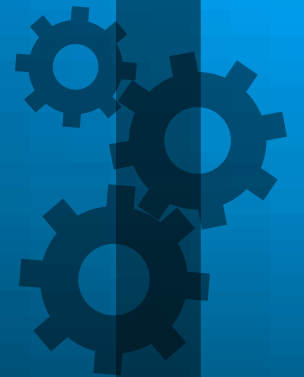


PROFILES

IN SUCCESS

FALL 2011



DAWNBREAKER[®]
The Commercialization Company

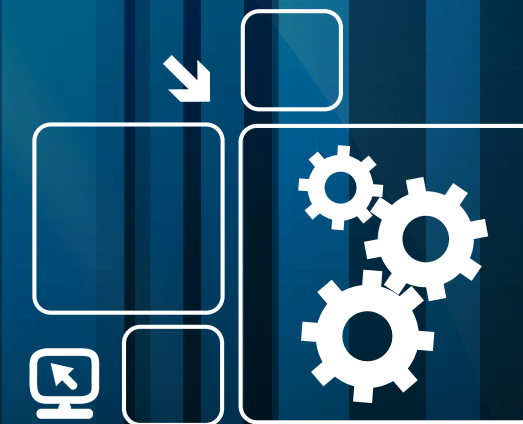
CONTENTS

SUCCESS

Measuring the success of research and development (R&D) is a challenge! The federal government invests in revolutionary technologies— solutions that will enable us to drive cars fueled by water; to fight wars using only unmanned systems; to beat cancer with nanorobots. Technologies such as these don't make it to market quickly. They take years of rigorous research and development, followed by countless rounds of tests, and evaluation, followed by system integration, production scale-up and marketing. So how do you know if you are on the right track? How do you know if you are on the road to success? We believe the answer is - money!

If there is sufficient market pull for what you are developing and if you are sufficiently diligent and gregarious to engage potential partners, investors, and customers, then it is likely that you will secure funding to advance your technology. Money is a good indicator of business success!

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FROM THE EDITOR

This issue celebrates the achievements of companies that participated in the 2006-2007 and the 2007-2008 Navy Transition Assistance Program (TAP). Cumulatively, participants in these two cohorts received in excess of \$375,000,000 in Phase III funding during the 18 months following participation in the TAP. Sponsored annually by the U.S. Department of the Navy's Small Business Innovation Research (SBIR) Program Office and developed and managed by Dawnbreaker, Inc., the TAP assists companies in achieving more rapid transition of SBIR and Small Business Technology Transfer Program (STTR)-funded technologies to the fleet. Companies that participate in the TAP are invited to present their technologies to potential customers, partners, and investors at the *Navy Opportunity Forum*®.

Since 1990, Dawnbreaker has had the pleasure of assisting over 4,500 SBIR and STTR-funded firms, using a methodology that is highly interactive and focused on developing specific tools, opportunities and relationships that facilitate transition. Dawnbreaker believes that success should be measured, and as such, collects data from participating firms at 6, 12 and 18 months following the *Navy Opportunity Forum*®. On average, 50 percent of participants in the Transition Assistance Program receive Phase III funding following program completion.

The success stories highlighted in this issue of *Profiles in Success* are a subset of the companies that individually achieved more than \$1 million in sales, Phase III contracts and/or investments during the 18-month evaluation period. Funding came from a wide variety of sources including Phase III contracts with the Department of Defense, or prime contractors, corporate acquisitions, equity investment, licensing, partnering, and sales. Congratulations are extended to all of the program participants for their Phase III achievements.



This issue celebrates the success of companies that achieved Phase III success during the sustained economic downturn.

Jenny C. Servo, Ph.D.
President, Dawnbreaker, Inc.
The Commercialization Company

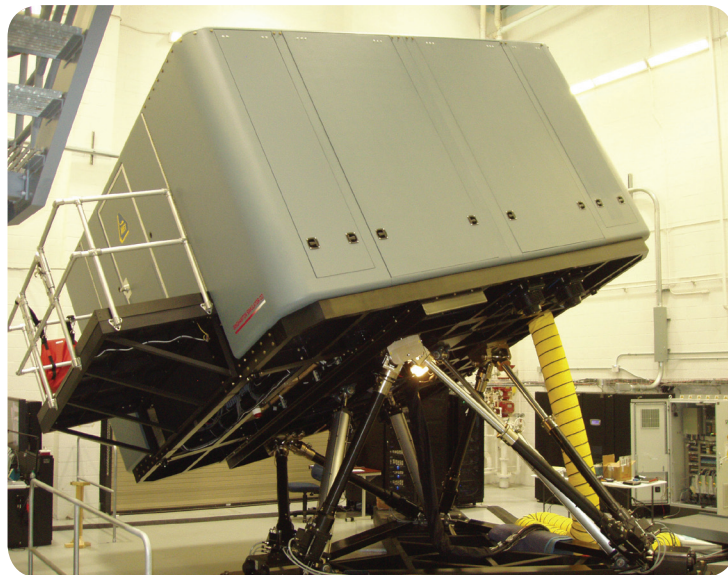
01 Binghamton Simulator Company

Visit Binghamton Simulator Company online at:
www.bsc.com

► Phase III Success: More than \$6M in government contracts and sales
Navy TAP 2006-2007

The BSC created virtual environment not only saved approximately \$10M versus live training, but additionally reduced the failure rate by 50 percent.

“TRAIN LIKE YOU WILL FIGHT” is the motto that drives the Binghamton Simulator Company (BSC) in its quest for realism in its simulator products. From its helmet-mounted visualization systems, high-fidelity visual images provide accurate depth perception and extreme fidelity. The company has captured a realistic aircrew experience in a virtual training environment. The Navy’s Aircrew Virtual Environment Trainer (AVET) provides helmet mounted displays that fit directly onto the air-crew’s personal helmets via the Night Vision Goggle rails, thereby allowing aircrews to train with their own equipment rather than using special helmets. An all electric six-degree-of-freedom motion system allows aircrews to experience the realism of flight at a 90 degree orientation to their flight path. Real weapons, modified for training, provide the critical skills training that are needed to acquire and engage targets in realistic scenarios. This combination provides a rapidly changing, realistic environment that is as close to the real thing as possible.



How did BSC develop this rotary-wing simulator capability that allowed it to secure NAVAIR Phase III funding in excess of \$6M? According to the BSC president, Terry Lewis, “BSC essentially started in the early 1990s as an outgrowth of the Link Flight Simulation Division of Singer Company. BSC started out as a simulation engineering and support company for training systems, worldwide. BSC pioneered the development of virtual aircrew training in the mid-90s. Working closely with the U.S. Air Force Special Operations Forces, BSC designed and built a simulation system to help train Aerial Gunners and Scanners. This training requirement had been identified as a critical need following the first mid-East war. Only one was fielded due to budget cuts and changing missions, but in early 2003, BSC, seeing a continuing need for this type of training, began research and development of an updated version of that original Special Operations Trainer.”

The Navy H-60 Program had identified a need for improved aircrew communications and resource management. An SBIR Topic was developed in 2003 to assist in the research. BSC was awarded a Phase I and Phase II award for this Navy Topic. In concert with the SBIR effort, BSC invested more than a million dollars of its own money in a Demo Unit that would be shown at several industry events.

The simulations were initially oriented toward improved communications for the helicopter crews, but the number of issues to be addressed increased as the Navy began to see the benefits of this cost-effective training approach. The training requirement was extended to weapons training, as well as “hoist” training in its current configuration. Following delivery of the Prototype AVET (PAVET), the Navy conducted a test for 12 months at Norfolk, VA where they did an extensive evaluation, determining that the virtual environment not only saved approximately \$10M versus live training,



but additionally reduced the enlisted training mission failures (Downs) by 50 percent. Based on this success, BSC received a five year IDIQ for \$25M with an initial order for \$260,000 to write the AVET specification. The second order was for the production of the first AVET device, which is now at North Island NAS, San Diego, CA.

The \$10M in cost savings is just the tip of the iceberg, which makes the technology even more enticing. Virtual training also extends the life of the aircraft, reduces ammunition cost, travel costs to and from the ranges and eliminates the EPA restrictions on aircraft during live training scenarios. The AVET system can simulate high-speed events and provide training for the critical skills and versatility needed in these extreme scenarios.

What gives BSC an edge is that they are providing the entire simulation system and the company is not working through a prime contractor, therefore it can control its “turnkey solution” by working directly with the organization needing its simulation system. For example, based on the power of the BSC Demo Unit, which the Swedish Defense Forces (SDF) saw at one of the industry shows, BSC was able to “rent” time on this Demo system to the SDF.

Through the successful work on this SBIR initiative, BSC has now teamed with a prime contractor on an Army requirement which has led to a contract

for two mobile trailers, each containing two training units, with an expectation of more systems being required over the next several years.

Early recognition that the “requirement” for simulator training needs to be part of the Navy aerial gunner training procedures and manuals is one of the key elements in the BSC success in this venture. According to Lewis, “Now, the U.S. Navy has taken the lead in developing the Aircrew Virtual Environment Trainer and the simulator is integrated into the Navy training syllabus for helicopter aircrew members. For the first time, these mission-critical aircrew members will have the ability to train 24/7 in an environment that is very close to the real thing.”

After attending the 2007 Navy Opportunity Forum®, Lewis acknowledged that it gave him a much broader view of the Navy’s requirements. “Both the TAP Program and the Navy Opportunity Forum® gave me a better view of how the Navy operates,” said Lewis. “SBIR firms need to understand the ‘upstream’ activities that influence the final decision making process. In the case of BSC, we learned that there was a distinct need to have the simulation process ‘called out’ in the training syllabus before the need could be recognized in a formal SBIR solicitation.” An important lesson for SBIR firms to internalize. ◀

What gives BSC an edge is that they are providing the entire simulation system ... therefore it can control its “turnkey solution” by working directly with the organization that needs its system.

02 Creare, Inc.

Visit Creare online at:
www.creare.com

► Phase III Success: \$1.5M in contracts and licensing agreements
Navy TAP 2007-2008

“WHEN YOU KNOW you have a great technology, stay with it,” advised Jay Rozzi, a Principal Engineer at Creare, Inc. Considering the level of success that Creare has already secured—\$1.5M in Phase III funding for a high-speed titanium machining process being the latest feather in their cap—it seems like sound advice. Located in Hanover, NH, Creare, Inc. is an engineering research and development firm that has been delivering engineering innovations for their clients for more than 50 years. Creare continues this tradition of innovation and exploration today in a multitude of areas, including advanced manufacturing.

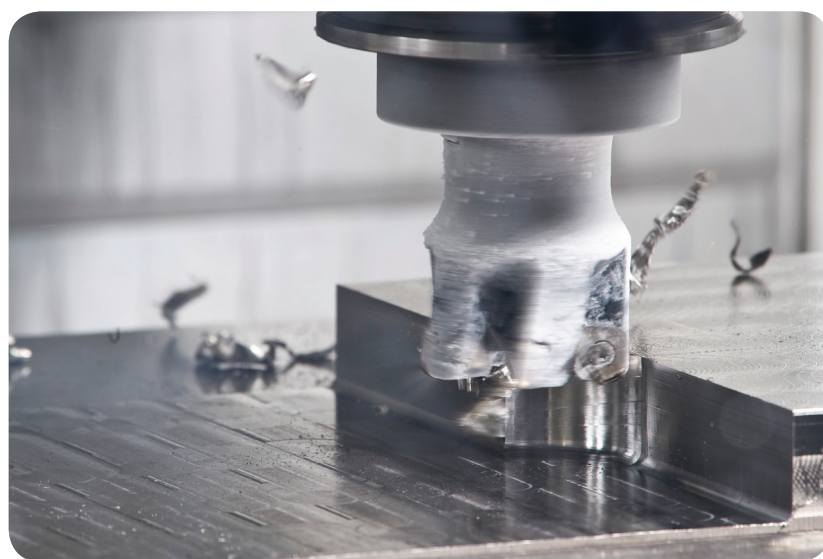
Though high strength and low density make titanium and its alloys attractive for use in military aircraft, its high strength and low thermal conductivity concentrates heating at the cutting edge during machining. This limits the attainable processing speed, which in turn results in increased part costs. The excessive machining costs have limited the

applications of titanium to the realm of high tech aircraft. Creare’s innovation is the development of an internal cooling approach for cutting tools using small flows of liquid cryogenics, which enables increased processing speeds and extends tool life up to 700 percent, markedly reducing the manufacturing cost of critical titanium parts.

Creare’s high-speed titanium machining process includes an internal cooling approach for cutting tools using small flows of liquid cryogenics, enabling increased processing speeds, extending tool life up to 700 percent, and markedly reducing the manufacturing cost of critical titanium parts.

Creare began developing this technology in 2004 when the company received its initial Phase I Navy SBIR contract. Most importantly, it was during this early period of development that Creare began working with a key prime contractor, Bell Helicopter–Textron (BHT). At that time, BHT was seeking a methodology for high-speed titanium machining for the V-22. Given its lighter weight and high performance characteristics, titanium was increasingly being used in new-build aircraft. Lockheed Martin was also interested in the Creare cooling technology for its F-35 production challenges. In fact, it was Lockheed Martin that secured funding as part of a larger F-35 initiative to enable the Phase III program.

“As long as they have a viable technology, it is important that SBIR firms go where the technology is needed,” stated Rozzi. “We started working with Bell Helicopter (V-22) and Lockheed Martin (F-35) early in our technology development to assure that we understood their needs and their manufacturing issues. Through the support of NAVAIR, and



the diligence of our SBIR Technical Monitor, Creare was selected as a NAVAIR CPP candidate in late 2007 for transition to the Program of Record. The key was getting the relevant prime contractors involved as early in the process as possible.”

Based on its strong intellectual property position developed through this Navy SBIR project, Creare has signed a licensing agreement with MAG Industrial Automation Systems, the world’s largest U.S.-based machine tool company. MAG is the global leader in metal cutting machine tools and automated composites equipment for the aerospace industry, and its machines are responsible for production of the F-35 titanium parts.

While the military applications for titanium production are important, this Creare technology has many commercial applications. Not only does it improve the titanium production process but it can be applied to ceramic matrix composites and stainless steel production as well. In fact, one of

the more promising applications is in the medical field based on the elimination of coolants in their machining process.

Creare has been highly successful in the commercialization of SBIR-developed technology. Creare has commercialized SBIR technology internally via sales of custom or specialized hardware and software and engineering services contracts as well as externally through creation of spin-off companies and licensing of technology to third parties. To date, the firm can trace nearly \$700M of revenues at Creare, the firm’s spin-offs, and technology licensees to commercialization of Creare SBIR projects. In the last 13 years, Creare itself has averaged about 40 percent of total revenues from Phase III commercialization activities related to past SBIR projects. These activities were primarily in the form of contract development, fabrication and testing of specialized hardware and software. ◀

“We used the Phase III transition plan [developed through the TAP] to put together a “technology integration plan” to get the Phase III contract with Lockheed. The TAP program is truly useful. ... All the companies with Navy Phase II’s, especially the smaller or start-up companies, should take advantage of it.”
– Jay Rozzi

03 Griffin Analytical Technologies, Inc.

Visit Griffin Analytical Technologies online at:
www.icxt.com

► Phase III Success: \$5.7M in government contracts, equity funds, grants and product sales Navy TAP 2006-2007

To go from a small 20 person organization with under \$5M in revenue to a valued subsidiary of a billion dollar company in nine short years is a remarkable achievement.

IT HAS BEEN QUITE A TRIP! Griffin Analytical Technologies (Griffin) began as a small SBIR firm founded in 2001 to commercialize “ion trap” technology that was patented by Purdue University. In late 2005, Griffin completed a merger with DC-based ICx Technologies, Inc. (ICX), which was followed by an initial public offering in 2007. That road led to an acquisition by \$1.5B industry leader, FLIR Systems, Inc. (FLIR) in August of 2010. It has been quite a trip, indeed!

While Griffin’s history is brief, it has been significant. Griffin has moved from its small business origins to its current corporate role as part of the Detection and Protection Division of FLIR Government Systems. FLIR, as a global company, is focused on the design, manufacture, and marketing of thermal imaging and radar surveillance systems, chemical, biological, radiation and explosive detection products, and turn-key integrated sensor solutions to a list of customers that includes U.S. and foreign government agencies and military programs, as well as commercial organizations. Within the FLIR Detection and Protection Division, Griffin operates as FLIR Mass Spectrometry, offering its full range of GRIFFIN™ mass spectrometry systems and accessories.

Back in 2003, Griffin responded to a Navy SBIR to develop a field portable system for chemical analysis. At that time, there were no “fieldable chemical analysis” systems available that could provide real-time monitoring of hazardous compounds in complex samples. The GRIFFIN-proposed field-portable miniature mass spectrometer (MMS) was intended to meet this operational need. Development of this system would transform traditional sample-to-lab analysis to lab-to-sample analysis. The Navy thought that successful development of this concept would provide the ability to conduct high-end chemical analysis in the

field, thereby offering a competitive advantage to U.S. armed forces.

After meeting the Phase II technical milestones, Griffin was awarded a MARCOR Phase III contract of approximately \$1.2M for further development of its field portable units. Griffin also won an Indiana co-grant, which provided an additional \$100,000 for product development. Interestingly, Griffin had an internal policy of supplementing SBIR awards (Navy, NSF, EPA, etc.) with equity funding, which reached a level of \$2.5M in 2005. On the strength of this combined funding, Griffin completed development of its field portable, dual-use design and was able to sell additional GC/MS systems to commercial organizations, environmental monitoring companies, Homeland Security agencies and universities.

GRIFFIN™ mass spectrometers incorporate “cylindrical ion trap (CIT)” technology, which was originally developed at Purdue University and ultimately commercialized by Griffin. This significant advancement in mass spectrometer capability allows for the technology to be “utilized in the field” when it was previously only available in laboratories. Incorporating CITs into field units has reduced the power and vacuum requirements normally associated with laboratory systems while still achieving the analytical performance equivalent to traditional laboratory ion traps. The inherent design has dramatically reduced size of the overall units and provided the ultimate in spectral information through its ability to perform multi-dimensional analysis (MS/MS). MS/MS provides both a first-stage mass analysis to determine if a particular analyte of interest is in a sample and within milliseconds, a second-stage confirmation of the analyte’s identity. Analysis this precise has never before been available in a field-portable GC/MS.

In the fall of 2005, Griffin merged as a wholly-owned subsidiary of ICX, a much larger company

with more than 600 employees and \$100M in investments in surveillance and detection technologies. Griffin continued development and production of its GRIFFIN GC/MS product line as part of the ICX Detection Division.

Field-portable mass spectrometry offered ICX an enhanced detection capability versus the standard laboratory technology for detecting, differentiating and identifying trace levels of chemical compounds in complex chemical environments. Mass spectrometers are uniquely sensitive and accurate. They extract chemical signatures from test samples much more quickly and accurately than is possible with alternative technologies. However, most conventionally designed units were too cumbersome to be deployed outside of the laboratory. As co-founder and president of Griffin, Dennis Barket, Jr., who is now the general manager of FLIR Mass Spectrometry, said, “Where chemical analysis was formerly a lengthy process that required bringing samples to the lab, GRIFFIN mass spectrometer systems have shifted the logistics paradigm from “sample-to-lab analysis” to “lab-to-sample analysis.”

The GRIFFIN line of GC/MS products all utilize an isolation system initially developed under the NAVY SBIR. The isolation system allows the analytical components to resist shock and vibration. This protective system is integrated inside the casing allowing for quick transition in and out of deployable forensic labs, mobile environmental/incident response labs, and CBRNE reconnaissance vehicles. GRIFFIN GC/MS systems are also equipped with Griffin System Software (GSS). GSS contains a simplified graphical user interface, which allows both advanced users and beginners to interact with the GC/MS. The software is mission-specific capable, equipped with method selector tools and libraries.

The FLIR Mass Spectrometry flagship product is the Griffin 460 GC/MS, which can be used for on-site chemical identification. The Griffin 460 contains both an integrated liquid injector and air sampling port. The self-contained system can accept direct liquid injections via syringe or solid phase micro extraction (SPME) fibers. Should users wish to expand the capabilities of the system, the split/splitless liquid injection port easily accommodates a headspace sampler or autosampler. The air sampling module performs direct air analysis via a sampling line or by thermally desorbing samples

from the Griffin™ X-Sorber. Water analysis may also be performed via the Griffin™ Purge & Trap accessory. No other GC/MS in the market has this range of flexibility and ease of use in the field, including both prep and prep-less sample introduction technologies.

In the fall of 2010, FLIR successfully completed a \$268M acquisition of ICX. FLIR Systems, Inc. is a world leader in the design, manufacture and marketing of thermal imaging and stabilized camera systems for a wide variety of thermography and imaging applications. These include condition monitoring, research and development, manufacturing process control, airborne observation and broadcast, search and rescue, drug interdiction, surveillance and reconnaissance, navigation safety, border and maritime patrol, environmental monitoring and ground-based security. Now FLIR also has a full range of CBRNE detection equipment, making it a leader in the Detection and Protection market.

To go from a small 20 person organization with under \$5M in revenue to a valued subsidiary of a billion dollar company in nine short years is a remarkable achievement for Griffin. “It was chiefly through the SBIR program, that we were able to get a foothold in the mass spectrometer market,” said Barket. “Licensing the “cylindrical ion trap” technology from Purdue University was a crucial step, but the SBIR funding, including the assistance provided by the Navy TAP, was the fuel needed to push us forward into successful implementation of this portable technology and subsequently, into these excellent company mergers.” ◀



“The biggest benefit of the TAP for GAT was the detailed process of finding the potential of our technology in the marketplace.”

– Josh Shenk, GAT PI

04 NAVSYS Corporation

Visit NAVSYS Corporation online at:
www.navsys.com

► Phase III Success: Nearly \$4.2M in funding from the ONR and the U.S. Air Force and private sector Navy TAP 2006-2007

New technologies like the Talon NAMATH GPS, which NAVSYS helped to develop, are currently in use in Iraq and Afghanistan.

NAVSYS HAS BEEN PROVIDING high quality technical products and services in GPS hardware design, systems engineering, systems analysis and software design to both government and commercial customers since its inception in 1986. Founded and still led by Dr. Alison Brown, NAVSYS is dedicated to promoting the use of GPS in a wide variety of commercial and military applications. NAVSYS pioneered GPS Network Assistance in the civilian community with key roles in enabling the FAA's Wide Area Augmentation System (WAAS) and the Wireless E911 system, among others. Today NAVSYS is committed to bringing those critical advantages to the military. The company provides specialized GPS products and services for customers through its unique technical expertise, innovative engineering approaches and high standards of excellence. NAVSYS offers services in three primary areas: Global Positioning Systems, Inertial Navigation Systems and Communication Systems.

In 2003, the Navy requested proposals for SBIR Topic N03-182, Integrated Communication Link and Global Positioning System (GPS) for Enhanced, Robust Position Information. The objective of this Topic was to, "Design and prototype a system that will use existing or planned naval communication systems to enhance standard GPS operation by connecting users in line-of-sight environments where GPS signals are partially blocked or jammed." NAVSYS responded with a highly innovative proposal to develop a GPS Network Assisted Positioning system (GPS-NAP).

GPS signals can deteriorate for a wide variety of reasons making the position and time information unreliable for mission-critical operations. In the event of GPS jamming, signals can be totally denied thereby prohibiting guidance and targeting of weapons systems. Network assistance can mitigate many of the causes of GPS signal degradation, but

requires that there be a network connection to the GPS device. As next-generation military communications systems become available, network-assisted GPS links need to be developed to augment GPS-derived position, navigation and timing. This network assistance is needed to enhance both the reliability and precision of the position and navigation information.

For example, the Small Diameter Bomb (SDB) requires precision and reliability beyond that provided by conventional over-the-air GPS signals. Alison Brown, President and CEO of NAVSYS: "While GPS generally provides location accuracies of less than 1 meter, it can be off by as much as 10 meters at unpredictable times. You can imagine, being off by 10 meters with a small tactical bomb can render it useless, or worse, cause catastrophic collateral damage. Network assistance eliminates those excursions, making it much more reliable for mission-critical operations."

After a particularly successful showing in the 2007 Navy *Opportunity Forum*®, NAVSYS was awarded an ONR Broad Area Announcement (BAA) contract valued at \$3.5M for Mine Countermeasures Precision GPS Ephemeris (MCM PGE), based largely on its successful GPS NAP SBIR Phase II demonstration. One of the objectives of this Precise Navigation and Marking Program was to improve the positioning and maneuvering accuracy of Mine Countermeasure (MCM) platforms; specifically those operating in the littorals in support of amphibious operations. This ONR program demonstrated the capability of Mine Countermeasure assets to both mark the location of underwater mines and navigate around them by using network assistance technology. MCM PGE makes it possible to clear narrower lanes through mine fields so that amphibious assault vehicles can get Marine Expeditionary Forces to shore and out of the risk zone faster.

Another capability directly related to GPS NAP is the Air Force NAMATH Program, developed by NAVSYS under a \$3M contract initially with the Air Force TENCAP program and later transferred to the Air Combat Command. The system answered an Urgent Universal Need Statement (UUNS) by delivering precision GPS ephemeris information over tactical data links to improve accuracy for GPS-guided munitions. One of the chief advantages of this approach is that it can provide differential GPS (DGPS) accuracy worldwide without the need for in-area DGPS reference stations. NAMATH replaced a planned DGPS system that was going to cost \$35M plus \$5M per year to maintain, saving the DoD about \$54M to date. The NAMATH system is currently operational in Iraq and Afghanistan.

Why is all this accuracy needed? Primarily for two reasons...to improve the accuracy of the military's tactical weapons such as the Small Diameter

Bomb (SDB) and to reduce collateral damage through greater targeting precision. According to Rick Edwards, NAMATH Program Manager for NAVSYS: "This is especially important in the urban battlefields of Iraq and Afghanistan where implementation of the NAMATH system improves the effectiveness of tactical munitions while minimizing collateral damage."

In one of the company's many other current projects, NAVSYS is applying their Network Assistance concept to Software Defined Radios (SDR). NAVSYS is developing an embedded GPS application called GPS-Lite that can run on a radio in place of a hardware GPS solution to reduce size, weight, power and cost.

In all of these GPS endeavors, NAVSYS Corporation has become a premier provider of innovative navigation solutions. Their efforts were recognized in 2007 when they received a Tibbetts Award for development of the NAMATH Program. ◀

"The Forum was just 1st class! The Dawnbreaker Portfolio Manager did a very good job [throughout the TAP]. He was a straight forward guy, just super."
- Charles Johnson, NAVSYS representative during the TAP



05 Softronics Limited

► Phase III Success: More than \$2M in product sales Navy TAP 2007-2008

We made some excellent contacts through the Forum event but emphasized that current SBIR firms need to focus on a specific business need.

AS NAVY SBIR FIRMS seek to transition their technology to the Fleet, they often run into the issue of pursuing Phase III money relentlessly while perhaps forsaking their company's need for continued technology development. Many firms struggle to balance these Phase III marketing demands against the needs of their on-going technology. One commercialization option is to confront this issue directly and embark on a "spin-off" strategy. Setting up a separate company that can focus exclusively on transitioning the Phase II technology to the Fleet can free the SBIR company to pursue its primary R&D mission. This is especially true when the SBIR firm is awarded a manufacturing contract to set up a production line that involves meeting MILSPEC requirements and ISO-9000 certification demands.

This was, in fact, the strategy pursued by Softronics, Ltd. once it finalized the design of its signal intelligence (SIGINT) product line. The two engineers, who designed and developed the RF tuners and digitizers while at Softronics, Ltd., set up Midwest Microwave Solutions and had the SBIR data rights transferred directly to them. With the assistance of the Softronics team, they undertook the production of these innovative, high performance receiver and RF digitizer products for SIGINT, COMINT, SDR, and ELINT applications. By 2008, the company had sold over \$2M worth of their MSDR-3000 Receiver family to various military customers.

In 2004, Softronics had received an SBIR award for \$599,825 from the Space and Naval Warfare Command (SPAWAR/San Diego) to design, build and flight test a miniature signal intelligence payload for miniature Unmanned Aeronautical Vehicles (UAVs). This technology represented a suite of equipment primarily aimed at minimizing the size of the SIGINT equipment needed for smaller payloads. At that time, current payloads were simply too large, heavy and power hungry to fulfill the needs of

Visit Softronics online at:
www.softronicsltd.com

UAV, UGS, USV and UUV applications. Prior to this Softronics innovation, previous designs required large radios weighing upwards of 125 pounds to transmit large data loads down to surface terminals via the Common Data Link (CDL). Softronics studied the CDL requirements and provided a miniature CDL-compliant datalink transmitter.

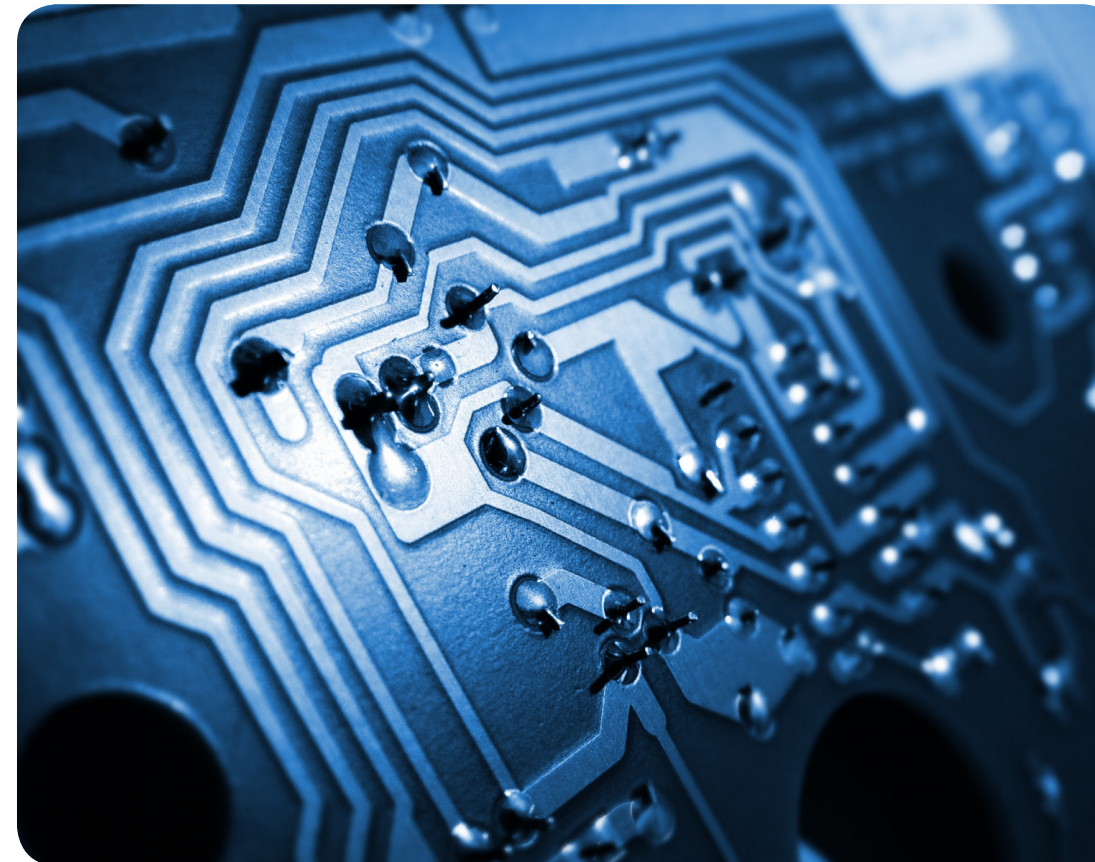
Robert Sternowski, president of Softronics, said, "Once this design was complete, we recognized that the development and implementation of this technology would require a dedicated program team. In order for Softronics to focus on our primary mission as an intelligence provider, we would need to set up a separate company for the design and production of these Miniature Surveillance Digital Receiver (MSDR) systems."

Coincidentally, just as Softronics was completing its CDL miniaturization of the terminal, the Air Force issued a BAA with the same broad SIGINT objectives. Softronics was successful in responding to this BAA with its recently created CDL-compliant datalink; thereby expanding the customer base for these SIGINT products.

The specific Softronics technology is comprised of three separately usable but synergistic pieces of equipment all focused on advanced radio technologies:

» **Wideband SIGINT Receiver:** a 30-2500 MHz SIGINT receiver that provides fast tuning, sophisticated DSP signal analysis and demodulation, and high speed FFT search/alert. GPS-time-tagged samples can be downlinked for geolocation, as well as, further advanced analysis.

» **Wideband Relay:** a 30-2500 MHz relay receives a user-defined frequency bandwidth and center frequency, and linearly retransmits it (with a 1 watt wideband Silicon Carbide power amplifier) at a



All aspects of the Softronics, Ltd. sensor system are very lightweight, small, low power and inexpensive commensurate with use in an expendable UAV or similar FORCEnet sensor application.

separately defined frequency. Intended for "special signals" requiring ground processing, the relay operates identically to a traditional "bent pipe" linear (non-processing) satellite transponder, with the exception that the input and output frequencies are remotely tunable on-the-fly by the user.

» **High-speed Datalink:** a miniature CDL-compliant datalink transmitter provides 10.71 mbps digital communication from the platform to a data collection node. The 15 GHz datalink provides all the features of its much larger, traditional predecessors, and can interoperate with existing CDL-compliant surface terminals.

Regarding the Navy Transition Assistance Program (TAP), Sternowski felt that they made some excellent contacts through the Forum event but emphasized that current SBIR firms need to focus on a specific business need. "SPAWAR did an excellent job in spreading the word throughout the Navy of

our CDL-compliant datalink and was an extremely helpful sponsor," said Sternowski. "However, SBIR firms need to sell jointly to both prime contractors and government agencies in order to communicate the value of their technology. Softronics was fortunate to have a clear business target that related directly to its core competence."

Softronics, Ltd. is a veteran-owned, privately held, small business focusing on the U.S. Government market for advanced radio and SIGINT equipment. Softronics is CCR-registered, DCAA-approved and possesses high-level security credentials and facilities. The staff boasts over 500 combined years of professional experience in radio engineering. The company's in-house CAD allows them to model, simulate and design circuits, printed circuit boards, mechanical components, and firmware/software, with a well-equipped lab for test and verification. Mechanical parts transmit directly from the designer's SOLIDWORKS computer output to our precision CNC machine shop. ◀

► Phase III Success: \$6.5M DARPA contract
Navy TAP 2007-2008

“IT TAKES STAMINA, persistence and vision to be successful in the SBIR world,” according to Sri Sriram of SRICO, Inc. SRICO has certainly been successful since it received a 2006 Navy SBIR award for the development of non-invasive electric field sensors to investigate the susceptibility of complex electronic equipment when exposed to High Power Microwave (HPM) sources. High Power Microwave is a form of directed energy weapons system, which use electromagnetic radiation to deliver heat, mechanical, or electrical energy to a target to cause pain or permanent damage. HPMs can be used against humans, electronic equipment and military targets depending on the technology.

The Program of Record for this SBIR is the Joint Non-lethal Weapons Program chaired by the Deputy Commandant of the Marine Corps for Plans, Policies, and Operations. The purpose of this Program is to provide warfighters a family of non-lethal weapon systems with a full spectrum of threats and crises. Non-lethal weapons are defined as “weapons, devices and munitions that are explicitly designed and primarily employed to immediately incapacitate targeted personnel or materiel, while minimizing fatalities, permanent injury

Dr. Sri Sriram has been the recipient of four R&D 100 Awards, two with SRICO and two from prior projects.



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to personnel and undesired damage to property in the target area or environment. Non-lethal weapons are intended to have reversible effects on personnel and material.”

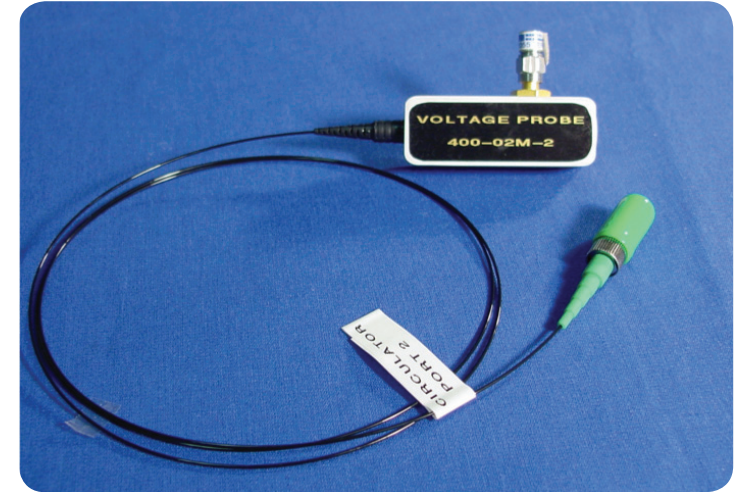
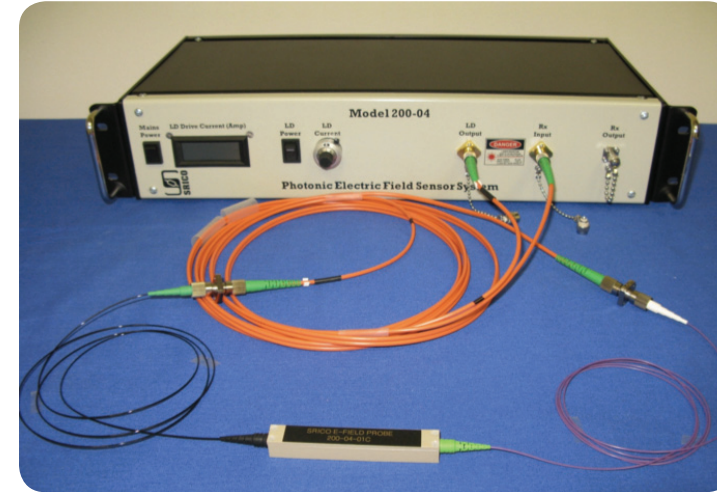
As a result of the development of these new HPM weapons, new instrumentation to measure the HPM effects for both development and protec-

The SRICO sensor eliminates the use of an antenna or metal connections that can interfere with accurate measurement and characterization of the electromagnetic environment.

tion are needed as well. New probes that sense the horizontal and vertical components of the electric field inside a target over the full frequency range are required. Since the electromagnetic wave front changes as it propagates inside a target, miniature dielectric probes that can be installed inside a target must be developed.

SRICO has been developing its photonic electric field sensor technology for over 20 years with a goal of dramatically improving sensor performance. Commercially available lithium niobate electro-optical sensor probes are currently limited to about 100 milli Volt up to a maximum frequency of 10 GHz. Improved materials, new sensor designs and innovative manufacturing techniques are needed to achieve upwards of 100 GHz performance.

Better ferroelectric materials have the potential to dramatically enhance the capabilities of optical waveguide electric field sensor probes for use in Directed Energy and High Power Microwave (HPM) test environments. The SRICO sensor eliminates the use of an antenna or metal connections that can interfere with accurate measurement and characterization of the electromagnetic environment.



“The marketing that Dawnbreaker does [during the TAP] is very valuable.”

– Sri Sriram

The complete instrumentation system includes laser source, optical receiver, and the electric field sensor component.

The NAVAIR TPOC, Kelly McDonald, worked diligently to open doors for SRICO in the Air Force, Marine Corps and NAVAIR, eventually securing NAVAIR 2.5 SBIR funding. This led to the sale of four Photonic Electric Field Sensors for a total of \$200K. On the strength of their Phase II performance, SRICO began marketing its sensor concepts to other government agencies.

As a result of its persistence and vision, SRICO was successful in securing a \$6.5M DARPA BAA award for further sensor development (Phase III funding of its NAVAIR technology). Sriram said, “Over 20 years ago, I had the vision that new types of electro-optic sensor designs and improved materials would be needed for E-field measurement over a wide frequency range, with extremely high-sensitivity. It was our perseverance through many technical challenges that allowed us to eventually secure this substantial DARPA contract.”

SRICO specializes in the design, development, manufacture, and worldwide marketing of high performance integrated optical components and subsystems for optical signal transmission, sensing,

and measurement applications. Since its founding in 1990, the company has been involved in cutting-edge scientific and engineering research and product development with a view to meeting future global demand for high performance, high speed, small size, low cost optical chip-based components. SRICO provides technology and product development services to both government and industry and does custom product design for clients worldwide.

The company has significant expertise in the design and development of advanced photonic electric field and voltage sensors, from very low to very high frequency requirements, for a variety of military and civilian applications. SRICO has won two prestigious R&D-100 Awards for its innovative sensor products and currently has seven patents. In addition to sensing and measurement applications, the company also specializes in high performance photonic components and optoelectronic subsystems for signal transmission in optical communications networks. SRICO products include wideband photonic e-field and voltage sensors & systems; all-optical electrophysiological (EEG & EKG) sensors; high-speed electro-optic modulators; periodically poled lithium niobate (PPLN) devices; frequency converters; and fiber optic links. ◀

07 Techno-Sciences, Inc.

► Phase III Success: More than \$70M in SPAWAR contracts Navy TAP 2006-2007

The TAP helped us take a hard look at who we are and what we were offering just as we began playing in the big leagues, and helped us to refine our technology transition and business plans accordingly.

– Kurt Kacprzyński, vice president of TSi's Trident Division

TECHNO-SCIENCES (TSi), a 36 year old high-technology company headquartered in Beltsville, MD, has extensive experience with the Navy, NASA, ARL, NRL and many other government organizations. It is primarily focused on four main technology sectors: Systems engineering, Aerospace engineering, Search and Rescue systems (COSPAS/SARSAT), and Trident integrated maritime operations management and information systems. This last sector provides shipboard and shore stations with information gathering, processing, management, and display systems to enhance Maritime Domain Awareness.

It is in this latter category that Techno-Sciences was successful in securing Phase III funding in excess of \$70M under multiple Integrated Maritime Surveillance Systems programs managed by PMW-740. These systems incorporate communications management technology developed in support of the Special Operations Command SBIR SOCOM02-006. The kernel of their success was the maturation of their "Bridge Communications System" that was designed to provide an automated system to manage various forms of data communications (voice,



email, images, etc.) through existing onboard communications channels.

Military radios generally use secure DoD networks to communicate with specified command centers. Often such communications are conducted via voice-based systems. To obviate this need for "active" attention, the ability to automatically send and receive data seamlessly through secure military radios was a necessity identified across DoD. Initially secure radios were used only for voice communications and did not have the functionality to communicate text messages or images. While proprietary software was available to send emails over a satellite link, it required substantial manual intervention on the part of an operator. Techno-Sciences overcame these limitations with its integrated Bridge Communications System (BCS) which provided automated data exchange from on-board systems without tying up a "live operator". In remote locations, crews needed an automated system that would manage their outgoing communications while providing them with command activities pertinent to mission critical data.

Specifically these systems were targeted at small combat crafts (11 meter range) known as Rigid Hull Inflatable Boats (RHIBs) deployed in remote locations. Beyond the automated capabilities, these RHIB based units also needed to be sufficiently "ruggedized" to withstand the harsh environments (high shock, high heat, possible flooding). Providing this capability was the essence of TSi's BCS concept.

TSi successfully matured and transferred the core communications management technology from this initial SBIR program to automatically relay target track data, radar and camera imagery, and text communications between afloat and ashore sensor nodes and central command centers in comprehensive Integrated Maritime Surveillance Systems (IMSS). On the strength

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of its technical accomplishments, beginning in October 2006 and continuing over the next two years, Techno-Sciences was awarded four sole source SPAWAR contracts, ultimately totaling in excess of \$70, to provide, install, train and support IMSS for Indonesia and Malaysia to combat piracy and terrorism. In Indonesia this system provided a network of eighteen shore-based coastal surveillance stations, eleven ship-based sensor and communications packages, and four regional and fleet command and control centers spanning the Indonesian coast along the Strait of Malacca and the Sulawesi Sea. In Malaysia it provided eight coastal surveillance stations and a regional command center to monitor the eastern coast of Sabah on the Sulu and Sulawesi Seas.

Indicative of the significance of this deployment, Admiral Mike Mullen, the current Commander of the Joint Chiefs of Staff, who was then the Chief of Naval Operations, said that, "Coordinated operations by Indonesia, Malaysia and Singapore to counter piracy and terrorist movements around the Strait of Malacca—clearly a model maritime network." This concept fit nicely into the "1,000 ship Navy" being advanced by the U.S. Navy at that time wherein vessels and related naval assets from different countries would work together to keep order on the high seas. Mullen further stated, "I believe an international '1,000 ship Navy,' offers a real opportunity to increase partner nation capabilities while reducing transnational crime, WMD

TSi overcame existing technology limitations with its integrated Bridge Communications System, which provided automated data exchange from on-board systems without tying up a live operator.

proliferation, terrorism and human trafficking."

TSi is proud of the fact that these SPAWAR contracts and that TSi's product line grew out of a Special Operations Command SBIR that started as a modest Phase I contract and grew into multiple multi-million dollar Phase III contracts and other related awards; a classic SBIR commercialization success story. Although they received no Plus-Up money, TSi still made a point of notifying their local Congressional representatives and Small Business



TSi's "Bridge Communications System" was designed to provide an automated system to manage various forms of data communications through existing onboard communications channels.

offices of their SBIR successes, letting them know the impact SBIR has had on the local community.

While TSi's participation in the 2007 Navy Forum itself did not lead to any direct contracts, it provided substantial visibility across Navy Program Managers and prime contractors for this relatively small 80 person company. "The biggest value that the Transition Assistance Program provided Techno-Sciences was the honing of our message for our capabilities brochure and the assistance provided us in defining ourselves as an 'innovation in engineering' company," said Kurt Kacprzyński, vice president of TSi's Trident Division. "It helped us take a hard look at who we are and what we were offering just as we began playing in the big leagues, and helped us to refine our technology transition and business plans accordingly. The TAP program was helpful in providing experienced resources to guide us and push us when necessary. Dr. Jenny Servo's *Business Planning for Scientists and Engineers* book that we used during the TAP has been borrowed from my office more times than I can count." ◀

08 Trident Systems, Inc.

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► Phase III Success: \$4M from the Navy and Marine Corps and a \$20M IDIQ from SOCOM Navy TAP 2006-2007

Trident Systems, Inc. has been in business for over 20 years and has products that are currently deployed with the U.S. Army and Marine Corps Forces.

"FLEXIBILITY IS THE KEY...don't rely on the expectation that prime contracts (or Programs of Record) will necessarily provide Phase III funding, but listen to what your SYSCOM really needs!" That is the recommendations from Mike Casey, Director of Business Development at Trident Systems, successful recipient of a \$20M Special Operations Command Phase III IDIQ.

"SBIR firms need to be especially tactical in assessing what the Navy and other military branches need in the search for end product solutions," said Casey. "In our case, the SOCOM requirements were emerging and we needed to be flexible and agile in our response to their changing needs."

Casey's advice, which comes from the vantage point of more than two decades in the defense market, could be very helpful to SBIR firms in search of Phase III funding. Meeting the Phase II technical specifications is the minimum expectation that most SYSCOMs have for their sponsored projects.



Essentially, they are looking for end-point solutions that may bring together several Navy requirements into a more robust solution. That is what Trident Systems realized in addressing the NAVAIR sponsored SBIR to provide "enhanced image capture and transfer capability."

From the initial SBIR solicitation, it was clear that there existed theater mission needs to support persistent information and intelligence collection in denied areas. Naval Expeditionary Forces and Special Operations Forces (SOF) lacked the technical means

"The biggest value for this company was the way that the TAP program made us focus on the market and the product. Based on our TAP experience and the Navy Opportunity Forum, we would recommend this Navy sponsored program to other small businesses currently in the SBIR program."

to enable persistent intelligence, surveillance and reconnaissance (ISR) in a timely manner. Critical information was not being rapidly relayed to decision makers, actionable intelligence and preemptive cues were not available due to "stove piped" systems that were not properly networked or optimized. The overall Navy need addressed by the Trident Systems technology was the ability to deploy and maintain a persistent, clandestine, and unattended network of sensors in regional conflicts.

Trident was quick to recognize that this was essentially a "communications issue"—the need to rapidly get the data from the enhanced network to the proper ISR operator. There was already a process in place for gathering intelligence, surveillance and reconnaissance information from tactical locations. The majority of intelligence is collected



Trident Systems

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by National Technical Means (NTMs). One of the challenges was to complement the strategic collection by the NTMs with more rapid communications of the ISR information to the appropriate decision makers. The Trident approach focused on optimizing the wireless radios within environmentally hardened but miniaturized form factors. Transporting the information from the ground sensors to the end users provided the endpoint solution being sought by the Special Operations Command.

While there were a variety of network sensors and data nodes (low data rate, high data rate, as well as a Wireless Node Controller) needed under this SBIR, it turned out that the overall schedule was the main issue of concern to SOCOM. Trident Systems, Inc. was successful in meeting the timetable and sensor specifications of SOCOM and received a \$20.3M IDIQ contract. They have fulfilled thirteen delivery orders against this IDIQ. Additionally, Trident Systems was awarded a \$3M contract from the Marines, as well as a \$1M from the Navy to develop additional communication links.

Today, Trident's family of hand-deployed unattended sensor products are optimized to meet persistence, environmental (MIL-STDs 810F, 461E), and transportability needs and can be deployed as an independent system or integrated into existing systems for a variety of tactical surveillance and force protection scenarios. The company's core

competencies include Systems Engineering, Custom Hardware Design and Manufacturing Oversight and Software Development. Headquartered in Fairfax VA, Trident also has facilities in North Carolina, Pennsylvania, Washington and California—employing a total of more than 140 employees.

Although Trident Systems, Inc. has been in business for over 20 years and has products that are currently deployed with the U.S. Army and Marine Corps Forces, Casey felt that the Transition Assistance Program and the Navy *Opportunity Forum*® were valuable experiences for the overall organization. "The biggest value for this company was the way that the TAP program made us focus on the market and the product. Based on our TAP experience and the Navy *Opportunity Forum*®, we would recommend this Navy sponsored program to other small businesses currently in the SBIR program," he said. And as far as additional advice for an SBIR firm as it moves through the channels to Phase III, "In concept, incorporation into a Program of Record (POR) or adoption by a prime contractor is a logical objective of a Phase II initiative," said Casey. "However, SBIR firms need to be vigilant in their pursuit of the true 'end product' being sought by the Navy. Needs are constantly changing and may be evolving to a more sophisticated requirement throughout the three year SBIR time frame." ◀

"SBIR firms need to be especially tactical in assessing what the Navy and other military branches need in the search for end product solutions. In our case, the SOCOM requirements were emerging and we needed to be flexible and agile in our response to their changing needs."

► Phase III Success: Nearly \$3M in government contracts and \$10M IDIQ contract from NAVSEA Navy TAP 2006-2007

SINCE THE EARLY 1980S and even more so since the tragic events of Sept. 11 2001, Weidlinger's Associates engineers have used internally developed software to provide timely and accurate support for blast vulnerability assessments, blast-resistant design and forensic investigations of terrorist attacks. This background led the firm's engineers to address the Navy's need for a non-explosive solution to their full ship shock testing requirements. By Congressional mandate, the U.S. Navy is required to conduct a full ship shock test (FSST) on each new class of ship used in combat. Ships must be able to withstand the effects of underwater explosions (UNDEX) as part of their design integrity. These tests have been traditionally done using high explosives, which cost upwards of \$30M per certification. upwards of \$30M per certification. A major part of this expense is the movement of the warship to an isolated location that is then monitored by helicopters and other surface vessels to prevent disruption or interference during the actual shock tests. As can be imagined, environmental groups have raised objections to these explosive tests due to their negative impact on area sea life.

Weidlinger Associates was successful in developing and patenting a non-explosive alternative to this Navy live fire approach using an array of air guns to simulate the effects of shocks associated with the underwater explosions. The array is charged using high-pressure gas which is released very rapidly producing a high intensity acoustic wave in the water. A tunable array of air guns of different sizes can be fired both simultaneously or out of phase to produce a very controlled and repeatable shock to the ship. Under these conditions, these tests can be conducted in virtually any location - a naval yard or a dockside environment - thereby eliminating the need for the ships to be moved to a fire-controlled area. By conducting

these tests in a non-remote environment, this air gun approach has both eliminated the expense of the attendant vessels as well as reduced the environmental impact of the live fire conditions.

Raymond Daddazio, president and CEO of Weidlinger Associates, said "These live fire tests take upwards of 4-6 weeks to conduct and require detonation of 10,000 to 40,000 pounds of high explosives. While these tests had an excellent safety record, they did raise concerns regarding their environmental impact. Our air gun approach has virtually eliminated the environmental issues while saving the U.S. Navy considerable expense by eliminating the need to transport these ships and crews to a controlled location."

In Weidlinger's method, high-pressure shock pulses that emanate from air reservoirs are generated very close to the vessel to induce a ship response similar to that produced by explosives. They produce an analogous test for a fraction of the cost of conventional tests. Air guns pose little risk to personnel and property, or fish and sea mammals, because the source is less severe and the energy goes directly into the ship's structure rather than into the environment. The only by-product is the air that powers the air guns. Tests can be completed within the Naval base environment in a small fraction of the time needed for explosives tests, since costly and time-consuming travel to distant sites is no longer necessary.

Based on the success of this air gun approach, Weidlinger Associates was awarded a Phase III IDIQ contract (Five year-\$10M contract) by NAVSEA for further development of their technology; along with congressionally directed funding for \$2.6M. Additionally, the Office of the Secretary of Defense, Director Operational Test & Evaluation (OSD/ DOT&E) jointly funded a demonstration of this approach with the United Kingdom Ministry of Defence

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using one of UK's decommissioned ships. Based on the success of this demonstration and the congressional funding, the Navy was successful in budgeting \$117M for the execution of a comprehensive program, beginning in FY11, to develop and validate an alternative approach to full scale shock trials. As one can imagine, many operational elements need to be addressed along with the legislative issues to accomplish this significant transition from explosive testing. The Navy is pursuing a combined approach of computational structural mechanics modeling coupled with this air gun testing to assure the results are providing the full shock assessments required to meet the Navy's requirements. The Navy estimates a savings of \$159M in T&E avoidance in its 30 year shipbuilding program.

Regarding the value of the Navy Transition Assistance Program (TAP), Daddazio stated, "I think the real value of the TAP was the opportunity it provided to really sit down and focus on the steps to

get to a TRL 8/9 level of performance. That exercise was extremely useful for developing the Narrative Briefing documents and Quad Chart for the Navy *Opportunity Forum*®. The Navy provides SBIR companies with an excellent Forum that is structured around a valuable 15 minute presentation that can be used after the event for briefings with parties interested in the technology."

Weidlinger Associates is a structural engineering firm of 300 employees generating \$63M in 2010 revenue. For more than 60 years, Weidlinger Associates has been known for its professionalism, innovative solutions and diversified practice. Much of Weidlinger's software was developed to support contracts with the Department of Defense. It is clear that these defense oriented technologies also play an important part in providing protection to civilian buildings, bridges and infrastructure which are as vulnerable to attacks as any military installation or Navy warship. ◀

"The real value of the TAP Program was the opportunity it provided to really sit down and focus on the steps to get to a TRL 8/9 level of performance. That exercise was extremely useful for developing the Narrative Briefing documents and Quad Chart for the Navy *Opportunity Forum*®." - Raymond Daddazio, president and CEO of Weidlinger Associates



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