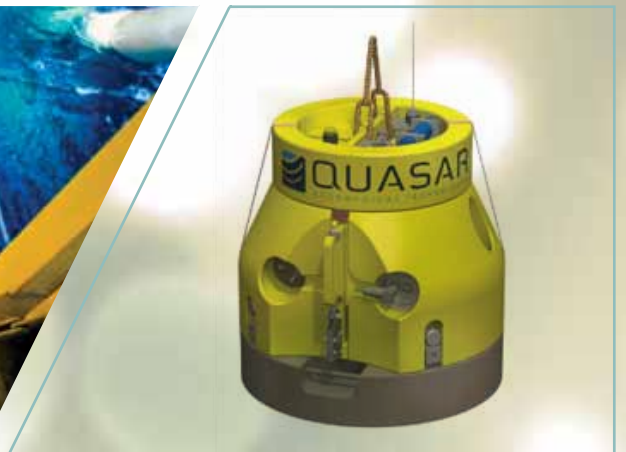
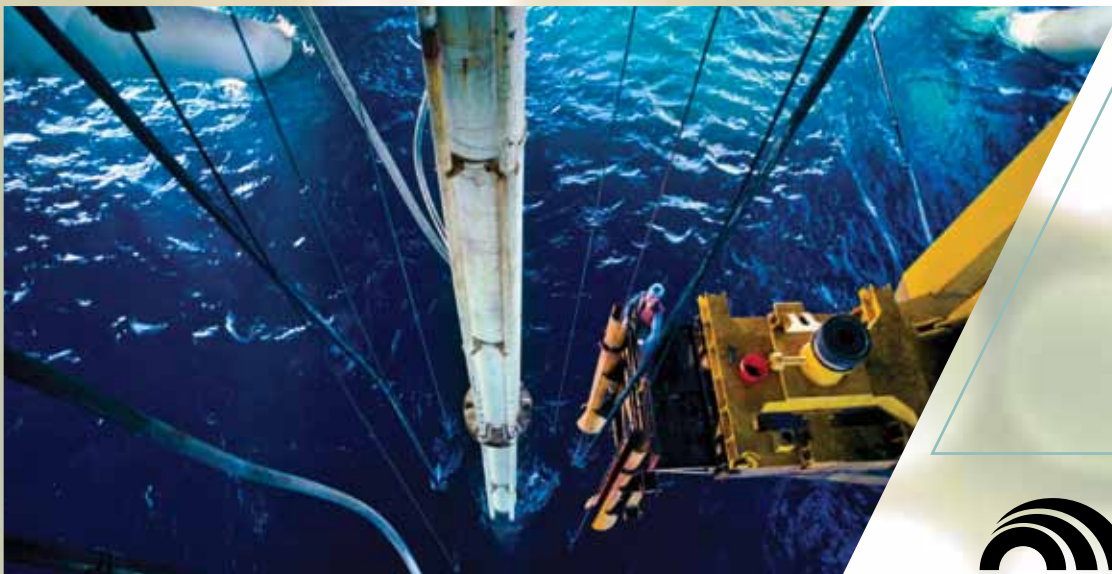


PROFILES

IN SUCCESS

FALL 2010



DAWNBREAKER[®]
The Commercialization Company

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NAVY TAP

The Navy Transition Assistance Program (TAP) is a competitive program designed for, and offered exclusively to, the Navy SBIR/STTR Phase II awardees. The TAP, an evolving 11 month program, assists small business participants with market research, Phase III strategies and development of other appropriate tools, all geared to accelerate the transition of their technology.

Companies that complete the TAP can then present their projects to hundreds of government agencies, contractors, investors and other private sector companies in attendance at the Navy *Opportunity Forum*[®]

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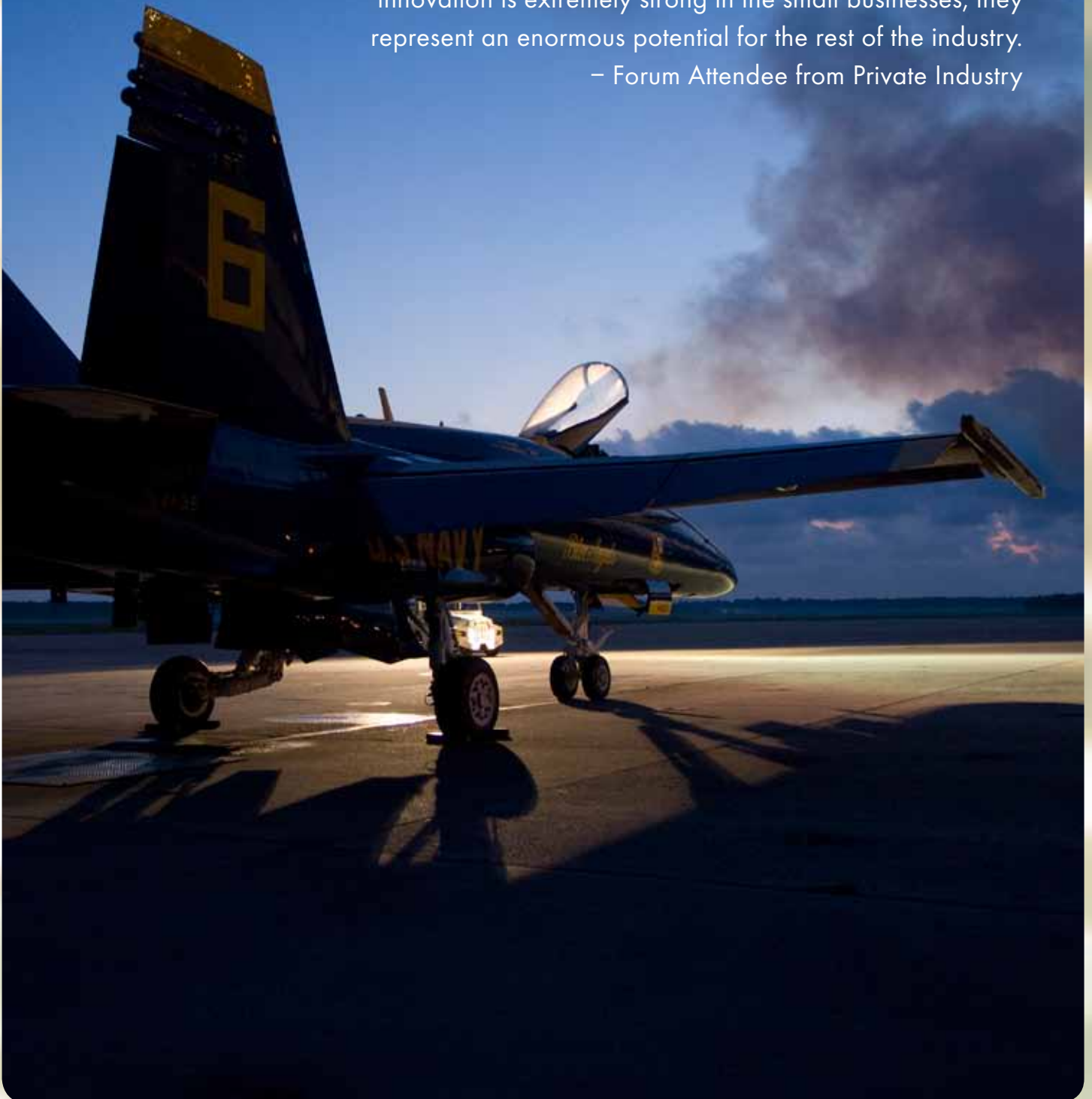
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The Forum is very important and valuable event both to the primes/industry and the small businesses. Because innovation is extremely strong in the small businesses, they represent an enormous potential for the rest of the industry.

– Forum Attendee from Private Industry



FROM THE EDITOR

This issue celebrates the achievements of 10 companies that participated in the 2007-2008 Transition Assistance Program (TAP) and one company that participated in the 2005-2006 TAP. The TAP is sponsored annually by the U.S. Department of the Navy's Small Business Innovation Research (SBIR) Program Office and continually evolves in order to achieve the goal of more rapid transition of SBIR and Small Business Technology Transfer Program (STTR)-funded technology into the fleet. The methodology used by Dawnbreaker in working with participating firms is highly interactive and is focused on developing specific tools, opportunities and relationships that will facilitate transition. Companies that participate in the TAP are then invited to present their technology to potential customers, partners, and investors at the Navy *Opportunity Forum*®.

Since 1990, Dawnbreaker has had the pleasure of assisting more than 4,200 SBIR and STTR funded firms. By collecting data from participating firms at 6, 12 and 18 months following the Navy *Opportunity Forum*®, Dawnbreaker is able to monitor the results of participation in our Phase II program. On average, 50 percent of Dawnbreaker clients receive private sector financing within 18 months following the development of business plans with our assistance, and a comparable percentage receive Phase III funding after participation in the Transition Assistance Program [TAP].

The 2007-08 TAP saw the participation of a combined total of 224 companies. Companies presented in this issue of Profiles in Success are a subset of the 19 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, contracts from prime contractors, corporate acquisitions and Congressional funding.

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 economic downturn.

A handwritten signature in black ink that reads "Jenny C. Servo". The signature is fluid and cursive, with the first name "Jenny" being the most prominent.

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

01

Accurate Automation Corporation

Visit Accurate Automation Corporation
online at:
www.accurate-automation.com

► Phase III Success: More than \$5M in contracts from the Navy and a major Prime Contractor.

Since its founding in 1985, the company has been awarded 14 Navy SBIR Phase II awards, with many successfully transitioning to Phase III.

THE U.S. NAVY has a roadmap which provides a vision for future development and deployment of Unmanned Surface Vehicles (USVs). According to the Navy Unmanned Surface Vehicle Master Plan, "USVs will augment current and future platforms to deliver enhanced steady-state and surge capability. This will help to deter the enemy on regional, trans-national, as well as global fronts. USVs are highly automated to reduce communication/data exchange requirements and operator loading. They will deploy and retrieve devices, gather, transmit, or act on all types of information, and engage targets with minimal risk or burden to U.S. and Coalition Forces." Although the master plan identifies a goal of 2020 to, "develop and effectively meet the Navy's strategic planning and Fleet objectives and the force transformation goals

of the Department of Defense (DoD)," Accurate Automation Corporation with its collaborators has a head start on the competition, and is well positioned to make a meaningful contribution to the country's national defense efforts.

Accurate Automation Corporation, headquartered in Chattanooga, Tenn., is a high-tech developer of intelligent systems for control and signal processing. The company was founded in 1985, and has been building unmanned systems since its inception. During that period of time, the company has won 14 Navy SBIR Phase II awards—many of which have successfully transitioned to Phase III. According to Robert Pap, co-founder and president of Accurate Automation Corporation, his company, "serves as a showcase for the Small Business Innovation Research (SBIR) program by demonstrating that small business holds the key to future technological growth in the United States." Although Accurate Automation Corporation has had many SBIR successes, one of their most successful projects was topic number N04-128, Unmanned Surface Vehicle Autonomous Maritime Seaway Navigation.

The Office of Naval Research (ONR) originally sponsored this SBIR topic because they understood that the Navy would use USVs to perform various missions in the future. Specifically, they wanted to develop a USV capable of stable performance in an ocean environment while transiting over some distance to reach their mission area, and then perform additional maneuvering or stationkeeping while executing the mission. To perform these actions, the USV would require an autonomous system on-board the USV to assist the craft in navigating through waves, optimizing course and speed to maximize fuel efficiency. It would have to have reliable power available and be immune to various environmental conditions.



Leveraging more than 15 years of experience in building unmanned aircraft, Accurate Automation Corporation developed a USV that uses an adaptive control system that is Joint Architecture for Unmanned Ground Systems (JAUS) compliant. According to Mr. Pap, "Using an adaptive control system instead of a rigid algorithm allows us to have a learning algorithm." Their USV also takes advantage of network centric communications and can survive hostile electronic attack. Collectively, these approaches allow their USV to navigate autonomously while avoiding obstacles. Other technical features include, "their anti-porpoising detection and compensation system, real-time telemetry and data acquisition, and unique capabilities such as intelligent wave navigation, multi-ship operation, formation and automated launch and recovery."

The company found success with this topic rather quickly – they found their customer while at the Navy *Opportunity Forum*[®]. As with other participating TAP companies that year, Accurate Automation Corporation presented their solution at the 2006 Navy Opportunity Forum. According to Mr. Pap, "While we were at the Forum an admiral came around and asked if we were ready for prime time. After a brief discussion, he made a phone call to ONR, and someone came to look at our USV. They then volunteered to use us for a transition to Navy Expeditionary Combat Command, which was a big Phase III." Pap said that the successful commercialization of this technology was primarily based on two factors: the company's ability to develop and demonstrate an innovative approach to USVs and successfully completing the Navy TAP. "The TAP, the Forum and Dawnbreaker staff made this success a reality. There is no way to fully thank them for all that they have done and continue to do," said Pap.

Based on the success of this and other SBIR topics, Mr. Pap has been able to grow his company. However, he is most proud of what his team has accomplished by delivering complete USVs



to the warfighter. To date, Accurate Automation Corporation has delivered more than a half dozen USVs, with more in production. The company recently received a letter of commendation from the undersecretary of defense for coalition warfare. "This letter recognized Accurate Automation Corporation for something that was above and beyond the call of duty, and it is very special to us," Pap said.

Additional funding has been provided by Quick Reaction Funding (QRF) from OSD and using the USV's as testing platforms from experiments in "Dynamic Engine Stopping Experiments" for NRL. Accurate Automation and Naval Surface Warfare Center at Dahlgren used an ocean racing hull to demonstrate the Naval Expeditionary Overwatch (NEO) USV with the Gunslinger payload for a Limited Military Utility Assessment (LMUA).

"Key parts of the success in the NEO USV are working with the Navy Labs and primes. Do not be afraid to have other technologies involved in the testing. The LMUA had real naval operators as users of the technology with their ideas exposing potential blemishes that needed to be addressed before becoming a real program. In addition, other SBIR companies as collaborators allow for additional intellectual capital in the evaluation. It takes more than one Phase II to make it to Phase III and all the Phase II's do not have to be from your company." ◀

Successful commercialization of this technology was primarily based on two factors: the company's ability to develop and demonstrate and innovative approach to USVs and successfully completing the Navy TAP.

02 Advanced Technology & Research Corporation

Visit Advanced Technology & Research Corporation online at:
www.atrcorp.com

► Phase III Success: \$2.1M in government funding.

The ATR system is intended for safe recovery of fixed wing UAS in the 100-500lb range, and is designed to be compact and modular, allowing for easy storage aboard smaller vessels.

UNMANNED AERIAL SYSTEMS (UAS) are becoming increasingly successful in their deployment for land-based forces in the Middle East and around the world. UAS have been used for tracking of key militants in remote areas as well as being used to launch missiles on enemy locations. Given their unmanned nature, UAS have the distinct advantage of not putting U.S. personnel at risk, and they bring an additional advantage of providing extended “fly time” for intelligence, surveillance and reconnaissance missions. Land-based systems vary in size from the hand-launched Raven, to larger tactical units (RQ7 Shadow, RQ-8 Fire Scout) and up to the largest systems, which include the ocean-crossing Global Hawk and the weaponized Predator-B “Reaper,” known for combating insurgents in Afghanistan and elsewhere.

However, adoption of UAS for use aboard Navy ships is not as advanced as in land-based applications, largely due to the challenges of launch and recovery (L&R) at sea. While pneumatic launchers can serve to put fixed wing UAS into flight, recovery is extremely problematic. No ships other than aircraft carriers have runways, and the small flight decks of other “aviation-capable” Navy ships are suitable only for Vertical Take-off and Landing (VTOL) vehicles. In addition, one must deal with the significant velocities of the UAS relative to the ship, the proximity of ship superstructure and personnel to the landing zone, turbulence from the ship’s airwake, wind gusts and potentially large sea-induced deck motions.

Advanced Technology & Research Corp (ATR) addressed these issues with its ONR-sponsored SBIR entitled “Stable Platform Module for Ships (N04-225).” Their “macro-micro” technology features a “macro” robotic arm to position a UAS capture de-

vice over the side of the ship and out of the strongest turbulence induced by the ship superstructure. The end of the arm is stabilized against ship motion to offer a stable target for the UAS. The UAS is captured by a “micro” mechanism that adjusts for UAS tracking errors on approach, acquires the UAS by means of a cable catching a hook mounted to the top of the UAS, and then controls cable pay-out and tension to achieve a graceful arrest. The system is intended for safe recovery of fixed wing UAS in the 100-1000 lb. range and is designed to be compact and modular for easy storage aboard smaller vessels.

While ATR was successful in achieving TRL 4 on some parts of its system by the completion of its Phase II, additional funding was needed to develop other parts of the system and to build a demonstration model of the full system at a useful scale. Their breakthrough came from DARPA, which had a long-term vision for shipboard launch and recovery systems capable of handling large fixed wing UAS (upwards of 1,000 lbs). While this DARPA vision, dubbed “SeaCatcher,” had somewhat different design objectives, the ATR approach to UAS recovery offered a promising approach for handling much larger UAS as well. Through a DARPA “Seedling” project in 2007, ATR was first provided \$500,000 in funding in support of this Navy Phase III development effort.

Serendipitously, full scale for a system geared to the mid-size UAS of interest to the Navy today is roughly the same size as a reduced-scale Advanced Technology demonstrator (ATD) version of the SeaCatcher system. A SeaCatcher ATD thereby provides a vehicle to demonstrate the viability of L&R technologies deployable in the mid-term as well as the long-term.

In 2009, ATR was awarded a contract under a DARPA Broad Agency Announcement (BAA) to focus on the design, build and testing of the “macro

arm” part of its recovery system. The objective of this \$1.6M effort is to prove that the end of a large-scale robotic arm fixed to a ship moving under elevated sea states could be controlled well enough to hold an end-mounted UAV capture mechanism stable. Additionally, it will demonstrate a robust structure able to sustain the forces of high accelerations during UAV launch and recovery.

Eric Rees, the Chief Operating Officer for ATR, cited the fact that the Navy SBIR companies need to explore every avenue available to them when searching for Phase III funding. Rees: “The Navy *Opportunity Forum*[®] was a very successful event for ATR. The traffic at our booth from Navy PMAs/PMSs/PEOs and prime contractors was strong. We were able to build on the information in our formal presentation and engage in wide-ranging conversations about the Navy’s unique needs and desires for UAS operations.”

Additionally, Rees recommended getting to know Congressional representatives to help build awareness of your company’s technology development efforts. Having recently relocated ATR to Columbia, Md., Dr. Jackson Yang, ATR’s Owner, President & CEO, and Eric Rees, took the opportunity to introduce the company to its new Congressional representatives. “It was not so hard to get time with Congressional offices to discuss exciting new initiatives that are relevant to defense stories appearing regularly in the headlines,” said Rees. “Your home state delegation is an important resource that many SBIR companies could utilize more frequently to build awareness and interest in their company, technologies and job-creation potential.”

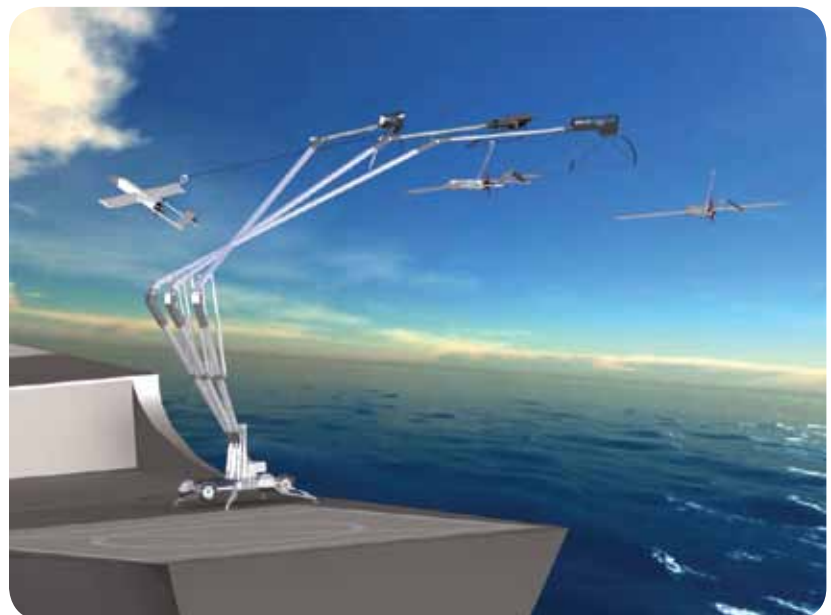
ATR is a well-established engineering-focused company with over 30 years experience in defense contracting, with emphasis on the U.S. Navy. In ad-

dition to its engineering services forte in weapons effects analysis, modeling and simulation, the company has two decades of experience in the development and production of automation and robotic systems for military and industrial applications. The company develops its control software based on a particular methodology and toolset ideally suited for the integration of multiple technologies and systems to address complex problems such as ship-based launch and recovery of UAS.

ATR is the principal developer of control systems for Oceaneering International in ONR’s Large Vessel Interface Load-On Load-Off (LVI-Lo/Lo) program, which involves ship motion compensation to enable the transfer of cargo containers between ships while underway in high sea states. ATR has primed government-customer automation system R&D and manufacturing programs up to the \$10M range. ◀

“Your home state Congressional delegation is an important resource that many SBIR companies could more frequently utilize. This group can assist a firm in building awareness and interest in their company and their technologies.”

— Eric Rees



► Phase III Success: More than \$3.3M in product sales.

"The Navy Opportunity Forum® and the Transition Assistance Program were excellent networking opportunities, which provided quite a few leads."
— Brian Peterson

ONE OF THE PRINCIPAL OBJECTIVES of the Navy SBIR/STTR Program is to stimulate small company technology development and to foster commercialization of the resulting technology. As stated in the SBIR/STTR Overview:

"The Navy's SBIR/STTR Programs are primarily mission oriented, providing companies the opportunity to become part of the national technology base that can feed both the military and private sectors of the nation. To that end, the Navy incorporates into its Phase II component, the emphasis on the small business' need to market its technology to both military and private sectors."

Given this underlying philosophy of marketing to both the military and private sectors, the Navy SBIR/STTR Program has provided many companies with early development funding that allowed them to gain a foothold in the market and then successfully transition its technology to the private sector. This initial funding allows companies to establish a "proof of concept" (Phase I) and achievement of a sufficient Technology Readiness Level of 4-5 (Phase II) to secure additional Phase III funding; generally from the Prime Contractors or private sector.

This is exactly the scenario experienced by Concepts Research Corporation with its microchip laser development. In 2005, Concepts Research responded to a NAVAIR solicitation targeting replacement of the existing fuze technology which was over 20 years old and rapidly becoming obsolete. The target platform for this "microchip laser" was the Navy AIM-9X Sidewinder Missile Block II upgrade to improve the missile performance. A new microchip laser design was needed with increased energy output and additional system bandwidth. The specific technology addressed the redesign

of the "active optical target detector" that uses reflected laser energy by the microlaser to detect missile targets.

Concept Research proceeded to develop a miniature opto-electronic packaged solid-state laser producing high pulse rates and sub-nanosecond pulses capable of kilowatt peak powers. One of the key elements in this redesign related to the manufacturability of these extremely small devices (one to two millimeters long). Implementation of a well-defined manufacturing process was needed to produce the technology in the volumes required to meet the customer's requirements.

The Navy and Raytheon provided the initial funding to underwrite the manufacturing processes and provide the pre-production equipment used by Concepts Research to deliver the early microchip lasers. In addition to development of these manufacturing processes, a robust packaging methodology was needed to provide reliable and operationally sustainable devices. Once these manufacturing and packaging processes were established and documented, NAVAIR proceeded to consolidate the subsequent manufacturing with Raytheon, which had an established ISO 9000 certified manufacturing operation.

With this shift to Raytheon for the microchip production, Concept Research was able to purchase the pre-production equipment and clean room from the government by placing a formal bid to acquire the equipment. The Navy provided infrastructure and the technical "know-how" developed under this SBIR to put Concept Research in an excellent position to leverage this technology in the commercial marketplace. The company consequently began pursuing commercial applications of the technology in the areas of printing, surveying and medical sterilization.



In 2005, Concepts Research responded to a NAVAIR solicitation to replace a 20 year old fuze technology. Today the company is leveraging their technology in the commercial marketplace.

Concepts Research Corporation now offers a line of mil-spec microchip laser devices. These passively Q-switched microchip lasers emit sub-nanosecond, high-peak-power pulses from industry standard opto-electronic packages. It has sold over \$1.5M in microchip lasers to the surveying and scanner industries and is currently experiencing \$1.8M annually in sales of these microchip lasers. In June 2009, RPMC Lasers, Inc. was selected as sole international distributor for Concepts Research Corporation lasers.

According to Brian Peterson, the principal investigator, "We would not be having our current commercial success in the Survey and Scanner System field if it were not for our initial funding through the NAVAIR SBIR. This funding allowed Concepts Research to establish this high tech solution for the Navy and then transition this technology to commercial applications." Peterson further stated that, "The Navy *Opportunity Forum*[®] and the Transition Assistance Program were excellent

networking opportunities that provided quite a few leads from PMA 261, Ford Motor Company and Lockheed Martin to mention just a few."

Concepts Research Corporation is a Wisconsin based corporation with locations in Bemgium, Wisconsin and Charlotte, North Carolina. Initially positioned as an engineering services provider in 1999, it currently has a diverse staff of approximately 20 employees encompassing multiple disciplines. It offers extensive corporate engineering experience including electrical engineering services in the areas of conceptual design, detailed design, product implementation and project management. Their expertise includes over 130 years of lasers, optics, electronics and mechanical engineering. While their product offerings include diode pumped lasers and laser control systems, their extensive background with embedded system design and product development allows for easy integration with other applications. ◀

► Phase III Success: Over \$1.2M in Phase III contracts from the DoD and IC.

"The TAP really helped us to clarify our thinking and put together valuable materials to market our technology."
— Isaac Potoczny-Jones

WHAT EXACTLY IS A WIKI, ANYWAY? Most office workers today are aware of Wikipedia, the online collaborative encyclopedia that documents information about virtually every topic and provides it for common access and usage. However, Wikipedia is not the only online wiki, just the most well known. There are many other special purpose wikis in existence.

"Wiki" is a Hawaiian word for "quick or fast" and is often referred to by some with the phrase, "What I Know Is." However, as defined by Wikipedia, a wiki is "a website that allows for easy creation and editing of any number of interlinked web pages." Wikis are used to create collaborative websites, power community websites for personal note taking, in corporate intranets, and in knowledge management systems.

Wikis have been adopted in many organizations as software tools because they encourage collaboration. Common uses include project communication, intranets, and documentation. Today, some companies and government organizations use wikis as their only collaborative software and as a replacement for static intranets. However, when wikis are used across organizations and behind firewalls, issues may develop regarding the security and access rights of individual users. There may be greater use of wikis behind firewalls than on the public Internet.

The government, in particular, wants both the benefit of the security that comes with separate network systems, and the collaboration that wikis provide. Hence the need to develop a separate network security structure for multi-level confidential documents, which is what Galois addressed with its Tearline Wiki project.

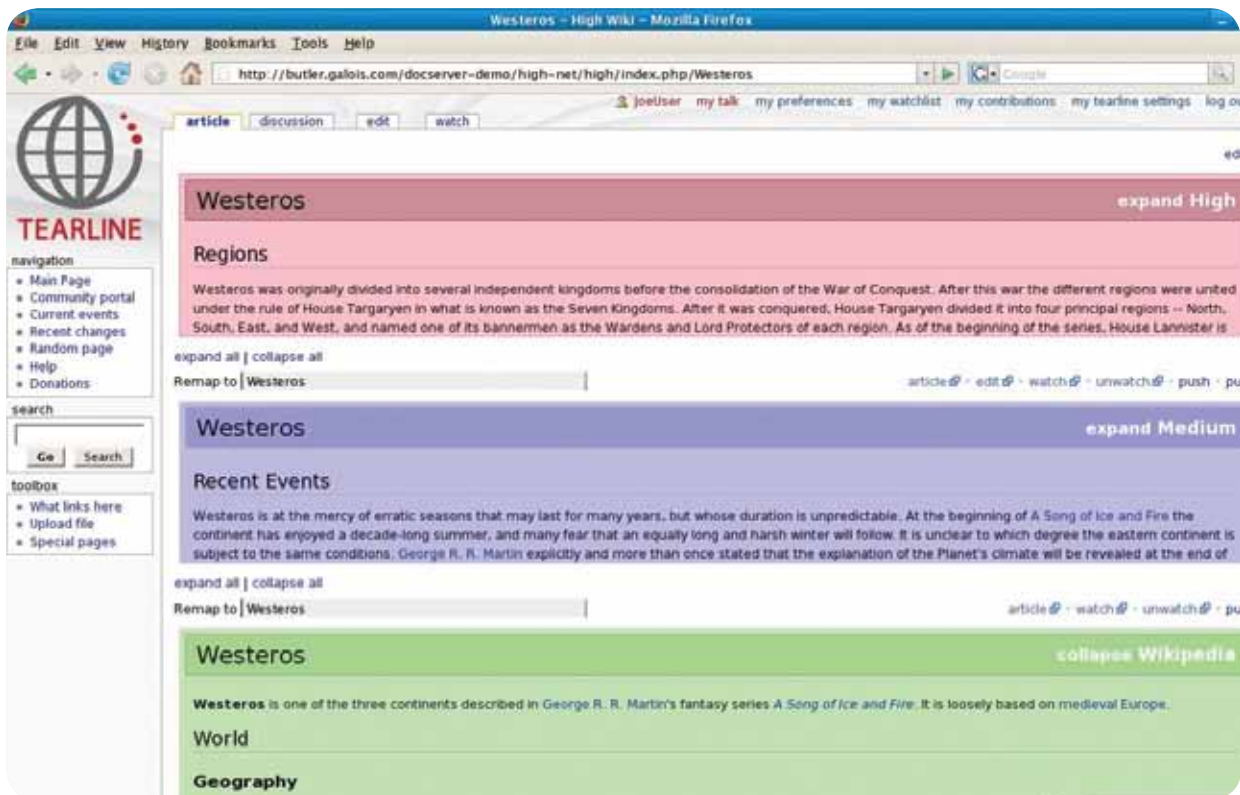
Currently the U.S. Government has several million individual security clearances outstanding

and is producing tens of millions of new classified documents each year. In many government organizations, there exists a need to restrict access to confidential documents based on the user's access rights. Those who have security clearances for Secret and Top Secret documents need to be careful when sharing information with team members who do not share those clearances and who work on separate networks. In multi-level secure environments information silos develop, inhibiting users from sharing knowledge with those outside the network. Users at higher levels often need information that is only available at lower levels, or on different networks, but do not have a way to easily access it in real-time situations.

Galois addressed this issue under a \$1.5M Phase II award from SPAWAR by developing its Tearline Wiki. (A "Tearline" is a physical line on intelligence messages/documents that separates categories of information that have been approved for foreign disclosure and release.)

The Tearline Wiki is a software tool with a high-assurance approach that interfaces with existing web technologies. It integrates information from multiple separate networks into a single web document. Tearline Wiki users are able to read information at any security level, up to their own clearance authorization. Additionally, they are able to write and edit information at their highest authorized level. Virtual "tearlines" separate the information by classification level.

The key benefits of this multi-level security capability is the reduction of redundancy of having low information on the high side and avoidance of the potential divergence of data that can result. The reduction in hardware costs, which previously took three levels of hardware, one for each security clearance level is an additional benefit. Additionally,



Tearline Wiki saves replication costs while avoiding problems of latency and consistency. This results in reduction in space, weight and power requirements as well as system administration.

Galois took the Tearline Wiki technology through the 2007-08 Navy Transition Assistance Program and participated in the 2008 Navy *Opportunity Forum*[®]. "The TAP really helped us to clarify our thinking and put together valuable materials to market our technology. The emphasis on SBIR data rights throughout the program was also quite useful," said Isaac Potoczny-Jones, principal investigator at Galois.

While Galois was completing the Navy TAP, it was also working with members of the intelligence community on a beta test version of this technology. The intelligence community had multiple wikis deployed in several classification levels and was searching for a separate network solution. Based on the Navy SPAWAR success that brought the Galois Tearline Wiki to a TRL 6, the project received funding for follow-on prototype development with Phase III funding of \$1.2M.

"It's clear that there are different criteria for

asserting a company's SBIR Data Rights," said Potoczny-Jones. "Since Galois' work with the intelligence community was so closely tied to its SPAWAR Phase II project, it felt that the Phase III funding was an appropriate use of its SBIR Data Rights. With another related project, however, it was determined that it would be more supportive of the customer's needs and Galois' long-term goals to not pursue our SBIR Data Rights." Largely this is a judgment call based on the applicability of the technology, the specifics of the agency needs and the company's relationship with the requesting agency.

Galois is a technology transition company founded in 1999 that specializes in information assurance challenges. Located in Portland, Ore., Galois employs 30 computer scientists, mathematicians, engineers and technologists that invent next-generation software tools and technologies for government and commercial clients. Recognized for the use of cutting-edge mathematically-based tools and approaches, Galois works with customers across the government, including the DoD and Intelligence Communities. ◀

05

Innovative Defense Technologies LLC

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www.innovativedefense.com

► Phase III Success: \$12M in Phase III contracts from the NAVSEA.

IDT's technology is designed to support the testing of complex systems comprised of computer networks, display consoles and applications.

BACK IN THE 1990s, manual testing of hardware oriented technology was common in order to determine its adherence to system specifications. Increasingly, however, the critical component of Navy systems was not so much the hardware, but the software needed to drive the more complex technology applications. To accommodate the changes in testing requirements, teams were set up to provide on-going regression testing of the large complex software systems.

In 2004, as the Navy worked to streamline costs, the Chief of Naval Operations asked the Commander of Operational Test and Evaluation Force (OT&EF) to investigate what Test and Evaluation (T&E) cost-savings could be produced, theorizing that a 20 percent reduction in costs was achievable. The OT&EF team identified five significant issues driving the test and evaluation costs: redundant testing, increased levels of regression testing, complexity of computer software testing, interoperability testing (and certification), and the need for unique facilities (test-beds) for major Navy projects.

Then in 2005, the Office of Naval Research (ONR) team formulated an SBIR Topic (N05-163) titled, "Tools for Rapid Insertion or Adaptation of Combat System Capabilities." Innovative Defense Technologies proposed Automated Test and Re-Test (ATRT) in response with the objective to develop automated testing processes and tools that would enable swift insertion of new capabilities into complex open-architecture systems while reducing the overall testing costs.

Innovative Defense Technologies (IDT), a small information technology business in Arlington, VA was successful in securing a Phase I contract for this project and began to assess the existing manual testing operations. As a pioneer in the design, development and implementation of automated

software testing solutions for complex software systems, IDT discovered through its assessment that the testing methods the Navy had in place consumed nearly two-thirds of the time required for a new capability to be introduced to the Fleet.

"Too much time is spent on software testing," said Bernie Gauf, IDT president. "As software programs increase in complexity, testing times continue to increase as a proportion of the total application development." This is largely due to the manual testing routines and the need for regression testing driven by technology insertion issues. With the Navy's emphasis toward Commercial-off-the-Shelf (COTS) hardware, the testing requirements shifted from methodologies focused on the hardware to those more related to software implementation.

IDT proceeded to develop its Automated Test and Re-Test (ATRT) technology to provide automated software testing capability including a testing framework, automation engine and reporting features. This testing application can be introduced at any phase of a program. It is designed to provide cost savings, which are proportional to the percentage of the program to which the testing is applied.

The company participated in the 2007-08 Navy TAP and presented the ATRT technology at the 2008 Navy *Opportunity Forum*®. "The TAP helped provide a framework and a timetable for the transition of this technology. The program also gave us the guidance needed to organize the necessary paperwork a transition required," said Gauf.

It was during the late stages of Phase II development that IDT was able to demonstrate, through its time savings and expanded reach – in terms of the the number of completed tests, a savings approaching 90 percent on several Navy applications. In parallel with test time savings, the IDT "reach"



resulted in more than 10 times as many tests as the former manual approach.

It was due to the demonstrated savings that IDT was awarded a Phase III IDIQ contract by NAVSEA for \$15.4M in 2007 to incorporate their technology into programs such as LCS and AEGIS. In 2009, the company received another \$45M IDIQ from the Naval Underwater Warfare Center (NUWC) for delivery of automated testing for submarine combat systems through 2014.

Automated testing provides not only a reduction in test costs, but additionally provides a more reliable system, improved testing quality, expanded depth of coverage, and reduced test effort and schedule. The quality of the test effort was improved through better regression testing, built-in verification testing and the ability to reproduce software problems. The system was more reliable system because

of the improved performance testing, improved load/stress testing, and improved system development life cycle through automated testing. "The most successful automated testing environments develop a framework of automated tests with reusable components that are continuously maintained when new capability is added," said Gauf.

Today, using the Navy-funded ATRT technology, IDT provides solutions, which support the entire lifecycle from software component testing, to system integration, to system testing, and the analysis of results. "The primary difference with the IDT approach is that most automated testing systems focus on a single application or single computer, while our ATRT solution is designed to support the testing of complex systems comprised of computer networks, display consoles and applications," Gauf concluded. ◀

"The TAP helped provide a framework and a timetable for the transition of this technology."

- Bernie Gauf

06 Out of the Fog Research

Visit Out of the Fog Research online at:
www.outofthefogresearch.com

► Phase III Success: \$3.7M in government contracts.

IN 2005, OUT OF THE FOG RESEARCH was awarded a contract to design and build an advanced RF distribution system (RFDS) for SPAWAR. The new technology needed to provide a low noise RF path from shipboard antennas to below decks, processing electronics while operating in a high electromagnetic interference (EMI) environment and working with extremely small SIGINT/ELINT/IO/EA and communications signals to shipboard processing electronics that monitor electronic attack, acquisition and direction finding.

The value of this technology to the warfighter is an increase in the probability of intercept for a very weak signal of interest.

SIGINT systems generally cannot mitigate interference blocking the detection of the fourth ranked Signal of Interest (SOI). SOI detection is limited due to insufficient cancellation of electro-magnetic interference (EMI) whereas this technology can provide an increase in Probability-of-Intercept (POI), even for SOI as weak as -110 dBm. Improved performance is accomplished by advanced filtering and low-noise amplification using cryogenic technology.



Out of the Fog Research LLC responded to this need by providing a full-band cryo-enabled CLIC technology that would improve signals intelligence (SIGINT) systems by mitigating interference blocking the detection of Signals-of-Interest (SOI). Upon successful completion of this Phase II SBIR initiative, Out of the Fog Research LLC received follow-on funding of \$1.75M through the Navy's Commercialization Pilot Program (CPP).

Clearly, the value to the warfighter from deployment of this technology was an increase in Probability-of-Intercept (POI) for very weak SOI. Cryogenic filters in a CLIC (Comb Limiter Combiner) architecture eliminate EMI from radar and COMINT transmit into the SIGINT systems. Cryogenic-CLIC technology achieves better EMI rejection without increasing noise figure or impacting the demodulation of the received signal.

This was accomplished through technology transition into the Navy Cryptological Carry-On Program (CCOP). CCOP is a carry-on Program of Record that is easily reconfigured and therefore able to respond rapidly to tasking. The Advanced Wide Band RF distribution system design (developed by Out of the Fog Research LLC) permits the rapid insertion of new and emerging technologies and is the building block that will integrate capabilities from existing systems and insert advanced technologies into a single, scalable, interoperable Maritime Cryptologic System for the 21st Century. CCOP will improve front-end sensor capabilities to exploit current and emergent signals of interest, integrate RDF and enable Information Warfare capabilities, and provide embedded scenario based training.

Out of the Fog Research LLC was clearly able to meet the Navy's requirements for low signal detection, however, as Stuart Berkowitz, company founder said, "The key was recognizing the



larger Navy need of configuring the technology in the easily expandable 'bookshelf' form needed to integrate its design into the larger SIGINT environment. We essentially ended up replacing their entire subsystem with our design, which incorporated all of their essential elements. It wasn't enough to simply meet the SPAWAR Signal of Interest levels down to 110 dBm, but to provide a subsystem design that "fits into the Navy platform."

Based on this successful technology development and integration within SPAWAR, Out of the Fog Research LLC has additionally received a large Air Force contract of \$1.7 million for development of tunable filters. The Navy Cryptological Carry-On Program (CCOP) is currently purchasing two additional systems for final environmental testing at \$160,000 each.

As participants in the 2007-08 Navy TAP, Out of the Fog found that the TAP and the *Opportunity Forum*[®] were useful in meeting potential collaborators and members of the Navy SBIR team. "We

also found that the TAP was quite useful in helping us to focus on our transition planning," explained Berkowitz. In summary, Berkowitz's advice to current SBIR firms is to take a broader look at the Navy's overall requirements beyond your immediate technology. "The key challenge is for the SBIR principal investigator to consider the overall technical requirements regarding how the technology will be deployed," said Berkowitz. "We ended up redesigning the entire SIGINT subsystem in order to integrate our technology into the Navy platform and reduce any rework needed to accommodate our final design."

Beyond these Navy and Air Force applications, this technology can be deployed in civilian environments to provide situational awareness for a variety of homeland security and Coast Guard applications such as border monitoring, port security, high value (power plants, chemical plants, water plants, etc.) facility protection. Other civilian applications include acquisition and location of cell phones and mobile emergency signals for quick emergency response. ◀

"It wasn't enough to simply meet the SPAWAR signal of interest levels, but to also provide a subsystem design that fits into the Navy platform."

– Stuart Berkowitz

► Phase III Success: \$5.7M in government funding and product sales.

We could not have focused on developing these advanced separators and on refining our manufacturing processes without the Navy SBIR funding and support.

NAVY SBIR COMPANIES that go through the TAP know that the contacts they make at the Navy Opportunity Forum are key to moving forward, but the work necessary to promote a company needs to continue. Assuming that the technology is applicable across various military services, SBIR companies should market to the Navy and DoD at large to maximize the potential reach of the technology. By building upon the work they had completed through the TAP program, Power and Energy (P+E), located near Philadelphia, has been very successful in employing an expanded marketing strategy with its Navy funded hydrogen separation technology.

P+E is a supplier of hydrogen purification systems used in the manufacturing of advanced semiconductors, solar cells and LEDs, as well as for various research and laboratory requirements. Established in 1993, the company's mission is to enable the hydrogen economy and promote energy efficiency through the application of micro-channel technologies. The company focuses on developing advanced products for distributed generation of hydrogen, which will enable the widespread usage of energy-efficient fuel cells without the need for investment in costly centralized hydrogen production, distribution, and storage. Using fuel-processing technology based on Power+Energy's reactor technology, hydrogen fuel can be produced and delivered on demand from widely available liquid fuels. P+E provides a full range of micro-channel hydrogen purifiers to ultra-high purity users across the U.S., Asia and Europe.

Its initial SBIR contracts were based on NAVSEA's interest in using Power+Energy membranes for an onboard-ship fuel cell power unit. During this phase, a local consultant with a great deal of experience in Navy procedures and R&D projects was identified and hired to help move the projects along. Later, after reviewing a Navy Broad Area Announcement (BAA), P+E developed a proposal to advance the technology developed under the SBIR phase II. P+E received \$1.9M in government funding in January 2008 through the Navy for a project intended to improve the TRL level of its membrane sepa-

tor. The work was completed at the NAVSEA facility in Philadelphia under an ONR contract.

Their membrane system is designed to extract fuel cell grade hydrogen from a stream of reformed logistic diesel fuel (JP-8). The P+E separator unit was installed into a demonstration system at the Naval Surface Warfare Center (NSWC) in Philadelphia to convert diesel fuel into high-purity hydrogen to feed a large hydrogen fuel cell.

On the strength of this demonstration, P+E received additional funding of \$2.4M and the company was selected to be the Project Manager for a NAVSEA initiative to build larger and more durable hydrogen separation systems for the Navy. This contract will be coordinated with Precision Combustion, Inc., another SBIR firm, to scale-up its system and to integrate the separation technology into a larger, more durable system.

Over the past two years, P+E has delivered hydrogen purifiers and hydrogen separators worth \$1.4M to a number of commercial organizations.

In addition to the continuing Navy project work, P+E has also delivered hydrogen purifiers and hydrogen separators worth \$1.4M to a number of commercial organizations over the past two years. Their customer list includes Battelle, United Technologies, a number of electronics companies, and an industrial gas supplier in the Middle East.

To further advance their interests internationally and throughout the DoD community, P+E retained American Defense International (ADI). Being willing to reach out and work with various companies and consultants has helped advance its technology story across a wider spectrum of interested parties; including the prime contractors for other elements of hydrogen supply. Since hydrogen separators and purifiers are sub-components



that need to be integrated into a larger system, P+E needed to identify and collaborate with these contractors to complete a system that could be successfully deployed.

Power + Energy acknowledges that its Navy SBIR funding, and its subsequent success in responding to Broad Area Announcements, has allowed it to develop a robust hydrogen separator and the accompanying manufacturing process. Albert Stubbmann, vice president sales and marketing, said, "We could not have focused on developing these advanced separators and on refining our manufacturing processes without the Navy SBIR funding and support." Stubbmann went on to say that the TAP "helped to structure our thought process. We believe that as our TRL level grows, the contacts we made at the Forum will be quite helpful."

On the commercial front, P+E has deployed the technology in hydrogen purifiers that supply ultra-high purity hydrogen to the manufacturers of Light Emitting Diodes (LEDs). Backlighting for cell phones and larger LED-based televisions has increased the demand for high purity hydrogen needed in the manufacturing of these products. P+E is also working with various international manufacturers of solar cells that require reliable, high purity hydrogen for the manufacture of thin film photovoltaic devices.



P+E recently introduced its new PE9000MZ hydrogen purifier product line featuring increased flow capacities, lower cost of ownership and small footprint. This new product is based on P+E's micro-channel membrane technology developed in part with ONR/NAVSEA funding.

► Phase III Success: \$1.2M in Phase III contract from NAVAIR and product sales.

QFS produced the world's first integrated electric and magnetic field sensing device.

CURRENT NEWS regarding the explosion of a British Petroleum leased oil rig and the subsequent leakage of oil into the waters of the Gulf of Mexico highlights the extreme operating conditions and safety challenges inherent in deepwater oil drilling. However, the oil industry has not cut back on its deepwater operations, but is instead increasing this type of work, pushing the drilling depths ever deeper. Operating in the deepwater environment presents technical challenges not present in land-based and/or shallow water drilling. The distance from the boat on the surface to the drill site makes simple operation of the equipment challenging, the tremendous water pressure at depth requires specialized equipment, optimized for this environment, and the hostility of the environment means that divers cannot be sent down to handle problems that may arise.

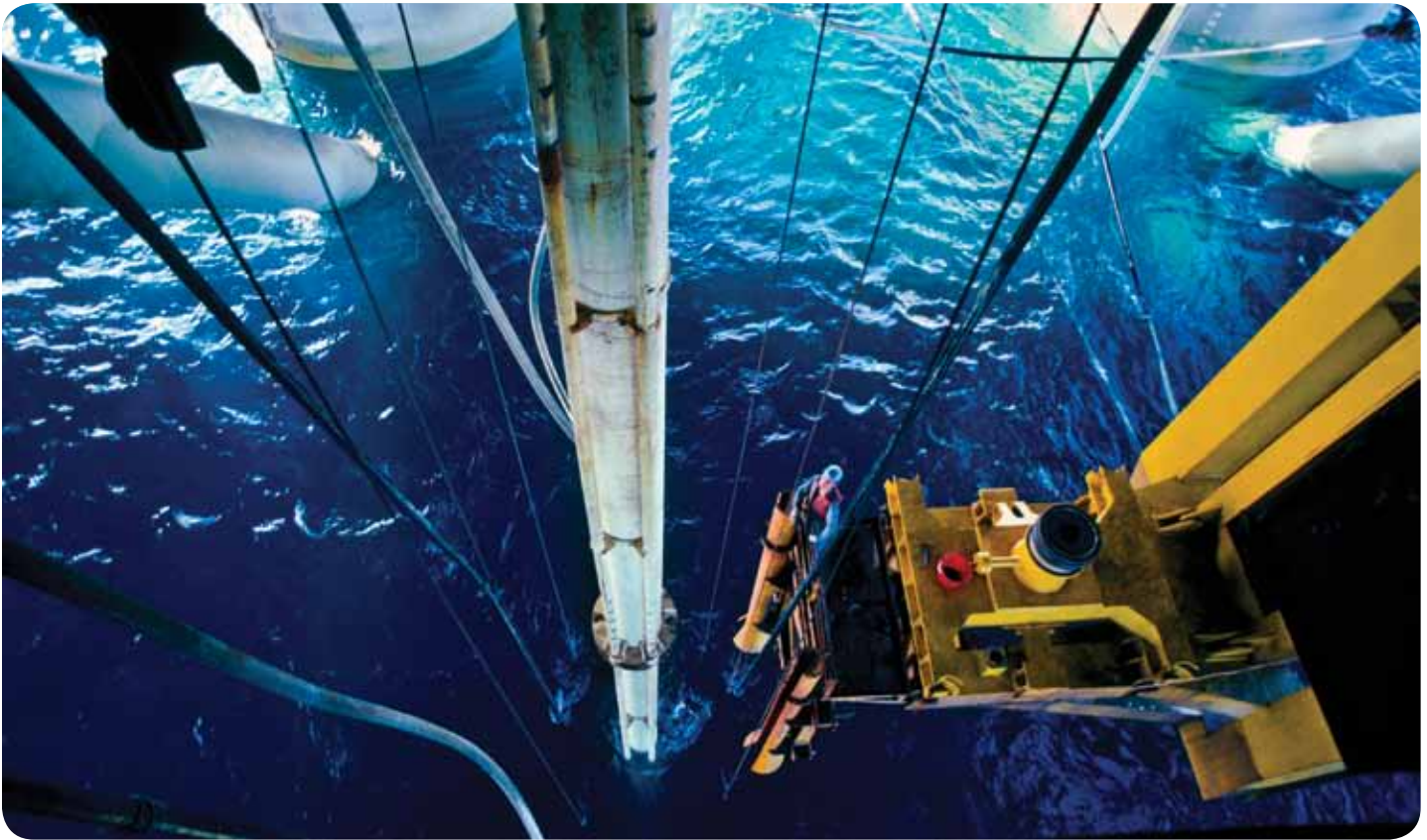
These challenges drive the cost of deepwater drilling astronomically high. It is estimated that

the cost of an exploratory well alone is currently ~\$200M. Therefore, oil companies invest considerable resources into surveying of potential drilling sites to try and predict which locations are most likely to yield oil before drilling. Surveying has traditionally been conducted with acoustic technology, a technique which yields information about the composition of the subsurface. However, it has recently been discovered that the addition of electromagnetic (EM) survey data to the acoustic information can result in more precise maps, thus resulting in a higher "strike rate" per well drilled.

Enter QUASAR Federal Systems (QFS), Inc. and a Navy SBIR Topic (N05-003) to develop innovative electrodes for underwater electric field sensing for object location. That project received Phase II funding to develop a complete electric-field sensing system and is currently running under Phase 2.5 funding to build and test multiple prototypes of that system. While developing the technology needed for Navy applications, QFS has also developed electromagnetic sensing technology for oil surveying from technology. QFS secured a \$6 million Indefinite Delivery, Indefinite Quantity (IDIQ) contract from NAVAIR in 2007. Since that date, NAVAIR has issued approximately \$900,000 in Task Orders against the IDIQ for related EM sensing work in an airborne modality, plus an enhancement to the original Phase II SBIR contract for similar EM work.

Historically, the Navy has used acoustic methods for object location applications. However, the noise present in the underwater environment, especially the shallow-water, coastal regime, minimizes the effectiveness of the acoustic technique. According to Gayle Guy, head of QFS Corporate Communications, "There are significant advantages to the electromagnetic approach, particularly in the





location of objects via electric field signatures. These signatures are very weak and therefore require the utmost in sensitivity in an electric-field sensor.”

Once QFS established the viability of its electrode innovation under SBIR funding, the company began to pursue commercial applications in resource exploration (subsurface oil) in parallel with its Navy marketing efforts. Given the size and sophistication of the oil industry with its substantial revenue potential, QUASAR Federal Systems took the unique step of forming a division, Quasar Geophysical Technologies (QuasarGeo, www.quasargeo.com), devoted to addressing the specific needs and requirements of the oil and gas industry. This independent division is focused on selling to the oil industry as well as mineral and other resource exploration companies by supplying enhanced performance EM surveying instrumentation. QuasarGeo oversaw adaptation of the Navy technology for the

surveying application, and is currently pursuing customers in the resource exploration industry, having successfully concluded a \$300,000 technology sale to one commercial entity.

Since its 1998 founding, the San Diego based QUASAR Federal Systems has built a reputation as a world leader in electromagnetic sensing devices and systems. The company specializes in integrating state-of-the-art sensing technology with custom produced electronics to produce systems tailored to customer specifications.

QFS produced the world's first integrated electric and magnetic field sensing device and have built on that innovation to create systems for ground, airborne and underwater EM sensing applications. QuasarGeo was formed to address the specific needs and requirements of the oil/gas industry, as well as mineral and other resource exploration companies, by supplying enhanced performance EM survey instrumentation. ◀

Operating in the deepwater environment presents technical challenges not present in land-based and/or shallow water drilling.

► Phase III Success: \$9M in Phase III funding from the Navy.

In July 2006, SimVentions was awarded both a Phase II and a Phase III contract from NSWCSS for development of their OA TIME technology.

THE GROWING COST of building new warships in recent years has led the Navy to reduce its order, resulting in the loss of economies of scale, which has driven costs of individual warships (both hulls and weapon systems) even higher. That downward economic spiral has caused concern on the part of the Navy, members of Congress, defense contractors and most certainly shipbuilders. Based on an analysis of the underlying problems with the existing ship building approach, the opportunity has been created for a set of tools and processes to assist Program Managers with the integration and collaboration of technical and programmatic information associated with combat system capability development.

Additionally, as the Department of Defense moves further toward Open Architecture (OA) solutions to address these significant technical challenges, it means more companies will be integrated into the delivery mix, thus making the job of program management and sponsor oversight more challenging. More companies mean more contracts to administer, more schedules to coordinate, greater risk-coordination demands and a greater adherence to technology refresh to meet these growing requirements.

The complexity of integrating these various organizations led to the development of the Open Architecture Technology Insertion Management Environment (OA TIME) technology, which is designed to help navigate the various processes and steps involved in transitioning new and/or enhanced tactical capability to the warfighter. OA TIME provides a framework for the various programmatic and engineering tools that help users at all levels of a government/corporate enterprise in managing, developing, monitoring and planning next generation products for use in fleet opera-

tional programs. It provides an embedded toolset that can be applied to any process implemented by the enterprise and it provides a framework and an architecture that allows for the insertion of additional tools that are currently available or under development. The overall OA TIME product is being developed by four small businesses under a Collaborative Development Partnership, which provides a business construct for cooperating companies to work together on a single integrated technical solution. SimVentions is a major contributor to this four company collaboration.

First, some history. SimVentions, Inc. is a small business incorporated in June 2000 in the Commonwealth of Virginia. SimVentions is, first and foremost, a Department of Defense (DoD) focused engineering services and product development company. Their DoD involvement includes systems engineering, modeling and simulation (M&S), and software engineering. While most SBIR firms struggle during their Phase II cycle to identify potential platforms and prime contractors that will lead to a Phase III contract, interestingly, SimVentions had overlapping Phase II/Phase III contracts during its participation in the 2007-08 Navy TAP. In July 2006, SimVentions was awarded both a Phase II contract and a Phase III contract from the Naval Surface Warfare Center, Dahlgren Division (NSWCDD) for development of their OA TIME technology. This was prior to the 2008 Navy *Opportunity Forum*[®], which was held in June.

Asked why SimVentions remained in the TAP Program after it obtained a Phase III contract, Bob Duffy, the corporate business developer replied, "We saw this as an excellent opportunity to build awareness, across the Navy SYSCOMS and prime contractors, of the OA TIME technology. The discipline of the Dawnbreaker TAP Program and the



The OA TIME toolkit provides all levels of personnel working on a particular system the ability to plan, manage and control information and technology to support the rapid deployment of a new capability.

visibility provided by the Navy Opportunity Forum were very valuable contributions as we worked toward completing the development of this technology insertion and planning application.”

The OA TIME toolkit provides all levels of personnel working on a particular system, or a system of systems, the ability to plan, manage, and control information and technology to support the rapid deployment of new capability. The web-based architecture allows work to be performed from any remote site while data access is limited by the level of security of the user. Program managers are given the visibility into integrated information that is otherwise difficult to capture and consolidate, including a tool utilizing Base Object Model (BOM) standards, which have been developed in conjunction with the Simulation Interoperability Standards Organization (SISO). Since the contract award in June 2006 through to January 2010, a total of \$9M has been placed against this \$10.5M IDIQ contract.

The cooperation between NSWCCD and SimVentions engineers, scientists, and developers has led to improved planning, development and testing associated with OA tactical compo-

nents and management tools. Based on this cooperation, in August 2008 SimVentions entered into a Cooperative Research and Development Agreement (CRADA) with NSWCCD for the purpose of collaborating and sharing data rights pertinent to the planning, designing, developing, testing and delivering of new Open Architecture (OA) components and capabilities to the fleet. It is anticipated that this relationship will contribute in a meaningful manner and scale in the overall defense acquisition process while providing the Navy customers (acquisition and fleet) better capability in a more cost effective and time efficient manner. This CRADA includes shared access to the Integrated Warfare Systems Lab (IWSL), the Open Architecture Test Facility (OATF), the Human Performance Lab (HPL), and the Integrated Command Environment (ICE) facilities.

“We have been very fortunate in providing this technology to multiple groups within NSWCCD, as well as the PEO-IWS, for the procurement of combat systems,” said Duffy. “While this SBIR was initiated by PEO Ships, we have been able to work with all of these organizations by providing comprehensive program management support.” ◀

► Phase III Success: \$1.83M from the USAF and technology sale to Canadian government.

POTENTIAL TRANSITION PARTNERS can be found in all branches of the armed services, in the Department of Homeland Security and in several friendly nations such as Great Britain, Australia and Canada. Systems Technology, Inc. (STI) of Hawthorne, CA, found this to be the case as it was completing its Phase II development with its helicopter training model. The company received Phase III orders from the U.S. Air Force, Air National Guard and the Canadian Royal Navy for its Fused Reality Visual System.

Founded in 1957 as a contract research and consulting firm, the foundation of STI's work is based on a fundamental understanding of both aerospace and ground vehicles and the human operators that control them. The company has developed technical expertise in vehicle dynamics, control system design and analysis, handling qualities, computer simulation, human-in-the-loop simulation, human operator modeling, and human factors. STI also develops and markets products in addition to its traditional contract research and consulting practice.

The company's business model has been the key to STI's success in commercializing newly developed technological products to the Department of Defense [DoD] and private sector markets. Even though STI is a small R&D firm with 30 employees, the company has developed a model that vertically integrates their R&D business with their manufacturing and distribution capabilities, thus giving them overall control in developing products to meet the needs of the market.

For the 2007-08 Navy TAP, STI was working on a Navy Phase II, further developing its patented "fused reality" system. This system provides real time interactive fusion of physical and virtual environments employing live video, virtual environ-

mental simulations and real time video editing. The fused reality concept involves the integration of real hardware (i.e. a machine gun) into the environment so that the operator would use his hands to manipulate the machine gun while all of the other elements that were not being "touched" would be made virtual. The advantages of this approach minimize the need for live training in the actual aircraft, such as the H-60S, while retaining the realism of the operational environment. This expands training opportunities while reducing training costs. Especially in the case of training pilots, the fused reality technology is clearly a less risky, less expensive approach, which also expands the training envelope beyond available aircraft and eliminates aircraft variability and inclement weather issues.

"The TAP forced us to put together much needed documents. It also made us very organized in the way we presented the technology to our potential customers."

– Edward Bachelder

While working through the TAP, the company focused on how to position the company and approach potential investors with the fused reality system.

"The TAP forced us to put together much needed documents," said Edward Bachelder, STI principal investigator. "It also made us very organized in the way we presented the technology to our potential customers."

It was during the second year of its NAVAIR Phase II development that this particular technology began its successful transition. It was at that



Due to the current success of the STI technology, they are planning to launch three more trainers over the next several years.

time that the Navy TPOC initiated the involvement of the U.S. Air Force in some of the technical review meetings with STI. The TPOC was focused on the CH-60S Helicopter system development, but through her connections she was aware of the Air Force requirement for a similar training module. This prompted her to invite them to participate in the Navy SBIR reviews.

Not only was the Air Force interested in providing \$1.7 million for additional testing, but once the testing proved successful, it decided to make STI's implementation a "showcase" throughout its training organization. "The Air Force has been an excellent reference point for the STI technology and a true 'showcase' for the benefits associated with the Fused Reality approach to training," said Dr. Bachelder.

Due to the current success of the STI technology through the Air Force's training organization, they are planning to launch three more trainers over the next several years. In addition, Bell/Boeing is scheduled to integrate this Fused Reality Visual System with their Cabin Part Task Trainer at Kirkland Air Force Base in September 2010. Through this

partnership, STI will function as a subcontractor to Bell/Boeing for this installation.

Through their work with the U.S. Air Force, STI has also piqued the interest of international clientele. While attending the American Helicopter Conference in Canada, the STI PI discussed this technology with the Defense Research and Development Canada (DRDC) representative. As the technology progressed through its TRL levels, the Royal Canadian Navy purchased STI's innovative training approach for its Landing Safety Officer training program. The deal closed in 2009 for \$130,000.

STI has continued their product development and continues to find success. The further development work has extended the capability of their ParaSim parachute training simulator, which can now be used in mission planning and rehearsal via a Phase II SBIR for U.S. Special Operations Command (SOCOM).

"The STI ParaSim parachute training simulator and the STISIM Drive ground vehicle simulator are two of our most important products," said Dr. Bachelder. ◀

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Ultra Communications

Visit Ultra Communications online at:
www.ultracomm-inc.com

► Phase III Success: \$1.68M in Phase III funding from NAVAIR and technology sales.

“The concept of making ourselves look marketable was the most important part of the TAP for us.”
– Charlie Kuznia

VERY FEW SBIR/STTR-FUNDED companies have a sponsor that plans for Phase III funding before writing the Phase I request. However, that is the scenario behind the Phase III success of Ultra Communications (Ultra Comm), a Vista, California based company. At the inception of the 2005 STTR, topic number N05-T005, an enterprising NAVAIR engineer envisioned the development of a “built-in-test” (BIT) capability for evaluating fiber optic links. Built-in-tests were relatively common for fault detection and fault isolation in modern aircraft, but had not been applied to fiber optic links. And while some rudimentary BIT capability existed in some commercial transceivers for years, there had not been any adoption of BIT technology into military platforms.

Previous generations of fiber installations had relatively few dedicated fiber links and no significant maintenance/logistical issues, but more recent designs of modern aircraft (F-18, F-22 and the JSF) incorporated extensive fiber optic cables. Though most avionics components generally had built-in diagnostics, modern aerospace fiber optic implementations lacked such “built-in-test” (BIT) capability. This meant that fiber optic faults were typically detected by skilled technicians on grounded aircraft using specialized diagnostic tools. Replacement of a faulty link required replacement of the fiber link and associated components. It was also of concern that fiber optic links in a marginal state of operation could fail during a flight (due to vibration, g-forces, temperature, etc.). With the increased usage of fiber links, there was an increasing need for the “built-in-test” capability.

Ultra Communications was successful in securing the Phase I and Phase II STTRs for this “built-in-test” capability and proceeded to develop it to a Technology Readiness Level of 6. The technical approach the company employed

is known as Optical Time Domain Reflectometry (OTDR), which basically involved shooting light down the fiber optic cable and measuring the back-reflected light. Since this Phase II development only achieved a TRL 6, Phase III funding would be needed to complete the isolation in the multiple fiber links in the affected aircraft (F-18, JSF). Through the prior planning and internal conditioning within NAVAIR, this STTR received Phase III funding for additional R&D development in April 2009.

Fiber faults, such as open connectors, cable breaks or fiber contamination could be detected via Ultra Comm’s OTDR approach. By measuring the optical power at each end of the link, the overall optical loss (or ‘link loss’) could be determined. While this was a major step forward in identifying the link loss, the Navy needed the ability to isolate the location of faults, to within 10 cm, among the multiple fiber links within the cable plant. The ultimate goal of the STTR was to produce a transceiver with the ability to diagnose the health of both the transceiver itself and the fiber link; thereby achieving significant reduction in maintenance costs, improved aircraft supportability and increased aircraft operational availability.

“We were a relatively new start-up when we won this Phase I STTR,” Charlie Kuznia, Ultra Communications president, explained. “The company was formed as a spin-out from Peregrine Semiconductor during the “dot com bubble” in early 2000. During that time, Peregrine was going through a reassessment of its mission and it decided to focus its resources on the cell phone industry. This change in strategy created the opportunity for the formation of Ultra Comm and led to our eventual success in securing several military SBIRs/STTRs.”

During Phase II of the technology development, Ultra Comm participated in Navy 2007-08 Transition Assistance Program. The company found that assistance in creating marketing materials filled a significant void in their skill set. "The concept of making ourselves look marketable was the most important part of the TAP for us." said Kuznia. "We are all engineers, and we don't think about this on a day to day basis. Dawnbreaker was extremely helpful in developing our marketing strategy and the materials to move it forward."

As of the printing of this booklet, Ultra Communications is in its second year of the Phase III contract, which extends to January 2012. The company fully expects to show technical success by the end of the contract period and is keeping several prime contractors and commercial companies advised of its progress.

As an outgrowth of this technology, Ultra Comm now markets its technology, commercially known as the X-20 Phantom product. The X-20 Phantom is a quad 2.5 Gbps transceiver for bidirectional

optical data communications over multimode ribbon fiber links that incorporates many of the BIT features. The transceiver performs the electrical-to-optical and optical-to-electrical conversions for parallel optic data transmission. Designed for harsh environment applications such as military avionics and satellites, the X20-Phantom operates through an extended temperature range as well as thermal cycling, shock, vibration, humidity, salt fog, and radiation.

Building upon its success, Ultra Comm has now expanded to the point that it supplies highly compact and robust photonic components for harsh environment applications, such as satellites, military airframes, UAVs and missiles. The company has also developed a hybrid IC and optoelectronic integration approach, which features standard planar manufacturing of photonic packages along with single chip integration of multiple functions—transmitters, receivers with built-in-test, high speed digital and RF photonic components. ◀

"Dawnbreaker was extremely helpful in developing our marketing strategy and the materials to move it forward."

- Charlie Kuznia





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