



U.S. ARMY

COMMERCIALIZATION

Small Business Innovation Research

SBIR



FUTURE COMBAT SYSTEMS

The Army is undertaking a transformation into a more responsive, deployable, and sustainable force, while maintaining its high levels of lethality, survivability and versatility. GEN Peter J. Schoomaker, the new Army Chief of Staff, reaffirmed this strategy, "Our recent combat operations reinforce the requirements for units and echelons that are flexible and tailorable. As long as the United States Army has existed we have transformed...and we always will. For four years our Army has asked hard questions and made tough choices. We will continue to go where the answers to those questions take us."

This new force, called the Future Force (FF), is intended to meet the full spectrum of present and future Army missions. The cornerstone of the FF capability and transformation is the Future Combat Systems (FCS) program. This reconfigurable, adaptive system of systems will provide a common baseline capability that increases the Army's ability to conduct network/collaboration-centric warfare. Within this decade, the Army is working to develop and demonstrate first generation FCS and all its enabling technologies. This transformation had and will continue to have a major impact on the entire Army Science and Technology (S&T) enterprise – to include the Small Business Innovation Research (SBIR) program. The SBIR program is aligned with FF and FCS technology categories and this will be an ongoing process as FF/FCS needs change and evolve.



“Through the Army SBIR Program, we call upon our small business community to fulfill the needs of our warfighters deployed around the world...”



Small business owners rely upon their courage and judgment to blaze new trails so that the rest of us can deal more effectively with an uncertain future. In doing so, they take on great risk -- sometimes putting all of their life savings on the line because they believe in an idea. In looking to the future, small businesses anticipate the needs of their customer base, typically 3-5 years down the road, and in fact, create the needs through an understanding of how a product will fit into an evolving world of technological change and innovation. Small businesses are the driving engine of our economy as well as the world economy.

Through the Army SBIR Program, we call upon our small business community to fulfill the needs of our warfighters deployed around the world by helping to drive the Army S&T program for Future Combat Systems (FCS) and Army Technology Objectives (ATOs). The current Phase II proposals selected for award are 100% aligned with the Army Science Technology Objectives. This means that over \$200M per year additional money supports the Army vision.

The future readiness and effectiveness of our armed forces will be determined, in large measure, by our investment in relevant technologies. It is our job to ensure that tomorrow's warfighters are prepared to meet future challenges.

On behalf of our brave men and women in uniform and the Army's leadership, I thank you for your tremendous contributions to our warfighters, America's Army, and our nation.

Dr. John A. Parmentola

Director for Research and Laboratory Management
Office of the Deputy Assistant Secretary of the Army
(Research & Technology)

Excerpt from the 2004 U.S. Army Phase II Quality Awards Ceremony
August 24, 2004



ARMY

SIBIR

THE SMALL BUSINESS INNOVATION RESEARCH PROGRAM



The Small Business Innovation Research Program (SBIR) is a Congressionally-mandated program established in 1982 and has been reauthorized through 2008 to increase the participation of small businesses in Federal Research & Development (R&D). These small businesses develop technologies, products, and services that can be commercialized through sales in the private sector or back to the government.

The Department of Defense publishes several SBIR solicitations on an annual basis; the Army participates only in the solicitation that is published in the summer of each year.

Participating Army organizations develop research topics for this solicitation that address current and anticipated warfighting technology needs. Small businesses submit proposals of their innovative solutions to these topics.

PHASES

1

- Feasibility of concept phase
- Duration: 6 months
- Funding: Award up to \$70K
- Phase I Option: 4-month option (Government's discretion), up to \$50K, to fund interim Phase II efforts

2

- Research & Development phase
- Duration: 24 months
- Funding: Award up to \$730K
- Goal: A viable dual-use technology, product, or service

3

- Commercialization phase
- Duration: Unlimited
- Funding: Unlimited, but no SBIR funds may be used
- Goal: Market dual-use products or services to the Government and/or private sector

SBIR is very competitive with only about one in ten Phase I proposals and one in three Phase II proposals selected for award.

The following success stories highlight the positive impacts made by small firms that commercialize SBIR-sponsored products or services. They describe some of the benefits that the Army, the small business community, and our Nation received through this dynamic program.

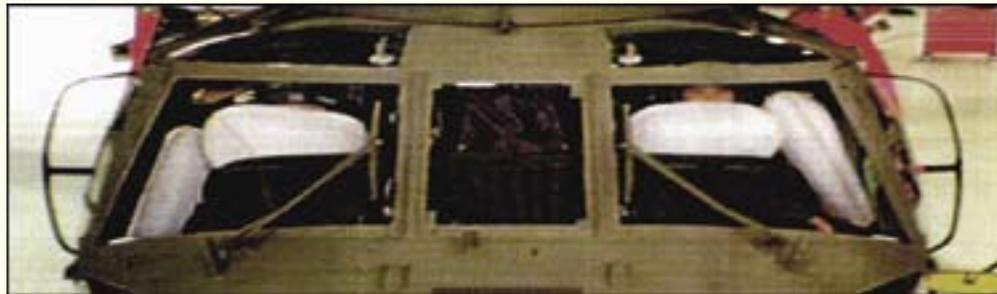
Cockpit Air Bag System

Simula, Inc., Phoenix, AZ

The Cockpit Air Bag System (CABS) is a supplemental restraint system that provides pilot and copilot protection during aircraft crashes by minimizing crewmember motion and by providing forward and lateral protection from occupant head/upper torso strike hazards. The Army CABS program represents the first effort to design, develop, qualify, and field an inflatable supplemental restraint system into military aircraft.

In 1989, recognizing the potential for protection that may be afforded by an aircraft-mounted air bag system, the U.S. Army Aviation Applied Technology Directorate initiated the CABS program by awarding a Phase I SBIR contract to Simula Government Products, Inc. (now known as Simula, Inc., an Armor Holdings Company) to investigate air bag technology for use in rotary wing aircraft. The Army, Navy, Air Force, and Federal Aviation Administration participated in the Joint Development of CABS (JCABS) program that was conducted with the UH-60-A/L Black Hawk as the technology demonstrator and then served as the basis for all subsequent Phase III efforts including the UH-60A/L and the OH-58D Kiowa Warrior.

Upon successful completion of SBIR Phase III integration and qualification efforts, production option contracts for UH-60A/L and OH-58D CABS were awarded to Simula in June 2001. The UH-60 CABS installation began in August 2002 and approximately 400 UH-60L and 40 OH-58D aircraft have been equipped with CABS, including those deployed to Iraq and Afghanistan. Simula continues to deliver under the Indefinite-Delivery Indefinite-Quantity UH-60 CABS contract and the OH-58D CABS production option.



PHAS IMP

Installed in over 400 DoD
helicopters

Over \$42M in DoD sales





Installed on FMTV, HMMWV, HEMTT, and M915/M916. Potential core component of Army's next generation Movement Tracking System

Approximately \$1.8M in follow-on DoD funding for expanded R&D initiatives

Vehicle Electronic Systems Integration (ESI)

American Systems Technology, Inc., Troy, MI

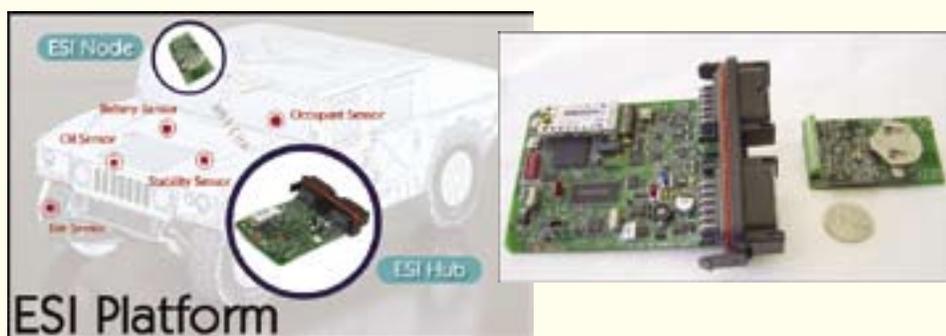
American Systems Technology, Inc. (ASTI) developed Electronic Systems Integration (ESI), a platform for ground vehicles that enables rapid and cost-effective insertion of new electronic control systems. The platform is a collection of hardware and software components that enables quick deployment and integration of sensors and devices to provide vehicle diagnostics information and advanced vehicle management systems.

The innovative wireless architecture enables communication from sensors to a central communication hub and further communication of key vehicle health information to vehicle occupants, maintainers, and command centers. Core components of the platform include the ESI Hub, which gathers and processes vehicle data and wirelessly transmits data on and off the vehicle, and the ESI Nodes, which connect sensors and other devices wirelessly to the Hub. Product applications include vehicle fluid condition management, power management, tire wear monitoring, stability management, inventory management, and occupant health monitoring.

The open-architecture platform is easily expandable, allowing new sensors and devices to be quickly added. It is especially beneficial for retrofitting new electronics technology and safety capabilities onto existing vehicle platforms, but can also be designed into new vehicle programs and supplied as original equipment.

The platform is designed to integrate with existing Army programs, such as the Movement Tracking System (MTS). The data can be offloaded through satellite communication to appropriate commanders for effective planning and response. It also supports the Army's FCS vision for a joint networked system of systems for optimal Soldier situational awareness.

Future applications of the ESI platform may include rollover detection, convoy wireless networking, and Voice-Over-IP (VOIP) communications.



Ammunition Identification With Machine Vision

Cybernet Systems Corporation, Ann Arbor, MI

Cybernet Systems Corporation developed innovative technology for high-speed identification and inspection of ammunition. The core system was designed to support modular recognition algorithms so that it can be easily adapted to support new inspection requirements.

The technology has been used to create two separate devices: the Automated Tactical Ammunition Classification System (ATACS), which inspects and sorts small caliber ammunition at a high rate of speed; and the Projectile Identification System (PIDS), which identifies projectiles as they are loaded into automated fire weapon systems specifically developed for the Mortar Technology Army Technology Objective (ON-MT ATO).

The ATACS can sort and inspect 9mm, 5.56mm, 7.62-mm, 45-caliber, and .50-caliber ammunition at a rate of up to 12,500 rounds per hour. The system sorts mixed ammunition and inspects for chambering dimensions, concentricity, dents, corrosion, and other damage. By leveraging the core technology, Cybernet was able to deliver the first ATACS within three months of contract award.

PIDS recognition modules support identification of conventional and new 120mm mortar shells. The hardware mounts directly on the mortar and uses shape, color, and text recognition to identify pertinent shell characteristics to determine identity. PIDS integrates inventory control with actual firing, which leads to ammunition accountability.

PHAS
IMP

Two ATACS units fielded by the Defense Ammunition Center and deployed in support of Operation Iraqi Freedom

\$250K in DoD R&D funding
\$1.2M in DoD investments





400 antennas currently being field evaluated in Operation Iraqi Freedom

**\$247.5K in DoD R&D funding
Over \$10.6M in DoD sales**

Innovative Communications and Electronic Warfare Antenna

FIRST RF Corporation, Boulder, CO

A very broad bandwidth antenna that encompasses various communications, sensors, and electronic countermeasure systems is a critical requirement for the Army. FIRST RF Corporation developed passive antenna technology to meet this requirement.

Two basic antenna approaches utilize the FIRST RF antenna technology. One utilizes monopole technology, while the second utilizes slot technology. The utility and application of each approach vary depending upon the installation requirement and the pattern coverage. Long-term goals of Army communications and electronic warfare (EW) support the need to eliminate deficiencies with a new small multi-decade antenna.

FIRST RF Corporation demonstrated feasibility of the technology under the SBIR program by developing prototype antennas that covered 20 to 2500 MHz from a single antenna structure less than fifty inches tall. The antenna is capable of handling 100 watts of power.

An additional application of this antenna includes broadband/lowband fuzing where interaction with the mounting body has limited the application and performance of RF fuzes.



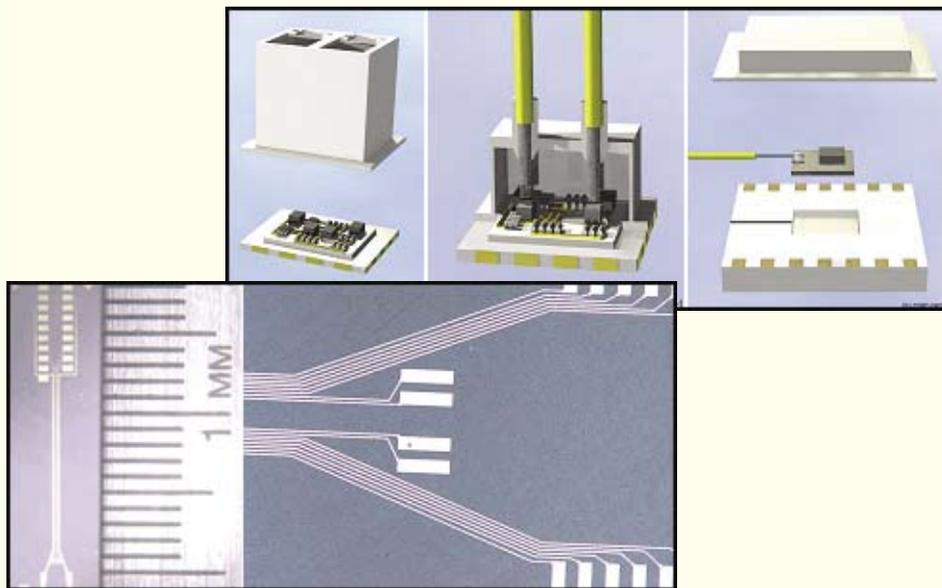
Packaging Techniques for Liquid Crystal Polymers

Foster-Miller, Inc., Waltham, MA

Foster-Miller, Inc. developed a new electronic packaging platform that offers device designers an incredibly flexible and adaptable technology to interconnect and protect electronic and photonic subsystems. Liquid crystal polymer (LCP) packages offer superior cost and electrical performance advantages over metal and ceramic packages. Since LCPs' moisture and gas barrier properties are better than most polymer materials, LCPs can also be engineered to achieve desired package lifetimes for many military and commercial applications.

The ultimate promise of this novel packaging platform lies in the ability to integrate next-generation functionality such as high bandwidth optical interconnects or microfluidic networks for device cooling or sensor applications. The ability to microfabricate such intricate structures on a homogeneous device platform will offer designers a true "system-in-a-package" solution across a wide array of markets and applications. Foster-Miller has already demonstrated application of the technology for a number of Army and other customers, including ambulatory physiological monitoring electrodes, wearable global positioning system (GPS) patch antenna modules, and implantable electrode arrays for interfacing with the central and peripheral nervous system.

Foster-Miller continues to explore applications with government and commercial customers in a number of diverse markets, including optoelectronics, radio frequency components, Micro-Electro-Mechanical Systems (MEMS), and medical devices.



Built a 2,200 sq. ft. clean room prototyping facility to support escalating packaging and microfabrication business

Over \$3M in federal R&D funding

Agreement pending with a commercial partner to explore transition

1 U.S. patent, 2 patents pending





\$400K in sales to Centers for Disease Control for bio-terror response tent kit stockpile

\$1M in DoD R&D funding

Patent pending for Cellular Insulation Structure

Low Package Volume Insulation

L'Garde, Inc., Tustin, CA

With many Soldiers deployed and in temporary barracks for long periods of time, the Army has created entire cities of temporary shelters and tents. In order for Soldiers to live and effectively work in these sometimes extreme conditions, it is essential that environmental controls be adequate. In some cases, current systems have not worked effectively. At the request of Natick Soldier Center, L'Garde, Inc. developed a low package volume insulation that gives higher insulation value at a lower cost, and most importantly, at a fraction of the shipping volume and weight.

The insulation has a very lightweight cellular structure and can be packaged extremely efficiently for shipping, thus resulting in significant savings in transportation. Use of the insulation can save up to 65% of the energy required to maintain a livable work space for troops, and can make as much as a 25-30°F difference in the internal temperature of a tent.

The impact is two-fold: First, the material is easier to ship, because it packs down in a ratio of 20 to 1. Second, once installed, energy efficiency reduces the requirement for fuel; resulting in a reduction of the logistics footprint for deployed forces, making the fighting force more effective. Additional benefits include a noticeable reduction in ambient noise levels, a reduction of infrared imaging intensity, and a blanketing effect of radar return to threat sensors. As a result, it is far more difficult for an opponent to determine the activities inside the structure by audio, thermal, or radar scans.



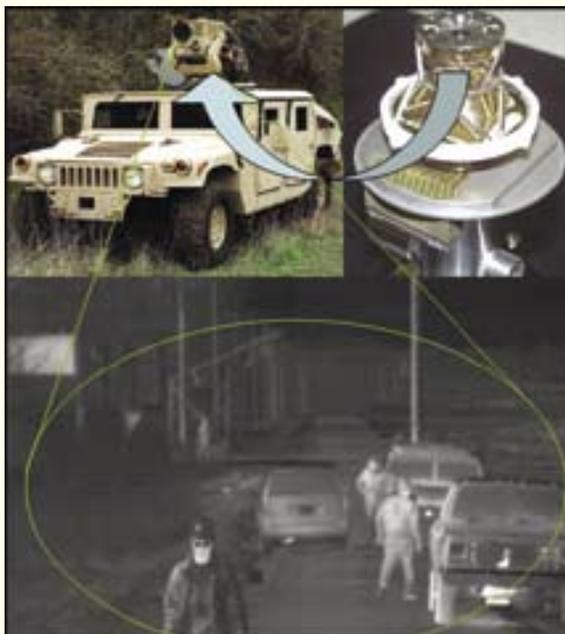
Improved Sensing for Targeting and Navigation

Opto-Knowledge Systems, Inc., Torrance, CA

Opto-Knowledge Systems, Inc. (OKSI), an R&D-oriented small business specializing in hyperspectral imaging, developed a continuously variable aperture cold stop for use with infrared (IR) cameras. Using a variable aperture cold stop is advantageous to the Army because the same IR optical system can be used for wide field search and long-range automated target recognition and identification without compromising image quality. In addition, automatic brightness control can be used for high dynamic range scene imaging, greatly reducing camera saturation. The system's flexibility also reduces the number of different camera types that are needed for multiple requirements.

The technology developed through the SBIR program is a major advance in tactical Forward Looking Infrared (FLIR) systems and has enabled the Army to define third generation systems as incorporating dual f/number technology. This allows system designers to optimize cooled infrared systems for different field of view applications and to obtain longer identification and recognition ranges in the Narrow Field of View (NFOV) while at the same time optimizing for wide area search applications, airborne sensing and targeting applications, or other Wide Field of View (WFOV) detection focused operations.

OKSI partnered with Raytheon and L-3 Communications Cincinnati Electronics to implement this technology into the first third generation dewars to be used in the FLIR demonstration systems. The first third generation dewars prototype was scheduled for delivery in June 2005. This technology is ideal for FCS and other programs where long-range identification is critical for force protection and mission accomplishment.



PHAS
IMP

Federal sales of \$175K

Over \$700K in DoD R&D
funding





Biometric Security Systems

Over \$1.5M in federal and private sector sales. Deployed at several airports, intermodal ports, and hospitals.

\$1.1M in DoD R&D funding and over \$6M in federal R&D funding

1 U.S. patent pending

Ultra-Scan Corporation, Amherst, NY

Current commercially available biometric systems are not accurate or robust enough to meet the demanding requirements of a field deployable, tactical-grade identification system for mission critical security applications. The solution developed by Ultra-Scan Corporation utilizes the proven effectiveness of ultrasonic fingerprint imaging technology pioneered by Ultra-Scan to simultaneously image and match two adjacent fingers for rapid and positive identification.

Ultra-Scan's ultrasonic fingerprint readers have a number of significant advantages when used in demanding field environments, including insensitivity to contamination; superior accuracy (nearly 1000 times more accurate than traditional, single-finger biometric technology); and the ability to operate in demanding environments (tested to Mil-Std-810 to ensure long-term reliability).

This highly accurate identity management system revolutionizes automated fingerprint identification systems (AFIS) and battlefield personnel identification for key applications. For mobile field identification by both military and non-military personnel, the system integrates fingerprint authentication with Common Access Card (CAC) functionality and provides secure wireless communication. It easily retrofits into existing access control systems in a standalone or network

configuration and operates outdoors in all environments. When used for patient and staff identification in a medical environment, it ensures positive and accurate identification through wireless e-script authentication with secure PC logon for compliance with Health Insurance Portability and Accountability Act (HIPAA) mandates.



Acoustically Intelligent Surfaces

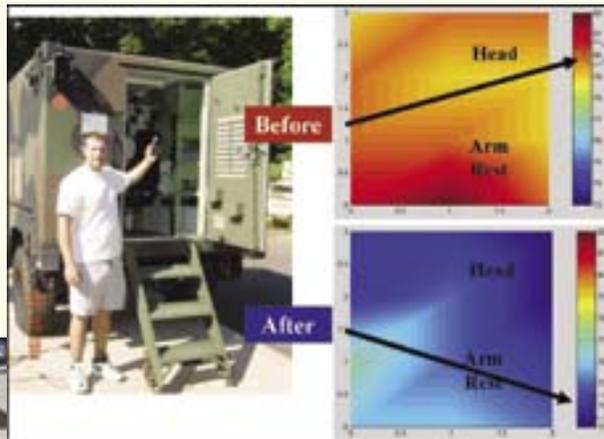
QRDC, Inc., Chaska, MN

Background noise in static and mobile headquarters enclosures presents a challenge to effective command and control within the Army's Theaters of Operation. Fully equipped command and control shelters, both hard and soft walled, can become extremely noisy – to the point of jeopardizing control of current operations.

Through the SBIR Program, QRDC, Inc. developed a unique energy and space efficient solution based on the development of Acoustically Intelligent Surfaces™ using Smart Skin technology. By adapting state-of-the-art proactive sound and vibration management technology into the walls of the shelters, sound energy is diverted and channeled to regions where it does not add overwhelming background noise.

QRDC's Energy Flow Control™ design and control methodology utilizes sensor/actuator arrays that channel and divert noise to regions where it does not interfere with the operations. The Energy Flow Control™ technology was applied to the walls and ceiling of an Army command and control shelter to maintain noise levels below 65dBA (normal conversation level).

Acoustically Intelligent Surfaces™ have application for further design, manufacturing, and retrofit applications in existing commercial and industrial market segments including aerospace, agricultural machine, window and door, furniture, computer, appliance, power generator, railroad equipment, boat, and automotive industries.



40 units sold to mining industry to date

\$500K in DoD R&D funding
\$1.3M in DoE R&D funding
\$1.3M in private R&D funding
\$3.25M in equity investments

Patent pending



\$500K in DoD R&D funding

1 patent pending

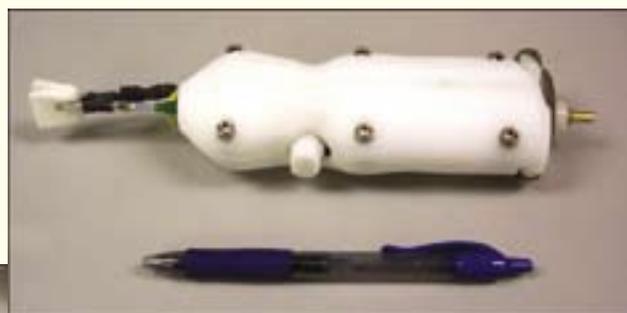
Advanced Magnesium Corrosion Protection

Technology Applications Group, Inc., Grand Forks, ND

Magnesium corrosion is a major problem for helicopter drive train components for both military and commercial users in terms of cost and maintenance downtime. Technology Applications Group, Inc. (TAG) has developed a line of specialized coatings with the Tagnite label to improve the corrosion resistance of magnesium castings. With the help of Army Phase II SBIR funding, TAG has developed a Brush Tagnite unit that can repair magnesium corrosion in the field and at the depot level. The Brush Tagnite unit consists of a small rectifier with application brush heads and coatings chemicals delivered via a disposable syringe enclosed in the brush head assembly unit.

The primary benefit of this system is the elimination of hexavalent chromium (a known carcinogen) from the magnesium repair scheme. The Brush Tagnite coating also gives the magnesium drive train component enhanced galvanic corrosion protection.

Although specifically designed for use on military rotorcraft, this technology can easily be adapted to military and civilian fixed wing aircraft and civilian rotorcraft. The automotive industry uses 90% of the magnesium produced and this technology can be used in all types of automotive applications.



Array Repository Data Analysis System

3rd Millennium, Inc., Waltham, MA

Today's U.S. Army researchers employ high throughput functional genomic technologies to identify biomarkers to monitor early infection or exposure. Using this data, researchers develop strategies for rapid diagnosis, vaccine development, and/or therapeutic intervention for exposure and infection to pathogens and/or toxins of military importance.

To manage the massive data sets generated by these technologies and advance time to biological discovery, 3rd Millennium, Inc. developed the Array Repository Data Analysis System (ARDAS), a web-enabled highly integrated informatic platform. The system consists of a Laboratory Information Management System (LIMS) to manage upstream laboratory processes, and a data repository for archival storage and organization of raw and derived data in projects and experiment designs. The repository is structured to enable rigorous statistical analysis and includes a sophisticated search engine. The Analysis Information Management System (AIMS) provides guided analytical workflows for current microarray platforms. The results of analyses generated in the AIMS can be imported back into the data repository where they are available – along with sample information and other experimental data – to support powerful scientific queries. The system permits flexible upload of data to a central server such that researchers at distant sites can share and exchange data as well as perform complex queries across large-scale meta data sets. ARDAS provides an integrated informatics architecture to support biological research and discovery efforts being conducted throughout the Army's Medical Research and Materiel Command (MRMC).



PHAS IMP

\$800K in private sector sales

\$110K in DoD R&D funding



Federal and private
organizations to transition
into commercial applications

\$250K in DoD R&D funding

2 patents pending

Hydrogen Generation for Fuel Cell Applications

MesoSystems Technology, Inc., Kennewick, WA

MesoSystems Technology, Inc. and MesoFuel, Inc., a subsidiary of Intelligent Energy, Inc., have developed a compact, ammonia-based hydrogen generator. This device is composed of a lightweight MesoChannel™ reactor, high-effectiveness heat exchangers, high-capacity ammonia adsorbent, and flow/temperature control components. Ammonia is reacted at approximately 600°Celsius to form a 75/25 mixture of hydrogen and nitrogen with trace quantities of ammonia remaining in the product gas. The ammonia is removed using an adsorbent and the remaining hydrogen/nitrogen mixture is fed to a fuel cell for the production of electrical energy. Additionally, a multi-fuel reactor was developed with integrated hydrogen separation, which allows production of high-purity hydrogen.

The capability of utilizing existing fuel infrastructure and providing pure hydrogen to enable the use of fuel cell power systems is the key success criterion. Research through this SBIR has proven that liquid fuels convert into pure hydrogen for fuel-cell power systems in a system with single-push-button™ operation.

Additionally, the team has displayed this SBIR-funded hydrogen generation system integrated with a fuel cell system to generate electrical power. These demonstrations have been made for numerous government and commercial entities, including multiple international companies and organizations.



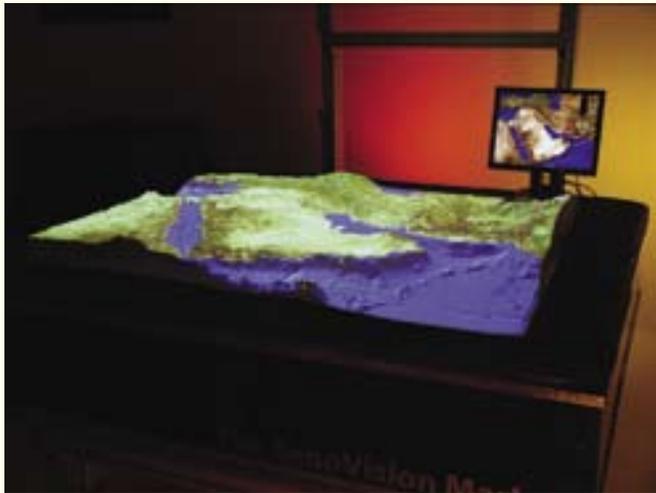
Dynamic Digital Sand Table

Xenotran Corporation, Glen Burnie, MD

Xenotran Corporation has developed a 3-Dimensional (3-D) geospatial terrain data modeling tool. The tool called the XenoVision™ Mark III Dynamic Sand Table uses digital elevation data with a corresponding image file, and produces a 3-D, full color terrain model in less than 3 minutes. This model can be reconfigured with fresh data within the same time frame. The Mark III displays the 3-D terrain data models in a 4'x3' large table format and allows for quick visualization of scenarios to support current operations, mission planning and rehearsal, and general situational awareness.

This terrain modeling-on-demand supports both commercial and government requirements for quick analysis of data, and allows for live video feeds and animation of activity played over the constructed models. The Mark III capabilities will revolutionize mission rehearsals and goes a long way in supporting mission accomplishment. The next generation of the Mark III will incorporate the ability to allow a second model to be computed while the first is being displayed and instantaneously construct the next model without the current erase, and rebuild time.

Xenotran's innovative new technology has been in substantial publications in 2004 such as Federal Computer Week, Geo-Intelligence, Geo-Spatial, and Directions Magazine. This unique visualization product, previously unimaginable, is now a reality and will emerge as the leader of data analysis tools that support the Army and the Federal Government.



PHAS
TIMP

First unit sold to Navy
Research Laboratory

\$130K in non-SBIR funding





150 units sold to federal and private sector

\$1.5M in DoD and private R&D funding

Urban Combat Planning and Training Tool

Boston Dynamics, Cambridge, MA

Effective Military Operations in Urban Terrain (MOUT) has grown in importance in recent Theaters of Operation. It requires well-trained individual combatants to work seamlessly in a tactical team, in close proximity to innocent civilians, armed civilians, potential hostages, and enemy forces while maneuvering in close-in urban terrain. MOUT encompasses a variety of missions from peacekeeping to full combat.

Boston Dynamics created Mission Planning and Training Tool (MPTT) software that allows experienced users to create urban combat training scenarios in less than one hour. The software, accessible through a personal computer, lets users rehearse scenarios and prepares them for what engagements will look like. MPTT supports the Army's requirement for MOUT mission planning and rehearsal at battalion level and below. The tool allows computer-generated forces to maneuver in and around buildings and to react to the actions of other forces in the scenario. Further enhancements have allowed MPTT to support effective mission planning, rehearsal, and training.

MPTT has been commercialized as DI-Guy Scenario™, a tool that runs on affordable PC computers, supports rapid 3-D scenario generation, and runs in real-time. DI-Guy Scenario™ is used by approximately one hundred organizations worldwide, including all components of the Department of Defense. Both MPTT and DI-Guy Scenario™ have been applied in Navy flight-deck operations training, law enforcement, and emergency response preparedness training.

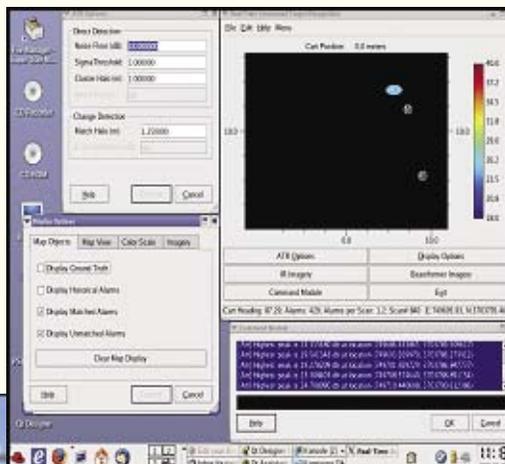


Innovative Radar for IED and Landmine Detection

Planning Systems, Inc., Reston, VA

Buried anti-tank mines, off-route mines, and Improvised Explosive Devices (IED) constitute major threats to deployed Soldiers and their vehicles. To detect these weapons at standoff distances (8-30 meters depending on threat type and concealment), Planning Systems, Inc. (PSI) developed Forward-Looking Synthetic Aperture Ground Penetrating Radar (FLGPSAR). The system produces real-time images of threat objects while moving at speeds of 20-30 kph. PSI designed and built an advanced detection system that includes a modified mid-sized 4x4 truck outfitted with custom FLGPSAR electronics, radar transmit and receive arrays, real-time image processing, and computer display systems. PSI software engineers developed custom software that includes automated target recognition algorithms, provides real-time threat display and cueing for the operator, and displays a scrolling image as the vehicle moves forward.

Unlike other ground penetrating radars, PSI's state-of-the-art system uses near-field beamforming to image objects in three dimensions. The objects are precisely localized in geodetic coordinates using real-time Kinematic ground penetrating radar. The system is flexible and can be optimized for the detection of a variety of threats, including anti-tank mines and IEDs. It transmits less power than a cellular telephone over a frequency band of 800 MHz to 2.0 GHz while imaging and processing a 20-meter wide swath up to 30-meters ahead of the array. Tests against actual mines indicate that the system can detect buried metallic and plastic anti-tank mines, certain types of IED, and side-attack mines.



PHASE III
IMPACTS

\$1.8M in DoD and private sector sales

\$3.75M in DoD R&D funding





ARMY STTR



THE SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAM

The Small Business Technology Transfer (STTR) Program is a government-wide program, mandated by the Small Business Research and Development Enhancement Act of 1992 and has been re-authorized through 2009. As with SBIR, the STTR Program spans Army research and development across the Major Army Commands.

PHASES

1

- Feasibility of concept phase
- Duration: 6-12 months
- Funding: Award up to \$750K

2

- Research & Development phase
- Duration: 24 months
- Funding: Award up to \$750K
- Goal: A viable dual-use technology, product, or service

3

- Commercialization phase
- Duration: Unlimited
- Funding: Unlimited, but no SBIR funds may be used
- Goal: Market product to the Government or private sector

STTR has the same objectives as SBIR regarding the involvement of small businesses in federal R&D and the commercialization of their innovative technologies, but STTR requires participation by universities, federally funded research and development centers (FFRDCs), or other non-profit research institutions. Each STTR proposal must be submitted by a team, which includes a small business (as the prime contractor for contracting purposes) and at least one research institution. The project must be divided such that the small business performs at least 40% of the work and the research institution(s) performs at least 30% of the work. The remainder of the work may be performed by either party or a third party.

Advanced Portable Power

INI Power Systems, Inc., Cary, NC

Over \$3M in private R&D
funding

Exclusive licensing of U.S.
patent 6,713,206

3 patents pending for direct
methanol laminar flow fuel cell

Advancements in telecommunications and electronic weaponry are key to a dismounted Soldier's ability to leverage portable electronic equipment during combat. Laptops, GPS, night vision goggles, cellular phones, two way-radios, laser-designators, chemical-biological sensors, and other portable electronic devices require equally portable and sustainable DC power sources to maintain the Soldier's technological advantage.

Currently, primary batteries provide the majority of portable DC power for the dismounted Soldier; however, major drawbacks are added weight and low power density. For example, in a typical 72-hour mission, up to half of the rucksack weight for a dismounted Soldier outfitted with standard electronic gear is in primary batteries. This creates a logistical problem for Soldiers who must prioritize either extra batteries or adequate ammunition and supplies. The ever-growing power demands for the Soldier's electronic gear exacerbates this dilemma. As this power gap widens and today's Soldier becomes increasingly networked on the battlefield, portable DC power sources must provide much higher energy density than current state of the art can supply.

INI Power Systems, Inc. is developing a proprietary direct methanol fuel cell system as a portable power solution to replace/augment primary batteries. This initial concept was demonstrated via a Phase I STTR award. With continued engineering efforts, INI Power will deliver a Personal Power Plant (IP3) to the Army. The IP3 will enable the dismounted Soldier to reduce the weight burden from primary batteries by nearly five times for a 72-hour mission. This improvement in power density assists in transitioning to a more mobile fighting force with greater tactical capabilities and firepower.

Funded research will lead to environmentally friendly, superior power sources for use in both the public and private sector for applications in a broad range of portable electronics. Army Research Laboratory Phase I and Phase II STTR contracts totaled \$850K and facilitated collaboration with researchers at the University of Illinois, Urbana-Champaign.





SBIR CBD



THE CHEMICAL AND BIOLOGICAL DEFENSE SBIR PROGRAM

The Department of Defense (DoD) established the Chemical and Biological Defense (CBD) Program to provide state-of-the-art defense capabilities that allow U.S. military forces to operate and successfully complete missions in chemical and biological warfare environments.

PHASES

1

- Feasibility of concept phase
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- Funding: Award up to \$70K
- Phase I option: 4-months option, up to \$30K, to fund interim Phase II efforts

2

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- Funding: Unlimited, but no SBIR funds may be used
- Goal: Market product to the Government or private sector

The overall objectives of the CBD Small Business Innovation Research (SBIR) Program are to elicit innovative solutions from the small business community that address chemical and biological defense technology gaps confronting DoD and to include technologies that also have high commercialization potential in the private sector. The Joint Science and Technology Office for Chemical and Biological Defense (JSTO-CBD) provides management for the Science & Technology component of the Chemical and Biological Defense Program. The JSTO-CBD Science and Technology programs and initiatives are improving defensive capabilities against chemical and biological weapons. Technologies developed under the SBIR program have the potential to transition to the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) if the appropriate level of technology maturity has been demonstrated.

High-Speed Chemical Weapons Analyzer

Syagen Technology, Inc. Tustin, CA

Instrument technology forms platform for other products

\$2M in federal and private sector sales

\$5.6M private sector sales from spin-off technology

Radiance Pro[®] is Syagen's high-throughput molecular analyzer configured for routine open access analysis of large numbers of chemical samples. The core technology is photoionization mass spectrometry (PI MS), which enables reliable detection of target compounds present in complex mixtures without the need for a front-end separation device such as gas or liquid chromatography (GC or LC).

Radiance Pro[®] CW is specifically designed for the detection of chemical weapons and their degradation compounds in addition to other chemical compounds such as Toxic Industrial Chemicals (TICs). The technology was originally developed for high-throughput screening to augment Chemical Weapons Convention (CWC) treaty compliance monitoring. In that application it is used to confirm the presence of alleged compounds. However, the limited time available to test potentially enormous numbers of samples dictated the need for a fast screening method. The photoionization technique offered a viable approach that could be used to facilitate on-site analysis requirements.

A target market for Radiance Pro[®] is early warning to screen water supplies for chemical contamination to include chemical warfare agents. Several pioneering water utilities and government laboratories have purchased systems for evaluation and have been promoting the effectiveness of the system for high-speed and high-throughput screening. The pharmaceutical industry represents another potential market that will benefit from this screening technology as it applies to the process of drug discovery.



Threat	Level
DF	2.2E+0
Pinacoyli alcohol	2.3E+0
Sarin	1.0E-1
OMMP	1.1E-1
EMPA	1.4E-1
Isopropylamine	8.0E-2
	0.0E+0
	0.0E+0
	0.0E+0
	0.0E+0



ARMY SBIR/STTR

COMMERCIALIZATION



During Phase III of the U.S. Army SBIR/STTR Programs, small companies are expected to obtain funding from the private sector and/or non-SBIR/STTR government sources to develop prototypes from Phase II into products for sale in private sector and/or military markets. U.S. Army Phase III commercialization success encompasses the following aspects:

SALES

“Sales” includes cash revenue from the sale of new products or non-R&D services embodying the specific technology and/or spin-off technology developed under this Phase II project.

The only “sales” revenue counted is that accruing to the firm itself and not to other entities, except in the following circumstance: If the firm sold or licensed the technological know-how developed under Phase II to another entity, the cash revenue accruing to the other entity from its sale of new products or non-R&D services embodying the Phase II technology also counts as sales.

If the new product/service embodying the Phase II technology is a component of a larger product/service (e.g., an improved coating on an existing optical lens product), the only “sales” counted are those that are attributable to the component rather than the larger product/service.

ADDITIONAL INVESTMENT

"Additional Investment" includes investment from any source other than the federal SBIR/STTR program in activities that further the development and/or commercialization of the specific technology developed under the Phase II project. Examples of such activities include:

- Additional R&D on the Phase II technology
- Manufacturing/production start-up
- Purchase of plant and equipment for manufacturing/production
- Protection of Intellectual Property
- Obtaining certifications
- Marketing start-up and marketing
- Training of workforce to manufacture or sell new products embodying the Phase II technology

These may be activities funded and conducted by a firm itself or by other entities.

HOW TO GET YOUR STORY PUBLISHED

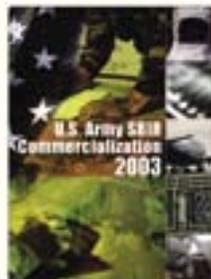
The U.S. Army SBIR/STTR Commercialization Brochure is published annually. The brochure highlights the positive impacts made by small firms that commercialize SBIR/STTR-sponsored products or services. The Army Research Office in Washington (ARO-W) distributes this high-quality, full color brochure within the Army/DoD community and to the private sector at a number of conferences and other venues across the country. These brochures provide excellent visibility for your company as well as your products and services. Please note that there is absolutely no fee for your participation. If your firm has had Phase III success, we would like to consider your story for inclusion in the next U.S. Army SBIR/STTR Commercialization Brochure.

For more information, visit www.aro.army.mil/arowash/rt/commercialization/comm.htm or contact the Army SBIR/STTR Program Management Office.

PAST COMMERCIALIZATION BROCHURES



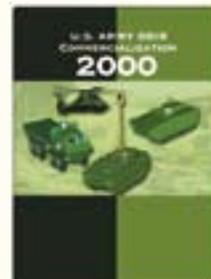
2004



2003



2002



2000



1999

WWW.ARO.ARMY.MIL/RT/AROWASH

OUTREACH AND SOURCES OF INFORMATION



The Army SBIR/STTR Programs conduct an aggressive outreach program to increase small business awareness of broad opportunities provided by the Army. Army SBIR/STTR personnel participate in national, regional, and local conferences across the country. This provides small businesses with face-to-face contact with people who are knowledgeable about Army needs and the SBIR/STTR process. The Army SBIR/STTR Website identifies upcoming events at which the Army will be participating.

The Army Research Office - Washington Website provides online access to comprehensive information about the SBIR/STTR Programs:



- General Information (on participating in the Program)
- Changes and New Requirements
- Points of Contact and Links (to other Army programs and related SBIR sites)
- Proposal Submission (procedures and entry points)
- Recent Army SBIR/STTR Awards
- Searchable Database of Past Awards
- Chemical-Biological Defense SBIR Program (Joint Army/Navy/Air Force/SOCOM)
- Phase III Success Stories
- Phase II Quality Awards Program

2004 QUALITY AWARDS WINNERS



Bare Earth Models & Feature Extraction from Light Detection & Ranging (LIDAR) Technologies

Spectrum Mapping, LLC.

U.S. Army Engineer Research and Development Center

Countermine Operations

Planning Systems, Inc.

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

Rapid Water Testing

Pacific Technologies

U.S. Army Medical Research and Materiel Command

Large Quantity Carbon Nanotube Production

NanoLab, Inc.

U.S. Army Research Laboratory

Successful Ultra-Wideband Communications

Time Domain Corporation

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

Flexible Photovoltaics for Fabric Structures

Iowa Thin Film Technologies

U.S. Army Natick Soldier Center

Developing Effective Decision-Making Skills

ScenPro, Inc.

U.S. Army Research Institute

Analysis and Optimization of Military Incinerators

Reaction Engineering International

U.S. Army Research Office



The Army SBIR/STTR Programs sponsor an annual Quality Awards Program that recognizes exceptional Army SBIR/STTR Phase II projects. Each year, a distinguished panel of Army and industry experts selects the winning projects from nominations submitted across the Army.

During the 03.2 Solicitation, the Army received over 3000 Phase I proposals, of which 352 were chosen for Phase I award. During the same fiscal year, the Army invited and received over 400 Phase II proposals, of which 228 were selected for award.

This year, as in the past, the competition was keen. The Army received 38 Quality Award nominations and selected 8 winning projects. These 8 projects represent the best in technology innovation, relevance to the needs of the Army, and commercialization potential.

In recognition of their accomplishments, the winners and their projects are showcased at several Army conferences and symposia throughout the year via this Army SBIR/STTR Phase II Quality Awards brochure.

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