronic applications. In addition, nGimat recently entered into a licensing agreement with M&G Corp. of Italy, the world's second largest producer of polyethylene terephthalate ("PET") flat films, to apply the CCVD process to O2 barrier coatings on PET. nGimat now has three licensees for its CCVD and NanoSpray(SM) technologies.

Through development efforts such as those funded by the Navy, nGimat has built an intellectual property portfolio of 30 issued U.S. patents and multiple patent applications pending, which covers its raw materials, processes, equipment, composition of matter, intermediate products and final products.

ABOUT THE TECHNOLOGY

There is a strong desire among consumers for smaller, lighter, and less expensive electronics that are reliable and performs well. Generally, electronics are manufactured using discrete "surface mount" resistors and capacitors, which pose a major barrier to miniaturization. The repetitive "pick-and-place" surface mount manufacturing procedure is time consuming and susceptible to placement errors. nGimat Co. has addressed this problem by producing innovative thin film materials and passive devices that can be embedded within the circuit board, thereby freeing up valuable space to allow miniaturization. Embedded passives are produced through the use of nGimat's Combustion Chemical Vapor Deposition (CCVD) and NanoSpray(SM) technologies.

MILITARY & COMMERCIAL SIGNIFICANCE

Embedded capacitors improve electrical performance and reliability while reducing manufacturing cost and production time. The capacitor, using the CCVD process, offer the potential for capacitance densities greater than 200nF/cm^2, leakage current densities below 100nA/cm^2, and breakdown fields in excess of 5MV/cm. The use of embedded passives also reduces the amount of toxic lead solder used in manufacturing.

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Todd Polley, Ph.D.

Topic Number: D97-T003 (ONR)
STTR Investment: $700K
Project Revenue: $7M

Noesis, Inc.

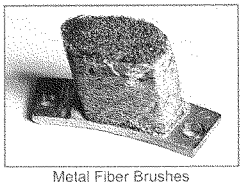
Materials Research In Sliding Electric Contacts

ABOUT THE TECHNOLOGY

As a result of using monolithic carbon brushes on 500 kW motor generators found onboard submarines the Navy has experienced high maintenance cost, frequent equipment repair and replacement, and lack of favorable working conditions for sailors. Utilizing carbon brushes on submarine motors and generators also damages rotors and decreases the longevity of the equipment. The brushes' electrical conductivity produces shorts, grounds and equipment fires. Further, when carbon dust from the brushes mixes with oil vapors, electrical insulation is softened, resulting in the need to remove, re-insulate, re-install and re-test the units, at great time and expense to the Navy. Sailors who clean the abrasive carbon dust that builds up from the use of the brushes find the work unpleasant, dirty, and repetitive. To address the effects of using carbon brushes Noesis, Inc. teamed with the University of Virginia (UVA) to develop the advanced metal fiber brush (AMFB).

MILITARY & COMMERCIAL SIGNIFICANCE

The AMFB offers significant improvements over carbon brushes. During at-sea tests aboard the USS Dolphin (AGSS 555) and in land based qualification tests the AMFB exceeded all naval technical requirements. The brushes' electrical performance is markedly superior - and the debris that is produced during use is non-conductive. The AMFB achieves greater operational availability of critical electrical machines, reduces maintenance cost, and improves environmental living and working conditions for sailors. The AMFB is applicable for all military motor systems that currently employ carbon brushes as well as commercial products that are similarly hampered by the effects of carbon dust build-up. AMFB technology has shown promise as an enabling technology for advanced electric ship drives, and it presents an exciting opportunity for manufacturers, of electrical motors, that are in need of advanced, low-electrical-loss, high current-carrying brushes.



Metal Fiber Brushes

APPLICATIONS

- Naval submarine 500kW motor generator
- Hand-held electric tools
- Automotive components
- Motorized wheelchairs
- Electric ship drives
- Electric motors

ABOUT THE COMPANY

Noesis, Inc. provides program acquisition support and technical expertise to federal science and technology organizations. It facilitates the flow of knowledge and information to enhance the quality of technology products delivered to end users. Noesis assists government customers in determining effective ways to transition systems and technologies into acquisition from government laboratories to industry. Noesis, Inc. and the University of Virginia Patent Foundation formed HiPerCon, LLC, so as to tap into the large market potential and wide spectrum of commercial applications for metal fiber brushes.

Topic Number: N96-103 (NAVSEA)
SBIR Investment: $840K
Project Revenue: $13.6M

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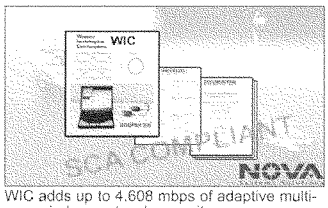
Nova Engineering, Inc.

SPAWAR

Wideband Intra-Battle Group Communications (WIC)



WIC adds up to 4.608 mbps of adaptive multi-user wireless network capacity

APPLICATIONS

- SCA compatibility
- Multi-user wireless network
- HDR LOS communications
- Digital modular radio

ABOUT THE COMPANY

Nova Engineering, Inc. is an innovative wireless data communication product company. It is an industry leader in area mobile ad-hoc wireless networks, unattended ground sensors, exotic modem and waveform development, advanced telemetry, and communication development tools. Nova has recently formed a separate division, Nova Systems Solutions, to focus on software defined radios. The division is active in the JTRS program and is currently subcontracting with Boeing on the JTRS Cluster 1 Wideband Networking Waveform. Nova has funded $82K for an internal research and development project to develop a "SCA Lite" core framework for commercial application of WIC.

ABOUT THE TECHNOLOGY

Nova has developed a spectrally efficient, wideband, nonproprietary, open source example waveform that is compliant with software communication architecture (SCA). Wideband Intra-Battle Group Communications (WIC) is designed to be resistant to channel impairments, commonly encountered in the Navy's signaling environment. The work realizes ubiquitous connectivity through integration of the high data rate (HDR) line-of-sight (LOS) waveform into digital modular radio or similar software defined radios. The HDR LOS waveform concentrates users into terrestrial burst rates to 1.536 Mbps operating on 600 KHz of bandwidth.

MILITARY & COMMERCIAL SIGNIFICANCE

The US Navy desired a means for HDR LOS communications among ships, submarines, and shore sites. Before WIC, the total point-to-point intra-battle group terrestrial data capacity was less than a few hundred kbps per ship. The capacity was just marginally adequate several years ago. Now, the increase in traffic load has resulted in requirements far exceeding current capacity. Nova Engineering's wireless waveform fulfills the need for increased data capacity. The waveform adds up to 4.608 mbps of reliable, adaptive multi-user wireless network capability to each ship within a battle group. It enables fixes to software bugs in the field by incorporating self-enabling error capability. The waveform has the added benefit of simplified user access and substantially enhanced timeliness/diversity of applications executed on the ship. WIC's reference implementation significantly reduces development costs due to new communication waveforms and services that can be added without changing the hardware.

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Steve Olenick

Topic Number: N00-030 (SPAWAR)
SBIR Investment: $849K
Project Revenue: $2.68M

Ocean Power Technologies, Inc.

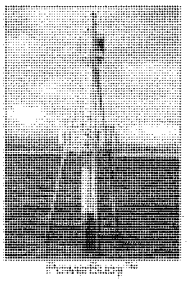
Underwater Autonomous Power Generation

ABOUT THE TECHNOLOGY

Ocean Power Technologies, Inc. (OPT) has developed a revolutionary renewable energy technology for converting large amounts of reliable and predictable energy in ocean waves into low cost, non-polluting electricity. OPT's proprietary PowerBuoy™ wave generation systems are modular in character with each PowerBuoy™ wave generation system using a "smart", ocean-going buoy to capture and convert wave energy into a controlled mechanical force that drives an electric generator. The rising and falling of the waves offshore causes the buoy to move freely up and down, and the resultant mechanical stroking drives the electrical generator. Generally, the generated AC power is converted into high voltage DC and is transmitted ashore via an underwater power cable. Large power stations can be economically built by assembling arrays of PowerBuoy™. The technical feasibility, the simplicity of deployment, and the survivability in storms of the OPT system has been demonstrated in several ONR SBIR ocean trials.

MILITARY & COMMERCIAL SIGNIFICANCE

The economic and environmental cost of providing power to DoD coastal facilities around the world is high. In many cases these facilities are totally dependent upon fossil fuel to generate power. PowerBuoy™ requires no fuel, thereby greatly reducing the cost of electricity. With the OPT systems there are no pollutants, no radioactivity, or other environmental problems. The systems can be used for commercial applications to (a) produce low cost electricity for disassociation of sea water into hydrogen and oxygen – the hydrogen can subsequently be used as a fuel or in a fuel cell to produce electricity, (b) desalinate sea water, and (c) natural resource processing/refinement plants.



PowerBuoy™

APPLICATIONS

- Power generation infrastructure
- Standby and operational power for systems left on the ocean floor
- Power generation for the Advanced Deployable System
- Battery recharge at or below the surface of the ocean for Autonomous Underwater Vehicles
- Array of the Autonomous Oceangraphic Sampling Networks

ABOUT THE COMPANY

Ocean Power Technologies, Inc. is the leader in cost-effective, advanced, and environmentally sound offshore wave power technology. Navy SBIR funding for testing and development of PowerBuoy™ wave power generator system has directly resulted in increased revenue for the company and potential sales from large commercial power generating systems. The success of OPT's system is expected to result in the core "building block" for future OPT commercial applications enabling OPT to sell products to a broad base of commercial applications.

Topic Number: N95-074 (ONR)
SBIR Investment: $1.02M
Project Revenue: $10.7M

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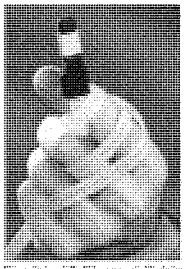
Charles Dunleavy

Page Automated Telecommunications Systems, Inc.

NAVAIR

Fiber Optic Computer Systems and Sensor Technology for Affordability known as Smart Skin Array Technology (SSAT)



Flexible 12 Channel Cable

APPLICATIONS

- Data link & controls
- Military uniforms for detection of position and communication
- Fly-by-light
- Optical Backplane Interconnect Systems
- Autonomous Space Vehicles
- Data interconnect; sensing; computer controls
- Airframe inclusion

ABOUT THE COMPANY

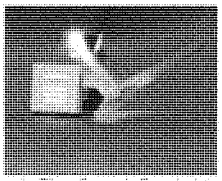
Page Automated Telecommunications Systems, Inc. (PATSI) is a leading developer and manufacturer of high performance fiberoptic interconnect systems. PATSI has a successful history in SBIR commercial and military based projects. PATSI has skillfully blended innovation and pragmatism in the design and manufacture of its systems. Patented Flexible Fiberoptic Technology delivers high performance, robust, scalable products, and the most flexible cable assemblies in the industry. PATSI has received nine worldwide patents for the SSAT technology.

ABOUT THE TECHNOLOGY

Page Automated Telecommunications Systems, Inc. (PATSI) developed Smart Skin Array Technology (SSAT) as a new and advantageous way of packaging fiber optic systems. It is based on an innovative optical fiber weaving technology, which allows highly dense fiber optic parallel pathways up to 100 channels per inch to be manufactured in a repeatable manner. PATSI developed SSAT to provide a single scalable technology for which the manufacturing process is transparent to the customization of fiber optics type and number, composite materials, and allows customers diversity in application and procedure.

MILITARY & COMMERCIAL SIGNIFICANCE

SSAT technology is electromechanical interference resistant, flexible, compact, and high-low temperature resistant. The technology provides robust structure sensing devices and photonic data links for military aircraft and space application. Its low weight coating material decreases carry load, thus increases aircraft performance and fuel efficiency. SSAT is an enabling technology that is simple in design, reduces the number of optical and non-optical steps required in a processing system, decreases systems certification cost, and increases overall efficiency.



High Density Fiber Ceramic Ferrule Interconnect

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pat@patsi.com
Patricia Wiener

Topic Number: N93-004 (NAVAIR)
SBIR Investment: $1.1M
Project Revenue: $864K

Phoenix Integration

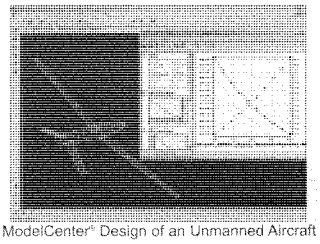
An Integrated Design System for Weapons Subsystem Development

ABOUT THE TECHNOLOGY

The Naval Surface Warfare Center has identified a need for a parametric, conceptual computer aided design (CAD) system for naval gun subsystem designs. The software should allow systems engineers to share information and collaborate on design projects. The level of analysis ranges from high level rule-based design to complex analysis algorithms. Phoenix Integration (Phoenix) has developed an engineering software tool that addresses these needs with a modeling interface and dynamic analysis software. The software links multiple computer programs together to afford engineers access to all design information in one application. The software integrates programs for the design and analysis of combat weapon subsystems and resolves a compatibility deficiency for ship design modules that needed weapon system concepts to be configured and analyzed in a timely manner.

MILITARY & COMMERCIAL SIGNIFICANCE

Phoenix Integration's ModelCenter® is the commercial result of this research. ModelCenter® gives DoD the ability to rapidly develop a single, unified picture of cost, performance, and risk for the design of weapons subsystems. The modeling and analysis tool offers designers a graphical, interactive capability for creating shipboard subsystems in less time and at less expense. ModelCenter® allows for a better analysis of design alternatives. Further, a better understanding of the total system is gained from a modeling and analysis tool that creates multiple subsystems and shows the integration between each element. The system quickly simulates design performance, which provides greater insight into the model's technology. ModelCenter® enables greater competitiveness among companies by improving productivity and allowing engineers to focus on important design issues. These efficiencies reduce engineering man hours and labor cost, and helps speed products to market.



ModelCenter® Design of an Unmanned Aircraft

APPLICATIONS

- G-33 Gun Design Group, propulsion design
- Future combat systems, conceptual design of aircraft
- Torpedo design, integrated hypersonic analysis
- Second Generation Reusable Launch Vehicles
- Aircrafts, space/missiles, satellite design
- Automotive, electronics
- Oil and gas exploration

ABOUT THE COMPANY

Phoenix Integration is in the business of helping organizations succeed by improving R&D and decision analysis. Its software has been used by a diverse range of Fortune 500 companies to improve processes from concept evaluation to product introduction.

The Navy SBIR funding has been pivotal in allowing Phoenix to develop the exact technology needed to make the company's business successful. As an SBIR Phase III company that has successfully transitioned its technology, Phoenix has done well in attracting outside investment capital. Nine of the top ten defense contractors employ Phoenix's software to improve the development of their weapons systems. Phoenix has diversified into automotive, oil and gas, and electronics markets, with 15% of its revenue now coming from international sales.

Topic Number: N98-080 (NAVSEA)
SBIR Investment: $646K
Project Revenue: $5.8M

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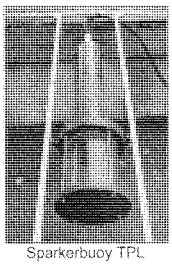
Phoenix Science & Technology, Inc.

NAVAIR

Sparker Acoustic Source "A" Size Sonobuoy



Sparkerbuoy TPL

APPLICATIONS

- TAMDA sonobuoy
- Submarine countermeasures
- Anti-biofouling, such as control of Zebra mussels
- Waste water treatment
- Water disinfection
- Oceanographic data collection
- Oil/seismic exploration

ABOUT THE COMPANY

Phoenix Science and Technology (PS&T), Inc. develops and commercializes pulsed acoustic and light sources for a wide range of applications. The company is focused on R&D, applications, prototypes and improvements of innovative technologies. NAVAIR SBIR has helped to fuel the growth of PS&T from a two person operation in 1995 at the start of Phase I to its current 11 employee company. The success of the Sparker has helped expand Sparker applications to NAVSEA and commercial clients. Together with its Surface Discharge Lamp technology, PS&T now has a strong IP position.

ABOUT THE TECHNOLOGY

Phoenix Science & Technology (PS&T), Inc. has developed a new Sparker impulsive acoustic source as an alternative to the chemical explosives currently used as a broadband acoustic source. The Sparker is a pulsed electrical discharge with a broadband low frequency spectrum that is highly efficient in high conductivity ocean environments. It offers a safer, more controllable, environmentally benign, multiple-pulse source for under-water environmental data collection and submarine/torpedo countermeasures.

The Sparker is a part of the Tactical Acoustic Measurement and Decision Aid (TAMDA) environmental sonobuoy that collects, processes, and transmits environmental acoustic data required by the US Navy to enhance anti-submarine warfare operations in shallow water.

MILITARY & COMMERCIAL SIGNIFICANCE

Navy explosive acoustic sources have environmental and safety implications that restricts use and impacts fleet operations. The Sparker is an electrically driven acoustic source that emits pressure pulses similar to explosives, but is safer and easier to control, thus reducing the safety and environmental concerns of explosives. Unlike explosives, Sparkers can "pinged" as many times as necessary.

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Shoko Yoshikawa

Topic Number: N95-005 (NAVAIR)
SBIR Investment: $1.10M
Project Revenue: $1.31M

Physical Sciences, Inc.

Advanced In-Line Fuel Monitoring

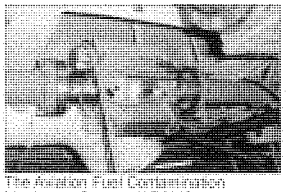
NAVAIR

ABOUT THE TECHNOLOGY

Physical Sciences, Inc. (PSI) has developed an in-line sensor to monitor free water and sediment contamination in JP5 aviation fuel carried aboard naval ships. The Aviation Fuel Contamination Monitoring System (AFCMS) utilizes laser-scattering technology to analyze the aviation fuel as it flows through a pipe and detects between 1-50 parts per million of free water and 1-20 milligrams per liter of sediment. PSI's innovative AFCMS is being tested aboard a Navy aircraft carrier as the culmination of a three-year effort funded by NAVAIR and NAVSEA under the SBIR program.

MILITARY & COMMERCIAL SIGNIFICANCE

The AFCMS reduces workload of fuel sampling by up to 3200 hours per month for an annual savings of nearly $1 million per carrier. It can provide fuel sampling at commercial airports, fuel storage sites, power plants, and can aid in the automation of refinery operations. Using the AFCMS reduces total ownership costs in virtually any liquid process where water or solid intrusions in minute quantities constitute a serious problem. The technology has expanded expertise in the general area of fluid condition monitoring and has led to the development of sensors for monitoring contamination and water in hydraulic fluids and lubricating oils.



The Aviation Fuel Contamination Monitoring System (AFCMS)

APPLICATIONS

- Air capable ships
- Carriers
- Fuel sampling by commercial airports, fuel storage sites, and power plants
- Automation of refinery operations
- Sensors to monitor contamination and water in hydraulic fluids and lubricating oils

ABOUT THE COMPANY

Physical Sciences, Inc. has developed a successful methodology for technology transfer and commercialization. Starting with funded research and development projects, the company supports the development of prototype products and services through the pre-commercial stage. Working with major corporate partners, PSI then establishes focused commercial businesses, joint ventures or licensing arrangements that promote rapid penetration of growth markets. The SBIR program has played a pivotal role in PSI's technical and commercial success, and has been responsible for a family of intelligent instrumentation products based on proprietary electro-optical and electromechanical technologies. It has also led to the assembly of experimental, prototype development facilities at the company. PSI is actively seeking licensing opportunities and partnerships for commercial applications in fluid condition monitoring and other market segments.

Topic Number: N99-053 (NAVAIR)
SBIR Investment: $989K
Project Revenue: $1.55M

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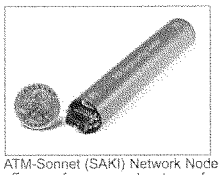
Planning Systems, Inc.

ATM-Sonnet Network Node (SAKI)



ATM-Sonnet (SAKI) Network Node offers performance advantages for surveillance arrays

APPLICATIONS

- Navy fixed deployable systems
- NATO Supreme Allied Commander Atlantic
- Underwater Deployable Acoustic Measurement System: Undersea Research Center Broadband Towed Arrar Sonar, MOD Wideband Towed Array Sonar
- Seismic seafloor arrays, seismic towed arrays, image sensor networks, video sensor networks, urban security, and surveillance networks

ABOUT THE COMPANY

Planning Systems, Inc. is a diversified high-technology company, founded in 1972 and head-quartered in Reston, VA. It employs more than 300 technical staff in multiple locations nationwide. PSI provides applied science and systems engineering expertise, information technology applications and solutions, and custom products to the Federal Government and commercial clients. Fiscal year 2001 revenue was $35 million, and revenues in FY2001 grew to $38 million. PSI has successfully performed on more than 400 government contracts and has won numerous repeat awards with over a dozen Federal agencies. It has consistently demonstrated that it not only has the technical breadth and depth required to support mission critical activities but is uniquely qualified to do so.

ABOUT THE TECHNOLOGY

Planning Systems used models and prototypes to demonstrate that asynchronous transfer mode (ATM) technology offers performance advantages for surveillance arrays. Several prototype components were developed to use the ATM technology. A miniature low-power ATM-Sonnet network node (SAKI) was developed that uses 1 Watt or less power, is only 0.8 inches in diameter by 4 inches long, and is tolerant to 3000 PSI. An underwater 4-port ATM switch was also developed. The switch is capable of 622 Mbps switching speeds, low power, and has configurable physical layer interfaces to support bridging networks with disparate protocols and interfaces. By leveraging recent advances in ATM telemetry, these prototypes enabled Planning Systems to build a surveillance array sensor system that maximizes the benefits of open-architecture ATM technology while solving issues such as coherent sample rate clock distribution across sensor nodes.

MILITARY & COMMERCIAL SIGNIFICANCE

ATM technology is compatible with standard network infrastructure gear and allows a low latency for real-time applications. It provides a low-power fundamental electronic building block for sensor networks and network-centric systems. The Department of Defense and joint forces are migrating to network-centric systems (NCS). The use of sensor network systems (SNS) increases accuracy, improves operational picture, facilitates faster response, and decreases total cost of system ownership. The SAKI network node and the 4-port ATM switch enables maximum use of NCS and SNS by reducing network power, weight, and size by a factor of 10, which enables network-connectivity in space and power constrained applications.

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Mark Henderson

Topic Number: N97-156 (SPAWAR)
SBIR Investment: $606K
Project Revenue: $3.55M

Progeny Systems Corporation

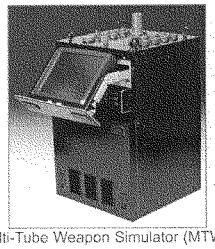
Flexible & Affordable COTS Based Tactical Weapon Simulation, Training & Maintenance

ABOUT THE TECHNOLOGY

Historically, commercial off the shelf (COTS) software has not been widely accepted beyond signal processing and display technology nor considered suitable for sensor and weapons applications. However, Progeny Systems has proven that COTS can be utilized for unique sensor and weapons applications that meet all shipboard requirements. The Multi-Tube Weapon Simulator (MTWS) software is a stand-alone 19-inch equipment rack, based on industry standard interfaces and protocols. It uses HTML and Java supported displays and C simulation codes to allow easy operator setup and control. Progeny Systems developed MTWS to afford the U.S. Navy Submarine Force the ability to simultaneously simulate and provide training on all vertical and horizontal weapons. MTWS supports simultaneous simulation and training for the 16-Tube SALVO launch of all 4 horizontal and 12 vertical weapon tubes, as well as, current horizontal and vertical Tomahawk missiles and MK-48 ADCAP Torpedoes.

MILITARY & COMMERCIAL SIGNIFICANCE

Progeny's MTWS improves weapon simulation and training, lowers maintenance expenditures, and provides greater savings for the Navy's submarine fleet. It is ninety percent less expensive than current simulation software. Application upgrades, weapon simulation, and training support are simple and adaptable to other Navy simulation and training platforms.



Multi-Tube Weapon Simulator (MTWS)

APPLICATIONS

- Simulation and training
- Horizontal and vertical Tomahawk missiles
- MK-48 ADCAP torpedo

ABOUT THE COMPANY

Since incorporation in 1995, Progeny Systems Corporation has provided high quality engineering services to the United States Navy, Air Force, DARPA and corporate customers. In August of 1996, Naval Sea Systems Command awarded Progeny its first Small Business Innovative Research (SBIR) contract. Since then, Progeny has performed numerous SBIR contracts for the Navy, Air Force, and DARPA. Many of these contracts involve leveraging commercial technologies (e.g., Internet and COTS products) into special customer applications, reducing life cycle cost and improving system performance. Progeny Systems attributes a significant amount of its growth to the MTWS and the Navy SBIR programs. Over the past three years, the company has increased to about 190 employees.

Topic Number: N98-122 (NAVSEA)
SBIR Investment: $668K
Project Revenue: $4.2M

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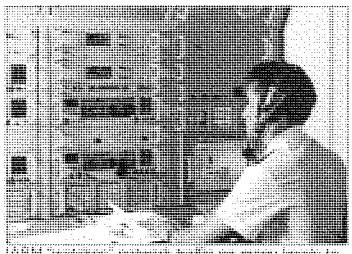
PROMIA, Inc.

SPAWAR

Intelligent Agent Security Module (IASM)



IASM "watches" network traffic on many levels to determine misuse

APPLICATIONS

- Fleet Network Operating Centers
- Navy Component Task Force
- SPAWAR Systems Center Labs
- Aircraft carriers and Flag command ships
- Commercial versions of the IASM product are available as a security Internet appliance

ABOUT THE COMPANY

PROMIA is a leading developer and supplier of distributed object and component security tools that are based on open standard components with advanced analytic capabilities. Its products are used in environments requiring high security, high reliability, high performance and scalability. Since the early 1990's PROMIA has been in the forefront of developing software infrastructure solutions based on object oriented technology and open standards for organizations worldwide.

ABOUT THE TECHNOLOGY

IASM is a high-speed secure distributed agent based system, operating as a single analytical and statistical processor, which connects agents gathering network information from many contractor and government off-the-shelf sources. IASM "watches" network traffic on many levels to determine misuse, fraud, or attack. Information is analyzed at the agent level, normalized and fused as it is sent to multi-level IASM servers. The data is correlated and analyzed further to determine cyber attack profiles in real time. Results are translated into simple English, for Navy watch standers and centralized analysts, to help them monitor the electronic terrain of their global networks.

MILITARY & COMMERCIAL SIGNIFICANCE

Analytic capabilities can now accurately identify, source, and isolate cyber attacks. The IASM system reduces false positive network intrusion alerts to less than 1 percent and improves identification of network attacks by 64 percent. The system provides accurate and timely situation awareness, and delivers better forensic analysis, data reduction, graphic display reporting, and incident response. The technology detects novel non-signature attacks with cluster attack analysis and anomalous intrusion detection.

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John Mullen

Topic Number: N99-167 (SPAWAR)
SBIR Investment: $800K
Project Revenue: $7.6M

Scientific Research Corporation (SRC)

Secure Internet Protocol (IP) Multicast (SIM)

SPAWAR

ABOUT THE TECHNOLOGY

Scientific Research Corporation (SRC) developed a secure internet protocol (IP) multicast (SIM) solution that is compatible with existing Navy shipboard networks and various voice compression algorithms. The result is a robust combination of voice quality and bandwidth utilization for the Navy's wireless environment. SRC's software-based SIM solution combines the bandwidth efficiency of multicast with the confidentiality of IP security (IPsec) for need-to-know separation in a security domain. Multicast group management provides scalable, secure, and manageable data networking for Type 1 encrypted traffic - common for inter-ship tactical wireless links. The SIM architecture enables centralized network administration by separating the process-intensive operations of traffic encryption and key management.

MILITARY & COMMERCIAL SIGNIFICANCE

SIM enhances support of confidential group communications by combining non-reputable multicast group membership, source authentication, and data-encryption key generation.

Military grade IPsec encryption (Type 4 ciphers) provides confidentiality that is transparent to user applications. Its public key infrastructure, common access cards, and multicast key distribution enable robust key and group management.

SRC's secure internet protocol multicast solution is compatible with existing Navy shipboard networks

APPLICATIONS

- Integrates with legacy Navy communication networks such as Secure Voice-21 Gateway
- Interfaces with commercial routers, low-rate radio frequency modems, multiplexers, hardened phones and wireless handsets
- Enables multicast in secure IP networks

ABOUT THE COMPANY

SRC is a provider of high-tech products and services to government and commercial customers requiring innovative communications, signal intelligence and radar systems. SRC's networking expertise includes wireless communications, mobile ad-hoc networking, quality of service policy management, security/key management, hardware-in-the-loop simulations, and covert waveform development.

Topic Number: N99-172 (SPAWAR)
SBIR Investment: $700K
Project Revenue: $2.25M

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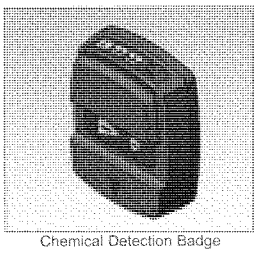
Robert Figucia

Smiths Detection (formerly Cyrano Sciences, Inc.)

Individual Chemical Alarm System (ICAS)



Chemical Detection Badge

APPLICATIONS

- Military: Personal protection; integration into existing systems - helmets, masks, sensor suites
- Homeland Security: Coast Guard, Customs, Border Patrol
- First responders: Police, Fire and HazMat Teams
- Industrial: individual protection for hazardous chemicals; leak monitoring

ABOUT THE COMPANY

Smiths Detection - Pasadena, formerly Cyrano Sciences, Inc., is focused on providing chemical and biological sensors and software solutions for defense, homeland security, industrial and commercial markets. Since 1997, Smiths Detection-Pasadena has directed its efforts to creating low cost, low power chemical sensors and sensor systems that are capable of capturing and interpreting data, providing real time notification and information as needed. Based on technical success with the chemical detector badge, Smiths Detection-Pasadena has acquired significant additional funding for commercialization into other military and civilian sectors.

ABOUT THE TECHNOLOGY

Smiths Detection - Pasadena developed a wearable personal protective badge that continuously monitors the atmosphere for chemical threats. The badge utilizes a low cost and low power nanocomposite sensor array to detect the presence of chemical threats in the air. The sensor array is rugged and the response is repeatable enabling multiple measurements. The sensor array is highly sensitive to chemical warfare agents and toxic industrial chemicals. The badge produces audible and visual alarms when a chemical threat is detected. The Marine Corps anticipates using this technology for personal protection.

MILITARY & COMMERCIAL SIGNIFICANCE

Smiths Detection - Pasadena's badge monitors, detects and notifies individual wearers of exposure to a chemical threat. No user interaction is required. This provides each individual with early warning and a margin of safety to don protective gear. Data is logged continuously for validation and verification and can be downloaded to a computer for archiving and analysis.

The badge is a true dual use technology and is ideally suited for protecting personnel in a variety of security and industrial settings. Sensor arrays can be manufactured for specific purposes and interchanged and chemical libraries updated for new or expanded threats. Future versions of the badge for civilian use will include wireless networking to report and record exposures in real-time over LAN/WAN systems.

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Timothy Burch

Topic Number: CBD02-203 (MARCOR)
SBIR Investment: $680K
Project Revenue: $3M

Stottler Henke Associates, Inc.

Acoustic Analysis Intelligent Tutoring System (AAITS)

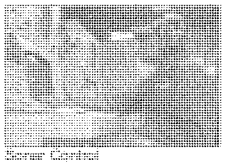
SPAWAR

ABOUT THE TECHNOLOGY

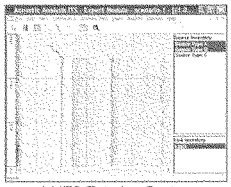
AAITS is an artificial intelligence tutoring system developed for naval sonar technicians. The software teaches trainees how to analyze acoustic signals in order to detect and classify undersea and surface targets. AAITS uses artificial intelligence to evaluate students' performance and provide immediate feedback. By simulating scenarios realistically, the intelligence tutoring system provides students with considerable experience at a fraction of the cost of other training methods.

MILITARY & COMMERCIAL SIGNIFICANCE

Developing the skills needed to detect and classify undersea vessels requires extensive practice in sonar data analysis, instruction from experts, and individualized feedback. The scarcity and cost of expert instructors and the large number of students requiring individualized tutoring made it difficult to provide extensive scenario-based training. The lack of real-world learning opportunities was also an impediment. By automating the evaluation of each student's analysis, AAIT enables instructors in large classroom settings to provide students with more practice-based learning, in less time. AAITS can be used to maintain organizational expertise in undersea acoustic analysis.



Sonar Console



AAITS Tutoring System

APPLICATIONS

- Navy (DoD) education and training (employed at eleven sites)
- Medical imaging
- Homeland security (e.g., baggage screening)
- Aerial and satellite images for intelligence, damage assessment, and earth science research

ABOUT THE COMPANY

Founded in 1988, Stottler Henke Associates, Inc. applies artificial intelligence and other advanced software technologies to solve problems that defy resolution using traditional approaches. The company delivers intelligent software solutions for education and training, planning and scheduling, knowledge management and discovery, decision support, and automated computing. Stottler Henke's clients include manufacturers, retailers, educational media companies and government agencies.

Topic Number: N95-117 (SPAWAR)
SBIR Investment: $670K

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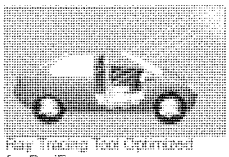
Jim Ong

ThermoAnalytics, Inc.

Ray-Tracing Tool Optimized for Pro/E Geometry



Ray Tracing Tool Optimized for Pro/E

APPLICATIONS

- Vulnerability assessment: Future Combat System Army, AAAV Marines, DD(X) Navy
- Solar Loading through Glass for Thermal Analysis (Military and Commercial) to design efficient climate control systems
- Enhanced Ray-Tracer for IR Signature Code to produce faster speeds and higher accuracy analysis
- Pro/E Plug-in for Thermal and IR Signature codes (Military and Commercial) increases the efficiency of thermal management design
- BRL-CAD to STEP Converter
- Ray-Tracer to be used in computing Plume Radiance
- Mesh mapper for mapping Hi-Res CFD to Lo-Res Thermal

ABOUT THE COMPANY

ThermoAnalytics, Inc. has established itself as a leading infrared modeling and software development company that provides software and services to both commercial and government customers. Derivative software from the raytracing tool has resulted in additional consultation on modeling, analysis, and signature management design from Northrop Grumman Ship Systems for the DDX program. ThermoAnalytics recently developed a new mesh mapper for mapping Hi-Res CFD to Lo-Res Thermal that has become a major commercial feature of its latest commercial software release. Revenue generated from the SBIR effort has broadened the technology base and has helped the company achieve 25% annual growth in sales and staffing.

ABOUT THE TECHNOLOGY

Current state-of-the-art survivability assessment software uses a Computer Aided Design (CAD) to generate 3D target descriptions of model threat penetration and damage. A "ray tracing" program is used to simulate the target/threat interaction by taking a ray and passing it through a target to produce geometric intersections between the ray and the target. Standard vulnerability tools depend on a single ray tracer that requires the program be in Ballistic Research Laboratory Computer Aided Design (BRL-CAD) constructive solid geometry format. In general, designers and analysts employ commercial CAD packages that typically use a boundary representation to represent solid geometry. The conversion of the geometry from a commercial Pro/ENGINEER format into a BRL-CAD format is an extensive effort and sometimes produces results that are not optimal for vulnerability assessment.

ThermoAnalytics developed a ray tracing tool that uses an open and standard interface to directly interrogate the Pro/ENGINEER geometry, as well as, other CAD packages that support the STEP (STandard for the Exchange of Product model data) file format. The tool eliminates the need to perform geometry conversions to BRL-CAD format. It supports not only vulnerability assessment needs, but signature and reparability assessments, and many other commercial applications.

MILITARY & COMMERCIAL SIGNIFICANCE

The capability to directly interrogate Pro/ENGINEER geometry produces significant savings in the time and effort required to perform survivability assessments. The ray-tracing tool enhances the accuracy of performing functions, such as Solar Loading through Glass for Thermal Analysis.

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Keith Johnson

Topic Number: N99-0198 (MARCOR)
SBIR Investment: $850K
Project Revenue: $500K

Touchstone Research Laboratory

Manufacturing of Designed Carbon Foams for Naval Structures

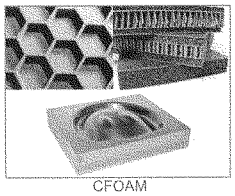
ABOUT THE TECHNOLOGY

Touchstone Research Laboratory developed a carbon foam structural material made from coal, called CFOAM® that uses carbon foam as a technology platform for shipboard applications. CFOAM is inexpensive, lightweight, fire-resistant, impact-absorbing, and can be thermally insulative or conductive. Its electrical resistivity can be varied over nine orders of magnitude. This versatile, next-generation material has been produced in a variety of forms from thin sheets to near-net-shape 3D components. The material can be cut, milled, turned, etc., with conventional equipment and tooling. CFOAM can accommodate metalized coatings using flame-spray techniques, allowing fasteners to be readily attached. Integration with other materials, including impregnation with phenolic or other resins or laminates, can be accomplished using commercially available equipment.

MILITARY & COMMERCIAL SIGNIFICANCE

CFOAM's versatility as a technology platform in support of Navy projects is wide-ranging. Serving as an ideal replacement for materials like balsa wood, polystyrene foams, steel and composites, the benefits of Touchstone's carbon foam include: low density, excellent thermal and fire protection, ballistic protection, electromagnetic interference (EMI) shielding, light weight, corrosion resistance, high mechanical strength, acoustic and thermal insulation, tailorable signature characteristics, and low toxicity.

CFOAM can replace a variety of materials in the commercial market including steel, aluminum, titanium, composites, ceramics, carbon, graphite, concrete, plastics, fiberglass, fire brick, fiberboard and more. CFOAM is an ideal composite tooling material due to its low coefficient of thermal expansion.



CFOAM

APPLICATIONS

- Ships: reduced radar signature deckhouse and island structures
- Aircraft carriers: jet blast deflectors
- Bulkheads and decks: thermal, fire and ballistic protection in high-risk fire zones
- Aerospace: rocket motors, heat transfer systems, radar and antennae systems
- Energy: heat exchangers, fuel cells, battery electrodes, and electrochemical cells
- Automotive: catalytic converters, crush zone capsules, brakes, and bumpers
- Home and commercial building: insulation, fire blocks, ceiling tiles, and prefab walls
- Carbon foam propulsion, radar & composite manufacturing

ABOUT THE COMPANY

Touchstone Research Laboratory is a woman-owned metals and materials research and development firm. Touchstone's engineering staff works in the areas of product and process development, industrial problem solving, materials testing services, applied materials R&D, and special test equipment. Since 1998, Touchstone has been awarded a number of SBIR Phase I, II, and III awards in several technology areas. Twice a winner of the Tibbetts Award for exemplifying the very best in SBIR achievement, Touchstone has more than doubled its size in the last six years. In September 2004, R&D Magazine recognized Touchstone's CFOAM as one of the 100 most technologically significant products introduced into the marketplace last year.

Topic Number: OSD98-043 (ONR)
SBIR Investment: $850K
Project Revenue: $11.1M

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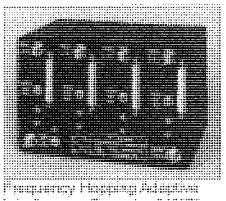
Zeger-Abrams Inc.

Cosite Interference Mitigation Device



Frequency Hopping Adaptive Interference Canceller (HAIC)

APPLICATIONS

- Marine Corp: AAAV (now EFV) and AAV radio suites
- Navy: JTRS radios, on-board radar systems
- SINCGARS radios on Bradley, Abrams M-1 Tank
- AN/ARC-210 radios on Hawkeye E2-C, Growler EF-18G, F-14, A-10
- Amphibious and land combat platforms

ABOUT THE COMPANY

Since its founding in 1977, Zeger-Abrams Inc. (ZA) has been developing and applying advanced signal processing techniques, with emphasis on the simultaneous suppression of radio frequency interferences (RFI) and enhancement of desired signals. As part of and in addition to its work in the field of cosite interference mitigation, ZA has expertise in RFI suppression, adaptive nulling antenna arrays, communications and radar, ECCM, direction finding and navigation, power amplifier adaptive linearization, co-channel spectrally-overlapping signal separation, multipath signal component suppression, spread spectrum multiple access CDMA communications, and ultrasonic detection and location of cracks developing inside pipe walls.

ABOUT THE TECHNOLOGY

As telecommunication systems grow in complexity, more and more antennae and radios using legacy and wide band waveforms are being placed upon a single ground vehicle, ship or aircraft. The resultant interference due to coupling between transmitting and/or receiving elements can stress the operation and integrity of the platform's crucial communications navigation and radar systems. This problem is called cosite interference. Cosite interference can corrupt signals with noise, deteriorating the quality of communications. It also can cause jamming and result in complete interruption of already established communications. The three causes of cosite interference are: (1) high power transmit signals that overload the linear range of the receiver; (2) transmitter noise and spurious sidebands entering the receiver; and (3) nonlinear intermodulation products created from the transmitter signal entering, or generated in, the receiver and other transmitters. Zeger-Abrams Incorporated (ZA) has developed a multifaceted approach combining RF adaptive interference cancellation, and RF filtering to greatly minimize all three of these cosite interference mechanisms, even under the severest conditions.

MILITARY & COMMERCIAL SIGNIFICANCE

ZA's Cosite Interference Mitigation Device (CIMD) is a ruggedized interference minimization system developed for the AAVC7A1 and other military amphibious and land combat platforms. The CIMD allows such vehicles to operate multiple modern frequency-hopping radios with minimal degradation to voice and data reception due to cosite interference. The CIMD offers gains both for VHF SINCGARS waveforms and for UHF HAVE QUICK and SATCOM waveforms. The CIMD design has the additional advantage of reducing the number of vehicle-mounted antennas from eleven to five. The CIMD has wide application and provides the Navy with a blueprint for the management of cosite interference on its ground vehicles, ships, and airborne platforms for existing VHF and UHF radios, the new JTRS radios, EMC and on-board radar systems as well.

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Topic Number: N97-002 (MARCOR)
SBIR Investment: $850K
Project Revenue: $1.7M

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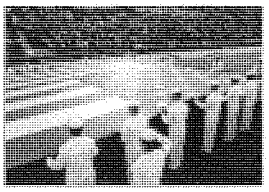

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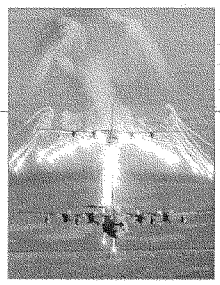

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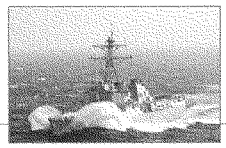

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Index of Success Stories by Command

MARCOR

Areté Associates. 4
Smiths Detection - Pasadena (formerly Cyrano Sciences, Inc.) 32
ThermoAnalytics, Inc. 34
Zeger-Abrams Inc.. 36

NAVAIR

ATK Composites (formerly Composite Optics, Inc.). 6
Bodkin Design & Engineering, LLC. 7
Coherent Technologies, Inc.. 8
Combustion Research and Flow Technology (CRAFT Tech). 9
Mathtech, Inc.. 16
Multispectral Solutions, Inc.. 17
Navmar Applied Sciences Corp.. 19
Page Automated Telecommunications Systems, Inc.. 24
Phoenix Science & Technology, Inc.. 26
Physical Sciences, Inc.. 27

NAVSEA

21st Century Systems, Inc. 1
Applied Hydro-Acoustics Research, Inc.. 2
Applied Ordnance Technology, Inc.. 3
Noesis, Inc.. 21
Phoenix Integration. 25
Progeny Systems Corp.. 29

ONR

Diversified Technologies, Inc.. 10
EIC Laboratories, Inc.. 11
HYPRES, Inc.. 12
Materials Systems Inc. 15
Native American Technologies Company. 18
nGimat Company (formerly MicroCoating Technologies). 20
Ocean Power Technologies, Inc.. 23
Touchstone Research Laboratory. 35

SPAWAR

Argon Engineering Associates, Inc.. 5
Innovative Technology Associates. 13
Makai Ocean Engineering, Inc.. 14
Nova Engineering, Inc.. 22
Planning Systems, Inc.. 28
PROMIA, Inc.. 30
Scientific Research Corp.. 31
Stottler Henke Associates, Inc.. 33

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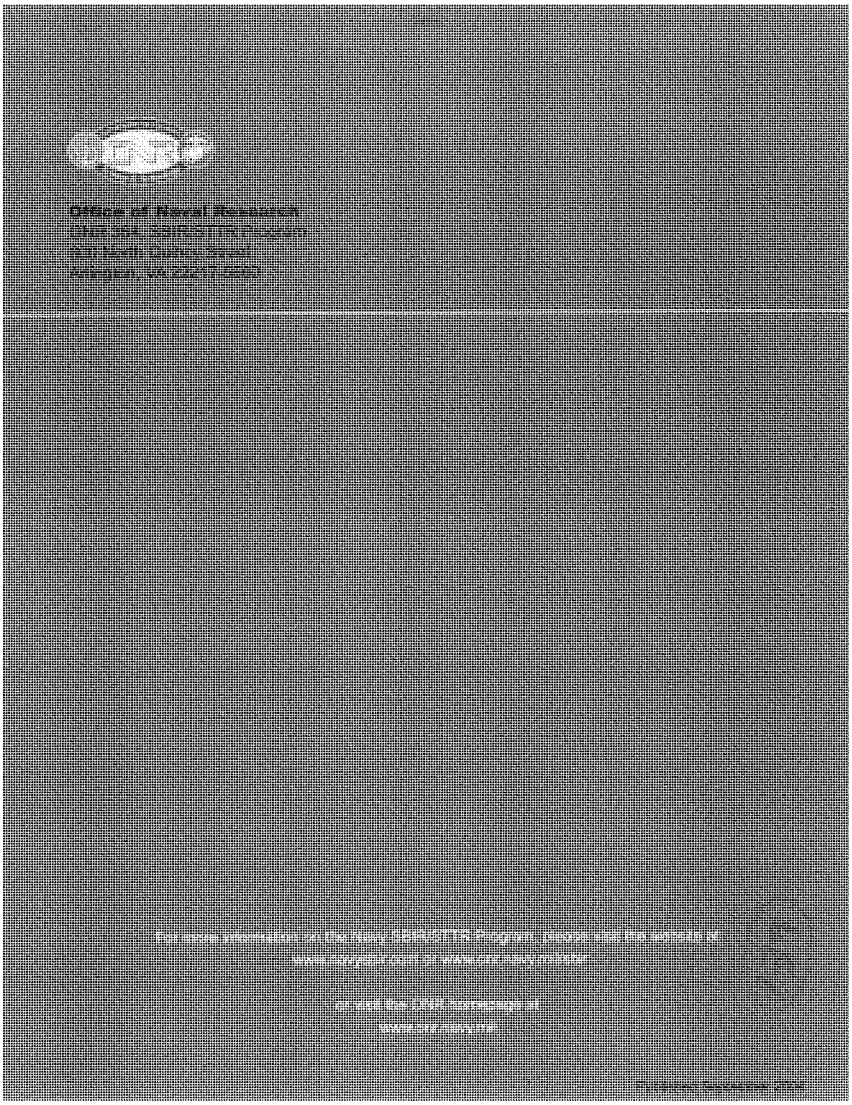
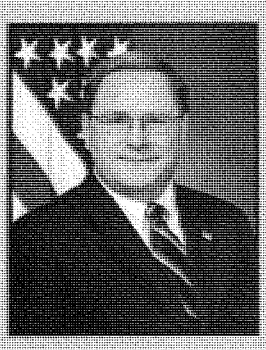
www.djaandassociates.com



SBIR STTR
Programs
U.S. ARMY
S B I R
CALL TO DUTY!
Small Business Innovation Research
Small Business Technology Transfer



"The vision of the Army SBIR and STTR programs is to be the Army's premier source of innovative technology solutions, providing direct access to America's high-tech small business research and development community…"

Dr. Thomas H. Killion
Deputy Assistant Secretary for Research and Technology and Chief Scientist, U.S. Army

The Army is very proud of the success of the SBIR and STTR programs. As our Nation's largest source of early stage technology financing, this billion-dollar program enables hundreds of small businesses to move ideas from drawing boards to the marketplace. Through SBIR and STTR, we now know that the best ideas don't necessarily come from the labs of large corporations or even our government labs. Most often, innovative technologies are invented by creative individuals at small, entrepreneurial companies.

The U.S. Army SBIR/STTR Commercialization Brochure is published annually and PM, Army SBIR distributes this brochure within the Army and Department of Defense community and to the private sector at a number of conferences and other venues across the country. These brochures are meant to highlight program successes and to provide visibility to the positive impacts made by small businesses that have successfully transitioned their SBIR/STTR research into operational capabilities or to the commercial marketplace.

The SBIR and STTR Programs

Congress established the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs to provide small businesses and research institutions opportunities to participate in government-sponsored research and development (R&D).

The goals of the SBIR and STTR programs are to: (1) stimulate technological innovation; (2) use small business to meet Federal R&D needs; (3) foster and encourage participation by socially and economically disadvantaged small business concerns (SBCs), and by SBCs that are 51 percent owned and controlled by women, in technological innovation; and (4) increase private sector commercialization of innovations derived from Federal R&D, thereby increasing competition, productivity, and economic growth.

While STTR has the same objectives as SBIR regarding the involvement of small businesses in Federal R&D and the commercialization of their innovative technologies, the STTR program requires participation by universities, federally funded research and development centers (FFRDCs), and other non-profit research institutions.

Both the SBIR and STTR programs use a three-phase program structure, reflecting the high degree of technical risk involved in developing and commercializing cutting edge technologies.

- Phase I is a feasibility study that determines the scientific, technical, and commercial merit and feasibility of a selected concept. Phase I projects are competitively selected from proposals submitted against solicitations. Each solicitation contains topics seeking specific solutions to stated government needs. The SBIR and STTR Phase I selection process is highly competitive, with about one out of ten submitted Phase I proposals receiving awards.

- Phase II represents a major R&D effort, culminating in a well-defined deliverable prototype (i.e., a technology, product, or service). The Phase II selection process is also highly competitive. Successful Phase I contractors are invited to submit Phase II proposals as there are no separate Phase II solicitations.

- In Phase III, the small business or research institute is expected to obtain funding from the private sector and/or non-SBIR/STTR government sources to develop the prototype into a viable product or service for sale in Government or private sector markets.

	SBIR	STTR
PHASE I	6 months $70,000 max	6-12 months $100,000 max
PHASE I Option	4-month option (Government's discretion) $50,000 max, to fund interim Phase II efforts	No option
PHASE II	2 years $730,000 max	2 years $750,000 max
PHASE II Plus	1 year $500,000 max (subject to third-party matching funds)	N/A
PHASE III	Unlimited time Non-SBIR funding	Unlimited time Non-STTR funding

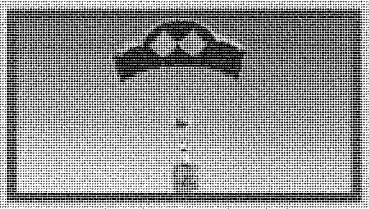
The following success stories highlight the positive impacts made by small businesses that successfully transitioned their SBIR/STTR research into operational capabilities or to the commercial marketplace.

Autonomous Aerial Delivery System

Atair Aerospace, Inc.

Brooklyn, NY
www.atairaerospace.com
info@atairaerospace.com

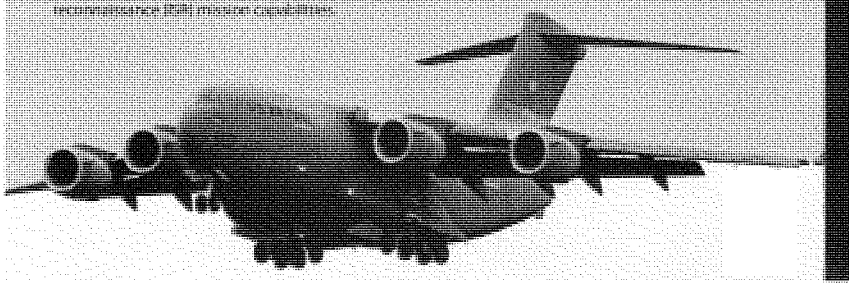
Current airdrop methods expose ground forces to threats from Improvised Explosive Devices (IEDs) and air crews to threats from man-portable air defense systems and Rocket Propelled Grenades (RPGs). The Atair Aerospace, Inc. Onyx 500kg, an autonomous precision guided parafoil delivery system, supports the Joint Precision Airdrop System (JPADS), which is being developed to help transition current WWII-era airdrop practices into the 21st century. Atair's innovative approach to urgent operational requirements integrates the state of the art in parachute designs and guidance systems into unmanned aerial vehicle (UAV) platforms, UAV recovery parachute systems, and military projects that utilize precision airdrop systems. The Defense Advanced Research Projects Agency (DARPA) selected Atair Aerospace, Inc. to develop and manufacture the Long Endurance Autonomous Powered Paraglider (LEAPP) UAV to fulfill an urgent need for long endurance (48-hours) intelligence, surveillance, and reconnaissance (ISR) mission capabilities.



"Onyx systems provide military planners with the capability to strategically and covertly position equipment and supplies for rapidly moving ground and special operations forces."

Phase III Impacts

Atair Aerospace, Inc. has received $8.5M in private investments and the Army has purchased 32 Onyx systems, plus support and certifications, with a contract value of $3.2M.



CALL TO DUTY!

CERDEC

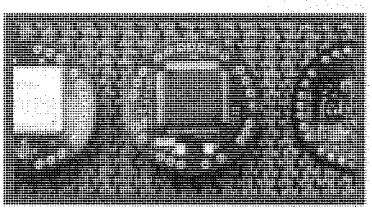
U.S. Army Communication-Electronics Research, Development and Engineering Center

Ultrawideband Technology for Sensor Network Communications

Innovative Wireless Technologies, Inc.

Forest, VA
www.iwtwireless.com
sales@iwtwireless.com

To conduct effective military operations on diverse urban and rural terrains against an enemy embedded in and indistinguishable from the local populace, Soldiers require accurate and comprehensive situational awareness data. Self-forming, low power, wireless unattended ground sensor (UGS) networks are one means to meet this requirement. UGS networks face the challenges of maintaining continual communications under harsh decentralized deployment scenarios, with limited or no available infrastructure. Innovative Wireless Technologies, Inc. (IWT) developed a complete communication suite that enables UGS ad hoc mesh networks. IWT's solution optimizes use of radio frequency technology, sensor type, latency of event transmission, and data routing within a limited battery budget in three components: hardware radio platform, mesh protocol stack, and mesh management tool. This modular platform development approach has produced derivative products and demonstrations with diverse deployment needs.

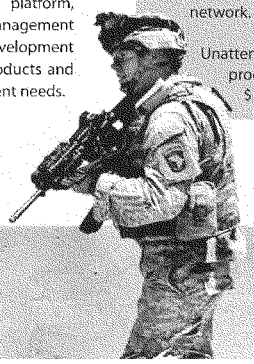


"Unattended ground sensor systems face the challenges of maintaining continual communications under harsh decentralized deployment scenarios..."

Phase III Impacts

The Communication-Electronics Research, Development and Engineering Center has invested over $3M and Innovative Wireless Technologies has investments of $6M to develop a two-chip Ultra Wideband radio for various applications, including Unattended Ground Sensors, Robotics Applications, and RFID tags; and demonstrate with a 100-node deliverable network.

Unattended ground sensors and derivative product sales are forecasted to be $11M in 2006-07.



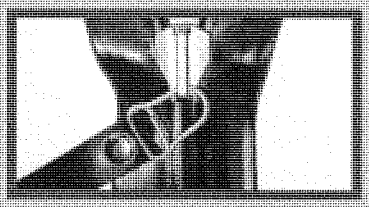
SBIR STTR Programs

Enhanced Chemical Biological Closure

Diversified Marketing Group, Inc.

Harleysville, PA
www.dmgroup.org
info@dmgroup.org

FLEXSEAL™, a flexible closure system for breathable, lightweight chemical protective applications, offers protection from gas, liquid chemical, biological (CB), and hazardous materials. By providing achieved impermeability and resistance to toxic/nerve agents, FLEXSEAL™ closures offer soldiers protection in a life-threatening CB environment, can protect civilian first responders in a hazmat scenario, and help save an able-bodied seaman keeps overboard. The closures can improve portable helicopter landing pads, chemical protective and airtight shelters, CB protective clothing gloves, footwear, jet engine covers, airplane wing protection assemblies, and DS4RS Level A through D suits. When built into chemical biological clothing and equipment, the closures will help Soldiers complete their missions by improving "wear ability" and intrinsic function. Most important, these closures extend the performance of all gear, whether utilized in a maritime deployment or in a CB hostile, "hazmat" environment. FLEXSEAL™ has potential in military/commercial products requiring closures such as tents, backpacks, and sleeping bags.



"Diversified Marketing Group, Inc.'s FLEXSEAL™ represents a technological breakthrough in zipper technology."

Phase III Impacts

FLEXSEAL™ has generated $6M in sales to various agencies within the Department of Defense.

CALL TO DUTY!

ERDC

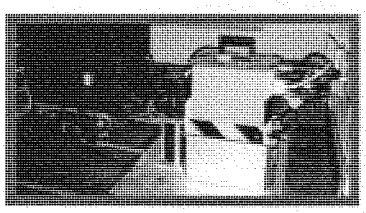
U.S. Army Engineer Research and Development Center

Buckeye: High Resolution Imaging System

Flight Landata, Inc.

North Andover, MA
www.flidata.com
information@flightlandata.com

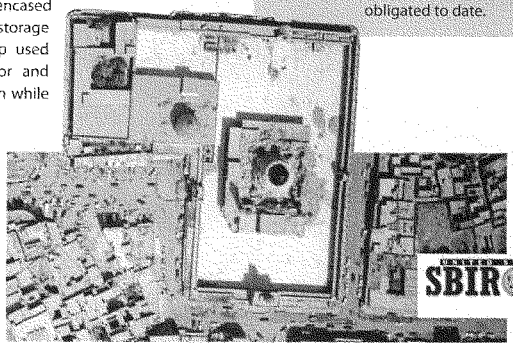
Flight Landata, Inc. designed, tested, and built an integrated aerial imaging system called Precision Geo-Reference Digital Airborne Camera System (PG-DACS) which became the Engineer Research and Development Center's Buckeye Sensor System. The Buckeye System's most notable contributions have been in support of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) in Afghanistan. The aerial system is platform independent and weighs approximately 30 pounds. The Buckeye Sensor can operate at a variety of altitudes based upon the desired image resolution and image swath width, and a variety of configuration options can meet each tactical application. The system is comprised of a digital camera to take near vertical pictures of an area; gyroscopes to measure the roll, pitch, and yaw of the aircraft; an accelerometer; an encased processor and data storage system; and a laptop used to control the sensor and monitor the collection while in flight.



"The Buckeye Sensor System was cited as one of the reasons ERDC was selected as the 2005 Army Research Laboratory of the Year, the highest Army research and development award given."

Phase III Impacts

The U.S. Army Engineer Research and Development Center (ERDC) has awarded a $10M indefinite duration/indefinite quantity (ID/IQ) Phase III contract to further develop the Buckeye Sensor System after use in Operations Iraqi Freedom and Enduring Freedom. $1M has been obligated to date.



SBIR STTR Programs

U.S. Army Research Laboratory

Disposable Sensor System

McQ, Inc.
Fredericksburg, VA
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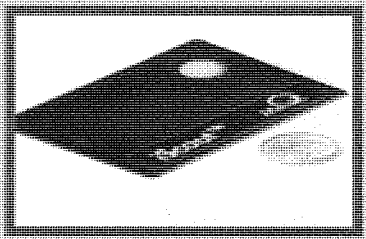
info@mcqinc.com

Unattended ground sensors (UGS) have been a trusted remote sensing system for surveillance and reconnaissance since the Vietnam era. Advances in technologies for detection, signal processing, communications, and user friendliness have dramatically improved the capabilities of UGS systems for the Army; however, the high cost of full featured UGS systems has prevented widespread use for many applications. McQ, Inc. demonstrated that UGS sensors can be developed at a dramatically lower cost using commercial consumer manufacturing techniques. McQ's complete Disposable Sensor System (DSS) includes a handheld PDA-based user display and a large quantity of sensor nodes, each with passive infrared, acoustic, magnetic, and seismic detection modalities.



"The Disposable Sensor System is packaged in a case that is smaller and lighter than a deck of cards and has a projected manufacturing cost of less than $20 per node."

Phase III Impacts

McQ, Inc.'s Disposable Sensor System formed the basis for a Phase III $1.7M award by the Defense Threat Reduction Agency (DTRA) for an accurate battle damage assessment sensor system that is currently undergoing pre-deployment tests.

CALL TO DUTY!

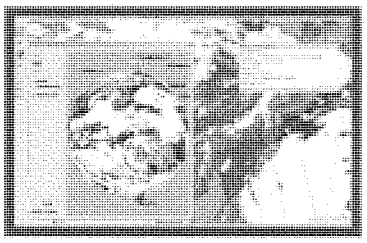
U.S. Army Space and Missile Defense Command

Single Integrated Space Picture

21st Century Systems, Inc.

Herndon, VA
www.21csi.com
info@21csi.com

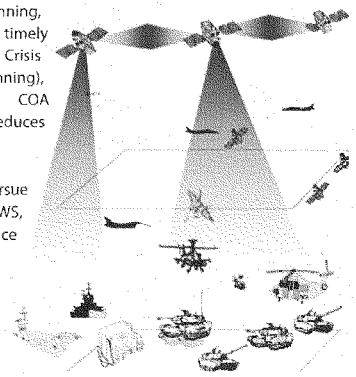
Because operational capability gaps limit rapid decisions based on situational awareness in space, the Army is developing Intelligent Agent Software to provide real-time course-of-action (COA) support based on predicted events. 21st Century Systems' Joint Awareness Warfighter-Space (JAWS) addresses a consolidated list of Army Essential Single Integrated Space Picture (SISP) Capability Needs. These requirements include integrated situational awareness for better control of the battlespace; transformation of space-based data into actionable knowledge; assessment of the impact of space and terrestrial weather on the status of satellite links; improvement of GPS navigational accuracy; and use of predictive analysis to reduce fratricide and collateral damage. For planning, JAWS assists in performing timely space planning (Deliberate, Crisis Action, and Mission Planning), provides automated COA development capability, and reduces the space operator's decision cycle. The Space and Missile Command will continue to pursue SISP technologies, such as JAWS, to meet Future Force Space situational awareness needs.



"Army Single Integrated Space Picture technology programs are addressing critical Space situational awareness needs and are set to transition to Soldier programs."

Phase III Impacts

The Space and Missile Defense Command and PEO Missiles and Space have invested nearly $14M in developing JAWS as an integral component of the Army's Single Integrated Space Picture program.



SBIR STTR Programs

2006 SBIR

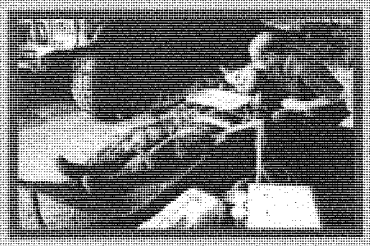
U.S. Army Medical Research and Material Command

Dentistry On The Move

Bell Dental Products

Denver, CO
www.bellderental.com
bdproducts@bellderental.com

The Dental Field Treatment and Operating System (DFTOS) is a state-of-the-art system utilizing the latest electric motor driven hand-piece technology and incorporates all of the functionality to perform any dental procedure from cleaning to oral surgery. The system includes an electric motor, with or without fiber optics, high-speed hand-piece, low-speed hand-piece, air/water supply, air/water syringe, high volume evacuation, saliva ejector, and variable speed foot switch. The system is lightweight and totally self-contained. It includes an oil-free air compressor that provides air to the water and air supply subsystems, a self-contained water supply for hand-piece coolers and oral irrigation, and a waste reservoir for collection of liquids and solids from the vacuum supply subsystem. The system supports a variety of standard electric motors and all E-type connected hand-pieces. The entire system can be quickly assembled or disassembled and packs into one molded shipping container for safe transport and storage.

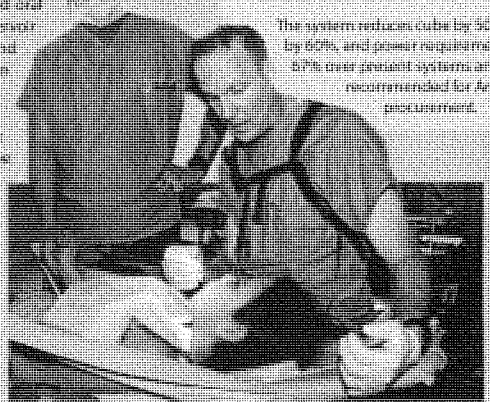


"28 Dental Field Treatment and Operating Systems have been deployed to Iraq since November 2005 and have accumulated over 12,000 operating hours, with only two confirmed failures."

Phase III Impacts

Bell Dental Products has received $1.6M from the Medical Research and Material Command for further development. The Department of Defense has purchased an initial 136 units for $3M.

The system reduces cube by 50%, weight by 60%, and power requirements by 87% over present systems and has been recommended for Army-wide procurement.



CALL TO DUTY!

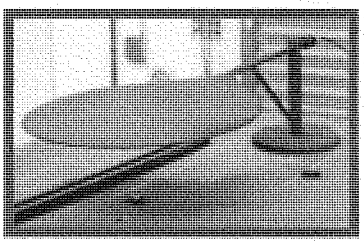
U.S. Army Research Laboratory

Noise-Cancelling Acoustic Sensors

Scientific Applications & Research Associates, Inc.

Cypress, CA
www.sara.com
information@sara.com

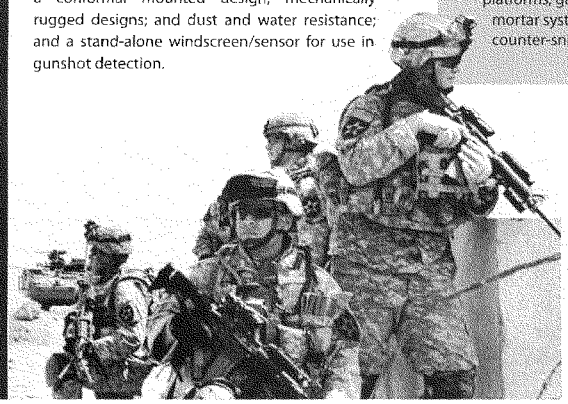
Flow noise limits the applicability of acoustic detection/tracking arrays on mobile platforms and must be reduced for accurate acoustical detection of targets at tactically significant ranges, in conditions of high winds and/or high vehicle velocities. Scientific Applications & Research Associates, Inc. developed an acoustic sensor array for ground vehicles that dramatically decreases associated flow noise and local acoustic noise. Further advances to this technology include sensors for aerostat platforms; ground-mounted counter-mortar systems; vehicle-mounted counter-sniper acoustic sensor systems; expanded acoustic frequency ranges for the detection of a variety of acoustic signals; a conformal mounted design; mechanically rugged designs; and dust and water resistance; and a stand-alone windscreen/sensor for use in gunshot detection.



"The Noise-Cancelling Acoustic Sensor allows for greater accuracy in detection, location and classification of ground vehicles, small arms fire, and mortar and artillery fire."

Phase III Impacts

Scientific Applications & Research Associates, Inc. has received $1.5M from the U.S. Army Research Laboratory to advance the noise-cancelling acoustic sensor for use on aerostat platforms, ground-mounted counter-mortar systems, and vehicle-mounted counter-sniper acoustic sensor systems.



SBIR STTR Programs

ERDC

2006 SBIR

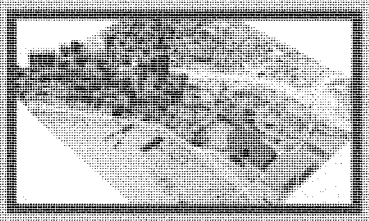
U.S. Army Engineer Research and Development Center

Automated Classification of Remotely Sensed Imagery

Visual Learning Systems, Inc.

Missoula, MT
www.featureanalyst.com
sales@vls-inc.com

Visual Learning Systems, Inc. developed Feature Analyst™ as a tool for automating the collection of information from remotely sensed images (e.g. satellite and aerial imagery) to provide the Army with a complete toolset for extracting all features, such as roads and buildings. Accurate and timely geospatial information benefits U.S. forces by reducing an adversary's home advantage and thus potentially saving lives. Easily integrated into existing software, the tool enhances without changing current workflows. This user-friendly technology improves the speed and accuracy of generating geospatial feature data from imagery to support mapping and other mission planning exercises by allowing Army imagery and terrain analysts to extend feature extraction models in a simple, straightforward manner. Several independent studies showed that Feature Analyst™ can save 80-90% of the time currently spent by analysts on feature collection. Feature Analyst™ is currently used by all U.S. military services as well as several U.S. intelligence organizations.



"Several independent studies showed that Feature Analyst™ can save 80-90% of the time currently spent by analysts on feature collection."

Phase III Impacts

Visual Learning Systems has received $1M in investments from the Department of Defense and private sources for further development of Feature Analyst™.

Visual Learning Systems also received $1.5M in sales from across the federal government including the Department of Agriculture, the Department of the Interior, and the U.S. Geological Survey.

CALL TO DUTY!

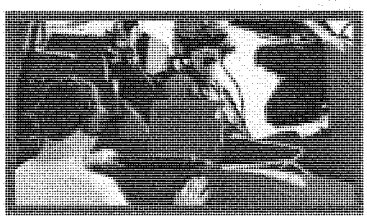
U.S. Army Aviation and Missile Research, Development and Engineering Center

Aviation Components Health and Usage Monitoring System

Intelligent Automation Corporation

Poway, CA
www.iac-online.com
info@iac-online.com

Helicopters produce significant vibrations that cannot be fully eliminated and must be considered in the reliability and maturation of aircraft components. Intelligent Automation Corporation developed a low cost regime recognition capability and integrated it into its Helicopter Usage Monitoring System (HUMS) as an extension to the U.S. Army's Vibration Management Enhancement Program (VMEP) for the AH-64, UH-60 and CH-47 aircraft. The software lets the Army aviators know how an aircraft is operating and subsequently how component damage is being accumulated. Helicopter operations benefit from continuous monitoring of adverse vibrations, reduction of controllable vibrations, and use of vibration characteristics to predict component faults. This system has been installed in helicopters deployed throughout the world. Aircraft equipped with the regime recognition system eliminate time-based maintenance procedures that will save millions of dollars for the Army over the life of the aircraft.



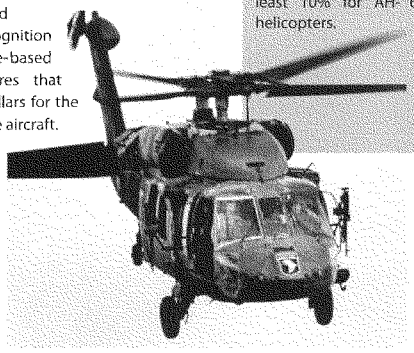
"...I should be thanking you all for the support and the impact this system has had on our maintenance program... which ultimately equates to combat power." From a Battalion Commander

Phase III Impacts

Intelligent Automation Corporation has received $9.2M in sales from the U.S. Army, Bell Helicopters Textron, and others.

The regime recognition/HUMS capability improved Fully Mission Capable rates by at least 10% for AH- 64D, Apache Longbow helicopters.

Bell Helicopter selected Intelligent Automation Corporation regime recognition/HUMS for the Bell 412 helicopter fleet.



SBIR STTR Programs

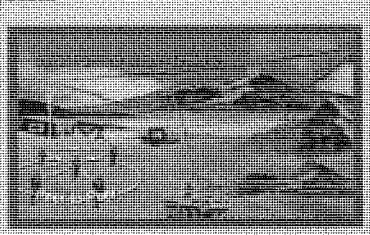
U.S. Army Simulation and Training Technology Center

Spectral Efficient Communications System

San Diego Research Center, Inc.

San Diego, CA
www.sdrc-inc.com
info@sdrc-inc.net

San Diego Research Center Inc. developed Hybnet, a transportable hybrid network communication system that addresses the Army's test and training ranges need to achieve interoperability and connectivity and to be ready for future Network Centric Systems and Operations. Hybnet combines both infrastructure-based and ad hoc capabilities, and uses a robust waveform designed specifically for long operating ranges and adverse conditions. It enables test and training ranges to be expandable and easily adaptable to requirements posed by evolving and new systems. The Hybnet instrumentation communications system separates the application from a specific radio link by providing a single dynamic wireless network. Hybnet manages all required communications by associating Type of Service and Quality of Service parameters with each application type.



"This system solves the very real word problem of providing dramatically increased data bandwidth using less radio frequency spectrum than was previously available"

Phase III Impacts

San Diego Research Center, Inc. was recently awarded an $82.5M indefinite duration/indefinite quantity (IDIQ) Phase III contract by PEO STRI to deliver these systems to the Army. $35M has been obligated to date.

CALL TO DUTY!

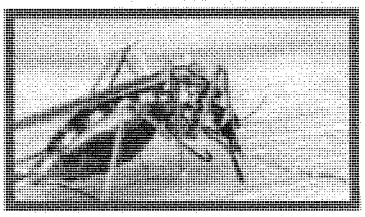
U.S. Army Medical Research and Materiel Command

Highly Effective Mosquito Trap

ISCA Technologies, Inc.

Riverside, CA
www.iscatech.com
info@iscatech.com

ISCA Technologies, Inc. provides integrated pest management solutions that are economical, effective, environmentally friendly, and importantly, do not have the harmful side effects of many conventional pest management techniques that rely solely on insecticides. ISCA Technologies created compositions mimicking host (i.e., human) skin and modified them using a patented synthetic method, which closely recreates for the mosquito a complete "olfactory sensation" associated with a host. Traps baited with these artificial "sensory correct" profiles trigger rapid responses from female mosquitoes, inducing host seeking and feeding behaviors. The traps are also collapsible, highly portable, and do not require pressurized gas, which makes it ideal for Soldiers in the field. A consumer version of this trap, the Zumba CMT20 mosquito trap, is being manufactured and sampled to distributors and researchers in several countries. ISCA Technologies is working with U.S. Army entomologists to field test these traps.



"In preliminary studies, a single trap in a medium-sized room captured all 100 released mosquitoes in as little as eight minutes."

Phase III Impacts

ISCA Technologies, Inc. received $2M from the National Institute of Standards and Technologies and $200K from the Office of Technology Transfer and Commercialization for further R&D.

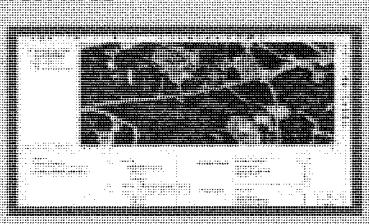
ISCA Technologies, Inc. has achieved six consecutive years of revenue growth.

SBIR STTR Programs

Seamless Data Display for Netted Indirect Fires

Prologic, Inc.
Fairmont, WV
www.prologic-inc.com
sbir-support@prologic-inc.com

Prologic, Inc. developed the Seamless Data to Display (SDD) Netted Fires Service to enable faster and smarter netted fires command and control decisions by automating the function of allocating weapon assets against targets. Integrated with the Combat Decision Aid Suite and the Joint Weaponeering Service, the SDD accesses several levels of information: Current Battlefield Situational Awareness, Joint Munitions Effectiveness Manual data and models, and logistical information. Combining Government, Commercial - Off-the-Shelf - technologies, the SDD enables the warfighter to realize the netted fires concept in a scalable, net-centric, service-oriented architecture. By bundling the powers of commercial geographic information systems, Army standard munitions databases, and leading edge netted fires algorithms, warfighters can exponentially increase their effectiveness with regard to indirect fires. SDD implements the netted fires concept as an end-user focused solution, enabling any user on the battlefield in rural and urban terrain to bring the full insight and power of the military rapidly and seamlessly onto any target or threat.



"Seamless Data to Display (SDD) Netted Fires Service will reduce the time decision makers' need to act on time critical intelligence and targets of opportunity."
– Dr. Norman Coleman, Chief, Armament Engineering Technology Center, U.S. Army Armaments Research, Development and Engineering Center

Phase III Impacts

Prologic, Inc. was awarded a $100K Phase III contract from U.S. Army Armaments Research, Development and Engineering Center to further develop this technology.

CALL TO DUTY!

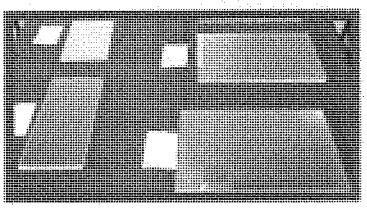
U.S. Army Research Laboratory

Transparent Spinel Armor

Technology Assessment & Transfer, Inc.

Annapolis, MD
www.techassess.com
info@techassess.com

Current and emerging threats dictate a compelling need for lighter weight transparent armor with improved ballistic protection capabilities. Weight critical weapon systems and support equipment cannot sustain the additional weight of bullet proof glass armor currently being used to meet these evolving threats. Recent ballistic tests of transparent magnesium aluminate spinel armor against advanced threats at Aberdeen Proving Ground have demonstrated outstanding multi-hit performance. Processing methods for large trapezoidal and curved spinel armor plates have also been demonstrated.



"Technology Assessment & Transfer, Inc. fabricated prototype 11"x 14" armor windows at approximately half the weight and thickness of present systems."

Phase III Impacts

Technology Assessment & Transfer, Inc. has received $1.6M in investments from the Department of Defense including the Air Force Materials Laboratory, NAVAIR, the Missile Defense Agency, and Army Tacticom Arsenal. It has also received over $2M from sales to Lockheed Martin, Northrop Grumman, and others.

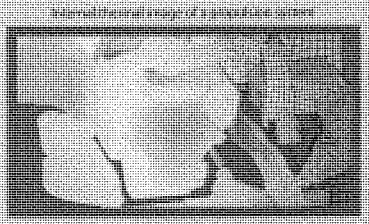
SBIR STTR Programs

Vehicle Thermal Design Tool

ThermoAnalytics, Inc.

Calumet, MI
www.thermoanalytics.com
info@thermoanalytics.com

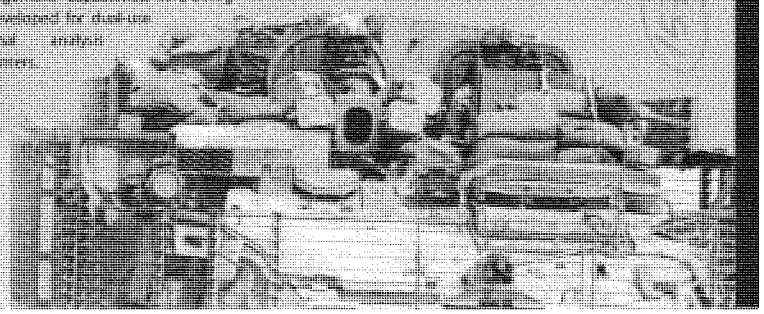
ThermoAnalytics, Inc. produced MuSES (Multi Service Electro-optical Signature Code), a software program that provides assessment of reliability problems, vulnerability performance, infrared suppression and detection, and thermal management system design in vehicles and aircraft. MuSES has improved systems currently in theater and has been used extensively in some Army and Navy acquisition programs. Field reports of specific vehicle problems and design challenges prompted vehicle guidance and prioritization of the software's critical new features. Military benefits include a 20% reduction in some stages of the design process. Also, significant economic benefits have been realized including improved productivity and design innovations for the Michigan-based automotive industry and increased jobs in Michigan's Upper Peninsula. A commercial version without signature management capabilities is being co-developed for due-time thermal analysis customers.



"ThermoAnalytics is also studying the feasibility of detecting roadside bombs with the software's infrared detection capability."

Phase III Impacts

ThermoAnalytics has received $1.5M from various programs in the Department of Defense to further develop the technology. Contributing programs include the Army Future Combat Systems, the Stryker Vehicle Program, the Marine Corps Expeditionary Fighting Vehicle Program, and the Air Force Target Acquisition Weapons Software.



CALL TO DUTY!

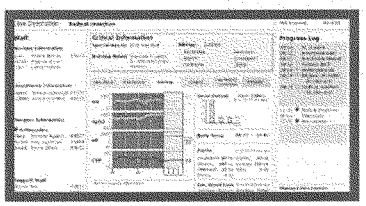
U.S. Army Medical Research and Materiel Command

Operating Room Situational Awareness

LiveData, Inc.

Cambridge, MA
www.livedata.com
info@livedata.com

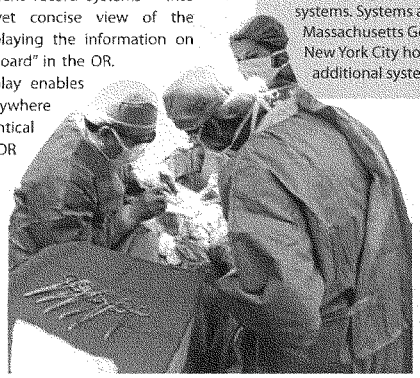
With the support of Army SBIR and in collaboration with the Center for Integration of Medicine and Innovative Technology (CIMIT) and Massachusetts General Hospital's Operating Room (OR) of the Future, LiveData, Inc. developed a patient safety perioperative readiness support system, currently installed in leading hospitals and commercially available as OR-Dashboard™. The system can help the OR team reduce errors and near misses due to oversight, failure to recognize an issue, or miscommunication. Patient safety improvements in the OR require systems that simplify the environment and augment staff capabilities. OR-Dashboard™ captures and integrates patient data from diverse sources – including physiological monitors, anesthesia equipment, and patient record systems – into a comprehensive yet concise view of the patient's status, displaying the information on an "electronic whiteboard" in the OR. The web-based display enables authorized users anywhere to view the identical images seen by the OR team.



"By capturing and organizing information in a highly visual, contextual way, OR-Dashboard™ makes it possible for everyone in the OR to be on the same page: to instantly view, understand, and act upon continuously changing information."

Phase III Impacts

LiveData, Inc. has generated over $2M in sales and commitments. Memorial Sloan-Kettering Cancer Center purchased 21 OR-Dashboard™ systems. Systems are operational at Massachusetts General Hospital; and a large New York City hospital has purchased four additional systems under a pilot program.



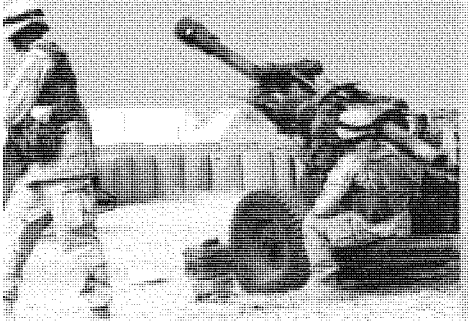
SBIR STTR Programs

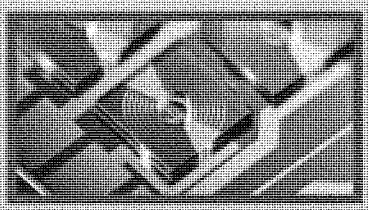
MEMS-based Micro Detonator Technology

Tanner Research, Inc.

Monrovia, CA
www.tanner.com
sales@tanner.com

The low-cost Integrated Composite Energetics Packaging System (ICEPS™), quickly evolved for immediate use within the XM-307 Airburst Fuze MEMS-based safe and arm device as the initiator based starting the advance the use of multiple micro-scale energetic components. From this very successful start in an important gun-launched munitions application, ICEPS™ may be the only methodology immediately available to cost-effectively implement the exploding foil initiators (EFI) required to initiate emerging insensitive munitions (IM) energetics. The EFI currently available to munitions and rocket motor developers cost about $143 each while Tanner's objective, albeit aggressive, is to provide $10 to $20 EFI devices, based on large quantity orders. The EFI will be mass fabricated by Special Devices, Inc. for multifunctional low-cost use as initiators/igniter devices in legacy and IM applications.





"Tanner's Integrated Composite Energetics Packaging System (ICEPS™) facilitates multiple revolutionary approaches for implementing micro-scale smart fuzing systems, and especially for use in very small projectile warhead and propellant cavities. Most importantly, ICEPS™ can be used with legacy or emerging insensitive munitions energetics."

Phase III Impacts

Special Devices, Inc. plans to invest over $1M to commercialize ICEPS™ and spin-off technologies including the Firesat EFI device to be repackaged for use in a MIL-STD-1901A indian motor igniter.

Tanner is fielding inquiries from munitions fuzing manufacturers such as Kaman.

The ICEPS™ is also being used in the Tanner/SDI MIL-STD-1901A Interrupted Igniter being developed for use in 12 Thaad missile pyrotechnic devices.

CALL TO DUTY!

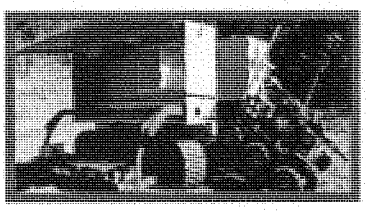
U.S. Army Medical Research and Materiel Command

Robotic Extraction/Evacuation of Casualties

Applied Perception, Inc.

Cranberry Township, PA
www.appliedperception.com
info@appliedperception.com

Many Soldiers have been injured or killed while trying to save others under hostile conditions. Applied Perception, Inc. prototyped a pair of unmanned ground systems to extract and evacuate combat casualties while reducing exposure to Soldiers. A small unmanned vehicle with a robotic manipulator is intended for short-range casualty extraction, and a larger unmanned vehicle, containing two life-support systems, is designed for further evacuation to forward medical facilities. Both vehicles are equipped with numerous new sensing technologies. Their autonomous navigation system is compliant with DoD Joint Architecture for Unmanned Systems (JAUS) and has been transitioned to the Army Program Manager for Force Protection Systems Family of Rapid Response Equipment (PM-FPS FIRRE) program for perimeter security. The U.S. Army's Tank Automotive Research, Development and Engineering Center is utilizing this technology to develop a modular, interoperable robotic platform to enable multi-mission capabilities for the Future Combat Systems (FCS) program.



"A complete Autonomous Navigation System was designed, implemented and tested for a dual robotic system with multiple payloads for a variety of missions."

Phase III Impacts

With $1.8M in Department of Defense funding, the immediate result of this program is the inclusion of this technology into the Tactical Amphibious Ground Support (TAGS-CX) vehicle with marsupial bay.

The navigation software first developed and tested on this SBIR project was a key factor in Applied Perception, Inc. winning a subcontract from Northrop Grumman to supply the FIRRE vehicle's autonomous navigation system.

SBIR STTR Programs

CERDEC

2006 SBIR

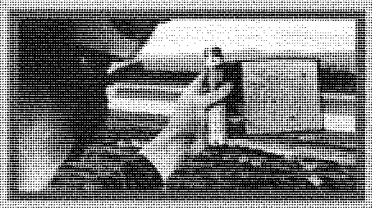
U.S. Army Communication-Electronics Research, Development and Engineering Center

Flexible Color Displays

Universal Display Corporation

Ewing, NJ
www.universaldisplay.com
info@universaldisplay.com

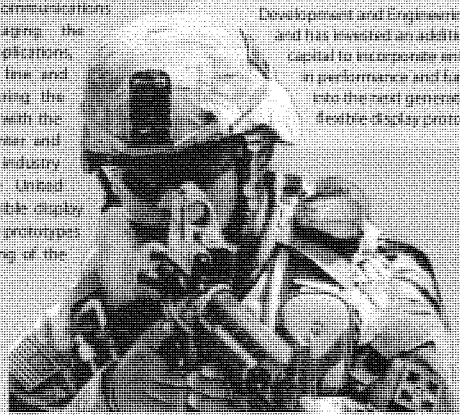
Under an SBIR award the Communication-Electronics Research, Development and Engineering Center has directed the Universal Display Corporation to develop conformable flexible display devices with integrated GPS and wireless communications, mountable on a soldier's wrist. The core innovation behind the initial project is the deposition of Organic Light Emitting Device (OLED) materials onto flexible steel foil substrates. In January 2006, three proof-of-concept prototypes were delivered to the Army and Air Force, and despite line defects, these prototypes were the world's first high-resolution, color-rotate, full-color displays using OLED materials deposited onto flexible steel foil. Under Phase III, UDC and L-3 Communications Display Systems are packaging the displays for wrist-worn applications, and minimizing the inherent line and pixel defects experienced during the Phase II effort. In conjunction with the U.S. Army Flexible Display Center and Arizona State University, this industry breakthrough will move the United States closer to creating a flexible display manufacturing capability. These prototypes will include improved packaging of the display driver electronics for delivery of thinner wrist-worn displays, integrated GPS, and near optimal display visual performance.



"The Army views these portable, flexible displays as a critical component required for future Commanders to assess the Common Operational Picture anytime, anywhere on the battlefield."

Phase III Impacts

Universal Display Corporation was awarded a $2.0M Phase III contract by the U.S. Army Communication-Electronics Research, Development and Engineering Center and has invested an additional $.9M in capital to incorporate enhancements in performance and functionality into the next generation of flexible display prototypes.



CALL TO DUTY!

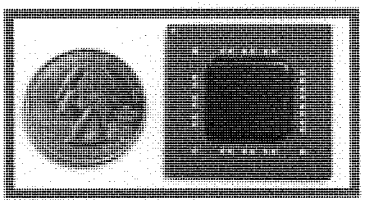
U.S. Army Armaments Research, Development and Engineering Center

Hyperspectral Image Processing Platform

Coherent Logix, Incorporated

Austin, TX
www.coherentlogix.com
doerr@coherentlogix.com

The Army recognized the need for lower power, size, and weight signal processing platforms and initiated the development of the miniature processor platform by awarding an SBIR contract to Coherent Logix, Incorporated. The objective of the effort was to investigate platform reprogrammability and dynamic reconfigurability to support continually changing static and dynamic application requirements and enable lifetime field upgrades. The HyperX™ platform has a ten times better computational efficiency and a 100 times better energy efficiency versus current Field Programmable Gate Array (FPGA) and Digital Signal Processor (DSP)/Multi Processor Platform (MPP) technology. The immense computational speed in a compact low-power device will enable hyperspectral and multi-spectral image/data fusion capability to be available to the Soldier. Because the processor platform is real-time reprogrammable, systems using the HyperX™ will be able to react in real time to meet the demands of a network-centric battlefield. Other applications being developed for the Army include a remote miniature sensor platform and a direct conversion ultra-broadband digital surveillance receiver.



"HyperX™ promises to be a breakthrough in next-generation parallel processing technology enabling a host of critical processing operations previously inaccessible to the Soldier."

Phase III Impacts

Coherent Logix has received $10.5M in funding from the Army, Air Force, DARPA, and others for continued development.

Planned HyperX™ applications across the Department of Defense include hyperspectral imaging, remote sensor platforms, surveillance receivers, multi-spectral data fusion, anti-jam GPS, and software defined GPS, software defined radio.

In May 2005, Coherent Logix received $5M in equity financing.

SBIR STTR Programs

Army SBIR/STTR

COMMERCIALIZATION

During Phase III of the U.S. Army SBIR/STTR Programs, small companies are expected to obtain funding from the private sector and/or non-SBIR/STTR government sources to develop prototypes from Phase II into products for sale in private sector and/or military markets. U.S. Army Phase III commercialization success encompasses the following:

Sales

"Sales" includes cash revenue from the sale of new products or non-R&D services embodying the specific technology and/or spin-off technology developed under the Phase II project.

Additional Investment

"Additional Investment" includes investment from any source other than the federal SBIR/STTR program in activities that further the development and/or commercialization of the specific technology developed under the Phase II project.

Commercialization Brochure

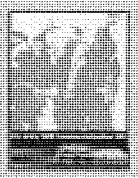
The U.S. Army SBIR/STTR Commercialization Brochure is published annually. This brochure is distributed within the Army R&D community and to the private sector at a number of conferences and other venues across the country.

Past Commercialization Brochures

2005

2004

2003

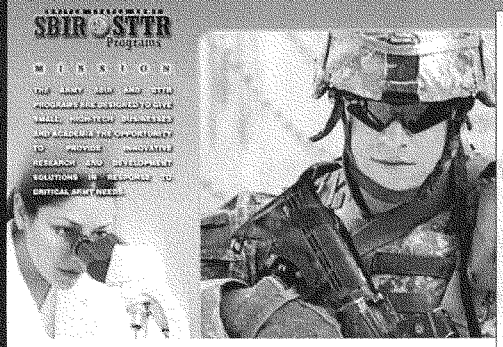


2002

CALL TO DUTY!

Outreach & Sources of Information

SMALL BUSINESS INNOVATION RESEARCH
SMALL BUSINESS TECHNOLOGY TRANSFER



The Army SBIR/STTR Programs conduct an aggressive outreach program to increase small business awareness of broad opportunities provided by the Army. Army SBIR/STTR personnel participate in national, regional, and local conferences across the country. This provides small businesses with face-to-face contact with people who are knowledgeable about Army needs and the SBIR/STTR process. The PM, Army SBIR Website identifies upcoming events at which the Army will be participating.

Website (www.armysbir.com)

- General SBIR/STTR information
- Changes and new requirements
- Points of Contact and links to other Army programs
- Proposal submission procedures
- Recent Army SBIR/STTR awards
- Searchable database of past awards
- Chemical-Biological Defense SBIR Program
- Phase III Success Stories
- Quality Awards Program

SBIR STTR Programs

2006 Army SBIR/STTR Quality Awards Winners

Applied Perception, Inc.
Cranberry Township, Pennsylvania

Akron Rubber Development Laboratory, Inc.
Akron, Ohio

Bay Materials, LLC
Menlo Park, California

Scientific Applications & Research Associates, Inc.
Cypress, California

Opto-Knowledge Systems, Inc.
Torrance, California

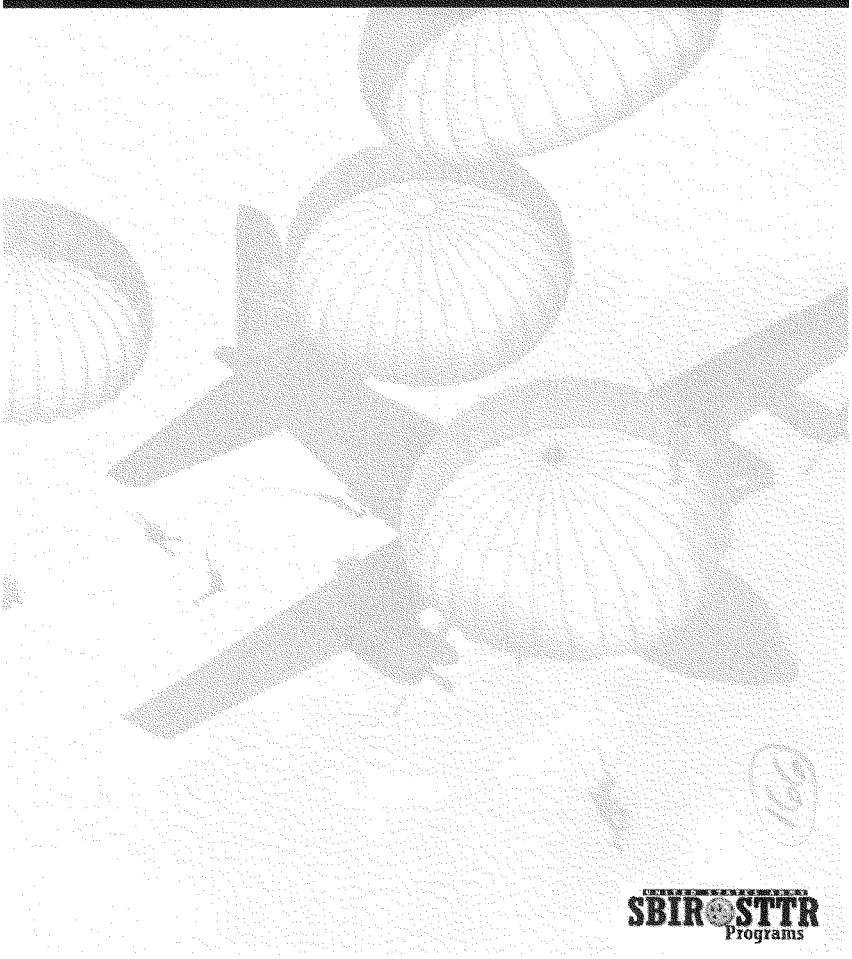
Visual Learning Systems, Inc.
Missoula, Montana

The Quality Awards Program recognizes exceptional Army SBIR/STTR projects. Each year, a distinguished panel of Army and industry experts selects the winning projects from nominations submitted from across the Army. Nominations are evaluated based on: originality and innovation of research, relevance of the research to the Army mission, and immediate commercialization potential of the research.

The Army Quality Awards Program is very competitive. This year, 254 projects were eligible to compete for an award and 34 nominations were forwarded to the Quality Awards Selection Board. The Board selected six projects from across the Army that represent the best in small business research and development.

In recognition of this achievement, the winners and their projects are showcased at Army and small business conferences and symposia throughout the year via this Army SBIR/STTR Quality Awards brochure.

CALL TO DUTY!



UNITED STATES ARMY
SBIR STTR
Programs

Photos courtesy of the U.S. Army and:

Senior Airman Jeffrey Allen
Staff Sergeant Jacob N. Bailey
Photographer's Mate First Class Bart A. Bauer
Captain Michael Blackwartz
Specialist Curt Cashour
Staff Sergeant James H. Christopher III
Specialist Jeremy D. Crisp
Staff Sergeant Kyle Davis
Gunner's Mate First Class Martin Anton Edgil
Staff Sergeant Jason W. Edwards
Lance Corporal Ben J. Flores
Specialist Allisan Gul
Staff Sergeant Russell Lee Kilka
Staff Sergeant Brian D. Lehmhardt
Kaye Pichey
Sergeant Craig Zentkovich

Research, Development & Engineering Command (RDECOM)

Program Manager, Army SBIR
6000 6th Street, Suite 104
Fort Belvoir, Virginia 22060-5844
Phone: (703) 806-2085
Fax: (703) 806-2044
Email: sbir@belvoir.army.mil
Website: www.armysbir.com

Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF04-293

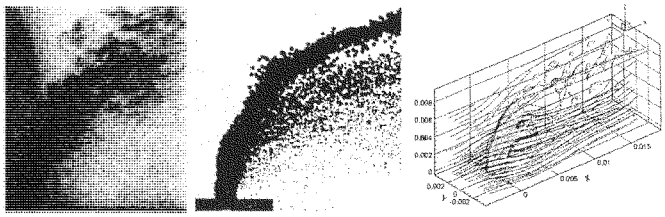
SBIR Title:
Computational Fluid Dynamics (CFD) Fuel Injector Design Tool Applicable to High-Pressure, Vitiated Augmentor Flow

Contract Number:
FA9101-05-C-0041

SBIR Company Name:
Flow Parametrics, LLC
Ivoryton, CT

Technical Project Office:
Arnold Engineering Development Center (AEDC)
Arnold AFB, TN

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Experimental photograph (left); computational fluid dynamics (CFD) simulation (middle); and volume of fluid (VOF) combined with large eddy simulation (LES) of the liquid jet in cross flow (right)

Design Tool for Fuel Injections in Turbine Engines

- Quality of fuel delivery injection characteristics is crucial to combustion system performance in modern gas turbine engines
- Air Force SBIR funding was used to develop and validate spray droplet breakup and dynamics models for use in a CFD tool
- Robust software package provides better liquid fuel boundary conditions and spray characteristics, and provides greater insight into liquid fuel breakup process
- Experimental datasets allow the Air Force to improve and develop its simulation software

AEDC/2007-116

A

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Air Force Requirement

The Air Force and its contractor base utilize experimental data to develop computational fluid dynamics (CFD) models in the design analysis of airframe and engine flowpaths, including turbine engine hot section components. Combustors and augmentors represent special challenges in component design, due to the complex physics of liquid fuel injection, breakup, atomization, evaporation, and combustion, all at high pressures, temperatures, and in a highly turbulent flowfield. Engine operability must be guaranteed at all points in the Mach-altitude flight envelope, including operating points at partial and full augmentation.

Understanding augmentor combustion performance over these wide ranges of conditions is a requirement. In order to achieve this understanding, detailed experimental data of the interaction of a liquid fuel jet and the associated crossflow is needed. This also allows for the validation of physics-based models that can be implemented into CFD flow solvers, which in turn provides an ability to compute, visualize, and understand these complex flows.

SBIR Technology

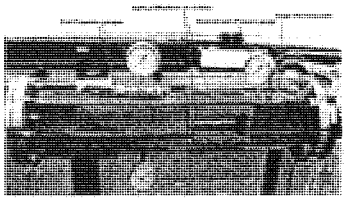
Flow Parametrics, LLC successfully developed a simulation tool that demonstrated the critical components of the computational fuel injection in gas turbine engines using combustion geometries. The physics of liquid fuel injection has been investigated experimentally, analytically, and computationally through a coordinated, multi-faceted program. Detailed experimental data for liquid fuel jets penetrating into a crossflow, the principal fuel injection technique for augmentors, have been acquired and used to develop new physical models for better CFD modeling of augmentors.

These models benefit from highly detailed, optical measurements performed at realistic augmentor operating conditions – a unique accomplishment. The experiments covered a range of orifice diameters and orifice configurations. The cross stream temperatures, pressures and chemical compositions were matched to actual augmentor flight conditions.

Potential Air Force Application

This program provided experimental datasets of liquid fuel jet(s) at actual augmentor flight conditions. These datasets allow the Air Force to improve and develop its own proprietary simulation software.

A stand alone volume of fluid (VOF) software package was supplied to the Air Force through this program. The benefit of the package is that it can provide better liquid fuel boundary conditions to CFD, provide better spray characterizations, and provide better understanding of the liquid fuel breakup process.



Experimental test rig for liquid jet in cross flow at high temperature and pressure: rig showing optical access port

The technologies developed for liquid fuel injection may be utilized directly by the Air Force, aircraft engine design and manufacturing suppliers, instrumentation developers, and test engineers to investigate and predict augmentor performance in advance of expensive testing in wind tunnels and test rigs. This approach can help eliminate unnecessary tests, optimize the instrumentation layout of tests to be performed, and thereby reduce risk and cost in product development and test programs.

Customers potentially benefiting from the code enhancements include key industrial firms and government agencies such as the U.S. Air Force at the Arnold Engineering Development Center (AEDC) and the Air Force Research Laboratory (AFRL), NASA Glenn Research Center, aircraft engine manufacturers such as Pratt & Whitney and General Electric, major international power generation turbine manufacturers, as well as companies in other industries.

Company Impact

Robert Ryder, President and Founder of Flow Parametrics, LLC said, "The opportunity to work with the Air Force on a focused project such as this has enabled us to acquire detailed experimental data in one of the most challenging areas, liquid fuel injection into combustion systems at high temperature and pressure. This in turn is allows us to provide more accurate software to our customers, beyond what is available in the literature."

Flow Parametrics, LLC develops and markets advanced CFD software, and provides expert consulting and outsourcing services to industry. Its flow solver, FPVortex™ is capable of computing aerodynamics and multi-phase, chemically reacting flows in and around complex geometries, ranging from rocket combustion chambers and gas turbine combustors and augmentors, to ground effects race cars and sailboat hulls and keels.

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Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF04-288

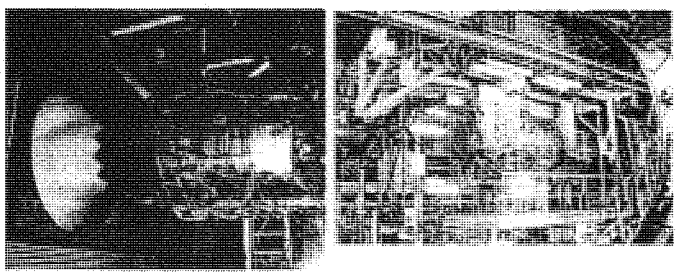
SBIR Title:
Innovative Thermal Barrier Coating (TBC) Blade Imaging System for Surface Temperature Mapping

Contract Number:
FA9101-05-M-0036

SBIR Company Name:
Advanced Fuel Research, Inc. (AFR), East Hartford, CT

Technical Project Office:
Arnold Engineering Development Center (AEDC), Arnold AFB, TN

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Engine testing at AEDC

Innovative Thermal Barrier Coating (TBC) Imaging System

- Air Force required a new sensing capability be developed to map and monitor the surface temperature and health of ceramic TBC on first stage turbine blades during engine testing
- SBIR project led to development of a long wavelength infrared (LWIR) optical system to capture on-engine thermal images of high-speed TBC turbine blades
- Project success was result of collaborative efforts of AEDC, Pratt & Whitney, and AFR
- Advanced fighter jet engines that implement TBC to protect metal turbine blades can run hotter for more thrust and improved performance

AEDC/2007-116

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Air Force Requirement

Aircraft gas turbine engines for the development of the nation's most vital aerospace weapons systems are tested in the Engine Test Facility (ETF) of the Arnold Engineering Development Center (AEDC) at Arnold Air Force Base, Tennessee. Sensors that monitor critical engine parts are essential during advanced engine tests in the ETF.

In this SBIR project, the Air Force required a new sensing capability to be developed to map and monitor the surface temperature and health of ceramic thermal barrier coating (TBC) on first stage turbine blades during engine testing. TBC is a vital component of advanced engines under development for protecting the metal alloy turbine blades from the extreme combustion temperature. TBC must be proven as a reliable means to prevent blade failure. The Air Force requires the following for the new on-engine sensor:

- Whole blade thermal map spatial resolution of less than 0.125 inches
- Non-intrusive; no wires or paints to put on blades
- Image integration time no longer than 1 microsecond
- TBC temperature accuracy goal per turbine revolution +/- 10 deg F (+/- 5.5 deg C) to above 2200 deg F (1204 deg C) to 2500 deg F (1371 deg C)
- Real-time diagnostic of cooling schemes of TBC blades
- Flag potential loss of TBC during engine operation
- Self-monitoring for maintaining calibration
- Compatible with a current on-engine probe and access port

Without this measurement capability, AEDC test engineers and engine manufacturers have no early warning of TBC conditions that may lead to a complete blade failure. Shut-down of a test engine before a catastrophic failure occurs has an enormous impact on minimizing both engine repair costs and delay to the test schedule.

SBIR/STTR Technology

Under a previous Air Force SBIR project (contract number F40600-90-C-0022), Advanced Fuel Research, Inc. (AFR) developed and delivered an innovative optical bench top instrument to AEDC for measuring the thermal spectral properties of TBC and other materials at high temperatures. Laboratory measurements on TBC samples supplied key information to the current project developing a long wavelength infrared (LWIR) optical system to capture on-engine images of high-speed TBC turbine blades to meet the Air Force specifications listed above.

Early work produced a LWIR lens system within the dimensional constraints of a Pratt & Whitney (P&W) turbine-case-mounted probe. When coupled to a LWIR focal plane array, whole-blade imaging of torch-heated parts in the laboratory were successful for demonstrating thermal-mapping capability and for distinguishing TBC defects.

The advanced sensor now in development for on-engine use includes custom LWIR optics integrated into a P&W engine probe for obtaining temperature maps of both sides of in-service TBC blades. The high performance thermal imaging camera provides the short sampling period needed to capture fast-moving TBC blades. Important temperature and condition information will be provided for both sides of each TBC blade on the turbine wheel.

Potential Air Force Application

Advanced fighter jet engines that successfully implement TBC to protect metal turbine blades can run hotter for more thrust and improved performance, thus providing an advantage to the war fighter. The Phase II deliverable supplies the Air Force with a truly unique measurement capability to validate and optimize operational specifications for TBC performance and survivability during flight simulation testing at AEDC. The innovative TBC blade imaging system for surface temperature mapping will provide essential data to expedite advanced engine development programs, and accordingly help to bring new, high performance propulsion engines to bear for national security.

Company Impact

AFR's prior commercialization successes resulting from its involvement in the SBIR program include creating spin-off companies that manufacture and sell products, licensing of software and patents, and providing unique measurement services and equipment. AFR today supplies contract research, product development and analytical services to industrial, government, and academic clients throughout the world.

Projects that are to result in on-board sensors for developmental aircraft jet engines are particularly challenging since subjecting the engine to new risk is intolerable. The sensor must add value without compromising engine performance or test objectives. As result of the collaborative efforts of AEDC, P&W, and AFR, on-engine demonstration of the new measurement capability was possible. P&W provided proven on-engine hardware for securing the new system, and valuable guidance during design, development and testing.

James R. Markham, CEO
Advanced Fuel Research, Inc.

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Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
SB962-069

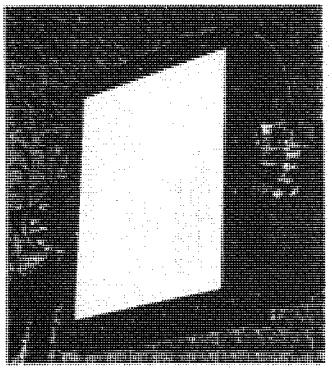
Title:
Microelectromechanical Systems (MEMS) Demonstration Radar System

AF Contract Number:
F19628-03-C-0052

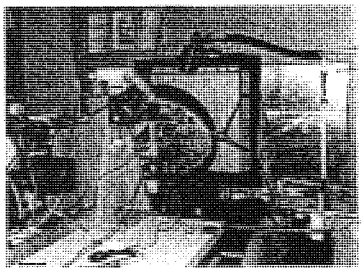
SBIR Company Name:
Radant Technologies, Inc. Stow, MA

Technical Project Office:
AFRL Sensors Directorate
AFRL/SNHA,
Hanscom AFB, MA

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR technology that met topic requirements and has outstanding potential for Air Force and DOD.



The 0.4m² MEMS Electronically Steerable Antenna in Radant's Antenna Test Chamber



Rear view of the 0.4m² MEMS ESA integrated with a Lockheed APG-67 Radar System

Microelectromechanical Systems (MEMS) Demonstration Radar System

- The Air Force and other DoD components require lightweight, low power, Electronically Steerable Antennas (ESA) for rapid scanning and diverse multiple target functions such as tracking and fire control.
- The Air Force SBIR Program is supporting development of a lightweight, electronically scanning antenna using Microelectromechanical Systems (MEMS) technology. This technology could provide significant improvements in battlefield information superiority and airspace dominance for US and Allied Warfighters.

ESC 06-0502

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Air Force Requirement

The DoD requires lightweight, low power, and low-cost Electronically Steerable Antennas (ESA) such as those needed by high-performance Airborne Moving Target Indicator (AMTI) and Surface Moving Target Indicator (SMTI) radars. Rapid beam scanning, beam agility, the performance of diverse functions such as multiple target tracking and fire control, reduced Radar Cross Section (RCS), and reduced physical profile are some of the numerous performance benefits to systems employing an ESA. These radar systems require a large power-aperture product, but must be lightweight enough for aerostats and airships, as required by the U.S. Army Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) program.

SBIR Technology

For the first time, a lightweight, electronically scanning antenna using Microelectromechanical Systems (MEMS) technology has been used for airborne and surface target detection, while interfaced with an existing radar system. The demonstration ESA contains 25,000 MEMS devices, electronically scans 120 degrees and operates over a 1-GHz bandwidth at X-band. The 0.4 square meter antenna was built to demonstrate feasibility of much larger antennas, exceeding 8 square meters. Much of the enhanced antenna performance is attributed to the employment of MEMS switches instead of traditional semiconductor-based switching technologies. The MEMS switches manufactured by Radant MEMS, Inc. have a volume of only 1.5 cubic millimeters and are produced by wafer capping of a micro-mechanical switch mechanism that travels less than 1 micrometer in 10 microseconds. Extremely high reliability exceeding 900 billion switch cycles has been demonstrated in multiple DoD laboratories, and this feat is unmatched anywhere.

Potential Air Force Application

The MEMS ESA results in dramatic savings of weight, prime power and cost in comparison to conventional active ESAs. The MEMS DRS has been included as a risk reduction effort in the acquisition strategy of the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) Major Defense Acquisition Program (MDAP). The JLENS requirement is to develop a very low-cost, lightweight and low-power usage Sensor System (suitable for aerostats and airships) that provides significant military value by improving battlefield information superiority and airspace dominance for US and Allied Warfighters as well as Homeland Security. Other radar and communication applications requiring a lightweight, low prime power and low cost Electronically Steerable Antenna can also benefit from the technology developed here.

Company Impact

This SBIR program has been instrumental in developing this novel antenna technology as well as the core MEMS switch technology. Radant Technologies is actively seeking additional applications for the antenna technology developed here while Radant MEMS has launched a series of commercially available MEMS switch products. Funding for this effort is responsible for increasing employment growth at Radant as well as for sustaining many high-technology jobs. Longer term, this funding is critical for growing key business segments within both Radant Technologies (Lightweight and Low-Cost Electronically Steerable Antennas) and Radant MEMS (MEMS switches and components) that will lead to increasing high technology employment at both companies as this technology matures.

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Air Force SBIR/STTR

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF98-180

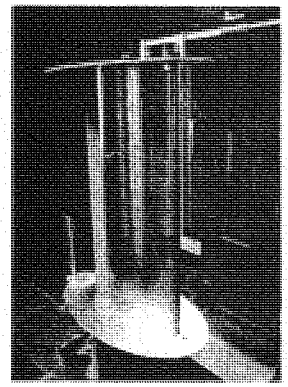
SBIR Title:
Mission Adaptive Compliant Wing

AF Contract Number:
F33615-98-C-3205

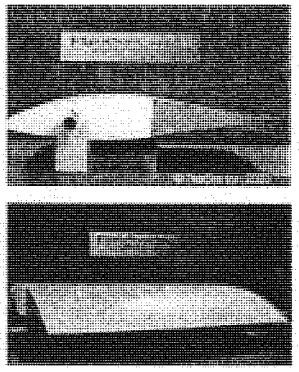
SBIR Company Name:
FlexSys Inc., Ann Arbor, MI

Technical Project Office:
AFRL/VA, Wright-Patterson AFB, OH

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR technology that met topic requirements and has outstanding potential for Air Force and DOD.



A laminar-flow flight test model fitted with variable geometry-trailing edge.



FlexSys' mission adaptive compliant trailing edge was designed for a high-altitude, long-endurance aircraft undergoing 10° flap deflection with a 3° twist.

Mission Adaptive Compliant Wing

A New Generation of Highly Maneuverable, Quieter, Faster and More Efficient Aircraft

- Morphing aircraft wing control surfaces in response to changing flight conditions can provide dramatic improvements for Air Force aircraft.
- The technology also offers very promising applications to variable geometry engine inlets and other surfaces to improve the performance of jet engines
- SBIR funding supported development of lightweight, low complexity and smooth variable geometry control surfaces that promise to improve aircraft maneuverability, while maximizing fuel efficiency

AFRL/VAO-06-419

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Air Force Requirement

Morphing aircraft wing control surfaces in response to changing flight conditions maximizes fuel efficiency (range) and flight performance (maneuverability and stability). This enables an aircraft to operate most efficiently under all flight conditions. In the mid 1980s, the Air Force Research Laboratory, modified and flight-tested an F-111 with flexible wing control surfaces in a program called "Mission Adaptive Wing (MAW). This program proved that adaptive wing control surfaces offered significant aerodynamic superiority over conventional leading and trailing edge flaps but suffered from significant increases in weight, complexity, packaging and mechanical performance. The Air Force wants technology that enables lightweight, low power, low complexity, and smooth variable geometry control surfaces.

SBIR Technology

Through SBIR funding, FlexSys, Inc., has successfully designed and built variable geometry airfoils and tested in a subsonic wind tunnel at the Air Force Research Laboratory under realistic flight conditions. A flight test model with a variable geometry trailing edge is scheduled for performance test in October 2006 on a Scaled Composite White Knight Aircraft. By exploiting the elasticity of the underlying structure FlexSys developed variable geometry airfoils. This approach was a radical departure from conventional engineering designs typically designed to be stiff, hinged structure, and the majority of smart/adaptive structure concepts which tend to be complex or heavy. This new design paradigm, rooted in biological inspiration, offers additional benefits since the entire adaptive structure is viewed as a compliant mechanism that can move into complex predetermined positions with only minimal force and yet remain strong and stiff to withstand external air loads in any desired configurations. Sophisticated design algorithms were developed for creating an optimum compliant structure, which minimizes the force required to morph surfaces during the full flight profile while maintaining maximum stiffness to withstand all external pressure conditions.

Potential Air Force Application

The technology developed under the SBIR program is ready for transition into military vehicles including Unmanned Air Vehicles. Better performing airfoils offer a whole new generation of quieter, faster, and more reliable vehicles and systems. The fuel fraction of an unmanned surveillance and reconnaissance vehicle is very high, thereby necessitating its operation under varying lift coefficients. A smooth continuous surface with variable geometry control surfaces offers significant drag reduction and enhanced performance under varying flight conditions thereby extending the mission time or range of one of these vehicles. The variable camber compliant surface technology can also be applied to military transport aircraft for fuel efficiency, and combat aircraft for enhanced roll performance and maneuverability. The technology also offers very promising applications to variable geometry engine inlets and other surfaces to improve the performance of jet engines. Application of the Compliant Wing technology to leading and trailing edges of a helicopter rotor could also have an even greater impact as demonstrated by FlexSys through an Army subcontract and an on-going DARPA contract.

Company Impact

FlexSys Inc. was founded as a result of Air Force SBIR contract, which enabled the transformation of a biologically inspired design concept into a practical reality. The technology developed under the Air Force SBIR has direct applications to commercial aircraft, helicopters, wind turbines, and underwater surfaces. A medium range transport aircraft with variable geometry compliant wing can save about 5% in fuel consumption. Combined with FlexSys's laminar flow technology the fuel savings can be as high as 12%. To put these percentages in perspective, approximately 50% of a commercial airline's operating budget is comprised of fuel costs. During the first eight months of 2006, domestic airlines spent $25.5 billion on 12.8 billion gallons of fuel, according to the Air Transportation Association. Consuming 3% less fuel would amount to $766 million savings over that period. Morphing the leading edge of a rotor blade once per revolution, as recently demonstrated by FlexSys, offers 12-25% gain in speed and maneuverability and about 10% increase in payload. The SBIR project positioned the company as a world leader in adaptive structures technology.

The design technology developed by FlexSys under this SBIR also applies to development of shape morphing or otherwise compliant design for consumer products. One such example is a one-piece compliant windshield wiper, which costs significantly less to produce in a fully automated manner here in the US compared to the imported ones. Automotive compliant wiper blades and side view mirror actuator technologies are already in transition to commercialization. Other applications of this unique design technology, developed under the Air Force SBIR Program, include development of novel consumer products and medical devices.

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Air Force

Air Force SBIR/STTR Transition Story

Transition

SBIR Topic Number:
AF01-143

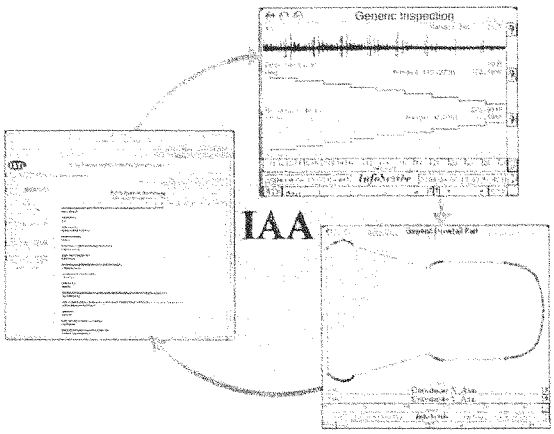
SBIR Title:
Engine Component Life Management Technologies

Contract Number:
F33615-02-C-5703

SBIR Company Name:
ISTL, Inc.
Beavercreek, OH

Technical Project Office:
AFRL Materials and Manufacturing Directorate
Wright-Patterson AFB, OH

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Intelligent Agent Architecture (IAA) Underlies Data Search Breakthrough

Engine Data Mining Software Offers New Capabilities

- Air Force SBIR contract focused on finding an innovative tool to wade through voluminous maintenance data information
- Developed tool enables users to quickly search gigabytes of data and generate electronic reports
- Oklahoma City Air Logistics Center has purchased an IAA software license
- Tool will significantly help with inspection and maintenance of Air Force turbine engines

Commercialization Pilot Program Series

AFRL/ML 2007-79

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Air Force Requirement

The Air Force needed a dynamic software program that would allow its engineers, researchers, and maintenance personnel to sort and search through fighter jet engine inspection data more efficiently. To extend engine life via data management technology, data had to be collected and organized to elicit patterns, anomalies, and trends which may extend or curtail operating life. Maintenance depot managers, who typically search hundreds or thousands of gigabytes of engine data per year, sought improved search capabilities.

SBIR Technology

Using SBIR contracts with the Air Force, InfoScribe Technology Laboratory, Inc. (ISTL) produced a data mining system in conjunction with the Air Force Research Laboratory (AFRL) Materials and Manufacturing Directorate's Manufacturing Technology (ManTech) Division. Known as the Intelligent Agent Architecture (IAA), this design originally was developed for use with data collected from the Eddy Current Inspection Stations (ECIS) under ManTech's Engine Rotor Life Extension (ERLE) program. Under ERLE's data management activities, this inspection database is the repository for all inspection data, including part numbers, probe information, and inspection time and linkage to the raw data for coordinate and eddy current signals. IAA, a fully developed and demonstrated search capability, enables users to search ECIS data, being stored at the rate of hundreds of gigabytes per year, and generate electronic reports within minutes. It allows the integration of all data sources so users can search for trends ranging from the engine inspection processes to the engine's remaining life. Data users can receive electronic reports within minutes, rather than sorting through paper copies of report information. Users can receive reports on demand or have the software automatically forward updated reports periodically.

Transition Impact

IAA saves time and allows engineers to build specifically tailored reports on the inspections of disks and engine components. Shop managers can narrow their search for engine data, which will be as high as hundreds or thousands of gigabytes per year. Thus, initial estimates show that the data search and reporting methods will save hundreds of man-hours annually. Another benefit is the new capability of pulling information from data that was previously never recorded, such as the start and end times of the inspection process and the specific probe used in the inspection.

The Oklahoma City Air Logistics Center (OC-ALC) at Tinker AFB, Oklahoma, has purchased the IAA software to obtain the capability to develop database search tools and reports for ECIS data. The purchase of the IAA license will allow engineers at OC-ALC to develop tools and reports to evaluate inspection times, test restarts and failures, probe performance and eddy current machine time. This will help with the overall inspection and maintenance of turbine engines on Air Force aircraft.

Company Impact

"The IAA is a component of ISTL's mission to serve the warfighter with reliable and cost effective turbine engine maintenance," said Jeff Heyob, President of ISTL, Inc.

This project has opened the way to perform virtual re-inspection of engine disks to assist engine component life prediction. Building on its Air Force SBIR project experience, ISTL provides data management solutions for scientific and manufacturing instrumentation to improve productivity, capability and to increase return on investment (ROI) for a wide range of processes. ISTL's data management system has been used to identify and improve process capabilities by historical archiving of critical data, analyzing critical current and archival data, substantiating ROI for new technologies and process improvements.

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Air Force SBIR/STTR

Air Force SBIR/STTR Transition Story

Transition

SBIR Topic Number:
AF98-072

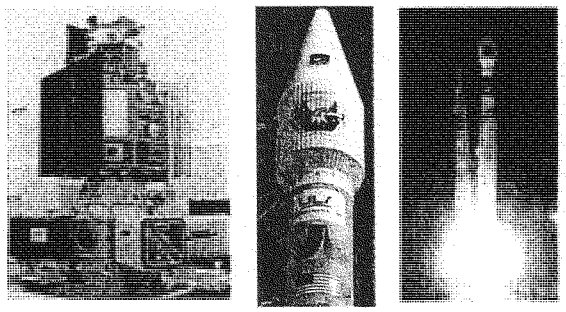
SBIR Title:
Isolation for Spacecraft with Multiple Payloads

Contract Number:
F29601-98-C-0218

SBIR Company Name:
CSA Engineering, Inc.
Mountain View, CA

Technical Project Office:
AFRL Space Vehicles Directorate, Kirtland AFB, NM

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Space Test Program STP-1 Launch on March 8, 2007

Adapter for Multiple Spacecraft on Atlas V and Delta IV

- Increased access to space for small satellites and space experiments
- Technology developed under Air Force SBIR funds leads to advancements in space-based technology
- Adapter crucial to DoD Space Test Program (STP) Mission on an Atlas V Launch Vehicle from Cape Canaveral
- STP is implementing a launch-on-schedule approach that will provide rideshare opportunities and reduce risk for launch

Commercialization Pilot Program Series

AFRL/VS07-0452

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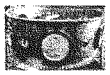
Air Force Requirement

The Air Force needs low-cost access to space for small satellites. The launch of secondary satellites (up to 180 kg) can greatly increase the number of missions flown, thereby increasing advancements in space-based technology for the Air Force.

Despite the benefits of small satellites for certain applications, infrequent launch opportunities and their associated high costs present the primary obstacle to the full utilization of small satellite technology. The Air Force identified large unused payload margins, on the majority of the DoD's Evolved Expendable Launch Vehicle (EELV) (Delta IV and Atlas V) manifests. By taking advantage of this existing unused payload margin the Air Force will increase access to space for small satellites and space experiments, and by sharing mission integration and launch expenses, the cost of space access will be dramatically reduced.

SBIR Technology

Using SBIR contracts under a program for the Air Force Research Laboratory's Space Vehicles Directorate, Kirtland Air Force Base, NM, CSA Engineering designed, built, and flight qualified EELV Secondary Payload Adapter (ESPA). ESPA is qualified to mount a 15,000-lb primary satellite and six 400-lb secondary satellites on a Delta IV or Atlas V EELV. This capability allows six additional spacecraft to be launched whenever there is excess capacity on an EELV Mission. ESPA is installed between the EELV upper stage and the primary payload (PPL). To provide minimal impact to the PPL, the ESPA duplicates the standard interface plane of the EELV upper stage and is designed to be very stiff in all directions. Since the ESPA ring is only 24 inches high, only a small amount of volume is taken away from the PPL. Vibration and shock isolation systems have also been designed for spacecraft on ESPA.



ESPA Ring

On March 8, 2007, the ESPA Ring enabled the launch of the STP-1 Mission on an Atlas V Launch Vehicle from Cape Canaveral. This Mission placed in orbit six unique spacecraft.

Transition Impact

Mission planners expect the ESPA technology to have a tremendous impact on future spacecraft programs by increasing the number of secondary payload launch opportunities available at a reasonable cost. Planners also anticipate that this AFRL development effort will help provide small satellite launch opportunities on a regular schedule, thus allowing for the full utilization of small satellite technology within the United States.

The small satellite community has adopted the ESPA secondary payload (SPL) interface as a standard. "ESPA spacecraft," weighing 400 lbs, with center-of-gravity at 20", and dimensions of 24"x28"x38", have become a standard small satellite configuration.

The DOD Space Test Program (STP) has focused near-term spacecraft development around ESPA-class spacecraft. The Standard Interface Vehicle (SIV) contract recently awarded to a team of Ball Aerospace and AeroAstro will build up to six ESPA spacecraft. STP is implementing a "launch on schedule" approach that will provide rideshare opportunities and reduce risk for launch by implementing existing technologies and standard interfaces to cut costs for multiple spacecraft buys.

Additionally, the AFRL's Demonstration and Science Experiments (DSX) Program has based its free-flyer spacecraft configuration on the ESPA Ring. DSX ESPA is a four-port Ring that will form the hub of a free-flyer spacecraft.

Company Impact

In addition to the flight program on which the original ESPA Ring technology was proven, this SBIR development has opened many doors for CSA for implementation of whole-spacecraft isolation as well as alternate ESPA configurations for current and future flight programs. In close succession to STP-1, CSA is providing an ESPA Ring for the next NASA lunar mission (LRO/LCROSS, October 2008), and ESPA will provide the hub of a free-flyer spacecraft for AFRL's DSX. LCROSS will consist of a lunar impactor and a "shepherding" spacecraft; the impactor will be the upper stage of an Atlas V, and the spacecraft is being built around an ESPA Ring. DSX will travel to the radiation environment of medium Earth orbit (MEO) to study wave-particle interaction and map the energetic particle and plasma environment.

ESPA was designed and built during the period when the EELVs were also being developed, and both EELV builders, Lockheed Martin and Boeing (now combined as the United Launch Alliance), were subcontractors to CSA during this period. Boeing and Lockheed advised CSA on launch environments for ESPA design, and both companies provided guidance for the development of the ESPA qualification program and test facility. CSA designed and built this facility and performed the ESPA qualification test. This general-purpose static test facility, located at Kirtland AFB, NM, expanded the test capability available to AFRL for qualification test programs.

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Air Force

Air Force SBIR/STTR Transition Story

Transition

SBIR Topic Number:
AF98-072

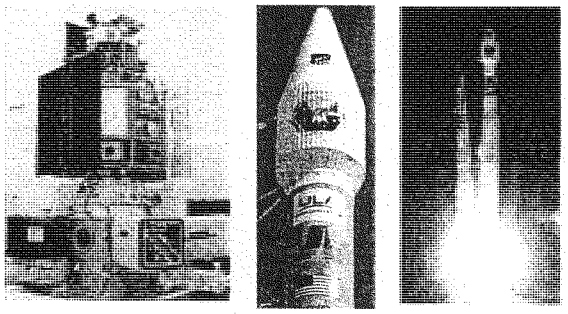
SBIR Title:
Isolation for Spacecraft with Multiple Payloads

Contract Number:
F29601-98-C-0218

SBIR Company Name:
CSA Engineering, Inc.
Mountain View, CA

Technical Project Office:
AFRL Space Vehicles Directorate, Kirtland AFB, NM

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Space Test Program STP-1 Launch on March 8, 2007

Adapter for Multiple Spacecraft on Atlas V and Delta IV

- Increased access to space for small satellites and space experiments
- Technology developed under Air Force SBIR funds leads to advancements in space-based technology
- Adapter crucial to DoD Space Test Program (STP) Mission on an Atlas V Launch Vehicle from Cape Canaveral
- STP is implementing a launch-on-schedule approach that will provide rideshare opportunities and reduce risk for launch

Commercialization Pilot Program Series

AFRL/VS07-0492

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Air Force Requirement

The Air Force needs low-cost access to space for small satellites. The launch of secondary satellites (up to 180 kg) can greatly increase the number of missions flown, thereby increasing advancements in space-based technology for the Air Force.

Despite the benefits of small satellites for certain applications, infrequent launch opportunities and their associated high costs present the primary obstacle to the full utilization of small satellite technology. The Air Force identified large unused payload margins, on the majority of the DoD's Evolved Expendable Launch Vehicle (EELV) (Delta IV and Atlas V) manifests. By taking advantage of this existing unused payload margin the Air Force will increase access to space for small satellites and space experiments, and by sharing mission integration and launch expenses, the cost of space access will be dramatically reduced.

SBIR Technology

Using SBIR contracts under a program for the Air Force Research Laboratory's Space Vehicles Directorate, Kirtland Air Force Base, NM, CSA Engineering designed, built, and flight qualified EELV Secondary Payload Adapter (ESPA). ESPA is qualified to mount a 15,000-lb primary satellite and six 400-lb secondary satellites on a Delta IV or Atlas V EELV. This capability allows six additional spacecraft to be launched whenever there is excess capacity on an EELV Mission. ESPA is installed between the EELV upper stage and the primary payload (PPL). To provide minimal impact to the PPL, the ESPA duplicates the standard interface plane of the EELV upper stage and is designed to be very stiff in all directions. Since the ESPA ring is only 24 inches high, only a small amount of volume is taken away from the PPL. Vibration and shock isolation systems have also been designed for spacecraft on ESPA.

ESPA Ring

On March 8, 2007, the ESPA Ring enabled the launch of the STP-1 Mission on an Atlas V Launch Vehicle from Cape Canaveral. This Mission placed in orbit six unique spacecraft.

Transition Impact

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Air Force

Air Force SBIR/STTR Transition Story

Transition

SBIR Topic Number:
AF03-094

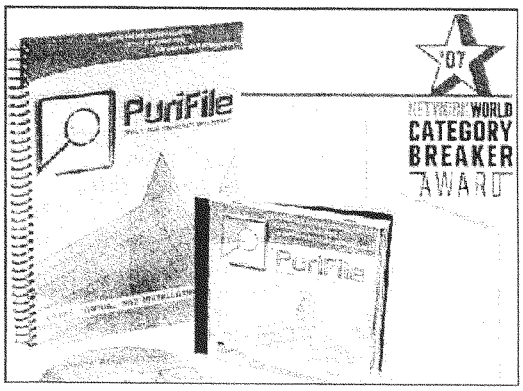
SBIR Title:
Innovative Information System Technologies

Contract Number:
FA8750-04-C-0102

SBIR Company Name:
Dolphin Technology, Inc.
Rome, NY

Technical Project Office:
AFRL Information Directorate
Rome, NY

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Electronic Document File Inspection Application Enhances Information Security

Developed to identify and minimize file vulnerabilities

- With support from the Air Force SBIR program, together with additional funding from the Defense Intelligence Agency (DIA) and the National Security Agency (NSA), an electronic document file inspection application was developed
- PuriFile ® not only identifies critical metadata hidden within Portable Document Format and Microsoft ® files, but also reveals other hidden information placed in applications either accidentally or maliciously
- Product application is highly configurable, allowing easy introduction into a variety of different environments
- This technology product is currently being integrated into a variety of Cross Domain Solution products such as Information Support Server Environment (ISSE v3.6), the Trusted Manager, and the NSA's Assured File Transfer program

Commercialization Pilot Program Series

AFRL07-0064

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Air Force Requirement

Commercial off-the-shelf software applications often contain vulnerabilities that can adversely impact the user. For instance, both Microsoft® Office file formats (Word, PowerPoint, and Excel) and Portable Document Format (PDF) files have many ways data can be hidden within them. This information can exist superficially, such as through metadata which discloses details about the author(s) or when and where the document was created. It can also exist at much deeper and subtler levels, such as information that remains in a file after deletion, or having a white font against a white background. The list of different ways information hiding can occur is long and complex and it can occur both inadvertently or maliciously.

The result is a security problem that cannot be effectively addressed through normal human review cycles. Numerous examples exist where this vulnerability has already caused significant problems in the field, not only for the Air Force, but across the entire Department of Defense (DoD) and intelligence communities.

SBIR Technology

Through their involvement with the Information Support Server Environment (ISSE) program, Dolphin Technology, Inc. has long been familiar with security issues related to document exchange across security boundaries, and they brought their expertise to bear on this problem. Initially started as the Microsoft Office File Inspection Application (MOFIA) initiative, the resultant product, PuriFile®, not only does a full inspection of Microsoft files but can also be used for inspecting other vendor file formats, such as PDF. In addition to checking for all metadata and object related concerns, it also includes a robust dirty word scan.

The PuriFile engine is installed on a single machine at a customer site. This approach minimizes installation footprint issues, while also providing centralized control and audit functions. File inspections are available through any normal web browser, as well as directly from the Word, PowerPoint, and Excel programs themselves. This add-in "Assistant" capability not only reports on the results of an inspection, but also provides tools that will assist in the correction of the security problem and perform some broad cleansing functions. Further information is posted at www.purifile.com.

Transition Impact

PuriFile is highly configurable, allowing easy introduction into a variety of different environments. Through a robust Application Programmer Interface (API), the product is now being integrated into a variety of Cross Domain Solution (CDS) products such as ISSE, the Trusted Manager (TMAN), and the National Security Agency's (NSA) Assured File Transfer (AFT) program, to name a few.

Recognizing the importance of this effort to address their specific functional requirements, additional SBIR funds were provided by both the NSA and the Defense Intelligence Agency (DIA).

Through the use of PuriFile, security reviews of PDF and Office documents are repeatable and efficient, allowing for more reliable and effective communications. Benefits from PuriFile are not limited to just Air Force installations. In addition to distribution as part of several CDS products, Dolphin has worked with Red River Computer Corporation to deploy the product across several organizations in the DoD and IC.

The end result is a significant improvement in document security across numerous branches of the government.

Company Impact

The success of this effort is recognized not only as a technical achievement, but also as a business one. Dolphin has invested heavily into the commercialization of the product, establishing a strong web presence through the PuriFile website and by attending conferences in the private sector. These efforts culminated in the recent selection of PuriFile as an outstanding product in the February 2007 issue of Network World Magazine. Winn Schwartau, a noted industry analyst, selected PuriFile as a "Category Buster," saying "Users from the enterprise, government, and home really have no idea of the security risks they face when using Microsoft Office . . . and worse . . . Microsoft doesn't disclose the vulnerabilities in a way that makes sense to non-techies. I became an instant fan of PuriFile!"

Through this and related SBIRs, we are seeing significant new business opportunities open up for Dolphin, while maintaining our focus on information security issues.

Jack LoSecco
President
Dolphin Technology, Inc.
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(315) 838-7000

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Major Partner

Virginia's Center for Innovation Technology · Entrepreneurship Centers Program

Supporting Partners

Crossroads Consortium

New Town Associates, LLC

February 6, 2008

Chairwoman Nydia M. Velázquez
Committee on Small Business
2360 Rayburn House Office Building
Washington, DC 20515

Dear Chairwoman Velasquez:

Subject: Error in Written Testimony

Thank you again for the opportunity to present to the House Small Business Committee regarding the renewal of the SBIR program. We believe very strongly in the program and therefore were quite pleased to confirm our support for the Program. I hope that my comments, spoken and written, were useful to the Committee.

Regarding the written Testimony, we have discovered an error that apparently occurred during the editing process. The result is a statement regarding the Navy's Dawnbreaker program that could be seriously misinterpreted and is incorrect as written. Therefore, I am requesting that a corrected version be entered as an Addendum to the original Testimony.

The offending sentence is on page 4, Section "Company Mentoring", second paragraph, last sentence. The sentence reads:

> "The Navy program seems particularly responsive, and their Dawnbreaker Program provides some structured process education but is not closely coupled to the real needs of companies."

It should read:

> "The Navy program seems particularly responsive, and their Dawnbreaker Program provides a high-quality structured process education".

The current sentence would seem to be disparaging of the Dawnbreaker program. This is not correct and was not what was originally written. Somehow during the crush of editing and formatting the erroneous words, which had been part of another sentence, crept in.

Your consideration in allowing this correction is greatly appreciated.

Sincerely,

William E. Bean, Director
Technology & Business Center
The College of William and Mary
Williamsburg, VA 23187