



**COMBATING TERRORISM  
TECHNOLOGY SUPPORT OFFICE  
2006 REVIEW**

## Preface

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*If not for America, who would rally freedom-loving nations to defend liberty and democracy in our world? Nearly five years after the tragedy of September 11th, the United States is leading a great coalition of countries in a global war on terrorism. When possible, we are bringing terrorists to justice. And when necessary, we are bringing justice to the terrorists. This is the fate that our troops delivered last week to the terrorist Zarqawi and now he will never harm, he will never murder, he will never terrorize innocent people again. That is what America stands for.*

*Secretary of State Condoleezza Rice  
June 14, 2006*

In the fight against those who would destroy our freedom, the United States Armed Forces, the Federal law enforcement community, and national first responders require new and improved capabilities. Since 2001, numerous departments and agencies have instituted programs to fill these gaps, but the Combating Terrorism Technology Support Office (CTTSO) has maintained its position at the leading edge of innovation. CTTSO's subordinate programs - the Technical Support Working Group (TSWG), Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC), and Irregular Warfare Support (IWS) - have provided two decades of solutions for those combating terror.

*This country is safer than it was prior to 9/11. We've taken a lot of measures to protect the American people. But obviously, we're still not completely safe, because there are people that still plot and people who want to harm us for what we believe in. It is a mistake to believe there is no threat to the United States of America. And that is why we have given our officials the tools they need to protect our people.*

*President George W. Bush  
August 10, 2006*

With ten departments and over 100 agencies collaborating in CTTSO programs, an opportunity exists that is unique in the United States Government. CTTSO makes it possible for a firefighter from New York City to sit next to a Marine just back from Fallujah and a senior scientist from the Transportation Security Laboratory to discuss operational and technological gaps in capability. In addition to sharing experiences and developing novel operating concepts, these frank discussions often result in




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*“This is the challenge of our time.”*

*George W. Bush  
Sept. 29, 2006*

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Dept. of the Army photo by Pfc. Brian Schroeder



DoD photo by Cpl. Brian M. Henner, USMC  
(Released)

## Preface



DoD photo by Tech. Sgt. Scott T. Sturkol, USAF (Released)

*“...we must also provide our military and intelligence professionals with the tools they need to protect our country from another attack. And the reason they need those tools is because the enemy wants to attack us again.”*

*George W. Bush  
Sept. 15, 2006*



U.S. Army photo by Pfc. William Servinski II (Released)

collaborative requirements identification and allow the sharing of resources among organizations that have little other opportunity to coordinate. The output of these requirements meetings is a prioritized list of cross-agency needs against which CTTSO can seek solutions. By pooling the resources of the participating agencies with its own budget, CTTSO is able to leverage finances, technical expertise, and operational understanding to realize the most efficient solutions possible.

However, the generation of requirements does not end our users' participation. The user groups that formulated the requirements continue to be involved during the development of the solutions. CTTSO identifies task managers within the user community to maintain awareness of the projects they championed to ensure that the ultimate solution meets the requirement.

While solutions come in many forms; from novel tactics, techniques, and procedures to innovative training architectures; the most prevalent remains prototype hardware. Nonetheless, delivering a prototype to satisfy a requirement does not necessarily make for a successful project. Not planning for success has thwarted more endeavors than any single factor. If an identified gap is truly to be filled, the solution must be operationally useful and sustainable. CTTSO requires all projects to include a technology transition plan so that novel solutions don't remain novelties for long. With licensing expertise and commercialization strategies, companies that develop products can find manufacturing solutions. Planning every step of the way allows technologies to transform the bright spark of an idea into a beacon that shines for years.

*The center of gravity of this war is not in Iraq or Afghanistan or in the Middle East. It's here in the United States. It's a test of wills between people who are determined to deny us freedom and kill innocent men, women, and children. They've killed 3,000 people in our country, some of them right here in the building I'm sitting in, in the Pentagon, and they are a vicious enemy, and I believe that. They need to be stopped and they need to be prevented and we have to do everything we can to protect the American people and to see that they're safe.*

*Secretary of Defense Donald Rumsfeld  
April 18, 2006*

## Preface

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There are many disenfranchised groups that aim to destroy American freedoms. But America has some secret weapons: firefighters; police officers; bomb disposal technicians; border patrol officers; airport screeners; the Armed Forces; and the American public. They all know the stakes and will perform to their utmost abilities to ensure that another terrorist attack does not occur on their watch. They are all customers of CTTSO.

CTTSO products share few common threads. Some of the projects that you will read about in the pages that follow are designed for first responders while some are designed for embassies or our warfighters abroad. Costs range from \$20 to hundreds of thousands of dollars. Some systems can fit in the palm of your hand; others require a C-17 for air transport. But each of these products, despite their varied appearance, is designed to provide a specific capability to a front-line defender. The one constant is that they all allow the United States to fight and defeat the threats of terrorism.



Photo courtesy of the Department of the Army





## Table of Contents

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### Combating Terrorism Technology Support Office

Overview and Organization.....	4
International Program.....	5

### Technical Support Working Group

History and Mission.....	8
Organization and Structure.....	8
Program Funding.....	10

### Technical Support Working Group Subgroups

Blast Effects and Mitigation.....	13
Chemical, Biological, Radiological, and Nuclear Countermeasures.....	19
Concept Development.....	27
Explosives Detection.....	29
Improvised Device Defeat.....	33
Infrastructure Protection.....	39
Investigative Support and Forensics.....	43
Physical Security.....	49
Surveillance, Collection, and Operations Support.....	55
Tactical Operations Support.....	57
Training Technology Development.....	61
Very Important Person Protection.....	67

### Explosive Ordnance Disposal/Low-Intensity Conflict

Organization and Funding.....	74
Focus Areas.....	75
Selected Completed Projects.....	76
Selected Current Projects.....	77

### Irregular Warfare Support

Mission and Focus Areas.....	82
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### Product Development and Delivery

Featured Project Updates.....	86
Technology Transition.....	89
2006 Meetings and Conferences.....	90
BAA Information Delivery System.....	91

### Appendix

2006 Membership.....	94
2006 TSWG Membership by Subgroup.....	98
2006 Performers.....	107
Glossary of Acronyms.....	116





# Combating Terrorism Technology Support Office





# Combating Terrorism Technology Support Office



*“Identify meaningful combating terrorism needs and satisfy them better than anyone else.”*

## Overview

The Combating Terrorism Technology Support Office (CTTSO) has used the above guidance to craft programs that are constantly adjusting to fill the needs presented by its customers. Following the example set by expeditionary combat units as the first elements to enter unknown territory and then displacing when the larger force is in place, CTTSO provides rapid capabilities while the larger research and development (R&D) community is mobilizing. When other organizations set up the infrastructure to provide long-term programs of record, CTTSO recalibrates to provide solutions to rapidly evolving requirements in new areas of the Global War on Terror (GWOt) that would otherwise go unmet.

As a program office under the Assistant Secretary of Defense (ASD) for Special Operations and Low-Intensity Conflict (SO/LIC), CTTSO is uniquely positioned to contribute to the success of the GWOt. With overall supervision of the Special Operations and Low-Intensity Conflict activities of DoD, including oversight of policy

## CTTSO Organization



## Combating Terrorism Technology Support Office

and resources, the ASD acts as the principal civilian advisor to the Secretary of Defense on SO/LIC matters. This allows CTTSO to take operational requirements from warfighters, incorporate policy objectives that flow down from the Department, and marshal technical expertise resident in its program managers, subject matter experts, and developers to provide capabilities that are fieldable and sustainable over the “Long War.” This fortuitous balance of political direction, operational relevance, and technical expertise has enabled CTTSO to respond with agility and speed to changing requirements.

In 1999, CTTSO was assigned program management functions for the Technical Support Working Group (TSWG), the organization named by the *Wall Street Journal* as “...the nation’s talent scouts for antiterrorism” technologies. More recently, CTTSO’s responsibilities have grown to include the Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC) program and Irregular Warfare Support (IWS) program. Numbering close to 100 dedicated managers, subject matter experts, and direct support personnel and over 400 active projects, CTTSO is positioned to sustain the success it has realized over the past seven years far into the future.



DoD photo by Petty Officer 2nd Class John F. Looney, USN (Released)

### CTTSO’s International Program

Terrorism has become the disgraceful tactic of choice for an increasing number of disaffected consortiums throughout the world. These extremists share tactics, techniques, and procedures via our very infrastructure to destroy the freedoms we hold dear. To defeat these globally connected terror groups, the U.S. must cooperate with our allies in the development of capabilities to combat terrorism.

In 1993, the U.S. Congress – recognizing the international nature of the terrorist threat – authorized TSWG, in the National Defense Authorization Act for Fiscal Year 1993, to actively seek “cooperation with other member nations of the North Atlantic Treaty Organization (NATO) and with major non-NATO allies” in the areas of combating terrorism research and development. Cooperative agreements were subsequently concluded with Israel, Canada, and the United Kingdom. In 2006, agreements were likewise signed with Australia and Singapore. Such international cooperation allows CTTSO to leverage foreign experience, expertise, and resources in the fight against terrorists and their infrastructure.





# Technical Support Working Group



## Technical Support Working Group



### History and Mission

In April 1982, National Security Decision Directive 30 assigned responsibility for the development of overall U.S. policy on terrorism to the Interdepartmental Group on Terrorism (IG/T), chaired by the Department of State (DOS). TSWG was an original subgroup of the IG/T, which later became the Interagency Working Group on Counterterrorism (IWG/CT). In its February 1986 report, a cabinet-level Task Force on Counterterrorism, led by then Vice-President Bush, cited TSWG as assuring “the development of appropriate counterterrorism technological efforts.”

Today, TSWG still performs that counterterrorism technology development function as a stand-alone interagency working group. TSWG’s mission is to conduct the national interagency research and development (R&D) program for combating terrorism requirements. It also has commenced efforts to conduct and influence longer-term R&D initiatives and, reflecting the shift to a more offensive strategy, balance its technology and capability development efforts among the four pillars of combating terrorism: antiterrorism, counterterrorism, intelligence support, and consequence management.

### Organization and Structure

TSWG operates under the policy oversight of the Department of State’s Coordinator for Counterterrorism and the management and technical oversight of the Department of Defense Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict. While TSWG’s core funds are derived principally from CTTSO and DOS, other departments and agencies contribute additional funds and provide personnel to act as project managers and technical advisors.



Photo courtesy of the Dept. of the Army

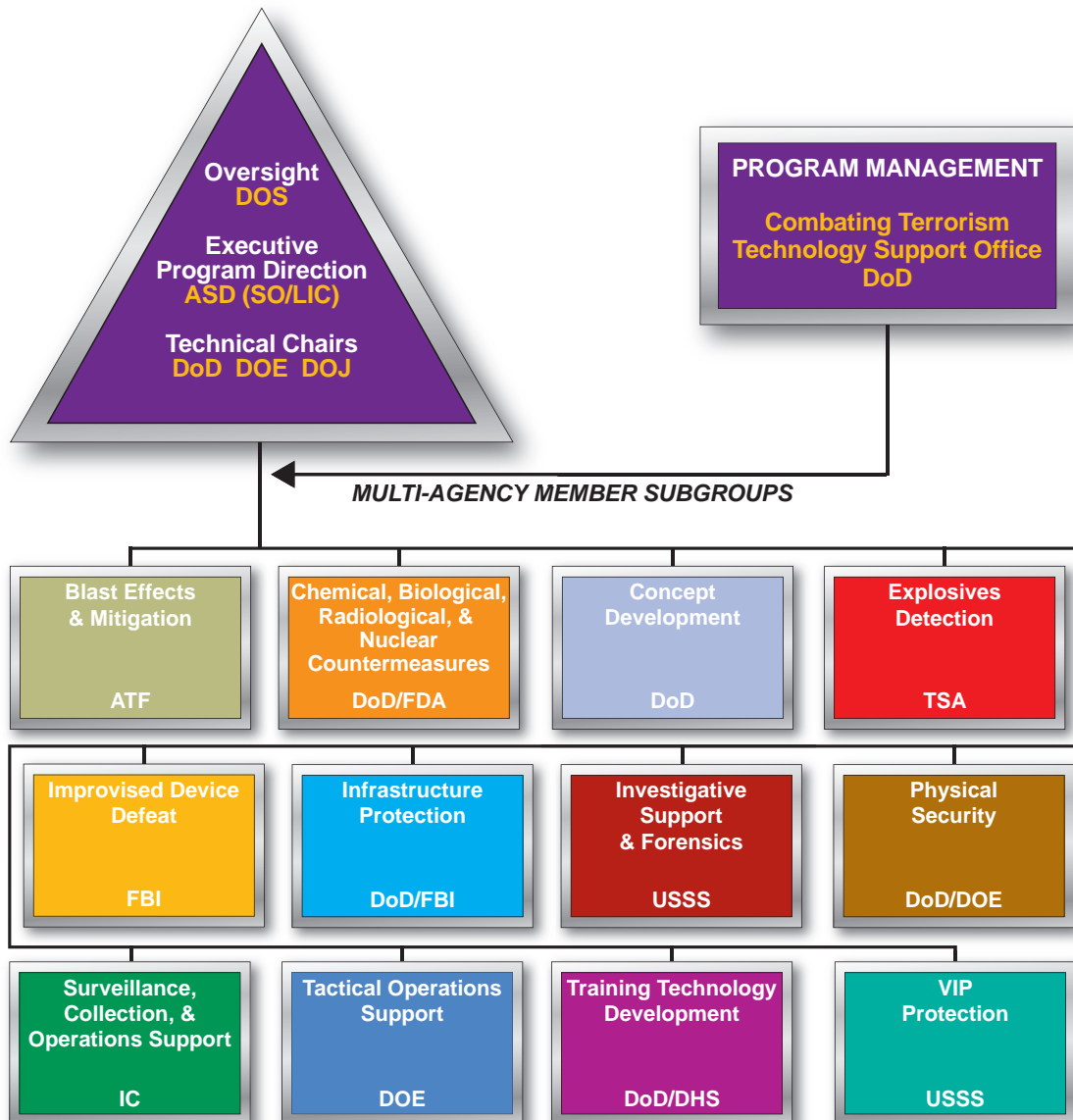
TSWG has successfully transitioned capabilities to the Departments of Agriculture, Defense, Justice, State, and Treasury; the Intelligence Community; the Transportation Security Administration; the Public Health Service; and many other departments and agencies. Additionally, TSWG has transitioned many systems to State and local law enforcement.

TSWG membership includes representatives from over 100 government organizations. Participation is open not only to Federal departments and agencies, but also to first responders and appropriate representatives from State and local governments and international agencies. These departments and agencies work together by participating in one or more subgroups. A comprehensive listing of member organizations by subgroup is provided in the appendix.

## Technical Support Working Group

Each TSWG subgroup is chaired by a senior representative from a Federal agency with special expertise in that functional area. Chairmanship of four subgroups is shared as indicated in the organizational chart below.

### TSWG Organization

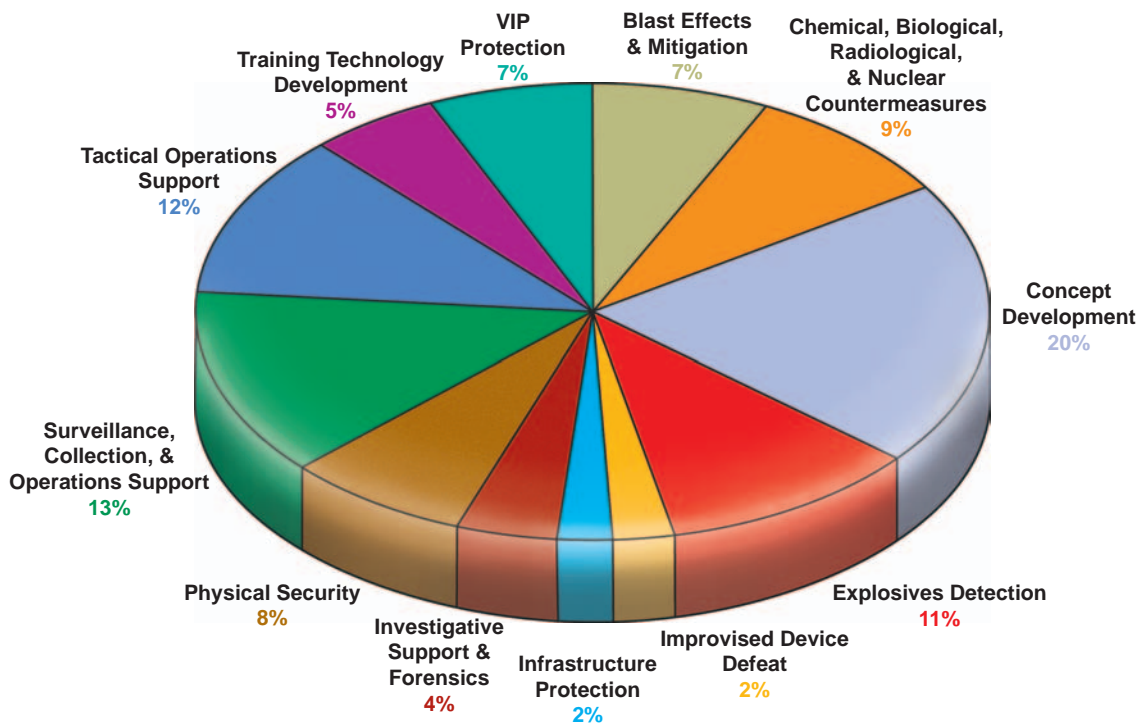


## Technical Support Working Group

### Program Funding

Funding for the TSWG program increased to almost \$218 million in FY 2006. This increase reflects the heightened concern over terrorist activity and the recognized need to accelerate the development of technology to effectively address the threat. The Department of Defense provides the bulk of funding for TSWG activities. The Department of State contributes annually to TSWG core funding, while other departments and agencies share the costs of selected projects.

TSWG FY 2006 Program Funding (\$218 Million)



# Technical Support Working Group Subgroups



U.S. Army photo by Tech. Sgt. Jeremy T. Lock





## Blast Effects and Mitigation



Photo by TSWG BX Subgroup

## Blast Effects and Mitigation

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### MEMBERSHIP

NEW YORK CITY MASS TRANSIT AUTHORITY

PORT AUTHORITY OF NEW YORK/NEW JERSEY

U.S. DEPARTMENT OF DEFENSE  
AFIP (OAFME), DTRA, USA (ARL, CE-PDC, SSC, USAISR), USAF (AFRL), USN (NAVFAC, NHRC)

U.S. DEPARTMENT OF JUSTICE  
ATF

U.S. DEPARTMENT OF STATE  
DS

### Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency and international requirements to define and mitigate the potential damage mechanisms from conventional and enhanced explosive mixtures.*

The Blast Effects and Mitigation (BX) subgroup identifies and develops technologies and techniques to evaluate the conventional and enhanced explosive effects on representative targets, including structures, critical infrastructure, vehicles, and humans. Projects conducted through this group characterize and provide interagency coordination of near-term solutions for emerging explosive threats. A representative from the U.S. Department of Justice's Bureau of Alcohol, Tobacco, Firearms, and Explosives chairs the subgroup.

### Focus Areas

The BX subgroup focus areas reflect the prioritized requirements of Federal engineering activities responsible for high-risk facilities, the owners of critical infrastructure, and the needs of military personnel exploring new concepts in body armor and ballistic protection. During FY 2006, these focus areas were:

#### **Conventional and Enhanced Novel Explosive Mitigation**

Investigate and characterize both conventional and novel explosives to fully understand the potential damage and to identify mitigation strategies. Emphasize the development, design, and construction of retrofit techniques for new and existing buildings, field fortifications, vehicles, and barriers in order to strengthen these structures and to reduce debris hazards and structural collapse.

#### **Advanced Instrumentation**

Develop new, repeatable, and sustainable test protocols, instrumentation suites, and models that capture and characterize the dynamic environment of emerging threats. Use data and information obtained through comprehensive instrumentation test efforts to develop new protection and mitigation methodologies to specifically address enhanced novel explosives.

#### **Human Lethality in a Blast Environment**

Quantify the effects of conventional and enhanced blast damage mechanisms to the human body. Evaluate the effectiveness of blast injury prevention and mitigation concepts from an injury perspective. Develop new methodologies to protect against blast fragmentation, fire, and overpressure injury.

## Blast Effects and Mitigation

### Critical Infrastructure Security

Test and evaluate critical structural systems in buildings, bridges, tunnels, and other critical infrastructure components using both full-scale blast testing and blast simulator technologies. Assess the level of protection that is sufficient to mitigate various threats to enable military planners and stakeholders in critical transportation systems to make more informed decisions.

### Selected Completed Projects

#### Testing of Close-In Explosives on Steel Columns

Many buildings employ steel columns as the primary source of structural support, but information on the columns' ability to withstand a close-contact blast is limited. The Energetic Materials Research and Testing Center (EMRTC) conducted live blast testing on steel columns to demonstrate the extent of the damage from a close-in charge. The effects of pressure, acceleration, force, strain, temperature, and displacement were measured with electronic recording and triggering systems. EMRTC was able to determine the levels of damage to a structure based on the charge weight and proximity to the columns. As a result, EMRTC was able to develop two software tools, one for near-contact blasts and one for steel columns, that evaluate the threat to a structure based on charge weight, shape, and stand-off distance. These tests allow architects, blast engineers, and security counselors to make informed decisions about structural design as well as potential retrofit and mitigation strategies. The software tools will be available through the U.S. Army Corps of Engineers' Protective Design Center in late 2006. Requests for additional information should be sent to [bxsubgroup@tswg.gov](mailto:bxsubgroup@tswg.gov).



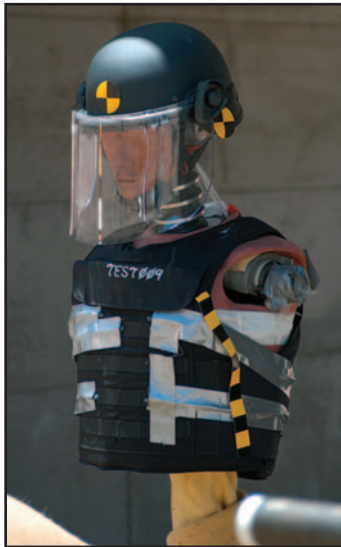
#### Blast Wall Tests

Building architects and planners in both the public and private sectors need the latest research and data available on the protective properties of construction material. TSWG and a foreign partner investigated methods for making walls more blast resistant. The primary investigation focused on close proximity blasts and areas with elevated threats and high vulnerability. This effort included testing new construction materials as well as testing both new and existing retrofit solutions, such as polymer application. The test results are now available on a restricted basis to government and private-industry planners to facilitate their design and decision-making processes for new structures. Requests for additional information should be sent to [bxsubgroup@tswg.gov](mailto:bxsubgroup@tswg.gov).



## Blast Effects and Mitigation

### Evaluation of Ballistic Protective Equipment in an Explosive Environment



Although ballistic protective equipment undergoes extensive testing against weapons and small-arms fire, the level of protection against a blast has been largely unknown until now. In conjunction with Applied Research Associates, Inc. (ARA), TSWG tested the current standard ballistic gear to determine performance in a blast. The results of these tests are available to government and private-industry developers searching for ways to update and redesign the equipment for better protection against the current IED threat. Interim results from Phase 2 of the testing confirm that existing ballistic protective gear does not exacerbate blast injuries for the blast conditions under evaluation. Level IV vests appear to offer some added protection, while head protection is enhanced when a helmet is worn with a face shield. Finally, this study provides the first histological data confirming that brain injuries may be caused exclusively by blast loading and that the threshold for blast traumatic brain injury is well below the threshold for lung injury. With the additional test data gathered in the third and final phase of tests, ARA will develop models that offer a viable, repeatable, blast injury testing protocol. Requests for additional information should be sent to [bxsubgroup@tswg.gov](mailto:bxsubgroup@tswg.gov).

### Selected Current Projects

#### Advanced Instrumentation



As new improvised explosive devices are identified, it is critical that their threat potential with respect to blast, fragmentation, thermal effects, and other phenomena be assessed and defined so that their effects on targets such as structures, vehicles, and personnel can be evaluated. The results can be used to determine which existing blast mitigation technologies are still viable against a newly defined threat and, just as importantly, which technologies are no longer viable. Applied Research Associates, Inc. is designing and planning test program instrumentation, as well as overseeing the fielding and operation of test instrumentation systems. The program includes assisting TSWG and cooperating partners in defining test program goals and objectives, defining test arenas and protocols, and identifying instrumentation and measurement requirements. ARA is also providing additional technical and logistical oversight support for test and evaluation efforts.

## Blast Effects and Mitigation

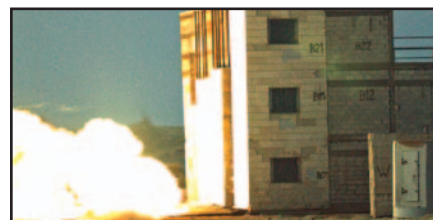
### Entry Control Point Technology Demonstrations

The Entry Control Point (ECP) demonstration project is designing and constructing state-of-the-art entry control facilities in the CENTCOM Area of Responsibility. The ECP will be built using Explora Group's Dynasystems (including Dynablok™ and Dynatower™), two blast mitigation construction materials, along with Metalith vehicle barriers created by Corrugated Metals, Inc. The ECP will integrate force protection and security systems in a design created specifically for the U.S. Marine Corps. The ECP will demonstrate new technologies in blast mitigation, ballistic protection, remote vehicle inspection and pedestrian screening systems, vehicle barriers, and tactical defensive measures required in a high-threat environment. Technical drawings required for this ECP design have been developed in collaboration with the U.S. Army Corps of Engineers' Protective Design Center.



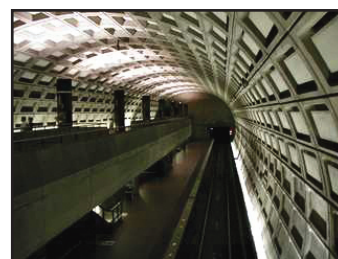
### Explosive Effects

In a joint effort, TSWG and an international partner are studying near-contact conventional and homemade explosive blast threats. The objectives of the project are to evaluate the effectiveness of the screening points at airports and border crossings; determine the impact of various explosive charge weights in different indoor and outdoor scenarios; and develop laboratory capability to perform research and development with improvised explosives, such as TATP and other homemade explosives. The results of the research and testing will be used by government, military, and civilian organizations to make informed decisions about building and perimeter security as well as measures for protection and mitigation.



### Tunnel Mitigation Strategies

To date, there is no reliable testing method to quantify the performance of possible countermeasures and mitigation solutions for critical infrastructure, including a number of cast-iron tunnels situated in saturated soils that were typically built in the first part of the 20th century. TSWG is working with transportation authorities and the Energetic Materials Research and Testing Center to better understand the inherent vulnerabilities of these tunnels. This study will evaluate the vulnerability of several types of cast-iron-lined tunnels subjected to explosive loading. The results of this study will provide needed vulnerability estimates for tunnel wall systems; information that is an essential component to the development of risk strategies. The data will be used by tunnel owners and operators to develop a better understanding of the response of these infrastructure components to blast overpressure and to develop better predictive capabilities through the use of computer software.



## Blast Effects and Mitigation

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### Bridge Tower Testing

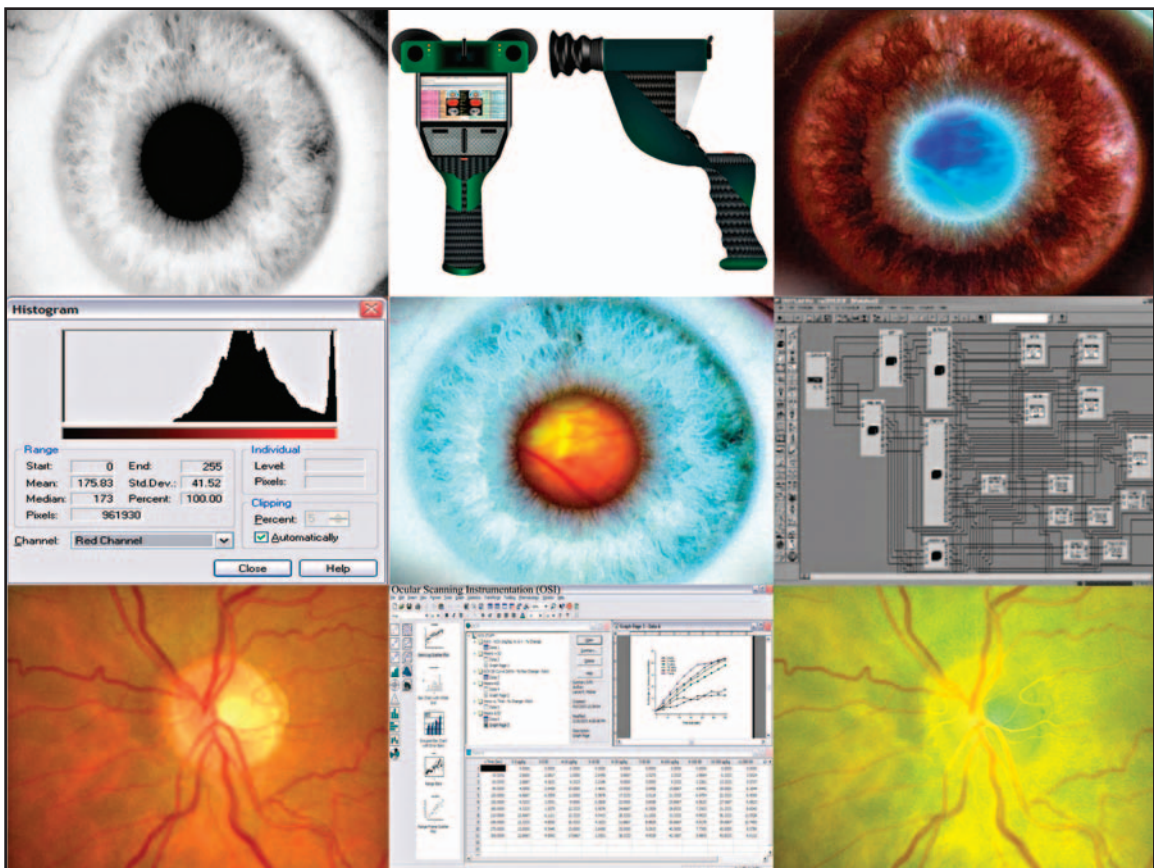


The blast mechanisms responsible for damage to bridges are not fully understood. The bridge tower testing project evaluates the performance of bridge components and connections to develop a greater awareness of the effects of a blast on the bridge itself and the surrounding environment. EMRTC is currently developing modeling tools to determine performance capabilities of existing bridge infrastructure, plan for retrofits, and develop new construction methods. The software tool will provide a rational alternative to the simplified single-degree-of-freedom methods currently in use by incorporating more complex dynamic material models, as well as incorporating design guidelines based on section compactness, plastic rotation capacity, shear failure modes, and the presence or absence of a splice in the column. Ultimately, the software will be available in a user-friendly graphical user interface format that facilitates data input and provides almost immediate output of the results. Civil and structural engineers not familiar with blast resistant design will gain the capability to do a first-cut analysis of the vulnerability of existing buildings.

### Contact Information

[bxsubgroup@tswg.gov](mailto:bxsubgroup@tswg.gov)

# Chemical, Biological, Radiological, and Nuclear Countermeasures





# Chemical, Biological, Radiological, & Nuclear Countermeasures

## MEMBERSHIP

- ENVIRONMENTAL PROTECTION AGENCY
- FAIRFAX COUNTY, VA FIRE DEPARTMENT
- FEDERAL RESERVE BOARD
- INTELLIGENCE COMMUNITY
- INTERAGENCY BOARD
- NEW YORK CITY FIRE DEPARTMENT
- NEW YORK CITY POLICE DEPARTMENT
- NUCLEAR REGULATORY COMMISSION
- SEATTLE, WA FIRE DEPARTMENT
- U.S. CAPITOL POLICE
- U.S. DEPARTMENT OF AGRICULTURE  
APHIS
- U.S. DEPARTMENT OF COMMERCE  
NIST
- U.S. DEPARTMENT OF DEFENSE  
ATSD (NCBD), DIA, DTRA, JCS, NSA,  
PFPA, USA (20th SUPCOM (CBRNE),  
22nd CML Bn (TE), CMLS, MANSCEN,  
NGIC, RDECOM-ECBC), USAF (ACC),  
USMC (CBIRF), USN (BUMED,  
NAVCENT, NAWC, NSWC)
- U.S. DEPARTMENT OF ENERGY  
HSS
- U.S. DEPARTMENT OF HEALTH AND HUMAN  
SERVICES  
CDC, FDA, NIOSH
- U.S. DEPARTMENT OF HOMELAND SECURITY  
FEMA, S&T, TSA, USCG,  
USSS
- U.S. DEPARTMENT OF JUSTICE  
FBI, NIJ, USMS
- U.S. DEPARTMENT OF STATE  
DS, OBO, S/CT
- U.S. POSTAL INSPECTION SERVICE
- U.S. SENATE SERGEANT AT ARMS

## Mission

*Identify, prioritize, and execute interagency chemical, biological, radiological, and nuclear combating terrorism requirements and deliver technology solutions for detection, protection, decontamination, mitigation, containment, and disposal.*

The Chemical, Biological, Radiological, and Nuclear Countermeasures (CBRNC) subgroup identifies and prioritizes multi-agency user requirements and competitively seeks technological solutions for countering the terrorist employment of CBRN materials. Through its participation in the InterAgency Board for Equipment Standardization and Interoperability and in coordination with DHS, NIJ, and EPA, the CBRNC subgroup integrates technology requirements from the fire, hazardous materials, law enforcement, and emergency medical services communities into its process. Senior representatives from DoD and FDA co-chair the subgroup.

## Focus Areas

The CBRNC subgroup focus areas reflect the prioritized requirements of the CBRN incident prevention and response community. During FY 2006, these focus areas were:

### Detection

Improve the sampling, detection, and forensic analysis of chemical, biological, and radiological threat agents in the air, in food or water, and on surfaces.

### Protection

Improve the operating performance and reduce the costs of individual and collective protection. Develop and enhance personal protective equipment (PPE), including respiratory protection systems and suits. Develop analysis and design tools for CBRN protection for building engineers and architects. Develop and evaluate advanced filter materials.

### Consequence Management

Develop technologies and procedures to mitigate the effects of a life-threatening or destructive event. Develop and improve response activities and related equipment to counter a terrorist use or accidental release of CBRN materials, to include short- and long-term decontamination and restoration.

### Information Resources

Develop shared information management tools to provide a common “picture of the scene”. Facilitate the efficient integration of diverse emergency and consequence management elements from Federal, State, and local agencies.

# Chemical, Biological, Radiological, & Nuclear Countermeasures

## Selected Completed Projects

### Improved Chemical Protective Ensemble

The threat of chemical, biological, and radiological (CBR) agents being used in international and domestic terrorism has expanded the need for enhanced protective clothing. This threat challenges the performance limitations of current personal protective equipment (PPE). First responders are restricted to the use of commercial-off-the-shelf (COTS) ensembles certified under the National Fire Protection Association (NFPA) 1994 standard, which only remain effective for one hour or less, are compromised by exposure to fire and sharp hazards in the environment, are difficult to don on the scene, and have visibility and dexterity issues. An optimized ensemble is critical to the mission of first responders. The Interspiro Chemical Ensemble (ICE™) is a certified NFPA 1994, Class 2 ensemble. The ICE is a fully integrated system including a chemical protective suit, chemical-resistant boots, and a self-contained breathing apparatus (SCBA), which is worn outside of the suit. The ensemble can be used in atmospheres deficient in oxygen or with immediately dangerous to life or health (IDLH) concentrations of substances that present severe inhalation hazards, as well as in CBRN environments. The suit is manufactured by Aerostar International, Inc. for Interspiro. For additional information see <http://www.aerostar.com/protectivewear.htm> or contact [sales@aerostar.com](mailto:sales@aerostar.com).



### The HyCAD™ Advanced Hybrid Chemical Detection System

Existing sensor systems to detect chemical agents are either very expensive or provide limited response to gross contamination bursts. To provide a better yet less expensive alternative, Avir, LLC designed and built the HyCAD™, a hybrid detection system for building ventilation protection and other fixed security applications that combines an optical sensor (the TOVA™, a totally optical vapor analyzer designed by Avir) and a COTS point sensor. This unique detection system, which uses two methods to detect chemical warfare agents and toxic industrial chemicals (TICs), provides improved reliability, response time, and accuracy. The system is low-cost, robust, sensitive to a large number of chemicals, and can be trained to detect new chemicals. Existing detectors or combinations thereof currently cannot provide the simultaneous protection against low-level exposures and gross contamination at an equally low cost. The HyCAD has undergone live TIC testing and environmental testing. Extended field-testing in select buildings is ongoing. Additional information is available at <http://www.avirsensors.com>.



## Chemical, Biological, Radiological, & Nuclear Countermeasures

### Rapid Air Flow and Contaminant Transport Modeling

To determine contingency plans in the event of a terrorist attack or accidental agent release, building managers and engineers need to accurately and rapidly determine air flow rates and residence times for a facility. The Pennsylvania State University (Penn State) developed CONTAM PCW, a software tool that identifies a set of simple measurements to confirm airflow predictions, which can then be used to refine the building model, guide security procedures, position sensors, and develop hazard response practices. The software is based on version 2.1 of CONTAMW, NIST's airflow and contaminant transport analysis software tool (publicly available on the Web), and was subsequently upgraded to be compatible with CONTAM 2.4. The software provides model tuning techniques and an enhanced, easier-to-use interface. In 2006 Penn State conducted large-scale building air flow tests to validate the model. Requests for additional information should be sent to [cbrncsubgroup@tswg.gov](mailto:cbrncsubgroup@tswg.gov).



### Low-Cost Personal Decontamination System

First responders face, either as a calculated terrorist act or as an accidental release, a wide range of chemical threats, including chemical warfare agents and toxic industrial chemicals. To deal with this largely unknown threat, responders require a flexible and broad-spectrum decontamination system. Self-decontamination with a small kit is the only feasible alternative for personal decontamination when thousands of people are victimized in a large public venue. For quick-acting agents, such as nerve agents, a kit must be pre-positioned and reachable within seconds of an alarm. Low-pressure water washes are not feasible for quickly decontaminating large numbers of victims. RSDL™ (Reactive Skin Decontamination Lotion), originally developed by Defence R&D Canada, is a patented, broad-spectrum skin decontamination product for personal use after exposure to certain nerve agents, blister agents, and vesicating toxins. Lawrence Livermore National Laboratory developed the Low-cost Personal Decontamination System (LPDS™), which improves on RSDL for personal decontamination. LPDS combines the nearly universal efficacy of solid sorbents with the penetrating nature of the RSDL. The LPDS requires no water and minimizes the risk of thermal burns and toxic vapor hazards. The system is small, easily pre-positioned, and can be distributed in large numbers. Requests for additional information should be sent to [cbrncsubgroup@tswg.gov](mailto:cbrncsubgroup@tswg.gov).



### Biological Aerosol Threat Warning Detector

GE Global Research delivered the prototype ultraviolet (UV) biological aerosol fluorescence detector, based on light-emitting diodes. The compact and low-cost device operates continuously to detect the presence of biological aerosols by detecting UV and visible photons generated from UV-induced fluorescence. The user can select alarm set-points based on intelligence information. The system uses multiple wavelengths to increase sensitivity and reduce

## Chemical, Biological, Radiological, & Nuclear Countermeasures

the probability of false alarms. An innovative flow-cell design keeps the particles from contaminating the optical components. Chamber testing conducted by the Calspan-University of Buffalo Research Center validated the performance of the system against non-pathogenic spores, vegetative bacteria, proteins, and viruses in the presence of common aerosol contaminants such as dust, tobacco smoke, and cooking oils. The system has been evaluated across a range of building environments. Requests for additional information should be sent to [cbrncsubgroup@tswg.gov](mailto:cbrncsubgroup@tswg.gov).



### Detection of Toxic Adulterants in Food

Current risk assessments combined with historical evidence indicate that soft targets such as the food and water supply may represent a point of entry for terrorist attacks. Detection of pathogens or toxic chemicals in food prior to consumption will require a systematic approach that yields an immediate and conclusive yes or no answer. Appealing Products, Inc. has developed a self-contained, deployable food security test kit that can detect sublethal concentrations of toxic chemicals (cyanides, azides, and sulfides) and metallic poisons (arsenic, mercury, lead, cadmium, thallium, and chromium) in a wide range of food matrices. The technology uses multi-layered tabs that rapidly change color (within minutes) when exposed to poisons at concentrations well below human health effect levels. The tabs are easy to use, sensitive, rapid, and reliable. In addition to independent lab validation, the kits have also been tested by individuals receiving only minimal instructions. Both trained and untrained personnel were able to complete blind tests of poisoned and non-poisoned food matrices and interpret the results as yes (poisoned) or no (non-poisoned). The kit is commercially available as the KT-05 Poisons Detection kit; ordering information is available at <http://www.chemsee.com>.



### Selected Current Projects

#### Personal Hydration Filter

The concern of a terrorist attack on municipal water supplies continues to rise. The two main contamination pathways of concern include indirect and direct contamination. Water supplies can be indirectly contaminated with bacteria, viruses, and protozoa, which are a common cause of diarrheal disease, as well as with toxic industrial chemicals as a secondary result of a terrorist attack on a municipality. Direct or unintentional water contamination may also occur by terrorist use of chemical, biological, and/or radiological materials. Providing response personnel with potable water is an ongoing challenge. Depending on climate, an individual needs to drink between 1 and 3.5 gallons per day to avoid dehydration. This need is compounded if an individual must wear personal protective equipment (PPE) for extended periods of time. MesoSystems and Cascade Designs are developing an in-line filter system for personal water purification that removes petroleum in addition to chemical/

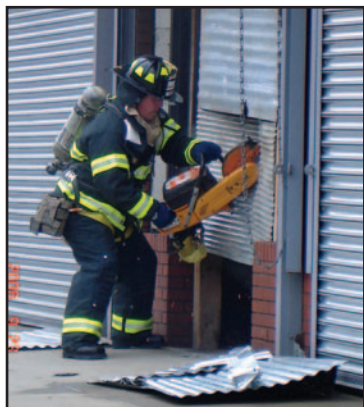


## Chemical, Biological, Radiological, & Nuclear Countermeasures

biological/toxic industrial material for use when water main/reservoir contamination is possible and bottled water is not available. The water purifier renders non-potable water safe for human consumption, complying with Environmental Protection Agency and DoD drinking water standards. The ChemFree Post Filter design is undergoing testing and will be available in 2007.

### Next-Generation Fire Fighter Protective Ensemble

In addition to conventional sources, fires may be caused by improvised explosive devices designed to distribute chemical or biological weapons of mass destruction. Fire fighters may respond to explosions, fires, or other emergencies with little or no indication of the presence of chemical, biological, or radiological/nuclear (CBRN) particulate hazards. Working in parallel project teams, the International Association of Fire Fighters and North Carolina State University have each designed structural fire fighting gear to meet the 2007 Edition of National Fire Protection Association (NFPA) 1971 CBRN option, Standard on Protective Ensemble for Structural and Proximity Fire Fighting. The project teams of users, material designers, and clothing-design experts are addressing deficiencies in current fire fighter protective clothing, which provides only limited protection against a liquid threat and no dermal protection to hazardous materials exposures. The NFPA 1971 CBRN option includes rigorous requirements for barrier material performance, as well as demanding requirements for the overall integrity of the ensemble. Ensemble elements must also meet all of the base requirements that apply to ordinary structural fire fighting apparel, including criteria addressing heat/flame protection, physical protection, and breathability (for heat stress release). Intense evaluations are underway at the New York City, Fairfax County, and Los Angeles Fire Departments; and at Goodfellow Air Force Base. The prototype suits will be available in 2007.



### Expedient Tactical SCBA

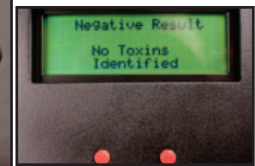
There are many tactical scenarios where a response or security force is required to enter or transit an area that may be contaminated with toxic industrial chemicals, fire by-products, or chemical or biological agents. In some of these situations, it is unacceptable for the personnel to use 'open-loop' or negative-pressure filtered respirators due to the nature of the contaminant or even its physical state. In these circumstances a self-contained breathing apparatus (SCBA) is required. One of the major inefficiencies of conventional SCBA units is that the exhausted or exhaled air still contains significant usable oxygen, but it is vented to the environment and lost to the user. Much greater efficiencies (translating into smaller, lighter units) can be attained by recycling the exhaust air and either recovering the oxygen or removing the undesirable products of respiration. Lambert

## Chemical, Biological, Radiological, & Nuclear Countermeasures

Rebreathers and O<sub>2</sub> Dive Technologies, in cooperation with Technical Products, Inc., developed the Tactical Rebreather (TACR) to address this problem. The TACR is a lightweight, rapidly donnable, efficient rebreather system that allows normal operations in a contaminated environment and does not impede tactical mission capabilities. TACR also interfaces with existing respirators and standard NATO masks. TACR is currently undergoing testing at the National Institute for Occupational Safety and Health.

### Ocular Scanning Instrument

A deliberate or accidental release of chemical or biological agents poses a serious health hazard to victims and responders. Effective medical intervention requires rapid diagnosis, quantitative assessment, and efficient treatment. Currently, treatment is often delayed because trained medical personnel must use invasive blood tests to identify the agent and determine the patient's health status before a diagnosis can be made. EyeMarker Systems, Inc. is developing an ocular scanning instrument (OSI) that will rapidly and non-invasively scan the eye for early physiological ocular indications of exposure to toxic agents prior to the onset of normal clinical symptoms. The device will scan, analyze, and quantify specific primary and secondary biomarkers in the eye and extrapolate these findings to characterize the health status of the individual. The automated instrumentation will provide an accurate and immediate analysis of the extent of exposure at the touch of a button, allowing quicker triage and medical intervention for those in need. The OSI will be capable of determining exposure to organophosphate nerve agents, botulinum toxin, cyanide, and carbon monoxide and will be packaged into a portable, lightweight, mobile hand-held device. The system will be simple to use, require minimal training, and will be inexpensive to manufacture, operate, and maintain.

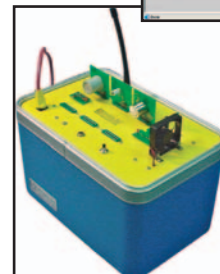


Services

### Wired/Wireless Multi-Sensor Environmental Monitor

In recent years building decontamination efforts have identified the need for improved monitoring of building conditions during decontamination. A distributed sensor system for the real-time monitoring of critical physical parameters and chemical concentrations is necessary to ensure effective gas-phase decontamination of large buildings. Esensors, Inc. is developing a prototype battery-operated sensor system with six interchangeable sensors and with both wired and wireless internet connections. This networked sensor system can monitor gases during building decontamination processes and can also monitor air quality under multiple conditions. The system also provides response personnel with the information needed to maximize the efficient use of resources. The EVmonitor has undergone laboratory testing, and further system testing is planned for FY 2007.

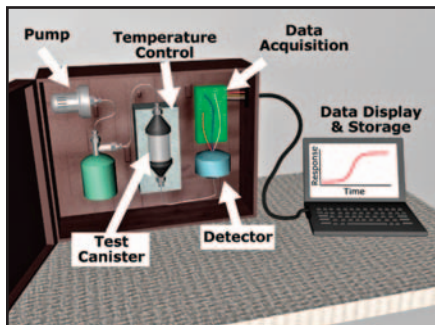
Esensors - Environmental / Toxic Gas Monitor			
<b>ACTUAL SENSORS</b>			
Hydrogen Sulfide	Low	High	
Sulfur Dioxide	Low	High	
Hydrogen Cyanide	Low	High	
Hydrogen Chloride	Low	High	
Hydrogen Bromide	Low	High	
<b>POD-4</b>			
Carbon Monoxide	Low	High	
Hydrogen peroxide	Low	High	
Phosgene	Low	High	
Sinclair	Low	High	
Carbon Dioxide	Low	High	
VOC/Total VOC	Low	High	



## Chemical, Biological, Radiological, & Nuclear Countermeasures

### Portable ASZM-Carbon HVAC Filter Test Kit

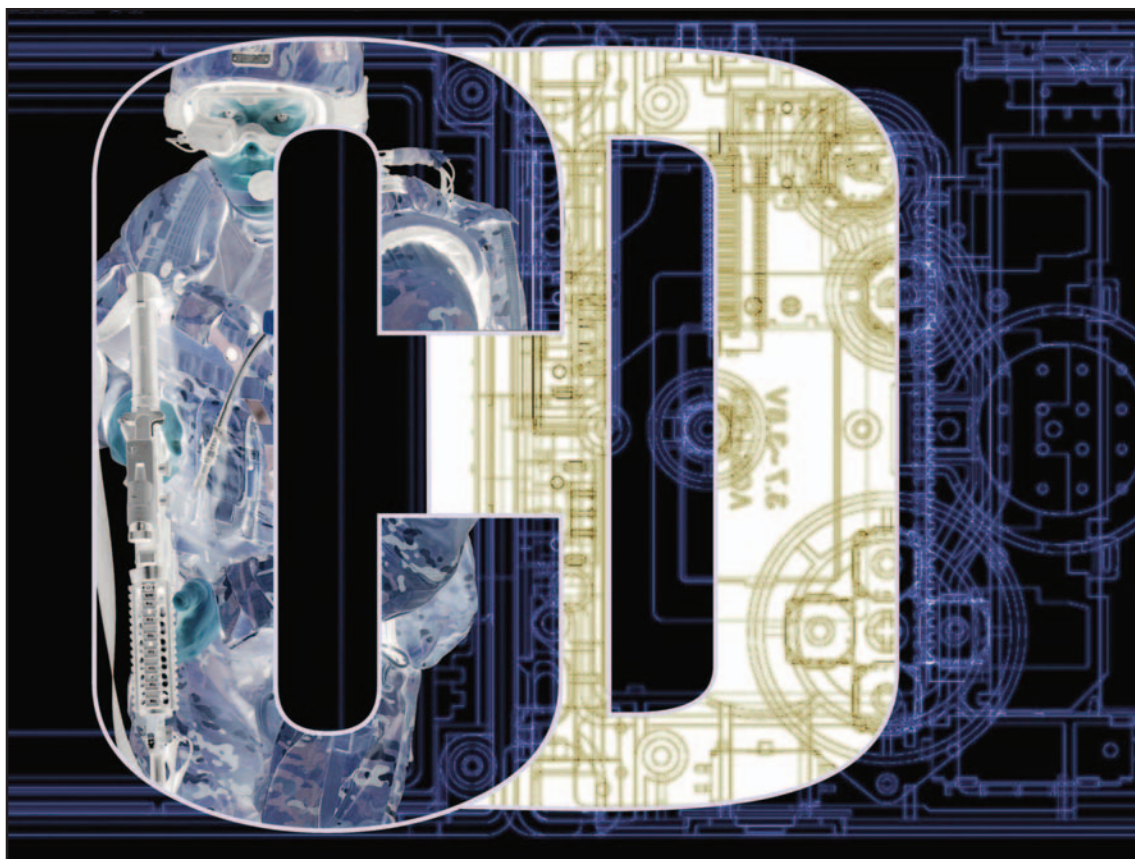
ASZM-TEDA-carbon is the U.S. military designation for the latest version of activated carbon impregnated with copper, silver, zinc, and molybdenum salts. ASZM-TEDA filters are widely used in building heating, ventilation, and air-conditioning (HVAC) systems, including many government buildings. These filters are expensive, and managing building operations requires an assessment of both filter performance and remaining life before deciding to replace these costly filters. Ensuring appropriate protection of building occupants requires filter testing that can in itself be expensive and time-consuming. Clean Earth Technologies is developing a test kit for filters in building HVAC systems that employs environmentally safe, air-transportable materials for use in field operations. The kit will provide facilities managers with a less expensive and more rapid test method for determining remaining filter life, resulting in significant savings and more reliable protection for building operations.



### Contact Information

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## Concept Development





## MEMBERSHIP

INTELLIGENCE COMMUNITY

U.S. DEPARTMENT OF DEFENSE  
DDRE

# Concept Development

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## Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements to increase national counterterrorism capabilities. Foster emerging technology programs that complement traditional subgroup mission areas.*

The Concept Development (CD) subgroup identifies user requirements and facilitates interagency coordination of near-term solutions and long-term direction. CD research and development efforts provide novel technologies and methods that enhance current counterterrorism and counterintelligence capabilities and strategies.

## Focus Areas

### Nontraditional Capability Design

Develop unique operational, intelligence, and technical capabilities that are tailored to support counterintelligence and counterterrorist operational and tactical forces.

## Program Highlights

CD programs are classified or highly sensitive. Program requirements, the success of programs, and specific program capabilities cannot be discussed in an unclassified document.

## Contact Information

[csubgroup@tswg.gov](mailto:csubgroup@tswg.gov)

## Explosives Detection



## Explosives Detection

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### MEMBERSHIP

U.S. DEPARTMENT OF DEFENSE  
DIA, NSA, USAF (AFESC, AFRL),  
USN (NAVEOTECHDIV)

U.S. DEPARTMENT OF ENERGY  
HSS

U.S. DEPARTMENT OF HOMELAND  
SECURITY  
ICE, S&T (HSARPA, TSL), TSA  
(FAMS), USCG, USSS

U.S. DEPARTMENT OF JUSTICE  
ATF

U.S. DEPARTMENT OF STATE  
DS

U.S. POSTAL INSPECTION SERVICE

### Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements for existing and emerging technologies in explosives detection and diagnostics. Emphasis is placed on a long-term, sustained approach leading to new and enhanced technologies for detection and identification of improvised explosive devices, including vehicle-borne devices.*

The Explosives Detection (ED) subgroup identifies and develops technologies to enhance the operational capability of both military and civilian applications. A representative from the Transportation Security Administration chairs the subgroup.

### Focus Areas

The ED subgroup focus areas reflect the prioritized requirements of a broad range of interagency customers, including those responsible for physical security and forensic analysis. During FY 2006, these focus areas were:

#### Vehicle-Borne IED Detection

Develop technologies necessary to provide a stand-off detection capability for explosives in large volumes at a distance. Investigate unique physical and chemical phenomena that identify the presence of explosives, the physical limits for sensor technology to respond to these phenomena, and enhancements to detection technology. Develop techniques to improve both stand-off distance and the types of explosives that can be detected. Evaluate remote techniques, in which a system is downfield from the operator but near the objects of interest. Explore technologies leading to a true stand-off detection capability.

#### Suicide Bomber Detection

Improve systems that detect the presence of improvised explosive devices concealed by persons engaged in suicide attacks against government installations and public facilities, both domestic and international. Programs in this area are highly sensitive; specific capabilities generally cannot be discussed in a public document.

#### Short-Range Detection

Develop new explosive detection capabilities and improvements to existing systems for detection and diagnosis of concealed terrorist devices. Emphasize technologies that support entry-point screening. Improve detection rate, throughput, and accuracy in identification of explosives, as well as safety for both operators and the general public.

## Explosives Detection

### Canines

Develop training tools, protocols, and technologies that support and enhance canine detection of explosives. Improve canine team effectiveness and consistency through better understanding of both canine detection ability and canine/human interaction.

### Completed Projects

#### Canine Welfare Manual

To provide for the welfare of and to preserve the effectiveness of working dogs, Defence Science and Technology Laboratory in the United Kingdom has developed a manual outlining appropriate housing and care conditions. This manual presents results of research work sponsored by TSWG in an easy-to-use format for canine handlers and agencies that train and deploy canine detection teams. It includes advice on improving the kenneling environment, reducing stress, and other methods of promoting canine health. Requests for this manual from Federal, State, and local governments and other approved organizations using canines for detection should be sent to [edsubgroup@tswg.gov](mailto:edsubgroup@tswg.gov).



U.S. Army photo by Pfc. William Servinski II  
(Released)

#### Explosives Detection by Neutron Resonance Radiography

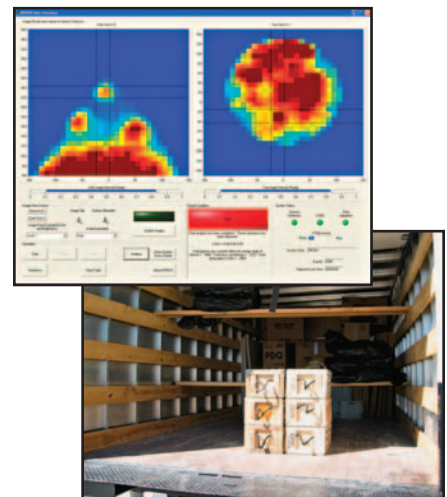
Researchers at the Massachusetts Institute of Technology (MIT) successfully demonstrated the imaging of concealed explosives using neutron resonance radiography. The technique has good spatial resolution, can be used to image through heavy objects, and is especially useful in identifying materials containing low-atomic-number elements. MIT also designed a deuterium target source for use with an existing accelerator and integrated these systems with a scintillator detector and a charge-coupled device camera. This equipment successfully demonstrated elemental identification in laboratory experiments. Work at MIT on neutron resonance radiography is continuing under a Department of Homeland Security-sponsored project with L-3 Communications to develop explosives detection systems for air cargo. Requests for additional information should be sent to [edsubgroup@tswg.gov](mailto:edsubgroup@tswg.gov).



### Current Projects

#### Associated Particle Imaging for VBIED Detection

Applied Signal Technology developed and is testing a prototype system using associated particle imaging, a neutron-based technique for the detection of bulk explosives concealed in cars and trucks. This is a cooperative effort between TSWG and the Department of Homeland Security. During an April 2006 demonstration, the system detected two different types of explosive threats in a car and a box truck. The technique can identify the general location of explosives within a vehicle and has other potential applications in contraband detection. A second demonstration with additional explosives and more complex detection scenarios is planned for the third quarter of FY 2007.



## Explosives Detection

### Quadrupole Resonance for VBIED Detection

GE Security is developing a prototype system that uses quadrupole resonance to detect and identify explosives concealed in cars and trucks. This technique is expected to be especially suitable for incorporation into garage structures and other fixed locations. GE Security has demonstrated this method with ammonium nitrate in a passenger car and has developed detection techniques for three additional explosives. Design of a detection prototype for both cars and light trucks is underway, and a demonstration is planned for 2007.



### Hardened Explosives Trace Detectors

Smiths Detection and GE Ion Track are developing hardened handheld and bench-top trace explosives detection systems in a cooperative effort between TSWG and the Joint IED Defeat Organization. These systems are being designed for military and civilian use in severe environments, including dust, rain, salt air, and extreme temperature conditions. The hardened systems will also allow more types of explosives to be detected in a single test, and include both new detector designs and modifications to existing systems.



### Contact Information

[edsubgroup@tswg.gov](mailto:edsubgroup@tswg.gov)

## Improvised Device Defeat



U.S. Air Force photo by Airman 1st Class Nathan Doza (Released)

## Improvised Device Defeat

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### MEMBERSHIP

FAIRFAX COUNTY, VA POLICE DEPARTMENT

INTELLIGENCE COMMUNITY

NATIONAL BOMB SQUAD COMMANDERS  
ADVISORY BOARD

U.S. CAPITOL POLICE

U.S. DEPARTMENT OF DEFENSE  
USA (EOD Tech Det), USAF (ACC,  
EOD Det 63), USMC (CBIRF,  
MCD NAVEOTECHDIV),  
USN (NAVEODFLTLAU,  
NAVEOTECHDIV)

U.S. DEPARTMENT OF HOMELAND SECURITY  
PD (G&T), S&T (HSARPA),  
TSA, USSS

U.S. DEPARTMENT OF JUSTICE  
ATF, FBI, NIJ, USMS

### Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements to more safely and effectively render terrorist devices safe. Particular emphasis is placed on technologies to access, diagnose, and defeat terrorist improvised explosive devices (IEDs); improvised chemical, biological, radiological, and nuclear devices; and vehicle-borne improvised explosive devices (VBIEDs).*

The Improvised Device Defeat (IDD) subgroup delivers advanced technologies, tools, and information to increase the operational capabilities of the U.S. military explosive ordnance disposal (EOD) community and Federal, State, and local bomb squads to defeat and neutralize terrorist devices. In collaboration with military, Federal, State, and local agencies, the IDD subgroup identifies and prioritizes multi-agency user requirements through joint working groups and thorough validation processes. A representative from the Federal Bureau of Investigation's Bomb Data Center chairs the subgroup.

### Focus Areas

The IDD subgroup focus areas reflect the joint priorities of military and civilian responders. During FY 2006, these focus areas were:

#### Access & Diagnostics

Develop advanced technologies for diagnostic analysis of IEDs in the areas of improved tools and equipment. Develop technologies to access and accurately locate and/or identify components and composition within an improvised terrorist device to facilitate timely response and device neutralization.

#### Defeat

Develop advanced technologies to defeat IEDs, VBIEDs, and improvised CBRN dispersal devices. Develop low-cost solutions that are readily available to the bomb squad community. Increase stand-off capabilities, reduce collateral damage, and provide EOD and bomb disposal technicians with precision disruption and disablement capabilities and techniques.

#### EOD Tools

Develop improved tools and equipment to increase the safety and effectiveness of EOD and bomb technicians during a response. Enhance command and control and situational awareness. Improve tactical and personal protective equipment and other critical technologies to counter emergent explosive threats.

## Improvised Device Defeat

### Information Resources

Develop information resources and delivery systems for consolidated and expeditious threat intelligence collection, storage, and distribution to bomb disposal technicians for enhanced response capabilities. Provide equipment performance evaluations, database resources, operational response technology information, and automated information systems to communicate the most current tactical and operational response procedures.

### Remote Controlled Vehicles and Tools

Improve the performance and reliability of robotic systems for the bomb technician. Develop advanced robotic platforms with improved manipulation capabilities, control systems, navigation technologies, payloads, and communications. Advance TSWG's Common System Architecture, the foundation of these systems, which for the first time enables all robotic components, regardless of the developer, to be "plug-and-play". Develop technologies that allow bomb technicians to conduct as much of their mission as possible by remote means.

### Selected Completed Projects

#### Pallet Charge Disruptor for Large Vehicle

The Pallet Charge Disruptor for Large Vehicles (PCD-LV), developed by Mining Resource Engineering, Ltd., provides bomb technicians a means to disrupt the contents of vehicles containing large quantities of explosives in a controlled manner while producing minimal collateral effects. The system is supplied with a binary explosive to reduce the burden of explosives storage logistics and is configured to minimize response time and "Time on Target". Evaluation of the PCD-LV was undertaken to further characterize its capabilities and effectiveness. Additional information on the PCD-LV is available at [http://www.mrel.com/Large\\_Vehicle\\_Disruptor.html](http://www.mrel.com/Large_Vehicle_Disruptor.html).



#### Small RCV Evaluation (Matilda & Talon)

In support of the Department of Homeland Security's System Assessment and Validation for Emergency Responders (SAVER) Program, the Minneapolis Police Department's and the Miami Police Department's bomb squads, together with IDD's Operational Analysis Team, evaluated the Mesa Matilda Block II and Foster-Miller Talon IIIB robotic platforms. These evaluations allowed actual users to rate the performance of the robot against specific mission tasks and to comment on the robot's technical characteristics. The results of these evaluations are posted on the SAVER Web site to assist bomb squads across the country in selecting robotic platforms to meet their needs. First responders can register to access these reports at <http://saver.tamu.edu/>.





## Improvised Device Defeat

### Critical Incident Response Technology Seminars

In 2006, three Critical Incident Response Technology Seminars were held at locations throughout the United States to bring together various subject matter experts and bomb technicians. At these seminars, participants attended lectures on threat and technology issues relating to IEDs, VBIEDs, and suicide bombers and then participated in exercises simulating emerging threat situations. Self-evaluation critiques at the end of each day assisted in identifying shortfalls in technical and tactical capabilities to address these new threats. Currently, certified bomb technicians can register for future seminars on the National Bomb Squad Commanders Advisory Board Web site at <http://www.nbscab.org>.



### Operational Assessment

To update and substantiate military user requirements for the next-generation EOD remote-controlled vehicle program, IDD's Operational Analysis Team conducted a new Remote-Controlled Vehicle Operational Assessment (RCVOA). The original RCVOA was completed prior to the onset of recent combat operations and thus focused primarily on peacetime requirements. This effort focused on capturing data based on wartime experiences by interviewing EOD technicians who have used robotic platforms in actual combat situations. Additionally, the assessment collected data relating to the strengths and weaknesses of operationally deployed robotic platforms. Requests for additional information should be sent to [iddsubgroup@tswg.gov](mailto:iddsubgroup@tswg.gov).



### Selected Current Projects

#### Robotic Simulator for the All-Purpose Remote Transport System

U.S. Air Force EOD units rely on actual operation of their All-Purpose Remote Transport Systems (ARTS) to accomplish training with the vehicle. Extensive training naturally reduces the operational service life of the remote vehicle, so the majority of Air Force EOD technicians do not receive enough training time to gain and maintain proficiency in operating the system. Additionally, robotics training has historically been limited to a small number of operational scenarios because of the expense of building the infrastructure needed for those scenarios. The robotic simulator for the ARTS is being developed to provide an easy-to-use, computer-based robotics training program with highly realistic training environments and scenarios at an affordable cost.



## Improvised Device Defeat

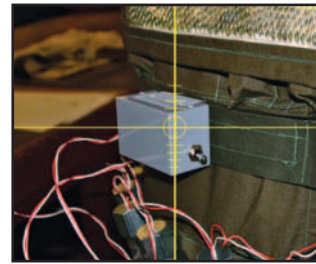
### Robotic White Light/Infrared Switching System Upgrade

Robotic platforms employed by EOD and bomb technicians use incandescent white lights for illumination in dark spaces and night operations. While these lights provide vehicle-mounted cameras with enough light to effectively function, certain tactical situations prohibit the use of traditional white light. Under a previous TSWG effort, QinetiQ developed a system for a limited number of RCV models to switch from using visible light to low-level infrared light. During this effort, prototype systems will be developed for additional robotic platforms.



### Advanced Aiming and Stand-off Measurement for Disruptors

During some EOD render-safe procedures, operators need the ability to precisely aim disruptors used to defeat IEDs. Current laser aiming devices for disruptors are difficult to see in certain lighting conditions, and they offer no means for measuring stand-off distance from the disruptor to target. Tecops, Ltd. is developing an aiming and stand-off measurement device that will not only assist in the precision aiming of disruptors, but will also indicate the stand-off distance from disruptor to target IED. The resulting system will allow integration with standard remote-controlled vehicles currently used by bomb technicians.

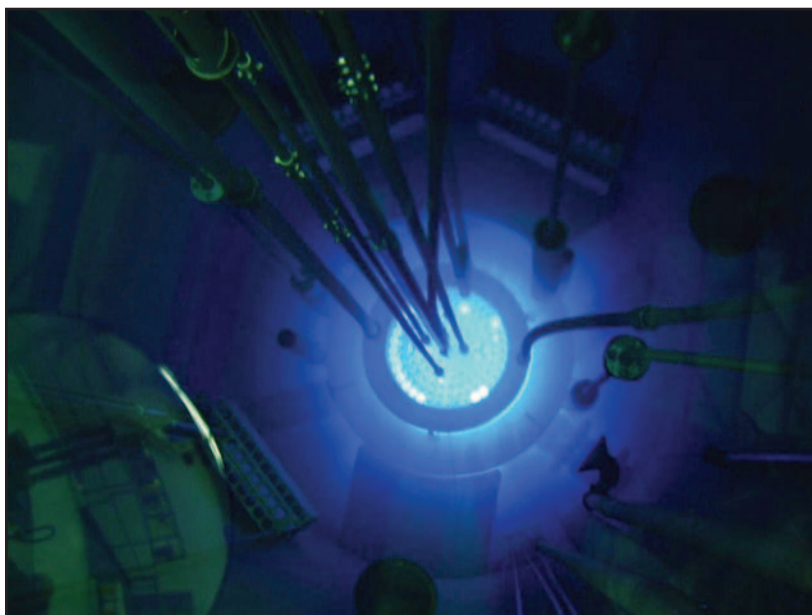


### Contact Information

[iddsubgroup@tswg.gov](mailto:iddsubgroup@tswg.gov)



## Infrastructure Protection



## MEMBERSHIP

ENVIRONMENTAL PROTECTION AGENCY

NUCLEAR REGULATORY COMMISSION

U.S. DEPARTMENT OF AGRICULTURE  
FS

U.S. DEPARTMENT OF DEFENSE  
DIAP, DTRA, NSA, USA (CE), USAF  
(OSI), USMC (MCNOSC), USN (NCIS,  
NSWC)

U.S. DEPARTMENT OF ENERGY  
BPA, ED & ER

U.S. DEPARTMENT OF HOMELAND SECURITY  
FEMA, NCSD, S&T (HSARPA), TSA,  
USSS

U.S. DEPARTMENT OF JUSTICE  
FBI

U.S. DEPARTMENT OF TRANSPORTATION  
FAA, RITA (Volpe)

## Infrastructure Protection

### Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements for the protection and assurance of critical Government, public, and private infrastructure systems required to maintain the national and economic security of the United States.*

The Infrastructure Protection (IP) subgroup works to ensure the uninterrupted service of the infrastructure systems vital to the national and economic security of the United States. These critical systems include control systems for electric power, natural gas, petroleum products, and water; telephone, radio, and television; ground, rail, and air transportation facilities; and cyber communications networks. IP research and development reflects the multivariate threat to the complex and interdependent systems, subsystems, and components of the nation's infrastructure. Solutions include conventional security measures plus those offered by emerging technologies. Representatives from the Department of Defense and the Federal Bureau of Investigation co-chair the subgroup.

### Focus Areas

The IP subgroup focus areas reflect the prioritized requirements generated with respect to critical aspects of the nation's infrastructure. During FY 2006, these focus areas were:

#### Cyber Security

Provide detection, prevention, response, and alert capabilities to counter cyber attacks and harden computer systems. Identify unforeseen vulnerabilities to complex and sophisticated information technologies. Deter criminals, terrorists, and hostile nation-states from stealing money or proprietary data, invading private records, conducting industrial espionage, or attacking vital national infrastructure.

#### Information Analysis

Develop tools and methodologies to support analysts who can otherwise become overwhelmed by the volume, variety, and velocity of information that must be processed before decisions can be made. Enhance the storage, protection, analysis, discovery, and presentation of disparate sources of data into human-readable forms.

#### Physical Protection

Standardize methodologies and decision aids for vulnerability analysis and enhanced protection of critical elements to secure the nation's infrastructure, including power generation and transmission, water supplies, and health services. Understand the dynamics of complex critical infrastructures, secure operating methodologies, and strategies to prevent and mitigate widespread failures caused by cascading and interactive network effects. Evaluate dynamic

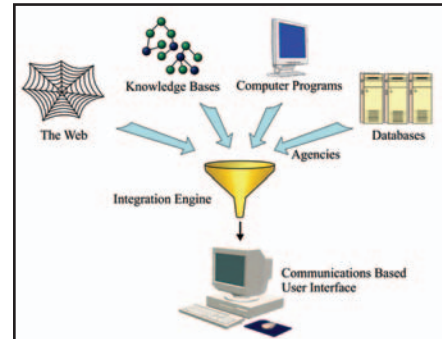
## Infrastructure Protection

behavior models, develop common standards and practices in and between critical infrastructures, and investigate system vulnerabilities to various threats.

### Selected Completed Projects

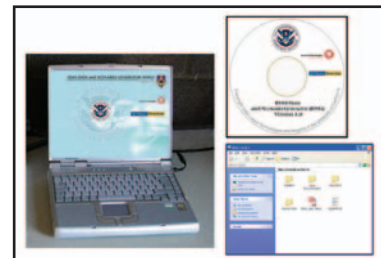
#### Conflicting Data in Semantic Graphs

In the fight against global terrorism, many organizations have been confronted with how to practically and reliably interpret data. This is especially true with financial information, for example, because high-risk individuals and organizations may deliberately modify their data. Fetch Technologies developed a platform that uses its record linkage technology to identify co-referent database records. This technology traces the pedigree of data and establishes relationships and associations between data elements. Fetch completed the modification of this machine learning algorithm and investigated ways to represent semantic graphs while also allowing user input for the resolution of anomalous relationships between the entities. Requests for additional information should be sent to [ipsubgroup@tswg.gov](mailto:ipsubgroup@tswg.gov).



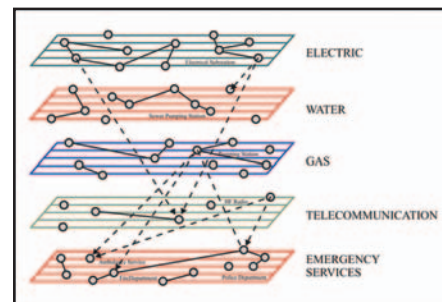
#### Evaluation Test Bed for Information Analysis Tools

Lucent Technologies, in conjunction with the University of California at Riverside, developed a synthetic data generation tool designed to create data that will be used for testing data mining tools. Data mining tools use diverse data sources to piece together evidence. A common challenge in testing these tools is the availability of input data. This input data can be hard to obtain because of the privacy concerns surrounding real data sources. The evaluation test bed circumvents these issues by generating synthetic data with sufficient quality. Requests for additional information should be sent to [ipsubgroup@tswg.gov](mailto:ipsubgroup@tswg.gov).



#### Critical Infrastructure Interdependency Tool Assessment

Infrastructure interdependency plays an essential role in our economy, and leaders must be able to assess, minimize, and mitigate potential threats. Many DOE national laboratories, military labs, universities, and commercial entities have developed Critical Infrastructure Interdependency Modeling Tool (CIIMT) systems. These tools have been developed for various users ranging from technical and engineering staff to high-level management for decision support on how different infrastructure systems are interdependent and thus vulnerable to common mode failure. However, there is no single source for CIIMT users that objectively assesses the capabilities of available CIIMTs or provides guidance to direct R&D to fill technological gaps. The results of this study will guide the R&D efforts of the infrastructure protection community and will assist CIIMT end users in selecting the right tool for their application. Requests for additional information should be sent to [ipsubgroup@tswg.gov](mailto:ipsubgroup@tswg.gov).



## Infrastructure Protection

### Selected Current Projects

#### Protected Aircraft Communications Addressing and Reporting System



An airplane's communications management unit provides a data interface with the ground operations center to inform them of a plane's air speed, destination, wheels up or down status, and other important data. Over time, the amount of data flowing through the system has increased, and some of it is sensitive. Honeywell has been developing the Protected Aircraft Communications Addressing and Reporting System (P-ACARS) for civil air. In Spring 2006, a version of the system developed for commercial aircraft was successfully tested to encrypt P-ACARS simulated transmissions from 10,000 civil aircraft to ground control. The success of the commercial version of ACARS has resulted in a pilot project with the Air Force for testing on various military aircraft, which will begin in early 2007.

#### Virtual Cyber Systems Testing Capability



Large commercial and government computer networks have access to multi-million-dollar test bed facilities for their networks. However, over 85% of U.S. companies are small businesses that cannot easily afford such testing. Ohio State is developing an independent virtual cyber security testing capability that will assess the operational impact and security functions of a network to support time-critical investment decisions for infrastructure owners. Specifically, given a target system (software and/or hardware) and a model of the environment in which the system will be deployed, the tools will execute a series of tests and evaluate the potential security and reliability impact on the system.

#### Automated Cyber Assessment

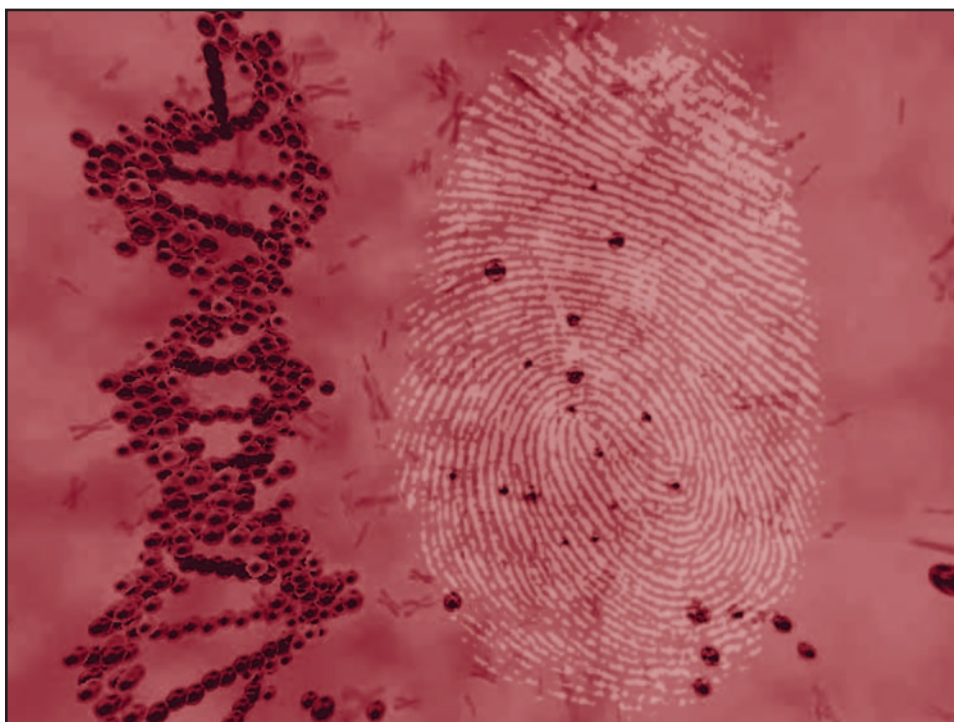


This assessment software, developed by Riskwatch via RedCell, will automate the government's existing paper-based cyber assessment methodologies. This software solution will enable users to categorize security requirements and the assets to be protected. The software will then automatically link these requirements and assets to fully customizable costs and threat values for many types of government facilities. The automated product will save significant resources by analyzing the return on investment of specific security alternatives and creating standardized report templates that can be tailored to the needs of the user. A recent pilot test based on Nuclear Regulatory Commission regulations successfully showed that the solution is an effective and affordable tool, at a fraction of the cost of most customized software applications.

### Contact Information

[ipsubgroup@tswg.gov](mailto:ipsubgroup@tswg.gov)

## Investigative Support and Forensics





## Investigative Support and Forensics

### MEMBERSHIP

ENVIRONMENTAL PROTECTION AGENCY  
CID, NEIC

FEDERAL RESERVE BOARD

INTELLIGENCE COMMUNITY

NATIONAL TRANSPORTATION SAFETY BOARD

U.S. DEPARTMENT OF COMMERCE  
NIST (OLES)

U.S. DEPARTMENT OF DEFENSE  
DCFL, PFPA, PI, USA (CID, ISC),  
USAF (OSI), USMC (CID),  
USN (NCIS)

U.S. DEPARTMENT OF ENERGY  
HSS

U.S. DEPARTMENT OF HOMELAND SECURITY  
ICE (FDL, FPS), USSS

U.S. DEPARTMENT OF JUSTICE  
ATF, DEA, FBI, NIJ (NCFS),  
NFSTC), USMS

U.S. DEPARTMENT OF STATE  
S/CT

U.S. DEPARTMENT OF THE TREASURY  
IGTA, IRS

U.S. POSTAL INSPECTION SERVICE

STATE AND LOCAL AGENCIES  
Illinois State Police  
Long Beach, CA Police Department  
Los Angeles County, CA Sheriff's  
Department  
South Pasadena, CA Police Department

### Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements for criminal investigation, law enforcement, and forensic technology applications in terrorism related cases.*

The Investigative Support and Forensics (ISF) subgroup implements research and development projects that provide new capabilities to law enforcement personnel, forensic scientists, and intelligence operatives responsible for investigating and interdicting terrorist incidents. Projects conducted through this group have had a major impact on forensic investigations and intelligence operations throughout the law enforcement community. A representative from the U.S. Secret Service chairs the subgroup.

### Focus Areas

The ISF subgroup focus areas reflect the prioritized requirements of the military and civilian law enforcement communities. During FY 2006, these focus areas were:

#### Crime Scene Response

Improve the quality of evidence recognition, documentation, collection, and preservation, as well as the protection of examiners from hazardous materials exposure. Train first responders and forensic examiners to handle terrorist incident scenes. Support scientific and technical efforts not assigned to other ISF focus areas.

#### Electronic Evidence

Develop computer forensic hardware, software, decryption tools, and digital methods to investigate terrorism. Develop advanced methods to extract and enhance audio recordings and video images from surveillance sources. Identify computer systems and media used by terrorists and extract the maximum amount of evidence from them.

#### Explosive and Hazardous Materials Examination

Improve methods for assessing the size, construction, and composition of explosive devices or other energetic hazardous materials. Identify and analyze explosive residue and other trace evidence present at blast scenes, especially those requiring rapid protection and processing, to preserve their evidentiary value.

#### Forensic Biochemistry

Develop analytical methods used on biological evidence found at terrorist scenes to make identifications and extract information such as origin or age. Explore the use of DNA to identify or profile persons of interest. Use stable isotope ratios to determine the geographic origin of organic material.

## Investigative Support and Forensics

### Friction Ridge Analysis

Improve latent print techniques used in terrorism cases. Emphasize processes to automate techniques that are currently tedious, expensive, non-portable, or chemically hazardous. Address efforts to create better visualization and development of latent prints using lasers or more versatile and affordable reagents. Support better comprehension of latent prints and their molecular content, as well as the scientific validation of fingerprint examinations.

### Questioned Document Examination

Develop advanced document and handwriting analysis techniques, devise standardized identification criteria, and establish a legal scientific basis for these examinations. Investigate forgeries, tracings, disguised handwritings, and writing in different languages and character sets. Develop software to identify counterfeit documents and match documents by handwriting analysis and pattern recognition algorithms.

### Surveillance Technology

Produce new and advanced surveillance devices for law enforcement use. Examine the nature of these technologies, such as infrared, X-ray, visual, audio, and speech. Analyze the type of data derived, such as visual, aural, and digital. Determine the awareness level of the target being surveilled. Advance polygraphy and the techniques and equipment needed for the detection of deception.

## Selected Completed Projects

### Mobile Command Post Vehicle

An immediate response with an extensive investigative capability to a terrorism incident yields the most evidence and intelligence. The mobile command post vehicle, developed by Titan Corporation, provides this capability to users. The vehicle has off-road capability and is also air-transportable. It features a vast array of satellite telecommunications and internet access, enabling transmission of data in a useful and timely manner. When deployed to a remote site, the first responders benefit from the basic living quarters in the vehicle and its self-generated electrical power while being able to function as though they are under normal working conditions. The first prototype vehicle went immediately into service in Fall 2005 when the Federal Protective Service deployed it to the region devastated by Hurricane Rita. Titan Corporation built two complete systems and can manufacture additional units upon special order. Additional information is available at <http://www.titan.com/products-services>.



## Investigative Support and Forensics

### Rapid Photo Realistic 3-D Scene Modeling System



After a terrorism incident, investigators face the difficult task of thoroughly recording all of the important details of the scene within a short period of time. Berkeley Engineering and Research developed the rapid photo realistic three-dimensional scene modeling system, which allows investigators to scan and photograph an entire scene within minutes and then produce a detailed 3-D computer model and image. Investigators can quickly deploy the system, which is man-portable and uses COTS cameras and optics. The system provides full-scene images and can overcome partially occluded areas. It can image scenes ranging in size from as small as the interior of a car to those with up to a 50-foot radius. The system is commercially available, and additional information is available at <http://www.bearinc.com>.

### Pocket Kit for Recording Finger and Palm Prints



Military and law enforcement personnel often must obtain a full set of fingerprints from a suspect in a remote area. The pocket kit for recording finger and palm prints efficiently solves this problem. This kit is compact enough to fit into the cargo pockets of military uniforms. The rugged, lightweight container holds enough inking foils and standard FBI cards to take 15 sets of finger and palm prints while its lid serves a card holder. The ink is smudge-proof and withstands extreme environments. Investigators can easily scan the cards into an electronic identification system or use them directly for forensic examinations. The Lightning Powder Company division of Armor Holdings produced the kits, which are commercially available. Additional information is available at <http://www.redwop.com>.

### Authentication of Digital Video Images



Law enforcement's extensive use of digital video in field operations requires proof for later legal use that no one has altered the recording. The Johns Hopkins Applied Physics Laboratory developed a digital video authentication system consisting of a small electronic device connected to a laptop computer. By using a public key together with a private key kept by the investigators, the system encrypts data about the recording. Later, during playback the system can validate the recording as being an unaltered original. The process can verify each frame of the video recording and is sensitive to one pixel. The system will work with any commonly available commercial digital video camera and recording equipment. The system can also verify the integrity of any electronic data file. Requests for additional information should be sent to [isfsubgroup@tswg.gov](mailto:isfsubgroup@tswg.gov).

## Investigative Support and Forensics

### Selected Current Projects

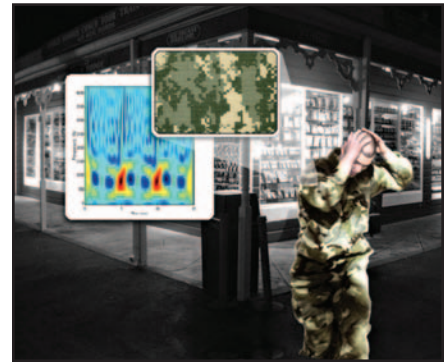
#### Digital Automotive Image System

Solving a terrorist investigation involving motor vehicles often requires quick access to images and data about cars. Southwest Research Institute is developing a system that gives investigators that capability. Designed to fit entirely on one DVD, the system will have front, side, and rear views of all makes and models of motor vehicles commercially manufactured in the last twenty years. The data will be searchable by vehicle category, body style, number of doors, and other characteristics. The system will generate “Be on the Lookout”-type posters and will produce photo line-ups. The basic design will allow for periodic updating to keep the database current. Upon completion, selected Federal, State, and local law enforcement and counterterrorism agencies will receive copies of the DVD.



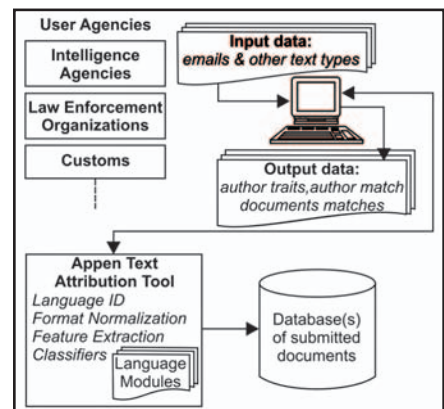
#### Statistical Verification of Camouflage Clothing Pattern Comparisons

Video cameras often record terrorists and other criminals committing crimes while wearing camouflage pattern-type clothing. Camouflage clothing patterns may provide a unique combination for positive identification. Quantum Signal is developing an automated application that will compare the camouflage clothing patterns of one image to that of another for identification or exclusion. The application will analyze the orientation of the seams and pocket patches, frequency of repetition, and intersection of colors. The system will include a database of previously encountered images for comparison and will provide probabilities of matches.



#### Text Attribution

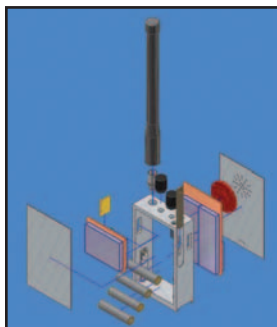
Terrorist threats, claims of responsibility, ransom notes, and other written messages frequently appear in terrorism cases. Often they do not contain handwriting, which prevents one technique for identifying the author. Appen Pty, Ltd., is developing a text attribution system to analyze printed text to provide information and traits about the originator even when previous writings of the author are not available. The automated system will use features such as vocabulary, spelling, style, linguistics, and idiosyncratic indicators to determine traits of the author, such as age, education, religion, geographic orientation, and native language. The product will give investigators the ability to analyze both English and Arabic text to develop investigative leads and to compare texts with those in a database for a positive identification. The automated system will also provide statistical probabilities about the text.



## Investigative Support and Forensics

### Two-Way Multifunctional Encrypted Radio

Conducting street investigations and apprehensions in dangerous, fast-moving environments necessitates advanced and specialized radio equipment. Law enforcement agents must be able to monitor undercover agents and response teams and to quickly issue instructions and receive status reports. DTC Communications is developing a sophisticated compact radio to handle these communication needs. The two-way radio will allow constant digital encrypted communications between the members of a tactical team on ten frequencies common to Federal agencies. Each radio will also be able to record the audio of concealed listening devices worn by undercover agents. The small size of 4" x 2.5" x 1" and 8-ounce weight will make it readily concealable and easy to wear during tactical operations. The radios will come with an assortment of accessories that will provide alternate configurations for different tactical settings.



### Optimization of Human Scent Identification

Several challenges confront investigators in their use of scent dogs to link suspects to crimes scenes. The handlers must improve the dog's performance and scientifically establish its abilities in court. Florida International University is developing and optimizing materials used to collect human odor samples and determining their properties for releasing the odors. The research will determine the best materials for human scent collection and the most efficient ways to preserve and maintain samples in human scent banks. The project will integrate lab studies with the field-testing of dogs to assess the variances in canine performance using the different materials, which will lead to better techniques for using the scent dogs.



### Contact Information

[isfsubgroup@tswg.gov](mailto:isfsubgroup@tswg.gov)

## Physical Security



Photo by TSWG PS Subgroup

## Physical Security

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### MEMBERSHIP

FEDERAL RESERVE BOARD

INTELLIGENCE COMMUNITY

NEW YORK POLICE DEPARTMENT

PORT AUTHORITY OF NEW YORK/NEW JERSEY

U.S. CAPITOL POLICE

U.S. DEPARTMENT OF DEFENSE  
ATSD (NCBD), CENTCOM, DATSD  
(NM), DIA, DTRA, JIEDDO,  
NSA, OUSD (I), PFPA, PSEAG, USA  
(CECOM, INSCOM, PM-FPS), USAF  
(AFSFC, FPSS), USMC (MARCENT),  
USN (NAVEODTECHDIV, NAVEUR,  
NCIS, NSWV, ONR, SPAWAR)

U.S. DEPARTMENT OF ENERGY  
HSS, NNSA

U.S. DEPARTMENT OF HOMELAND  
SECURITY  
S&T, TSA, USCG, USSS

U.S. DEPARTMENT OF JUSTICE  
BOP

U.S. DEPARTMENT OF STATE  
DS

U.S. DEPARTMENT OF TRANSPORTATION  
FAA, RITA (Volpe)

U.S. POSTAL INSPECTION SERVICE

### Mission

*Identify, prioritize, and execute research and development, testing, evaluation, and commercialization efforts that satisfy interagency requirements for physical security technology to protect personnel, vital equipment, and facilities against terrorist attacks.*

The Physical Security (PS) subgroup identifies the physical security requirements of Federal, State and local agencies, both within the United States and abroad, and develops technologies to protect their personnel and property from terrorist attacks. The subgroup creates prototype hardware, software, or systems for technical and operational evaluation by user agencies. A Department of Defense representative from the Physical Security Equipment Action Group and a Department of Energy representative co-chair the subgroup.

### Focus Areas

The PS subgroup focus areas reflect the prioritized requirements of the physical protection community. During FY 2006, these focus areas were:

#### Entry-Point Screening and Access Controls

Develop multiple technologies and techniques to detect explosives, weapons, and other contraband on or in personnel, vehicles, vessels, cargo, and mail entering protected facilities. Increase detection rates, throughput, and safety through remote automation while reducing the reliance upon security forces to perform the screening process. Develop expeditionary access control for admissible personnel and vehicles; integrating identity management, radio frequency identification, license plate reading, automated image anomaly detection technology, and remote communications.

#### Intrusion Detection, Assessment, Delay, and Response

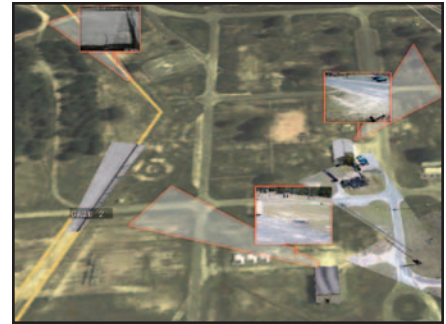
Develop improved intrusion detection systems, video alarm assessment systems, specialized intrusion-delay barriers, and subsequent armed response capabilities for protecting outer perimeters, building perimeters, and key assets from terrorist attacks. Develop prototype security systems with fewer false alarms, improved reliability, higher probability of detection and assessment, lower operation and maintenance costs, and more effective response capabilities.

## Physical Security

### Selected Completed Projects

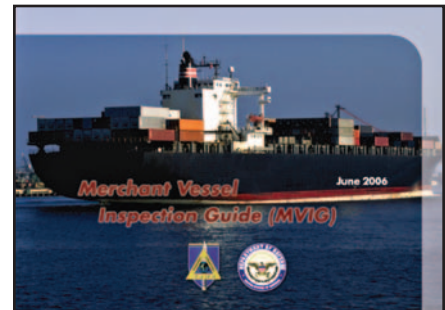
#### Force Protection Using a Blanket of Video Cameras

The integration of large numbers of video cameras poses significant problems for security force operators. To provide better situational awareness and operational control, Sarnoff Corporation developed an integrated command and control station allowing a single operator to monitor a large compound. Eglin Air Force Base established a test bed to develop technologies and methods to integrate large numbers of sensors into a unified view and leverage intelligent video analysis with computer-driven alarm conditions. Based on this, Sarnoff developed the Persistent Surveillance Dissemination System of Systems, or "PSDS2", with Raytheon and has fielded the system to CENTCOM. Sarnoff has also used the technology in security systems at two major airports and at two Marine training sites. This technology also formed the basis for the commercially available Praetorian system for site security and surveillance. Additionally, the object detection, tracking, and geo-registration capabilities developed under this project have been incorporated into unmanned aerial vehicle systems (UAVs) deployed by CENTCOM and in the commercially available TerraSight™ system designed to capture, geo-register, visualize, and search video data from multiple UAVs. Additional information on the Praetorian system is available at <http://www.l3praetorian.com>. Additional information on the TerraSight system is available <http://www.pyramidvision.com/terrasight>.



#### Merchant Vessel Inspection Guide

Physical security and force protection personnel need consolidated guidance on how to inspect merchant vessels for contraband, weapons, explosives, WMDs, and other hazards. The pocket-sized Merchant Vessel Inspection Screening Guide (MVIIG) not only provides important screening information for U.S. security forces to aid in the identification of contraband and hazardous items, but also provides information on how to recognize potential threats or suspicious behavior displayed by a vessel's crew. The MVIIG is available through the Government Printing Office. Additional information about this publication is available at <http://www.tswg.gov/pubs>.



### Selected Current Projects

#### Virtual Pat-Down Using Radar

Current handheld scanners cannot detect concealed non-metallic items on personnel. Users require a more capable, lightweight, low cost, low power handheld scanner that can detect metallic and non-metallic items, such as ceramic weapons and explosives. Advanced ground penetrating radar and processing algorithms are being used to develop a new breed of handheld scanners weighing less than three pounds to detect those hazards on people. L-3 CyTerra Corporation is developing the Virtual Pat-Down Using Radar, or "VIPUR", for entry-point screening, with an initial prototype due for Government evaluation in Summer 2007.





## Physical Security

### Mass Transit Surveillance and Early Warning System



To provide fast, effective video surveillance in transportation hubs, the University of Minnesota (UMN) has been developing and deploying the Mass Transit Surveillance System, an integrated monitoring, detection, and alerting system for transportation hubs such as railroad, light-rail, subway, and bus stations. To quickly identify possible terrorist attacks, the system distinguishes, tracks, and displays anomalous human behavior using widespread video camera coverage. The operator will have an integrated view of the site, the ability to respond to alarms, and the ability to control the cameras. The system can also provide automatic alarms to respond to threatening actions and can provide live and recorded video of alarm events. UMN has improved the system software, reducing false/nuisance alarms, and has developed testing protocols to validate the software algorithms. In late 2006 a full system will be installed at an Amtrak station, and additional operational testing and spin-off of technologies will take place in 2007. Operational security systems are scheduled to be available in mid-2007.

### Unconventional Barrier Design Guidance



A Department of State rating system is used to certify the level of protection that various vehicle security barriers provide. Most of the current fixed-perimeter (non-portal) barriers typically were designed and tested against a vehicle threat of modest kinetic energy. Significantly more robust perimeter vehicle barriers require additional testing and certification to mitigate the threats of even larger vehicles traveling at higher velocities. This project is evaluating unconventional mitigation measures that could be used to diminish threats posed by large vehicles attempting to breach a facility's perimeter. The results will provide guidance to government and military users on ways to increase their facility's physical security posture.

### Forward Scatter Detector System



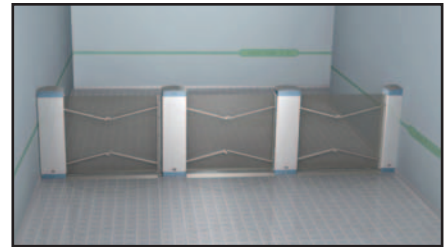
Non-intrusive inspection systems are used to support both police and military security operations to view vehicle interiors and cargo at checkpoints and facilities' entry-control points. The development and testing of an additional capability for the American Science & Engineering Backscatter X-ray Van (ZBV) allows for improved imaging of bulk metal objects using the forward-scattering effect of the X-rays. The Forward Scatter Detector System, suitable as a retrofit for fielded ZBVs, is mounted on the ZBV's trailer or a fixed barrier allowing for simultaneous viewing of organic and metallic objects, enhancing security personnel ability to examine vehicles and other objects for concealed weapons or IEDs.

## Physical Security

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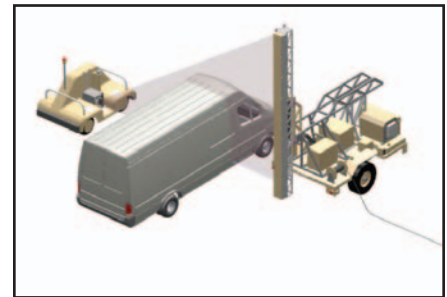
### Breach Control Barrier System

Entry control screeners at airports, government buildings, and other venues have limited resources to safely prevent partially screened or unscreened personnel from entering the controlled area beyond the security checkpoint. Allen-Vanguard is developing a user-friendly barrier that can be deployed quickly to stop an accidental security breach or delay determined adversaries until response forces can arrive. The barrier has three alternative designs; drop-down, pop-up, and columnar side-to-side models; to fit into most building configurations and blend with existing architectural features and decors. The modular design is fabricated in sections nominally ten feet long, which allows multiple units to be installed across virtually any hallway or atrium width to provide full coverage as required. The barrier is emplaced beyond the control point, activated manually or automatically, with warning lights and an audible alarm to alert innocent pedestrians. The Breach Control Barrier System is scheduled for testing in early 2007, with production models projected by FY 2008.



### Ruggedized Non-Intrusive Inspection Imaging System

Protected areas have an increasing need to detect vehicle-borne improvised explosive devices. However, the maneuverability of large, commercially available, non-intrusive inspection imaging systems in austere environments remains limited. In parallel efforts, SAIC and American Science and Engineering, Inc. are developing ruggedized trailer-based systems that allow force protection officials to conduct interdiction efforts away from fixed facilities. The systems will be capable of operating on primary, secondary, and unimproved road surfaces. The systems will also permit remote operation and detection of multiple threat items while operating in portal or scanning mode. The systems are scheduled to enter Government testing in early Summer 2007.



### Contact Information

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# Surveillance, Collection, and Operations Support



## MEMBERSHIP

INTELLIGENCE COMMUNITY

U.S. DEPARTMENT OF DEFENSE  
AWG, USSOCOM

U.S. DEPARTMENT OF JUSTICE  
FBI

# Surveillance, Collection, and Operations Support

## Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements supporting intelligence gathering and special operations directed against terrorist activities.*

The Surveillance, Collection, and Operations Support (SCOS) subgroup identifies high-priority user requirements and special technology initiatives focused primarily on countering terrorism through offensive operations. SCOS R&D projects enhance U.S. intelligence capabilities to conduct retaliatory or preemptive operations and reduce the capabilities and support available to terrorists. A representative from the Intelligence Community chairs the subgroup.

## Focus Areas

The SCOS subgroup focus areas reflect the prioritized requirements of the Intelligence Community. During FY 2006, these focus areas were:

### Traditional Surveillance

Improve the quality of intelligence collection. Develop and advance capabilities for the collection and enhancement of video, imagery, and audio surveillance.

### Analytical Surveillance

Improve automated tools for terrorist identification using biometrics, pattern recognition, speech and speaker recognition, and information retrieval from multiple sources.

### Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance

Develop and improve the capability to locate, identify, and track terrorists and terrorist activities. Support programs and initiatives critical to intelligence and law enforcement operations, such as tagging, tracking, and locating; special sensors; and clandestine communications.

### Information Operations Support

Develop and improve tools to degrade, disrupt, deny, or destroy both analog and digital adversary information and information systems.

## Program Highlights

SCOS projects are classified or highly sensitive. Program requirements, the success of projects, and specific capabilities cannot be discussed in an unclassified document.

## Contact Information

[scossubgroup@tswg.gov](mailto:scossubgroup@tswg.gov)

## Tactical Operations Support



Photo courtesy of the Department of Defense

## Tactical Operations Support

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### MEMBERSHIP

NATIONAL TACTICAL OFFICERS  
ASSOCIATION

STATE AND LOCAL SWAT TEAMS

U.S. DEPARTMENT OF DEFENSE  
USA (MP School), USSOCOM

U.S. DEPARTMENT OF ENERGY  
HSS, NNSA

U.S. DEPARTMENT OF HOMELAND SECURITY  
TSA (FAMS), USCG, USSS

U.S. DEPARTMENT OF JUSTICE  
FBI (HRT), USMS

U.S. DEPARTMENT OF STATE  
DS

### Mission

*Identify, prioritize, and execute research and development projects that enhance the capabilities of DoD and interagency special operations tactical teams engaged in identifying, attacking, and eliminating terrorists. This includes the development of non-sensitive capabilities for State and local law enforcement agencies to combat domestic terrorism.*

The Tactical Operations Support (TOS) subgroup provides technology solutions to assist “direct action” operational personnel in a variety of tactical missions and environments. Most often these solutions are in the form of rapidly prototyped and specialized equipment. Each material solution is specifically designed to provide enhanced mission effectiveness while assisting the operational personnel in maintaining “situational awareness.” A representative from the Department of Energy chairs the subgroup.

### Focus Areas

The TOS subgroup focus areas reflect the prioritized requirements of offensive counterterrorism forces. During FY 2006, these focus areas were:

#### Advanced Imaging Systems

Develop solutions that improve reduced-visibility imaging in all operating environments. Provide high-quality images under reduced-lighting conditions that enhance tactical forces’ ability to operate more effectively.

#### Specialized Access Systems

Develop technologies that assist tactical assault forces in gaining rapid access to objectives, improve evaluation of tactical options, and support efficiency of operations, while providing added safety for personnel.

#### Chemical and Radiation Detectors

Develop chemical and radiological detection instruments that are specifically designed to support the tactical user in the field. Design systems that are smaller, lighter, robust, and more covert than conventional technologies. Coordinate these efforts with the CBRNC subgroup.

#### Emerging Threats

Develop technologies that will protect military and civilian personnel from rapidly changing methods of terrorist attack.

## Tactical Operations Support

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### Offensive Systems

Develop equipment and capabilities that enhance the effectiveness of small offensive tactical teams engaged in specialized operations.

### Tactical Communications Systems

Develop flexible communications capabilities specifically designed for tactical forces. Emphasize reducing the size of equipment, while improving operator mobility and efficiency.

### Special Operations and Tactics

Develop technologies that satisfy interagency tactical operational requirements for law enforcement special operations.

### Program Highlights

TOS programs are classified or highly sensitive. Program requirements, the success of programs, and specific program capabilities cannot be discussed in an unclassified document.

### Contact Information

[tosubgroup@tswg.gov](mailto:tosubgroup@tswg.gov)





## Training Technology Development



DoD photo by Tech. Sgt. Andy Dunaway, U.S. Air Force. (Released)

## Training Technology Development

### MEMBERSHIP

ENVIRONMENTAL PROTECTION AGENCY

INTERAGENCY BOARD

NATIONAL BOMB SQUAD COMMANDERS  
ADVISORY BOARD

NATIONAL VIRTUAL TRANSLATION CENTER

U.S. DEPARTMENT OF AGRICULTURE  
APHIS

U.S. DEPARTMENT OF DEFENSE  
JIEDDO, OUSD (P&R), PFFA,  
USA (MANSCEN, NGB  
RDECOM, TRADOC), USMC,  
USSOCOM

U.S. DEPARTMENT OF ENERGY  
HQ

U.S. DEPARTMENT OF HOMELAND SECURITY  
FPS, PD (G&T), S&T, USCG, USSS

U.S. DEPARTMENT OF JUSTICE  
NIJ

### Mission

*Identify, prioritize, and execute projects that satisfy interagency requirements for the development and delivery of education, training, and mission performance support technologies for combating terrorism.*

The Training Technology Development (TTD) subgroup delivers training and training technologies to increase mission readiness and enhance operational capabilities in the combating terrorism community. The strategy behind the mission is to integrate and leverage advanced distributed learning (ADL) technologies to deliver high-quality education and training in the medium best suited to the users' needs and requirements. Representatives from the Department of Defense and the Department of Homeland Security co-chair the subgroup.

### Focus Areas

The TTD subgroup focus areas reflect the prioritized requirements of the military and civilian combating-terrorism communities. During FY 2006, these focus areas were:

#### Delivery Architectures

Advance and enhance existing content and knowledge management technologies. Develop software and hardware technologies to deliver education and training to combating terrorism personnel. Distribute on-demand, customized training to the end user.

#### Advanced Distributed Learning

Develop computer-based combating terrorism training courses and the advanced tools, techniques, and guidelines required to produce them. Integrate computer-based delivery technologies with terrorism training materials to increase the quality, effectiveness, and accessibility of training.

#### Training Aids, Devices, and Simulations

Develop training support products and virtual training systems to support mission performance and increase mission readiness. Develop training support packages for TSWG products, incorporate exercise simulations into ADL technologies, and provide simulants for training aids.

## Training Technology Development

### Selected Completed Projects

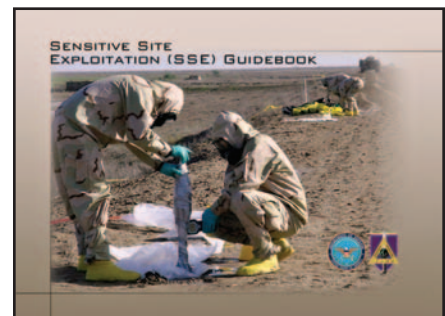
#### Portable Chemical/Radiological Simulant Training Kit

Currently available chemical and radiological training kits do not fully meet the training needs for the CBRN community because many cannot be used on humans or lack the fidelity of the desired agent's physical properties. Using compounds listed in the International Dictionary of Cosmetic Ingredients, Clean Earth Technologies, LLC developed and tested a portable simulant training kit for use in decontamination exercises. The simulants are safe and non-toxic to the skin, and all ingredients are "generally regarded as safe and effective" per FDA guidelines. The chemical simulants mimic the relative vapor pressure and solubility characteristics of G, H, and V agents. Using the kit, responders learn how to engage in decontamination exercises, attend to victims, cordon off affected areas, and use a photoionization detector to identify contamination. Used with black-light illumination, a fluorescent taggant makes the simulant visible to the trainer, who can easily and effectively evaluate the trainee's performance. The kit also includes a particulate simulant for radiological contamination that would result from a radiological dispersal device (or "dirty bomb"). The kit is available for ordering from Clean Earth Technologies, and additional information is available at <http://www.cleanearthtech.com/Kit.pdf>.



#### Sensitive Site Exploitation Guidebook

Terrorist organizations and rogue states are actively seeking chemical, biological, radiological, and nuclear (CBRN) materials to use as weapons against deployed forces. To respond to this amplified risk to military personnel performing sensitive site exploitation (SSE) missions, Concurrent Technologies Corporation developed the pocket-sized SSE Guidebook. The Guidebook is designed as a ready reference and operational guideline for military personnel involved in SSE operations. It also serves as a job aid in the pre-incident, incident, and post-incident management of SSE reconnaissance and mitigation. The SSE Guidebook contains the following elements: Force Protection; Pre-Planning; Execution; Specific Operations; Decontamination Procedures; U.S., International, and United Nations Hazardous Material (HAZMAT) Labels; Service Component Information; and Reference List and Web site Links. The guidebook is available from the Government Printing Office, and product and procurement information is available at [http://www.tswg.gov/tswg/prods\\_pubs/SSEG.htm](http://www.tswg.gov/tswg/prods_pubs/SSEG.htm).



## Training Technology Development

### Pocket Guide for Security Procedures and Protocols for Mitigating Radio Frequency Threats



Security officers at critical infrastructure facilities require information on the radio-frequency weapon (RFW) threat and mitigation strategies. The Pocket Guide for Security Procedures and Protocols for Mitigating Radio Frequency Threats, developed by the Naval Surface Warfare Center at Dahlgren and the National Terrorism Preparedness Institute at St. Petersburg College, provides information on the RFW threat, identifying RFWs and suspicious behavior, responding to an RFW attack, mitigation techniques, and establishing controlled areas. The Pocket Guide may be purchased from the Government Printing Office. Additional product and procurement information is available at [http://www.tswg.gov/tswg/prods\\_pubs/RFWG\\_PUB.htm](http://www.tswg.gov/tswg/prods_pubs/RFWG_PUB.htm).

### Selected Current Projects

#### Personal Protective Equipment Training for Skilled Support Personnel



To protect potential responders who willingly help victims during initial evacuation prior to arrival of first responders, training must be provided to prepare such volunteers to respond safely to a chemical, biological, or radiological (CBR) threat event. Sensis Corporation is developing a blend of classroom instruction and simulation-based training to prepare skilled support personnel (e.g., security guards and utility workers) to safely respond to a CBR incident. Students will receive awareness training regarding how incidents are managed through incident command, how to recognize CBR events, how to reach safety, and how to use the proper personal protective equipment when working in a contaminated environment. Students will be able to test their knowledge through computer-based simulated disasters designed to verify skills and build confidence. The project is in the final stages of developing the training material and disaster simulations. The course will be completed in early 2007.

#### Authoring Tool for Advanced Distributed Learning 3-D Simulations



A common requirement of both deployed military personnel and first responders is the need for new equipment training. Rapid response to terrorism threats and incidents requires that Federal, State, and local emergency responders and the military receive in-depth training on a variety of complex equipment. Vcom3D is designing and developing an authoring tool to create simulation-embedded web-based and CD-based equipment training independent of the type of equipment. The authoring tool will enable the integration of 3-D, 360-degree rendering and simulation into Web-based and CD-based training that is level-three interactive and that conforms to Shareable Content Object Reference Model 2004. The authoring tool was recently used in an initial proof-of-concept demonstration to develop training in the operation of an Advanced Portable Detector 2000 chemical detection system. Completion of the project is planned in early 2007.

## Training Technology Development

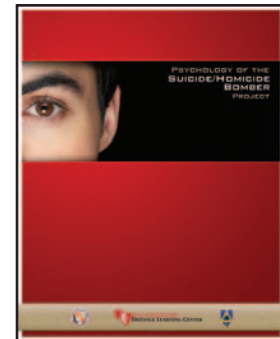
### Science Foundations for Bomb Squad Training

Civilian bomb squad technicians face a growing level of sophistication in improvised explosive devices (IEDs). Supplementing the technician's procedural training with a science-based knowledge of electronics, explosives chemistry, and physics will enable them to make more informed assessments and better response decisions. Applied Research Associates developed an innovative approach that directly identifies the science necessary for the bomb technician's job performance. A cognitive task analysis was used to capture a subject matter expert's decision-making process for identifying IED-significant characteristics with an emphasis on basic science foundations. The results of this analysis will be used to create a training product comprised of technical content specifically targeted at the bomb squad community. Certified technicians will be able to access the computer-based training from either the FBI Virtual Academy or a CD-ROM. Additionally, a hands-on kit will be developed for dissemination and to instruct users on how to assemble their own training kits. Project completion is expected for July 2007.



### Psychology of Suicide Bombers Courses

Suicide bombing has become a weapon of choice for extreme terrorists, as has been demonstrated throughout the world. Given the increased frequency of suicide bombings, both civilian and military personnel must be mentally prepared to handle a pre- and post-blast incident. The Early Responders Distance Learning Center at Saint Joseph's University is developing a program of online courses designed to provide military and civilian personnel with the mental preparedness to properly detect, deter, prevent, defeat, mitigate, and respond to a suicide bombing.



### Contact Information

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## VIP Protection



Photo by Sgt. 1st Class Kathleen T. Rhem, USA (Released)



## MEMBERSHIP

ENVIRONMENTAL PROTECTION AGENCY

INTELLIGENCE COMMUNITY

U.S. DEPARTMENT OF COMMERCE  
NIST-OLES

U.S. DEPARTMENT OF DEFENSE  
USA (SSC, TACOM), USN (NCIS),  
USSOCOM

U.S. DEPARTMENT OF ENERGY  
HSS

U.S. DEPARTMENT OF HOMELAND SECURITY  
TSA (FAMS), USSS (SSD, TSD)

U.S. DEPARTMENT OF HOUSING AND URBAN  
DEVELOPMENT  
OSEP

U.S. DEPARTMENT OF JUSTICE  
NIJ

U.S. DEPARTMENT OF STATE  
DS

U.S. DEPARTMENT OF THE TREASURY  
IRS

## VIP Protection

### Mission

*Identify, prioritize, and execute research and development projects that satisfy interagency requirements for equipment and systems that alert and prevent attacks on VIP protectees. This includes hardware and tools that provide security to both the VIPs and their protectors. Inherent in this development is additional emphasis on life safety and emergency response equipment.*

The VIP Protection (VIP) subgroup develops prototype hardware, systems, personnel protection equipment, and reference tools, as well as standards that support greater security for VIPs. To be effective, personnel who are charged with the safety of these VIPs must also have protective equipment to prevent injury and tools to improve their effectiveness. VIP projects deliver new tools and technologies to Federal, State, and local law enforcement protection details in hazardous combat-like environments and to the military. A representative from the United States Secret Service chairs the subgroup.

### Focus Areas

The VIP subgroup focus areas reflect the prioritized requirements of the personnel protection community. During FY 2006 these focus areas were:

#### Vehicle Protection and Performance

Improve the safety and effectiveness of armored vehicles to protect passengers. Develop upgrades to vehicle systems to enhance the performance and reliability of the vehicles in a broad range of operational environments. Validate existing designs against specific threats.

#### Transparent Armor Development

Develop and validate tools that will predict performance and support advanced design of transparent armor. Evaluate and design technologies to protect against a broad range of threat projectiles. Develop advanced lightweight transparent armor to provide substantial reductions in the weight and thickness necessary to obtain the required protection.

#### Individual Protection Systems

Develop and improve methods and equipment to protect personnel assigned to VIP details. Transition appropriate technologies to law enforcement officers. Improve the performance of body armor and understand its limitations (e.g., ballistic and thermal). Provide associated systems to improve comfort and effectiveness for the wearer. Develop technologies to identify situations where protection personnel and their VIPs need additional support.

## VIP Protection

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### Emerging Threats

Develop methods and systems to identify, prevent, or defeat potential attacks from remote areas. Develop technologies to identify potential sniper or remote attacks and alert users. Improve methods to provide threat-locating information and develop appropriate countermeasures.

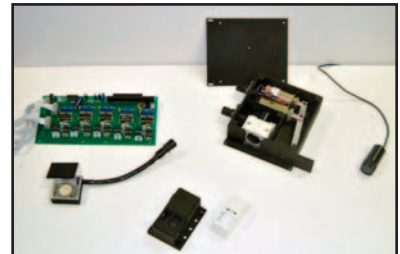
### VIP Installation Protection

Develop threat identification and warning technologies for potential threats directed against critical installations occupied by senior government officials. Identify appropriate countermeasures to enhance a facility's safety during terrorist actions.

### Selected Completed Projects

#### Covert Vehicle Tamper Detection

Security details employ armored vehicles to provide safe VIP transportation; however, vehicles must be monitored during unattended parking for evidence of tampering, such as the placement of explosive devices, tracking devices, and other methods of sabotage. Applied Research Associates, Inc. developed the SENSE and Report Vehicle ANti-Tamper (SERVANT) system, which consists of low-profile sensors installed throughout a vehicle. When a tamper event is detected, SERVANT automatically records sensor data and surveillance video and sends an alert to the security agent's PDA. Prior to approaching the vehicle, the agent can review the stored footage and assess the nature and severity of the event. Requests for additional information should be addressed to [vipsubgroup@tswg.gov](mailto:vipsubgroup@tswg.gov).



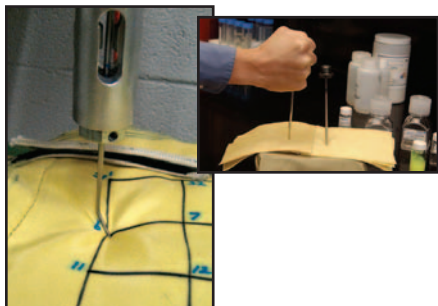
#### Laser Detection - Smart Glass

Laser aiming devices and rangefinders are widely available and used by snipers to enhance accuracy. While transparent armor is often used to provide ballistic protection in VIP vehicles, early warning of a sniper targeting a VIP vehicle would permit vehicle maneuvering to prevent an effective shot. Applied Research Associates, Inc. developed a transparent film, Smart Glass, which is placed on the interior side of the window to detect incoming laser beams and issue a threat alarm. Though Smart Glass was initially conceived for use in VIP vehicles, it also has applicability to building and aircraft windows. Requests for additional information should be addressed to [vipsubgroup@tswg.gov](mailto:vipsubgroup@tswg.gov).



## VIP Protection

### Shear Thickening Fluid Kevlar Study



To improve the protective characteristics of conventional Kevlar, the Army Research Laboratory conducted studies on the effects of Shear Thickening Fluid (STF) integration. STFs undergo phase transformations from a liquid-like material to a solid-like material when a critical level of force is applied. The STF surrounds and reinforces the Kevlar fibers, resulting in greater ballistic and stab protection than observed with untreated Kevlar. ARL will apply these results in a follow-on effort to optimize hybrid fabric architectures for concealable body armor with multi-threat protection. Requests for additional information should be addressed to [vipsubgroup@tswg.gov](mailto:vipsubgroup@tswg.gov).

### Selected Current Projects

#### VIP Security Kit



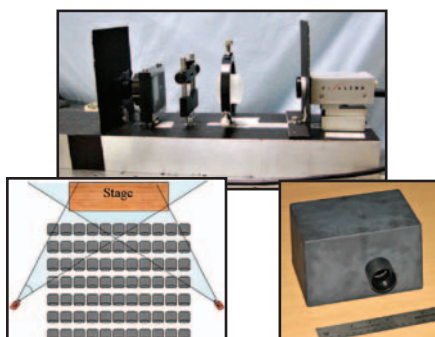
Security personnel require a surveillance system for use when VIPs travel away from their highly secured fixed facilities. Applied Research Associates, Inc. is developing a transportable VIP Security Kit for rapid deployment in temporary installations and residences. The kit enables security details to remotely monitor activity surrounding the VIP location and to receive intrusion and activity alerts via cell phone, PDA, or e-mail. Recorded surveillance allows security personnel to conduct post-event analysis.

#### Multi-Hit Ballistic Test



When subjected to automatic weapon fire, body armor performance is a primary concern for both military and civilian law enforcement personnel. Bosik Technologies, Ltd. developed a three-barrel test fixture to achieve shot pattern control and test repeatability. Bosik is using the three-barrel test fixture to evaluate factors such as angle shots, shot sequence, pattern orientation, and firing rates on body armor. These performance characteristics will be analyzed and used to develop a multi-hit ballistic testing methodology.

#### Indirect Laser Detection



Lasers are being used more frequently in anti-personnel roles such as targeting and aiming for small arms weapons and for generating physiological effects such as temporary or permanent blindness. Visidyne, Inc. is developing a system that provides off-axis detection of such lasers and issues a real-time threat alert. A breadboard system successfully demonstrated this capability in both indoor and outdoor environments. Visidyne will continue with prototype development in 2007.

## VIP Protection

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### Counter-MANPADS Airspace Protection System

Man Portable Air Defense Systems (MANPADS) are widely proliferated, increasing the likelihood of unauthorized acquisitions by terrorists. MANPADS are easily concealed and transported by an individual and can be lethal to both civilian and military aircraft. General Dynamics' Armament and Technical Products Division is developing an innovative ground-based Counter-MANPADS Airspace Protection System (CMAPS) designed to protect aircraft approach and departure corridors from the MANPADS threat. The CMAPS detects a MANPADS launch declaration from an external ground-based detection system, tracks the missile flight path, and activates a laser countermeasure to disrupt the missile guidance system. Because the CMAPS is ground-based, it protects all aircraft, including domestic or international military and commercial flights, without the need for aircraft modifications. Its mobile configuration supports rapid deployment for expeditionary airfields. A live-fire single-node demonstration is planned for Summer 2007.



### Contact Information

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# Explosive Ordnance Disposal/ Low-Intensity Conflict



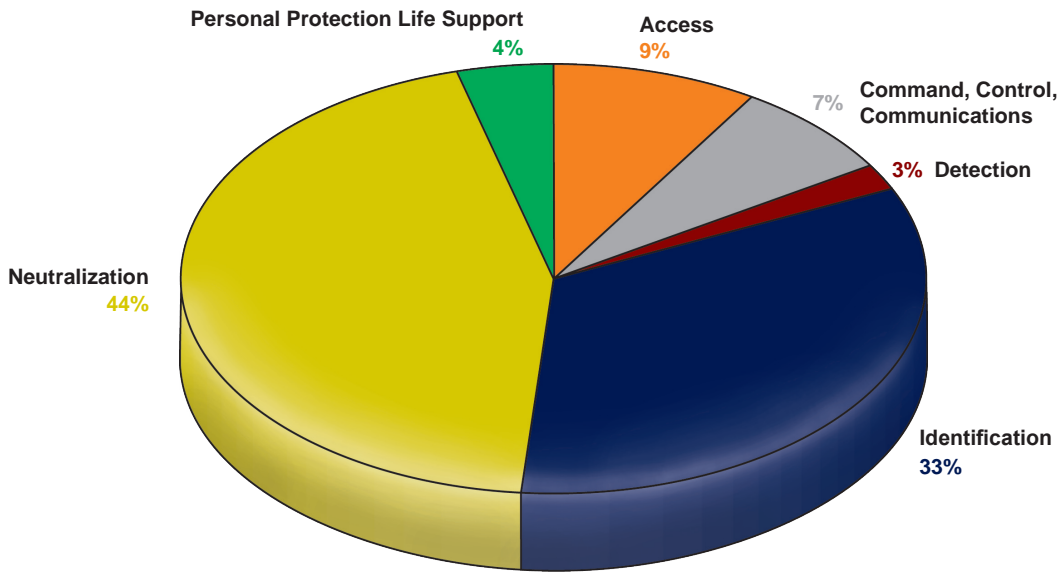
## Explosive Ordnance Disposal/ Low-Intensity Conflict



### Organization and Funding

To counter emerging threats, the Explosive Ordnance Disposal/Low-Intensity Conflict (EOD/LIC) program has grown and adjusted to provide new and advanced technologies to counter these threats. EOD/LIC supports Joint Service EOD and Joint Service Special Operations forces by developing new technologies to stay ahead of evolving threats. These Joint Service communities annually submit prioritized requirements, which are then reviewed and approved by the Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict. In FY 2006 EOD/LIC program funding was approximately \$13M.

### FY 2006 EOD/LIC Funding by Focus Area



# Explosive Ordnance Disposal/ Low-Intensity Conflict

## Focus Areas

### Access

Develop capabilities to safely approach, breach, or enter an area that has explosive threats intended to restrict the access of military personnel. Develop access technologies such as transportation systems; tools for opening containers, vehicles, and walls; and equipment for relocating ordnance to a safe area.



### Detection

Determine the presence of unexploded ordnance (UXO) and establishes location with sufficient accuracy to enable access. Develop detection systems such as imaging systems; explosives sniffers; and nuclear, biological, and chemical sensors.

### Command, Control, Communications

Develop technology and software to enable military personnel to use command, control, and communications (C3) assets to scan, recon, gather, and store imagery and other digital data and to transmit these to command units and personnel over short distances. Advance and upgrade C3 systems such as radios, computers, personal digital assistants, displays, computer databases, and other software.



### Neutralization

Eliminate explosive threats by destroying them or rendering them inoperable. Develop neutralization systems, including disrupters, rifles, counter-charges, and flails.



### Identification

Determine the specific type and characteristics of UXO, IEDs, and other explosive threats. Determine the condition of UXO and the specific hazards associated with these threats. Promote knowledge of UXO, such as the specific type of ordnance, type and amount of explosive fill, blast and fragmentation radii, condition of the item, and existence of any hidden dangers.



### Personal Protection Life Support

Develop technologies for life support and protection of personnel from ballistic and explosive threats. Advance the development of armor systems for personnel, life support equipment, and manned vehicles for land, sea, or air.

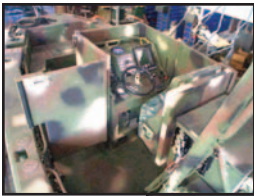




## Selected EOD/LIC Projects

### Selected Completed Projects

**Ballistic Protection for Special Operations Craft – Riverine**  
Battelle Memorial Institute, working with boat builder United States Marine, Inc. (USMI) recently completed development of a lightweight armor solution for the Special Operations Craft-Riverine (SOC-R). The armor kit is designed to provide ballistic protection to the occupants and propulsion system while providing a weight reduction of approximately 500 lbs over the previously used armor. The improved armor kits also protect against ricochets, a capability the previous steel armor lacked. With the ability to be quickly installed or removed as needed in the field by the operators, this armor solution has been chosen to be retrofitted onto the entire fleet of SOC-R craft. USMI will produce and install the kits. Additional information is available at <http://www.usmi.com>.



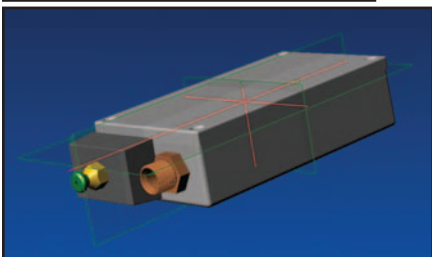
### Combatant Diver Display Mask

The Naval Surface Warfare Center in Panama City, working with the U.S. Marine Corps Systems Command, completed the successful development and final testing of the Combatant Diver Display Mask (CDDM). This mask displays critical life-support information in a digital readout and is capable of being read in light or dark conditions, regardless of water clarity. Depth, bottom time, and tank pressure information ensure the safety of the diver at all times. The Naval Sea Systems Command has authorized the purchase and use of the by Navy/Marine Corps diving units, and the Marine Corps plans an initial operational capability in FY 2007. The mask is commercially available as the Heads-Up Mask from Oceanic Worldwide. Additional information is available at [http://www.oceanicworldwide.com/p\\_computers\\_iddm.html](http://www.oceanicworldwide.com/p_computers_iddm.html).



### Rugged Universal Shock Tube Initiator

The original Universal Shock Tube Initiator (USTI) was rapidly designed and fabricated to meet the immediate needs of current operations. However, with the recent fielding of both smaller and disposable robots, users need a more compact, lighter-weight, and more rugged USTI. To meet this need, Duke Pro, Inc. developed the Rugged Mini USTI for Joint Service EOD. The Mini USTI measures 4.5" x 2.5" x 1.2" and weighs only ½ pound versus the original USTI, which is nearly double the size and weight. The Mini USTI can initiate standard commercial and military shock tube sizes from currently available remote firing devices and also satisfies all DoD Joint Service Safety Review Board requirements. Additional information is available at <http://www.dukepro.com>.



## Selected EOD/LIC Projects

### Digital Camera / X-Ray Combination System

To allow EOD personnel to transfer information at a greater range and with improved targeting information, SAIC integrated a digital camera and a fiber-optic link with their Real-Time Radiography (RTR) systems. The SAIC system integrates a commercially available compact digital camera with the RTR-4 and the Advanced Radiography Systems, both of which are in use with the U.S. military. Additionally, SAIC incorporated fiber-optic technology into existing RTR hardware and software, providing the capability to transfer X-ray data from the imager to a laptop computer at a 1000-foot stand-off distance, a significant improvement over the previous configuration of two fifty-foot spools of coaxial cable. These enhanced systems will allow EOD personnel to superimpose digital photographs over X-ray images to determine the exact location of internal components using external reference points. Additional information is available at <http://www.saic.com>.



### Extendable Camera Boom for Robotic Platforms

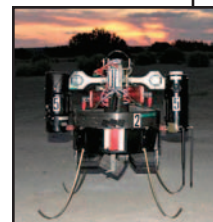
EOD and security personnel require the capability to search hard-to-reach areas for the presence of explosive threats. Applied Research Associates designed an extendable camera boom that allows remote inspection inside the passenger compartments of vehicles as well as other areas previously beyond the reach of existing systems. The Extendable Camera Boom mounts to a variety of existing military robotic platforms used by EOD and security personnel. Prototypes are being delivered for initial user evaluation. Additional information is available at <http://www.ara.com/seas/RMD/RMDrobotics.htm>.



### Selected Current Projects

#### Unmanned Aerial Reconnaissance Vehicle

Military EOD personnel require the ability to conduct remote reconnaissance of hazardous locations beyond the reach of current ground robotic systems. This effort will be to provide EOD personnel with a readily available, hover-capable, small aerial platform to conduct incident site reconnaissance in areas inaccessible to unmanned ground vehicles and to maintain operational and situational awareness when engaged in EOD operations in hostile or high risk locations. The EOD community will conduct initial operational assessment and feasibility testing and evaluation which will further support the development of tactics, techniques and procedures.



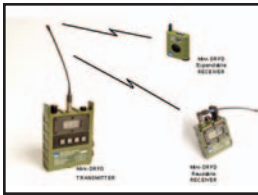
## Selected EOD/LIC Projects

### Night Vision for Bomb Suit



EOD technicians may be required to work on explosive threats in low-light environments. Currently, the technician must either take off the bomb suit helmet to wear night-vision devices, or leave the helmet on and work in the dark, either of which is dangerous. The U.S. Army Soldier Systems Center previously developed a night-vision device bracket to attach the AN/PVS-14 Night-Vision Scope to the EOD 8 helmet system on the Advanced Bomb Suit. This attachment enhanced low-light vision without requiring removal of the helmet. Prototypes of the brackets were delivered to military EOD technicians for testing, evaluation and training and to the Army Global Anti-Terrorist Operational Readiness (GATOR) Course. Continuing development is underway to provide an entirely new system utilizing the latest night-vision technologies with eventual transition to the Department of Defense for incorporation into the Advanced Bomb Suit.

### Joint Service EOD Firing Device



Joint Service EOD equipment compatibility and reliability is critical to successful mission accomplishment. There is a need for a common remote firing device that combines all services needs into one remote firing kit. MAS Zengrange, Ltd., together with A-T Solutions, Inc., has developed a remote firing kit that incorporates all of the Joint Service needs. The kit will have multiple features that eliminate the need for other devices, such as low-cost disposal receivers to remotely destroy explosive hazards. The receivers will operate on commercially available batteries with a remote arming and disarming feature.

### Improved Linear Shape Charge



EOD technicians often need to explosively cut or penetrate an object. The object can be anything from a chain holding a floating mine to an explosive-filled ordnance item. Battelle Memorial Institute is developing, for Joint Service EOD, a modular linear-shaped charge container that is effective against a variety of target materials on land and underwater. The design includes a multipurpose housing with an integrated means of attachment that is waterproof to depths of 190 feet. The cutting capabilities are equivalent to the Mk 7 series shape charge container and have been incorporated an integrated initiator holder. The Improved Linear Shape Charge accepts the current inventory of initiation methods (electric, non-electric, and acoustic).

## Selected EOD/LIC Projects

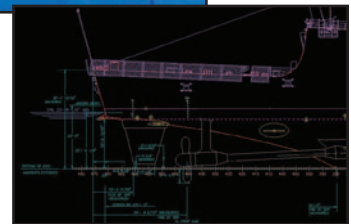
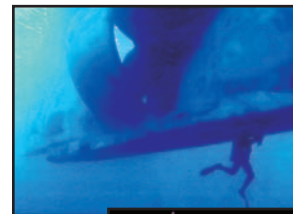
### Limpet Mine Removal Tool

After a limpet mine has been found and neutralized, it must be removed from the ship's hull. Removal must be accomplished remotely, since neutralization efforts may not have been completely successful. Attachment of the mine to the hull may include magnets, suction cups, and adhesives. The Limpet Mine Removal Tool has been designed to work effectively on limpets using these attachment methods. This tool is diver-emplaced and remotely actuated using a pneumatic lifter to release the limpet from the hull's surface, allowing it to fall into a netting system to be safely carried away and disposed.



### Navy Ship Hull Database

EOD dive teams responding to underwater missions are currently constrained in their preparation and missions, due to reliance on limited drawings in a usable format. Often divers must use hand sketches taken from larger drawings in the ship's library to prepare their dive packages. The Space and Naval Warfare Center is developing the Navy Ship Hull Database, a repository of ship hull drawings using editor/viewer software, to give the dive team the ability to create a dive package noting all intakes and areas of caution to help the diver navigate along the bottom of the ship. The team members on dock are able to mark the diver's findings on the drawings in the event a threat is found so that the diver will know exactly where to return to perform the proper disposal procedures. This database will be available for military use only.



### Bladderless Lift Balloon

Navy EOD personnel require remotely operated bladderless lift balloons to raise submerged unexploded ordnance from the seabed. Previous work conducted at the Naval Surface Warfare Center Indian Head Division culminated in a successful test and evaluation by Navy EOD divers of Subsolve USA's modified lift balloon. This test demonstrated the enhanced functionality and improved diver handling characteristics of the lift balloon. Ongoing work is focusing on reducing the overall size of the initiation system, developing an improved actuation valve, and redesigning the booster circuitry. This effort will result in a COTS system available for procurement by the Navy EOD community.



### Contact Information

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# Irregular Warfare Support



## Irregular Warfare Support



The Irregular Warfare Support (IWS) program is a new CTTSO initiative begun in 2006 to solve non-traditional problems in present warfare. IWS supports clients in Joint, interagency, and international counterinsurgency efforts in the “Long War”. Using an innovative and integrated process of operational analysis, capability development, and pilot program implementation, IWS provides adaptive and agile ways and means for the United States to defeat insurgent organizations, motivations, sanctuaries, and enabling enterprises.

### Mission

IWS supports the analysis and development of novel approaches to counter the rise of extremist ideologies and the absence of effective governance associated with irregular warfare.

IWS will (1) identify Interagency and international best/worst practices and capability requirements; (2) coordinate development of IW client capabilities in information, operations, technology, policy, and training; (3) execute development and integration projects and deploy IW capabilities; and (4) provide means of cooperation, collaboration, and coordination at operational and strategic levels.



### Focus Areas

#### MOTIVATION

Disengage popular and active support from the insurgency. Prevent recruitment of new insurgents through noncombatant influence initiatives. Investigate and develop tools and programs to dissuade a population from acting out as a potential terrorist, insurgent, or supporter.

#### Organization

Penetrate insurgent organizational structure using law enforcement models for counter-human network operations. Develop concepts and capabilities to deny, disrupt, identify, or otherwise exploit insurgent support networks.

#### Sanctuary

Deny insurgents safe operating zones ranging from the physical to the virtual. Analyze and identify perceived refuges and develop concepts and capabilities to change that environment into a perceived threat zone.



## Irregular Warfare Support

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### Enterprise

Undermine or otherwise exploit insurgent commercial/business organization systems. Illuminate, shape, or disrupt insurgent financial decision-making processes. Analyze and identify organizational and structural impediments to successful U.S. Government prosecution of the “Long War”, and act as change agent to overcome those impediments.

### Program Highlights

IWS programs are classified or highly sensitive. Program requirements, the success of programs, and specific program capabilities cannot be discussed in an unclassified document.



### Contact Information

[iws@iwsp.cttso.gov](mailto:iws@iwsp.cttso.gov)





## Product Development and Delivery



U.S. Air Force photo by Master Sgt. Lance Cheung (Released)

## Featured Project Updates

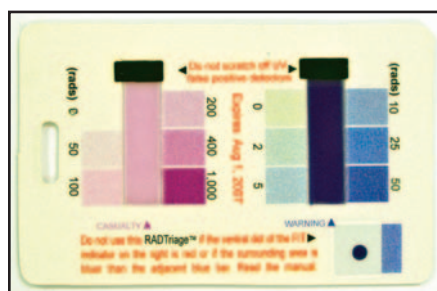
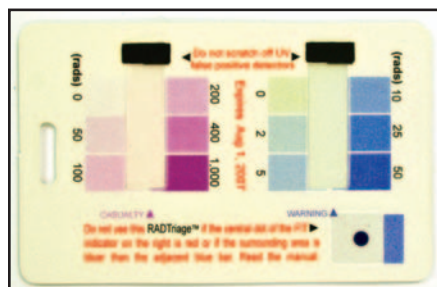
This new section of the CTTSO program review book provides significant updates to past CTTSO projects that have previously been reported on as completed projects. The projects featured in this section have had significant operational improvements, have enjoyed particular commercial success, or have had other developments of note.

### Wireless Phone and PDA Forensic Tool Kit (ISF Subgroup)



The Logicube CellDEK®, a cell phone forensics toolkit, was recently featured on an episode of *CSI: New York*. In the episode, a terrorist used a cell phone to detonate an explosive device, and despite most of the cell phone being destroyed, the forensics specialists were able to retrieve data from the phone using its SIM card. The rugged briefcase device enables investigators to extract data from 220 various cell phones and PDAs using an easy-to-navigate touch-screen computer. The display on CellDEK® allows investigators to identify communication devices by name or photo and then suggests the best way to connect the communication device to extract data. CellDEK® displays the downloaded records within five minutes and can retrieve data such as incoming and outgoing calls, text messages, voicemail, photos, and video, allowing forensics investigators to gather intelligence more efficiently than traditional practices. End users include several Federal agencies. Additional information is available at [http://www.logicubeforensics.com/products/hd\\_duplication/celldek.asp](http://www.logicubeforensics.com/products/hd_duplication/celldek.asp).

### Smart Radiation Dosimeter (CBRNC Subgroup)



JP Laboratories, Inc. is producing the RADTriage™, a dual-sensor personal smart dosimeter that reliably monitors exposure to radiation from an accidental or intentional radiological event. RADTriage™ has two sensors to monitor radiation exposure, each developing color in proportion to the dose. The “Warning” sensor turns blue and monitors lower doses of radiation (up to 50 rads) that may not require medical treatment. The “Casualty” sensor turns purple and monitors higher doses (50 to 1000 rads) that may require immediate medical treatment. Together these sensors will help first responders to triage potential victims. The FIT™ Indicator simultaneously monitors false positives/negatives, overexposure to heat, and shelf life and provides reassurance that radiation exposure is being reliably monitored. Black bars at the top of each sensor provide an additional method to detect false positives. The FIT™ Indicator enables RADTriage™ to be stockpiled, for years if kept frozen, for future distribution to users in emergencies, since shelf life is constantly monitored. The user-friendly RADTriage™ was designed to be carried at all times, for example in a wallet, handbag, or with an ID badge. These affordable and always-on credit-card-sized badges

## Featured Project Updates

require no batteries, calibration, or maintenance. Users match the colors of the sensing strips with the adjacent color key to instantly determine their dose. The SIRAD family of dosimeters received a 2005 R&D 100 Award as one of the 100 most technologically significant new products of the year. Additional details and ordering information are available at <http://www.jplabs.com>.

### Long-Range Non-Line-of-Sight Video Transmission System (ISF Subgroup)

The Long-Range Non-Line-of-Sight Video Transmission system, developed by DTC Communications, is a wireless video transmission system that is frequency-independent and uses an advanced digital technology to transmit surreptitious video surveillance signals. The new technology dramatically increases the range over other present technologies. DTC has also successfully fitted similar equipment onto EOD robots used to disarm explosive devices. The system has increased the range in which the robots can operate from their controllers, making bomb neutralization safer and more efficient. Since March 2005, DTC has sold 250 systems for sales of \$10 million. End users include several Federal agencies. Additional information is available at <http://www.dtccom.com/cofdm-digital-video.html>.



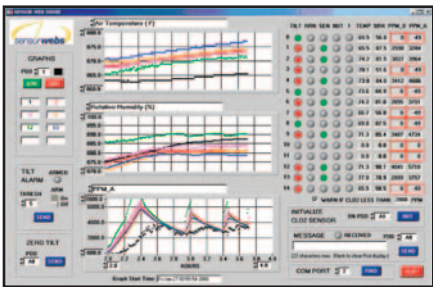
### Explosive Loading Laboratory Testing (BX Subgroup)

Obtaining quality data from blast tests typically requires expensive live field tests. The University of California at San Diego (UCSD) developed a hydraulic-based blast simulator to simulate full-scale, live explosive events up to 3000 psi/ms without the use of explosive materials and without a fireball. Energy deposition, which takes place in time intervals of 1 to 2 ms, is accomplished via an array of ultra-fast, computer-controlled hydraulic actuators with a combined hydraulic/high pressure nitrogen energy source. The blast simulator generates high fidelity data on the response and failure processes associated with critical infrastructure components subject to explosive loads. UCSD is working to improve and validate computational blast physics models and codes using blast simulator and field test data. UCSD also uses the simulator to evolve effective blast hardening/protective methodologies for existing and new structures that can be distributed to the appropriate agencies for the protection of people and infrastructure at home and overseas. The simulator is performing fully repeatable blast load simulations on structural elements such as columns, beams, girders, and walls; on nonstructural elements such as windows and masonry walls; and on bridge components such as piers, and towers. Requests for additional information should be sent to [bxsubgroup@tswg.gov](mailto:bxsubgroup@tswg.gov).



## Featured Project Updates

### Sensor Web (CBRNC Subgroup)



Users in New Orleans and the San Francisco Bay Area field-tested two different Sensor Web versions in 2006 under harsh real-world conditions. SensorWare Systems has licensed the technology from California Institute of Technology/Jet Propulsion Laboratory and is commercializing it for the defense, public safety and agriculture markets.

Fifteen pods and 8-ClO<sub>2</sub> sensors deployed to New Orleans in January 2006 and were used by a leader in ClO<sub>2</sub> decontamination conducting mold and mildew remediation work in buildings in the hurricane-affected area. Eight Sensor Web pods with chlorine dioxide sensors were deployed in the structure in about 20 minutes. In contrast to traditional sampling, the Sensor Web pods provide measurements at discrete points throughout the building in real time. The screenshot of the computer display below shows updates for each pod every 30 seconds for temperature, humidity and chlorine dioxide concentration for a typical 5-hour decontamination run. Benefits recognized by the field operators include rapid, real-time access to the data; spatially distributed data; trending of the data to get better control over gas flow and fans; replacing the tubing and wired temperature and humidity sensors currently used; and system robustness.

The Urban Search and Rescue Sensor Web was deployed in May and June 2006 as a 10-pod system with integrated sensors for air temperature, humidity, light, gas (oxygen, carbon monoxide, hydrogen sulfide, and explosive limits), and tilt to detect shifts in the structure indicative of progressive collapse. The gas sensors are interactively set at the OSHA limits for confined space entry, and the tiltmeters go into alarm for static tilts of more than 2.3 degrees. Measurements are taken synchronously across the system every 30 seconds. A full user interface runs on a laptop computer, demonstrating its flexibility and utility across a range of planned and unexpected alarm conditions. The system was also incorporated in a week-long training class (including a 2-day collapsed structure exercise), giving the system broad exposure to FEMA teams across the country. Additional information and ordering details are available at <http://www.SensorWareSystems.com>.

## Technology Transition

The TSWG charter identifies technology transition assistance throughout the development cycle as essential to supporting national combating terrorism objectives. CTTSO has institutionalized the technology transition process into every aspect of its R&D programs. CTTSO requires that every proposal received address technology transition as a principal task and that each new project include a technology transition plan. A dedicated technology transition manager works with CTTSO developers to prepare the plans and to address the issues associated with a successful transition to production, such as:

- Management of intellectual property (patents, trademarks, copyrights, trade secrets, and licensing);
- Market assessments;
- Environmental, safety, and health issues;
- Liability risk reduction and consideration of SAFETY Act Applications;
- Security;
- Regulatory restrictions and export control (military and commercial);
- Test and evaluation, including independent operational testing by users;
- Transition to production, including partnering, investment capital, and licensing; and
- Operational suitability and operational support.

A number of administrative technology transition tools and methodologies are used to assist the developer with resolving issues, such as:

- Commercialization assessments and plan formats;
- Publication of handbooks and special primers;
- Non-disclosure agreements;
- Provisional patents;
- Liability risk reduction techniques;
- Tailored license application forms and licensee/partner selection board assistance;
- Technical data and software package management techniques;
- Federal Business Opportunity announcements;
- General Services Administration and Defense Logistics Agency listing assistance; and
- Licenses and Cooperative Research and Development Agreements (CRADAs).

A disciplined process; available assistance; and teamwork among project manager, technology transition manager, and developer are the keys to the rapid acceleration of the complicated process of moving many prototypes to production. Additional information is available at the Technology Transition section of the TSWG Web site, <http://www.tswg.gov>.



Chemical Companion  
PDA Software Tool



Urban Explosive Storage  
Magazine



Video  
Detective™

## 2006 Meetings and Conferences



Photo courtesy of DoD

The following is a list of selected meetings and conferences sponsored in whole or in major part by CTTSO in 2006.

### June 2006

#### Explosives Detection Conference

TSWG hosted its first Explosives Detection Conference in June 2006. Over 500 attendees and approximately 30 exhibitors had the rare opportunity to review technologies and share experiences with the anti-terrorism and explosives detection community. This gathering included developers, academics, government and end-users in order to contribute information, examine current initiatives, and offer insight into R&D in the explosives detection field. Allies present included Australia, Canada, Israel, Japan, the Netherlands, the United Kingdom, and Singapore and a NATO representative.

The conference featured demonstrations and presentations meant to provide the developers of explosives detection technology interaction with the end users. Conference exhibits included explosive detection devices presently being deployed, technologies currently in development, and research and development for future systems. End users who participated in the conference included active-duty U.S. Marines who provided invaluable feedback about the impact of improvised explosive devices on their daily life and duties.

### June 2006

#### Tactical Technology Seminar

TSWG sponsored this seminar to provide a forum to convey the latest intelligence and technology information to SWAT teams, establish end-user requirements, and collect meaningful feedback that identifies capability gaps and drives future technology developments. The seminar included facilitated discussions in a classroom environment led by various subject matter experts, as well as practical exercises that enabled participants to demonstrate and evaluate counterterrorist tactics, equipment, and techniques in a simulated environment.

### November 2006

#### International Maritime Anti-Terrorism Security Workshop

The U.S. National Strategy - Maritime Security (September 2005) directs U.S. Government agencies to cooperate and coordinate with the international community to achieve an increased understanding of maritime threats, their significance and priority to achieve a unity of plans, capabilities, and actions. To achieve this, a technology workshop to foster discussions on maritime security between the United States and several key international partners was held in November 2006 at the Department of Transportation's Volpe Center. Through its International Program, TSWG is aware that technological needs for countering common threats are shared among the workshop's participants. The workshop identified common needs, solidified areas for information exchange, and established technology initiatives that can achieve significant improvements in maritime security.

## BAA Information Delivery System (BIDS)

TSWG periodically publishes Broad Agency Announcements (BAAs) to solicit innovative ideas and solutions to combat terrorism. Federal Government agencies, current military theatres of operation, and State and local entities collaborate with TSWG to bring urgent multi-user requirements forward for publication. TSWG's BAA Information Delivery System (BIDS) ensures the widest possible distribution to potential submitters including small businesses, universities, and other agencies as well as nontraditional submitters.

BAAs are competitive solicitations per the Federal Acquisition Regulations. BAAs are advertised at the Federal Business Opportunities website ([www.fedbizopps.gov](http://www.fedbizopps.gov)) and are accessible for download at the BIDS Web site (<http://www.bids.tswg.gov>) using a standard Web browser. In addition to conventional Government solicitation notices, all registered submitters are notified via e-mail of BAA postings, coming events, or partnering agency solicitations. The latest addition to BIDS is the RSS – or Really Simple Syndication - news feed. This allows interested users to receive broadcast BAA information and other BIDS news at their local computer when connected to the Internet.



Other submitter resources are available on the improved BIDS homepage released in October 2006. Online training, small business outreach, and user forums for teaming opportunities are easier to access. Based on submitter feedback, BAA instructions are revised to help interpret submission content and format requirements.

BIDS functions not only for response collection, but also for submission evaluation and submitter notification. In compliance with Federal source selection data handling requirements, submitter data is fully protected in a 128-bit point-to-point encrypted environment. Evaluators must comply with the nondisclosure agreement to gain BIDS access and must certify that there is no conflict of interest to accessed submissions. Evaluation results sent back to the submitter are tracked and monitored for timely response, and the automated notices are typically completed within 90 days. Overall BAA statistics and solicitation results are posted for submitter information.

BIDS continues to serve as a leading solicitation process model for other Federal programs. BIDS provides a streamlined electronic solution to receive proposals, provide access for subject matter expert evaluation, process submissions through the approving authority, notify the submitter of status, and provide a record of solicitation results.



## BAA Information Delivery System (BIDS)

As an electronic solution that reduces submitter preparation costs and encourages participation, BIDS is the future standard today for the Government, technology partners, and private industry.

### Doing Business with the Government



Vendors that contract with the Federal Government must comply with several prerequisites **before** a contract is awarded. [more info](#) ▶

### Submitter Resources



View the [Submitter Quick Card](#) and [Web-based Training](#). Also, the [Teaming and Partnership Forum](#) is provided as a discussion tool for potential submitters to TSWG BAAs.

# APPENDIX



DoD photo by Petty Officer 3rd Class Kevin S. O'Brien, USN (Released)

## 2006 Membership

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### FEDERAL AGENCIES

#### U.S. DEPARTMENT OF DEFENSE

- Armed Forces Institute of Pathology
  - Office of the Armed Forces Medical Examiner
- Defense Computer Forensics Laboratory
- Defense Intelligence Agency
- Defense Threat Reduction Agency
- Defense-Wide Information Assurance Program
- Joint Chiefs of Staff
- Joint Improvised Explosive Device Defeat Organization
- National Security Agency
- Office of the Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict
- Office of the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense
- Office of the Deputy Assistant to the Secretary of Defense for Nuclear Matters
- Office of the Director of Defense Research & Engineering
- Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics
- Office of the Under Secretary of Defense for Intelligence
- Office of the Under Secretary of Defense for Personnel and Readiness
- Pentagon Force Protection Agency
- Polygraph Institute
- U.S. Air Force
  - Air Combat Command
  - Air Force Electronic Systems Center
  - Air Force Research Laboratory
  - Air Force Security Forces Center
  - Explosive Ordnance Disposal Detachment 63
  - Force Protection Systems Squadron
  - Office of Special Investigations
- U.S. Army
  - 20<sup>th</sup> Support Command (Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives)
  - 22<sup>nd</sup> Chemical Battalion (Technical Escort)
  - Army Institute of Surgical Research
  - Army Research Laboratory
  - Asymmetric Warfare Group
  - Chemical School
  - Corps of Engineers
    - Protective Design Center
  - Criminal Investigation Command
  - Explosive Ordnance Disposal Technical Detachment
  - Intelligence and Security Command
  - Maneuver Support Center
  - Military Police School
  - National Ground Intelligence Center
  - National Guard Bureau

## 2006 Membership

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- Product Manager for Force Protection Systems
- Physical Security Equipment Action Group
- Research, Development, & Engineering Command
  - Edgewood Chemical Biological Center
  - Soldier Systems Center (Natick)
  - Tank-Automotive and Armaments Command
  - Training and Doctrine Command
  - U.S. Army Institute of Surgical Research
  - U.S. Army Reserve
- U.S. Central Command
- U.S. Joint Forces Command
- U.S. Marine Corps
  - Chemical Biological Incident Response Force
  - Criminal Investigation Division
  - EOD Detachment
  - Marine Corps Network Operations and Security Command
  - Naval Explosive Ordnance Disposal Technology Division, Marine Corps Division
- U.S. Navy
  - Bureau of Medicine and Surgery
  - Naval Air Warfare Center
  - Naval Criminal Investigative Service
  - Naval Explosive Ordnance Disposal Fleet Liaison Office
  - Naval Facilities Engineering Command
    - Naval Facilities Engineering Service Center
  - Naval Forces Central Command
  - Naval Health Research Center
  - Naval Research Laboratory
  - Naval Sea Systems Command
    - Naval Explosive Ordnance Disposal Technology Division
    - Naval Surface Warfare Center
  - U.S. Naval Forces Europe
- U.S. Special Operations Command

### **ENVIRONMENTAL PROTECTION AGENCY**

- Criminal Investigation Division
- National Enforcement Investigations Center

### **FEDERAL RESERVE BOARD**

### **INTELLIGENCE COMMUNITY**

### **INTERAGENCY BOARD FOR EQUIPMENT STANDARDIZATION AND INTEROPERABILITY**

### **NATIONAL TRANSPORTATION SAFETY BOARD**

### **NATIONAL VIRTUAL TRANSLATION CENTER**

### **NUCLEAR REGULATORY COMMISSION**

### **U.S. DEPARTMENT OF AGRICULTURE**

- Animal and Plant Health Inspection Service
- Forest Service

## 2006 Membership

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### U.S. DEPARTMENT OF COMMERCE

- National Institute of Standards and Technology
  - Office of Law Enforcement Standards

### U.S. DEPARTMENT OF ENERGY

- Headquarters
- National Nuclear Security Administration
- Office of Electricity Delivery and Energy Reliability
- Office of Health, Safety, and Security

### U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

- Centers for Disease Control and Prevention
- Food and Drug Administration
- National Institute for Occupational Safety and Health

### U.S. DEPARTMENT OF HOMELAND SECURITY

- Federal Emergency Management Agency
- Grants and Training
- Immigration and Customs Enforcement
  - Federal Protective Service
  - Forensic Document Laboratory
- Preparedness Directorate
  - Grants and Training
  - Infrastructure Protection
- Science and Technology Directorate
  - Homeland Security Advanced Research Projects Agency
  - Transportation Security Laboratory
- Transportation Security Administration
  - Federal Air Marshal Service
- U.S. Coast Guard
- U.S. Secret Service

### U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

- Office of Security and Emergency Planning

### U.S. DEPARTMENT OF JUSTICE

- Bureau of Alcohol, Tobacco, Firearms, and Explosives
- Drug Enforcement Administration
- Federal Bureau of Investigation
- Federal Bureau of Prisons
- National Institute of Justice
  - National Center for Forensic Science
  - National Forensic Science Technology Center
- U.S. Marshals Service

### U.S. DEPARTMENT OF STATE

- Bureau of Diplomatic Security
- Office of the Coordinator for Counterterrorism
- Overseas Building Operations

## 2006 Membership

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### U.S. DEPARTMENT OF TRANSPORTATION

- Federal Aviation Administration
- Research and Innovative Technology Administration
  - Volpe National Transportation Systems Center

### U.S. DEPARTMENT OF THE TREASURY

- Inspector General for Tax Administration
- Internal Revenue Service

### U.S. POSTAL INSPECTION SERVICE

### LEGISLATIVE BRANCH

#### U.S. CAPITOL POLICE

#### U.S. SENATE SERGEANT AT ARMS

### STATE AND LOCAL AGENCIES

#### FAIRFAX COUNTY, VA FIRE DEPARTMENT

#### FAIRFAX COUNTY, VA POLICE DEPARTMENT

#### ILLINOIS STATE POLICE

#### LONG BEACH, CA POLICE DEPARTMENT

#### LOS ANGELES COUNTY SHERIFF'S DEPARTMENT

#### NEW YORK CITY FIRE DEPARTMENT

#### NEW YORK CITY MASS TRANSIT AUTHORITY

#### NEW YORK CITY POLICE DEPARTMENT

#### PORT AUTHORITY OF NEW YORK/NEW JERSEY

#### SEATTLE, WA FIRE DEPARTMENT

#### SOUTH PASADENA, CA POLICE DEPARTMENT

#### STATE AND LOCAL SWAT TEAMS

### NON-GOVERNMENTAL ORGANIZATIONS

#### NATIONAL BOMB SQUAD COMMANDERS ADVISORY BOARD

#### NATIONAL TACTICAL OFFICERS ASSOCIATION

## 2006 TSWG Membership by Subgroup

### BLAST EFFECTS AND MITIGATION

NEW YORK CITY MASS TRANSIT AUTHORITY

PORT AUTHORITY OF NEW YORK/NEW JERSEY

U.S. DEPARTMENT OF DEFENSE

- Armed Forces Institute of Pathology
  - Office of the Armed Forces Medical Examiner
- Defense Threat Reduction Agency
- U.S. Army
  - Army Institute of Surgical Research
  - Army Research Laboratory
  - Corps of Engineers
  - Protective Design Center
- U.S. Air Force
  - Air Force Research Laboratory
- U.S. Navy
  - Naval Facilities Engineering Command
  - Naval Health Research Center

U.S. DEPARTMENT OF JUSTICE

- Bureau of Alcohol, Tobacco, Firearms, and Explosives

U.S. DEPARTMENT OF STATE

- Bureau of Diplomatic Security

### CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR COUNTERMEASURES

ENVIRONMENTAL PROTECTION AGENCY

FEDERAL RESERVE BOARD

INTELLIGENCE COMMUNITY

INTERAGENCY BOARD FOR EQUIPMENT STANDARDIZATION AND INTEROPERABILITY

NEW YORK CITY FIRE DEPARTMENT

NEW YORK CITY POLICE DEPARTMENT

NUCLEAR REGULATORY COMMISSION

SEATTLE (WA) FIRE DEPARTMENT

U.S. CAPITOL POLICE

U.S. DEPARTMENT OF AGRICULTURE

- Animal and Plant Health Inspection Service

U.S. DEPARTMENT OF COMMERCE

- National Institute of Standards and Technology

U.S. DEPARTMENT OF DEFENSE

- Defense Intelligence Agency
- Defense Threat Reduction Agency
- Joint Chiefs of Staff
- National Security Agency
- Office of the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense
- Pentagon Force Protection Agency
- U.S. Air Force
  - Air Combat Command
- U.S. Army
  - 20th Support Command (Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives)
  - 22nd Chemical Battalion (Technical Escort)
  - Chemical School

## 2006 TSWG Membership by Subgroup

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- Research, Development, & Engineering Command
  - Edgewood Chemical Biological Center
- Maneuver Support Center
- National Ground Intelligence Center
- U.S. Marine Corps
  - Chemical Biological Incident Response Force
- U.S. Navy
  - Bureau of Medicine and Surgery
  - Naval Air Warfare Center
  - Naval Surface Warfare Center

### **U.S. DEPARTMENT OF ENERGY**

- Office of Health, Safety, and Security

### **U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**

- Centers for Disease Control and Prevention
- Food and Drug Administration
- National Institute for Occupational Safety and Health

### **U.S. DEPARTMENT OF HOMELAND SECURITY**

- Immigration and Customs Enforcement
  - Federal Protective Service
- Federal Emergency Management Agency
- Science and Technology Directorate
- Transportation Security Administration
- U.S. Coast Guard
- U.S. Secret Service

### **U.S. DEPARTMENT OF JUSTICE**

- Federal Bureau of Investigation
- National Institute of Justice
- U.S. Marshals Service

### **U.S. DEPARTMENT OF STATE**

- Bureau of Diplomatic Security
- Office of the Coordinator for Counterterrorism
- Overseas Building Operations

### **U.S. POSTAL INSPECTION SERVICE**

### **U.S. SENATE SERGEANT AT ARMS**

## CONCEPT DEVELOPMENT

### **INTELLIGENCE COMMUNITY**

### **U.S. DEPARTMENT OF DEFENSE**

- Office of the Director of Defense Research & Engineering

## EXPLOSIVES DETECTION

### **U.S. DEPARTMENT OF DEFENSE**

- Defense Intelligence Agency
- National Security Agency
- U.S. Air Force
  - Air Force Electronic Systems Center
  - Air Force Research Laboratory
- U.S. Navy
  - Naval Explosive Ordnance Disposal Technology Division



## 2006 TSWG Membership by Subgroup

### U.S. DEPARTMENT OF ENERGY

- Office of Health, Safety, and Security

### U.S. DEPARTMENT OF HOMELAND SECURITY

- Immigration and Customs Enforcement
- Science and Technology Directorate
  - Homeland Security Advanced Research Projects Agency
  - Transportation Security Laboratory
- Transportation Security Administration
  - Federal Air Marshal Service
- U.S. Coast Guard
- U.S. Secret Service

### U.S. DEPARTMENT OF STATE

- Bureau of Diplomatic Security

### U.S. DEPARTMENT OF JUSTICE

- Bureau of Alcohol, Tobacco, Firearms, and Explosives

### U.S. POSTAL INSPECTION SERVICE

### IMPROVISED DEVICE DEFEAT

#### FAIRFAX COUNTY, VA POLICE DEPARTMENT

#### INTELLIGENCE COMMUNITY

#### NATIONAL BOMB SQUAD COMMANDERS ADVISORY BOARD

- Bloomington, Minnesota Police Department (Northern region)
- Houston, Texas Police Department (Southern region)
- Los Angeles, California Police Department (Western region)
- Philadelphia, Pennsylvania Police Department (Eastern region)

#### U.S. CAPITOL POLICE

#### U.S. DEPARTMENT OF DEFENSE

- Joint Improvised Explosive Device Defeat Organization
- U.S. Air Force
  - Air Combat Command
  - EOD Detachment 63
- U.S. Army
  - EOD Technical Detachment
- U.S. Marine Corps
  - Chemical Biological Incident Response Force
  - Marine Corp EOD Detachment
- U.S. Navy
  - Naval Explosive Ordnance Disposal Technology Division
  - EOD Fleet Liaison Office

#### U.S. DEPARTMENT OF HOMELAND SECURITY

- Preparedness Directorate
  - Grants and Training
- Science and Technology Directorate
  - Homeland Security Advanced Research Project Agency
- Transportation Security Administration
- U.S. Secret Service

#### U.S. DEPARTMENT OF JUSTICE

- Bureau of Alcohol, Tobacco, Firearms, and Explosives
- Federal Bureau of Investigation

## 2006 TSWG Membership by Subgroup

- National Institute of Justice
- U.S. Marshals Service

### INFRASTRUCTURE PROTECTION

#### ENVIRONMENTAL PROTECTION AGENCY

#### NUCLEAR REGULATORY COMMISSION

#### U.S. DEPARTMENT OF AGRICULTURE

- Forest Service

#### U.S. DEPARTMENT OF DEFENSE

- Defense Threat Reduction Agency
- Defense-Wide Information Assurance Program
- National Security Agency
- U.S. Air Force
  - Office of Special Investigations
- U.S. Army
  - Corps of Engineers
- U.S. Marine Corps
  - Marine Corps Network Operations and Security Command
- U.S. Navy
  - Naval Criminal Investigative Service
  - Naval Surface Warfare Center

#### U.S. DEPARTMENT OF ENERGY

- Office of Electricity Delivery and Energy Reliability
- Office of Health, Safety, and Security

#### U.S. DEPARTMENT OF HOMELAND SECURITY

- Federal Emergency Management Agency
- Office of the Under Secretary for Preparedness
- Science and Technology Directorate
  - Homeland Security Advanced Research Projects Agency
- Transportation Security Administration
- U.S. Secret Service

#### U.S. DEPARTMENT OF JUSTICE

- Federal Bureau of Investigation

#### U.S. DEPARTMENT OF TRANSPORTATION

- Federal Aviation Administration
- Research and Innovative Technology Administration
  - Volpe National Transportation Systems Center

### INVESTIGATIVE SUPPORT AND FORENSICS

#### ENVIRONMENTAL PROTECTION AGENCY

- Criminal Investigation Division
- National Enforcement Investigations Center

#### FEDERAL RESERVE BOARD

#### INTELLIGENCE COMMUNITY

#### NATIONAL TRANSPORTATION SAFETY BOARD

#### U.S. DEPARTMENT OF COMMERCE

- National Institute of Standards and Technology
  - Office of Law Enforcement Standards

## 2006 TSWG Membership by Subgroup

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### U.S. DEPARTMENT OF DEFENSE

- Defense Computer Forensics Laboratory
- Pentagon Force Protection Agency
- Polygraph Institute
- U.S. Air Force
  - Office of Special Investigations
- U.S. Army
  - Criminal Investigation Command
  - Intelligence and Security Command
- U.S. Marine Corps
  - Criminal Investigation Division
- U.S. Navy
  - Naval Criminal Investigative Service

### U.S. DEPARTMENT OF ENERGY

- Office of Health, Safety, and Security

### U.S. DEPARTMENT OF HOMELAND SECURITY

- Immigration and Customs Enforcement
  - Federal Protective Service
  - Forensic Document Laboratory
- U.S. Secret Service

### U.S. DEPARTMENT OF JUSTICE

- Bureau of Alcohol, Tobacco, Firearms, and Explosives
- Drug Enforcement Administration
- Federal Bureau of Investigation
- National Institute of Justice
  - National Center for Forensic Science
  - National Forensic Science Technology Center
- U.S. Marshals Service

### U.S. DEPARTMENT OF STATE

- Office of the Coordinator for Counterterrorism

### U.S. DEPARTMENT OF THE TREASURY

- Inspector General for Tax Administration
- Internal Revenue Service

### U.S. POSTAL INSPECTION SERVICE

### STATE AND LOCAL AGENCIES

- Illinois State Police
- Long Beach, CA Police Department
- Los Angeles County CA Sheriff's Department
- South Pasadena CA Police Department

### PHYSICAL SECURITY

#### FEDERAL RESERVE BOARD

#### INTELLIGENCE COMMUNITY

#### NEW YORK POLICE DEPARTMENT

#### PORT AUTHORITY OF NEW YORK/NEW JERSEY

#### U.S. CAPITOL POLICE

### U.S. DEPARTMENT OF DEFENSE

- Defense Intelligence Agency
- Defense Threat Reduction Agency

## 2006 TSWG Membership by Subgroup

- Joint Chiefs of Staff
  - U.S. Central Command
- Joint Improvised Explosive Device Defeat Organization
- National Security Agency
- Office of the Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense
- Office of the Deputy Assistant to the Secretary of Defense for Nuclear Matters
- Office of the Under Secretary of Defense for Intelligence
- Pentagon Force Projection Agency
- Physical Security Equipment Action Group
- U.S. Air Force
  - Air Force Security Forces Center
  - Force Protection Systems Squadron
- U.S. Army
  - Communications Electronics Command
  - Intelligence and Security Command
  - Physical Security Equipment Action Group
  - Force Protection Systems Program Office
- U.S. Central Command
- U.S. Marine Corps
  - Marine Corps Central Command
- U.S. Navy
  - Naval Explosive Ordnance Disposal Technology Division
  - Naval Criminal Investigative Service
  - Naval Surface Warfare Center – Dahlgren Division
  - Office of Naval Research
  - Space and Naval Warfare Systems Command
  - U.S. Naval Forces Europe

### U.S. DEPARTMENT OF ENERGY

- National Nuclear Security Administration
- Office of Health, Safety, and Security

### U.S. DEPARTMENT OF HOMELAND SECURITY

- Science and Technology Directorate
- Transportation Security Administration
- U.S. Coast Guard
- U.S. Secret Service

### U.S. DEPARTMENT OF JUSTICE

- Federal Bureau of Prisons

### U.S. DEPARTMENT OF STATE

- Bureau of Diplomatic Security

### U.S. DEPARTMENT OF TRANSPORTATION

- Federal Aviation Administration
- Research and Innovative Technology Administration
  - Volpe National Transportation Systems Center

### U.S. POSTAL INSPECTION SERVICE

## SURVEILLANCE, COLLECTION, AND OPERATIONS SUPPORT

### INTELLIGENCE COMMUNITY

### U.S. DEPARTMENT OF DEFENSE

- U.S. Army Asymmetric Warfare Group
- U.S. Special Operations Command

## 2006 TSWG Membership by Subgroup

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### U.S. DEPARTMENT OF JUSTICE

- Federal Bureau of Investigation

### TACTICAL OPERATIONS SUPPORT

#### NATIONAL TACTICAL OFFICERS ASSOCIATION

#### STATE AND LOCAL SWAT TEAMS

### U.S. DEPARTMENT OF DEFENSE

- U.S. Army
  - Military Police School
- U.S. Special Operations Command

### U.S. DEPARTMENT OF ENERGY

- National Nuclear Security Administration
- Office of Health, Safety, and Security

### U.S. DEPARTMENT OF HOMELAND SECURITY

- Transportation Security Administration
  - Federal Air Marshal Service
- U.S. Coast Guard
- U.S. Secret Service

### U.S. DEPARTMENT OF JUSTICE

- Federal Bureau of Investigation
  - Hostage Rescue Team
- U.S. Marshals Service

### U.S. DEPARTMENT OF STATE

- Bureau of Diplomatic Security

### TRAINING TECHNOLOGY DEVELOPMENT

#### ENVIRONMENTAL PROTECTION AGENCY

#### INTERAGENCY BOARD

#### NATIONAL BOMB SQUAD COMMANDERS ADVISORY BOARD

#### NATIONAL VIRTUAL TRANSLATION CENTER

### U.S. DEPARTMENT OF AGRICULTURE

- Animal and Plant Health Inspection Service

### U.S. DEPARTMENT OF DEFENSE

- Joint Improvised Explosive Device Defeat Organization
- Office of the Under Secretary of Defense for Personnel and Readiness
- Pentagon Force Protection Agency
- U.S. Army
  - Maneuver Support Center
  - National Guard Bureau
  - Research, Development, and Engineering Command
  - Training and Doctrine Command
  - U.S. Army Reserve
- U.S. Marine Corps
- U.S. Special Operations Command

### U.S. DEPARTMENT OF ENERGY

- Headquarters

## 2006 TSWG Membership by Subgroup

### **U.S. DEPARTMENT OF HOMELAND SECURITY**

- Federal Protective Service
- Preparedness Directorate
  - Grants and Training
- Science and Technology Directorate
- U.S. Coast Guard
- U.S. Secret Service

### **U.S. DEPARTMENT OF JUSTICE**

- National Institute of Justice

### **VIP PROTECTION**

#### **ENVIRONMENTAL PROTECTION AGENCY**

#### **INTELLIGENCE COMMUNITY**

#### **OFFICE OF THE U.S. TRADE REPRESENTATIVE**

#### **U.S. DEPARTMENT OF COMMERCE**

- National Institute of Standards and Technology

#### **U.S. DEPARTMENT OF DEFENSE**

- U.S. Army
  - Soldier Systems Center (Natick)
  - Tank-Automotive and Armaments Command
- U.S. Navy
  - Naval Criminal Investigative Service
- U.S. Special Operations Command

#### **U.S. DEPARTMENT OF ENERGY**

- Office of Health, Safety, and Security

#### **U.S. DEPARTMENT OF HOMELAND SECURITY**

- Transportation Security Administration
  - Federal Air Marshal Service
- U.S. Secret Service
  - Special Services Division
  - Technical Security Division

#### **U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT**

- Office of Security and Emergency Planning

#### **U.S. DEPARTMENT OF JUSTICE**

- National Institute of Justice

#### **U.S. DEPARTMENT OF STATE**

- Bureau of Diplomatic Security

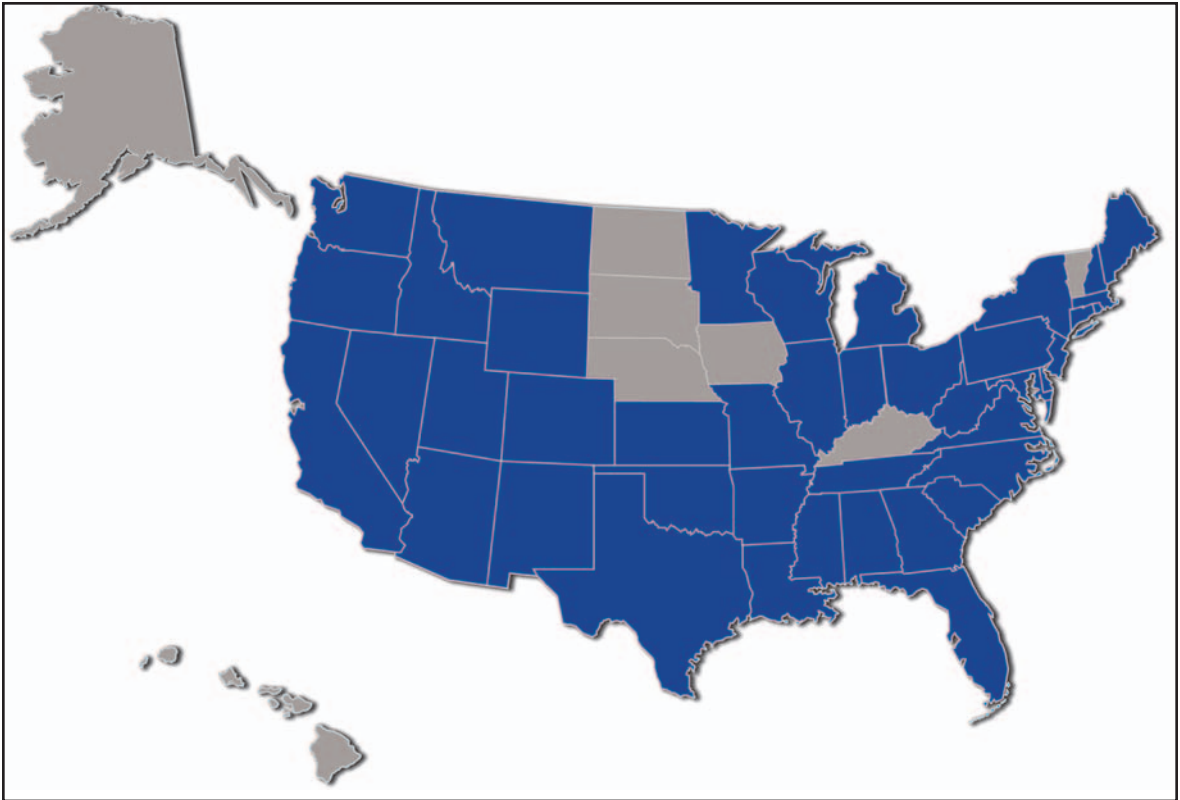
#### **U.S. DEPARTMENT OF THE TREASURY**

- Internal Revenue Service



## 2006 Performers

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### ALABAMA

Auburn University, Auburn  
Auburn University, College of Veterinary Medicine, Auburn  
Myers and Associates, Auburn  
Sparta, Inc., Huntsville  
U.S. Army Aeromedical Research Laboratory, Fort Rucker

### ARIZONA

Polymicro Technologies, LLC, Phoenix  
University of Arizona, Tucson

### ARKANSAS

Tekne Group, Inc., Hot Springs  
University of Arkansas at Fayetteville

### CALIFORNIA

ACM Systems, Inc., Rancho Cordova  
APIC Corporation, Los Angeles  
Applied Signal Technology, Torrance  
BEAR, Inc., Berkeley  
ComGlobal Systems, Inc., San Diego  
Fetch Technologies, El Segundo  
GE Infrastructure Security, San Diego



## 2006 Performers

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Intelligent Optical Systems, Inc., Torrance  
Jet Propulsion Laboratory, Pasadena  
Joint Warfare Program Office, Point Mugu  
Karagozian & Case, Burbank  
L-3 Communications Sonoma EO, Santa Rosa  
Lambert Rebreathers, Morgan Hill  
Lawrence Berkeley National Laboratory, Berkeley  
Lawrence Livermore National Laboratory, Livermore  
NASA Ames Research Center, Moffett Field  
Naval Air Warfare Station, China Lake  
Physical Optics Corporation, Torrance  
QPC Fiber Optic, Inc., San Clemente  
Quantum Magnetics, Inc., San Diego  
Rapiscan Security Products, Hawthorne  
Rapiscan Systems, Neutronics and Advanced Technologies, Santa Clara  
Raymat Materials, Inc., Fremont  
Rockwell Scientific Company, LLC, Thousand Oaks  
Safe Environment Engineering, Valencia  
Science Applications International Corporation, San Diego  
Sensis Corporation, Seagull Technology Center, Campbell  
Smiths Detection, Pasadena  
Space and Naval Warfare Systems Command, San Diego  
Special Technologies Laboratory, Santa Barbara  
Tactical Survey Group, San Bernadino  
University of California at San Diego  
WFI Government Services, Newbury Park  
X-Ray Instrumentation Associates, Newark

### COLORADO

Applied Research Associates, Inc., Littleton  
Colorado State University, Fort Collins  
Law Enforcement Technologies, Inc., Colorado Springs  
Summa Design, LLC, Montrose  
Thermo MF Physics, Colorado Springs

### CONNECTICUT

Applied Physical Sciences Corporation, New London  
Naval Submarine Medical Research Laboratory, Groton  
United Technologies Research Center, Hartford

### DELAWARE

DuPont, Wilmington

### DISTRICT OF COLUMBIA

International Association of Firefighters  
Naval Research Laboratory  
Perrault Structural Products, Inc.

## 2006 Performers

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### FLORIDA

46 Test Squadron, Eglin Air Force Base  
Air Force Research Laboratory, Tyndall Air Force Base  
Armor Holdings, Inc., Jacksonville  
General Dynamics, Ordnance and Tactical Systems, Orlando  
Harris Government Communications Systems Division, Melbourne  
Knights Armaments Company, Titusville  
L-3 CyTerra Corporation, Orlando  
Lightmaker Group, Ltd., Orlando  
Lightning Powder Company, Jacksonville  
National Center for Forensic Science, Orlando  
Naval Surface Warfare Center, Panama City  
Octatron, Inc., St. Petersburg  
St. Petersburg College, National Terrorism Preparedness Institute, St. Petersburg  
STS International, St. Petersburg  
VCom3D, Inc., Orlando

### GEORGIA

Emory University, Atlanta  
Georgia Tech Research Institute, Atlanta

### IDAHO

Idaho National Laboratory, Idaho Falls  
proSWAT, Inc., Meridian

### ILLINOIS

Applied Research Associates, Champaign  
Canine Associates International, Leland  
Nanosphere, Inc., Northbrook  
University of Illinois at Urbana-Champaign

### INDIANA

Creative Business Products, Fort Wayne  
Naval Surface Warfare Center, Crane

### KANSAS

Kansas State University, Manhattan

### LOUISIANA

Louisiana State University, Baton Rouge

### MAINE

Technology Systems, Inc., Brunswick

### MARYLAND

Army Research Lab, Aberdeen Proving Ground  
CeLight, Inc., Silver Spring  
Eagan, McAllister Associates, Inc., Lexington Park  
Edgewood Chemical Biological Center, Aberdeen Proving Ground

## 2006 Performers

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G3 Technologies, Clarksville  
GEOMET Technologies, Inc., Germantown  
Honeywell International, Columbia  
Johns Hopkins University Applied Physics Laboratory, Laurel  
National Institute of Standards and Technology, Gaithersburg  
National Oceanographic and Atmospheric Administration, Silver Spring  
Naval Air Warfare Center, Patuxent River  
Naval Explosive Ordnance Disposal Technology Division, Indian Head  
Naval Surface Warfare Center, Indian Head  
Northrop Grumman Electronic Systems, Linthicum  
Picometrix, Inc., Ann Arbor  
Red Cell/Risk Watch, Annapolis  
Remington Technologies Division, Rockville  
SimQuest, LLC, Silver Spring  
Technology Services Corporation, Silver Spring  
Techno-Sciences, Inc., Lanham  
Tektron Microelectronics, Inc., Hanover  
TRX Systems, Inc., Lanham  
Veritas, Inc., Rockville  
W.L. Gore, Elkton  
Zeus Technology Systems, Inc., Hanover

### MASSACHUSETTS

American Science and Engineering, Inc., Billerica  
Artisent, Inc., Boston  
Aspen Systems, Inc., Marlborough  
BBN Technologies, Cambridge  
Boston Dynamics, Cambridge  
Charles Stark Draper Laboratory, Inc., Cambridge  
FLIR Systems, Inc., North Billerica  
Force Protection C2 SPO, Hanscom Air Force Base  
Foster-Miller, Inc., Waltham  
GE Ion Track, Wilmington  
Idolon Technologies, Melrose  
Insight Technology, Inc., Londonderry  
iRobot, Burlington  
L-1 Identity Solutions, Inc., Billerica  
L-3 CyTerra Corporation, Woburn  
Massachusetts General Hospital, Boston  
Massachusetts Institute of Technology, Cambridge  
Pulmatrix, Inc., Cambridge  
SenTec, Inc., Stoneham  
Surmet Corp., Burlington  
Technical Products, Inc., Ayer  
Tufts University, Medford  
University of Massachusetts at Amherst  
Vanu, Inc., Cambridge  
Visidyne, Inc., Burlington  
Volpe National Transportation Systems Center, Cambridge  
Woods Hole Oceanographic Institution, Woods Hole

## 2006 Performers

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### MICHIGAN

Quantum Signal, LLC, Ann Arbor

### MINNESOTA

MTS Systems Corporation, Eden Prairie  
University of Minnesota at Minneapolis

### MISSISSIPPI

Mississippi State University at Starkville  
U.S. Army Engineering Research and Development Center, Vicksburg  
U.S. Marine, Inc., Gulfport

### MISSOURI

Alliant Lake City Small Caliber Ammunition Company, LLC, Independence  
Clean Earth Technologies, LLC, Earth City  
Essex PB&R Corporation, St. Louis  
University of Missouri at Rolla  
Washington University, St. Louis

### MONTANA

Veridical Research and Design, Bozeman

### NEVADA

Tactical Tracking Operations School, Mesquite  
University of Nevada at Las Vegas Research Foundation

### NEW HAMPSHIRE

BAE, Nashua  
DTC Communications, Inc., Nashua  
Globe Manufacturing Company, Pittsfield  
StockerYale, Inc., Salem  
Wilcox Industries Corporation, Portsmouth

### NEW JERSEY

ISP Technologies, Inc., Wayne  
JeBen Photonics, Inc., Denville  
JP Laboratories, Middlesex  
Sarnoff Corporation, Princeton  
Smiths Detection Corporation, Pine Brook  
Structured Materials Industries, Piscataway

### NEW MEXICO

Applied Research Associates, Inc., Albuquerque  
Honeywell Aerospace Electronic Systems, Albuquerque  
HYTEC, Inc., Los Alamos  
Los Alamos National Laboratory, Los Alamos  
MesoSystems Technology, Inc., Albuquerque  
New Mexico Institute of Mining and Technology, Energetic Materials Research and Testing Center, Socorro  
National Assessment Group, Albuquerque

## 2006 Performers

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Sandia National Laboratories, Albuquerque  
Science Applications International Corporation, Albuquerque

### NEW YORK

Calspan-UB Research Center, Inc., Buffalo  
Esensors, Inc., Amherst  
GE Global Research, Niskayuna  
Global Maritime and Transportation School, Kings Point  
IBM, Watson Research Center, Yorktown Heights  
Onondaga Community College, Public Safety Training Center, Syracuse  
Plug Power, Latham  
Sensis Corporation, East Syracuse  
Sentigen Holding Corporation, New York  
State University of New York at Buffalo  
Syracuse Research Corporation, Syracuse  
Tactronics, LLC, Westhampton Beach  
Weidlinger Associates, Inc., New York

### NORTH CAROLINA

Applied Research Associates, Raleigh  
Appealing Products, Inc., Raleigh  
Barrday Corporation, Charlotte  
BGP, Inc., Raleigh  
Blackwater Security, Moyock  
Duke Pro, Asheville  
General Dynamics Armament & Technical Products, Inc., Charlotte  
Lucent Technologies, Greensboro  
North Carolina State University, Textile Protection and Comfort Center, Raleigh

### OHIO

Air Force Research Laboratory, Wright-Patterson Air Force Base  
Battelle Memorial Institute, Columbus  
Lion Apparel, Dayton  
Northeastern Ohio Universities College of Medicine, Rootstown  
Ohio State University  
Total Fire Group/Morning Pride Manufacturing, Dayton  
University of Dayton Research Institute

### OKLAHOMA

Nomadics, Inc., Stillwater  
Southwest Research Institute, Midwest City

### OREGON

Oregon State University, Corvallis

### PENNSYLVANIA

Carnegie Mellon University, Pittsburgh  
Concurrent Technologies Corporation, Johnstown  
Dynamic Defense Materials, LLC, Boothwyn

## 2006 Performers

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EDGE Product Development Corporation, Newtown  
National Institute for Occupational Safety & Health, National Personal Protective Technology Laboratory, Pittsburgh  
Optical Systems Technology, Inc., Freeport  
Pennsylvania State University, University Park  
St. Joseph's University, Early Responders Distance Learning Center, Philadelphia

### RHODE ISLAND

Naval Underwater Warfare Center, Newport  
Subsalve USA, North Kingstown

### SOUTH CAROLINA

Savannah River National Laboratory, Aiken

### TENNESSEE

Animax Designs, Inc., Nashville  
University of Memphis

### TEXAS

Applied Research Associates, Inc., San Antonio  
BL Enterprises, Tyler  
Force Protection Battle Lab, Lackland Air Force Base  
International Personal Protection, Austin  
Lockheed Martin Missiles and Fire Control, Dallas  
Military Working Dog Center, San Antonio  
O<sub>2</sub> Dive Technologies, Houston  
Signature Science, LLC, Austin  
Southwest Foundation for Biomedical Research, San Antonio  
Southwest Research Institute, San Antonio  
Texas Agricultural Experiment Station, Bryan  
Texas Transportation Institute, College Station  
University of Texas at Austin  
University of Texas at Dallas

### UTAH

AccessData Corporation, Orem  
IsoForensics Inc., Salt Lake City  
University of Utah, Salt Lake City

### VIRGINIA

A-T Solutions, Inc., Fredericksburg  
Anteon Corporation, Fairfax  
Applied Marine Technology, Inc., Virginia Beach  
Avir, LLC, Charlottesville  
Battelle Memorial Institute, Arlington  
Booz Allen Hamilton, Arlington  
Booz Allen Hamilton, McLean  
Defense Group, Inc., Alexandria  
Digital Signal Corporation, Alexandria  
ENSCO, Inc., Falls Church

## 2006 Performers

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Gatekeeper, Inc., Reston  
General Dynamics, Charlottesville  
Institute for Applied Science, Reston  
International Association of Firechiefs, Fairfax  
Morphix Technologies, Inc., Virginia Beach  
Night Vision and Electronic Sensor Laboratory, Fort Belvoir  
Old Dominion University, Norfolk  
QinetiQ, Inc., Arlington  
SET Associates, Arlington  
Sparta, Inc., Arlington  
Stratech Systems, Inc., McLean  
System Planning Corporation, Arlington  
Technology Development Group, Inc., Leesburg  
Titan Corporation, Reston  
University of Virginia, Charlottesville

### WASHINGTON

Advanced Interactive Systems, Inc., Seattle  
Cascade Designs, Inc., Seattle  
Isotron Corporation, Seattle  
MesoSystems Technology, Inc., Kennewick  
Specialty Products, Inc., Lakewood

### WEST VIRGINIA

Eyemarker Systems, Inc., Morgantown  
West Virginia High Technology Consortium Foundation, Fairmont  
West Virginia University, Morgantown

### WISCONSIN

Interspiro, Inc., Pleasant Prairie

### WYOMING

Aristatek, Inc., Laramie

### INTERNATIONAL

#### AUSTRALIA

Appen Pty Ltd., Chatswood, New South Wales  
QR Sciences, Ltd., Perth, Western Australia

#### CANADA

Allen-Vanguard Protective Technologies, Ltd., Ottawa, Ontario  
Argon Security Technologies, Inc., Port Moody, British Columbia  
Ballard Power Systems, Burnaby, British Columbia  
Biokinetics and Associates, Ltd., Ottawa, Ontario  
Bosik Technologies, Ltd., Ottawa, Ontario  
Canadian Explosives Research Laboratory, Ottawa, Ontario  
Defence Research and Development Canada, Suffield

## 2006 Performers

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Defence Research and Development Canada, Valcartier, Quebec  
Dragonfly Innovations, Inc., Saskatoon, Saskatchewan  
Med-Eng Systems, Inc., Ottawa, Ontario  
Mining Resources Engineering, Ltd., Kingston, Ontario  
Natural Resources Canada, Canadian Explosives Research Laboratory  
Royal Canadian Mounted Police, Ottawa, Ontario  
Smiths Detection, Mississauga, Ontario  
Tecops, Ltd., Ottawa, Ontario  
Wardrop Engineering, Mississauga, Ontario

### FRANCE

University of Rennes, Brittany

### ISRAEL

Atlas Researches, Ltd., Hod Hasharon  
Controp Precision Technologies, Ltd., Hod Hasharon  
Israel Defense Forces  
Israel Institute for Biological Research, Ness-Ziona  
Israel Police National HQ, Jerusalem  
Israel Security Agency  
Ministry of Defense, Tel Aviv  
Rafael, Tel Aviv  
Rafael Armament Development Authority, Ltd., Haifa  
SOREQ, Tel Aviv

### UNITED KINGDOM

Defence Science and Technology Laboratories, Fort Halstead, Kent  
Forensic Science Service, Birmingham, West Midlands  
Forensic Science Service, London  
Hazard Management Solutions, Ltd., Faringdon, Oxfordshire  
Home Office Scientific Development Branch, Sandridge, Hertfordshire  
QinetiQ, Ltd., Farnborough, Hampshire  
QinetiQ, Ltd., Malvern, Worcestershire



## Glossary of Acronyms

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### A

ACC	Air Combat Command
ADL	Advanced Distributed Learning
AFESC	Air Force Electronic Systems Center
AFIP	Armed Forces Institute of Pathology
AFRL	Air Force Research Lab
AFSFC	Air Force Security Forces Center
ARL	Army Research Laboratory
ARTS	All-Purpose Remote Transport Systems
ASD(SO/LIC)	Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict
ATF	Bureau of Alcohol, Tobacco, Firearms, and Explosives

### B

BAA	Broad Agency Announcement
BIDS	BAA Information Delivery System
BUMED	Bureau of Medicine and Surgery
BX	Blast Effects and Mitigation

### C

CB	Chemical and/or Biological
CBIRF	Chemical Biological Incident Response Force
CBRN	Chemical, Biological, Radiological, and Nuclear
CBRNC	Chemical, Biological, Radiological, and Nuclear Countermeasures
CBRNE	Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives
CDC	Centers for Disease Control and Prevention
CE	Corps of Engineers
CE-PDC	Corps of Engineers Protective Design Center
CENTCOM	U.S. Central Command
CID	Criminal Investigation Division (U.S. EPA)
CID	Criminal Investigation Command (U.S. Army)
CIIMT	Critical Infrastructure Interdependency Modeling Tool
CML Bn(TE)	Chemical Battalion (Tech Escort)
CMLS	Chemical School
COTS	Commercial-off-the-Shelf
CRADA	Cooperative Research and Development Agreement
CTTSO	Combating Terrorism Technology Support Office

### D

DATSD (CBD)	Office of the Deputy Assistant to the Secretary of Defense for Nuclear and Chemical and Biological Defense
DCFL	Defense Computer Forensics Laboratory
DEA	Drug Enforcement Administration
DHS	Department of Homeland Security
DIA	Defense Intelligence Agency
DIAP	Defense-Wide Information Assurance Program
DNA	Deoxyribonucleic Acid
DoD	Department of Defense
DOE	Department of Energy

## Glossary of Acronyms

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DOJ	Department of Justice
DOS	Department of State
DS	Bureau of Diplomatic Security
DTRA	Defense Threat Reduction Agency

### E

ECBC	Edgewood Chemical Biological Center
ED	Explosives Detection
ED & ER	Electricity Delivery and Energy Reliability
EMRTC	Energetic Materials Research and Testing Center
EOD	Explosive Ordnance Disposal
EOD Tech Det	Explosive Ordnance Disposal Technical Detachment
EPA	Environmental Protection Agency

### F

FAA	Federal Aviation Administration
FAMS	Federal Air Marshal Service
FBI	Federal Bureau of Investigation
FBOP	Federal Bureau of Prisons
FDA	Food and Drug Administration
FDL	Forensic Document Laboratory
FEMA	Federal Emergency Management Agency
FPS	Federal Protective Service
FPSS	Force Protection Systems Squadron
FS	Forest Service
FSIS	Food Safety and Inspection Service
FY	Fiscal Year

### G

G&T	Grants and Training
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### H

HSS	Office of Health, Safety, and Security
HQ	Headquarters
HRT	Hostage Rescue Team
HSARPA	Homeland Security Advanced Research Projects Agency
HVAC	Heating, Ventilation, and Air-conditioning

### I

ICE	Immigration and Customs Enforcement
IDD	Improvised Device Defeat
IDLH	Immediately Dangerous to Life or Health
IED	Improvised Explosive Device
IG/T	Interdepartmental Group on Terrorism
IGTA	International Group of Treasury Associations
INSCOM	Intelligence and Security Command
IP	Infrastructure Protection
ISF	Investigative Support and Forensics
IWG/CT	Interagency Working Group on Counterterrorism
IWS	Irregular Warfare Support

## Glossary of Acronyms

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### J

JCS Joint Chiefs of Staff

### M

MANPADS Man-Portable Air Defense Systems  
MANSCEN Maneuver Support Center  
MCD Marine Corps Detachment  
MCNOSC Marine Corps Network Operations and Security Command  
MIT Massachusetts Institute of Technology  
MP SCHOOL Military Police School

### N

NATO North Atlantic Treaty Organization  
NAVCENT Naval Forces Central Command  
NAVEODFLTLAU Naval Explosive Ordnance Disposal Fleet Liaison Office  
NAVEODTECHDIV Naval Explosive Ordnance Disposal Technology  
NAVEUR U.S. Naval Forces, Europe  
NAVFAC Naval Facilities Engineering Command  
NAWC Naval Air Warfare Center  
NCFS National Center for Forensic Science  
NCIS Naval Criminal Investigative Service  
NEIC National Enforcement Investigations Center  
NFESC Naval Facilities Engineering Service Center  
NFPA National Fire Protection Association  
NFSTC National Forensic Science Technology Center  
NGIC National Ground Intelligence Center  
NHRC Naval Health Research Center  
NIJ National Institute of Justice  
NIOSH National Institute for Occupational Safety and Health  
NIST National Institute of Standards and Technology  
NNSA National Nuclear Security Administration  
NRL Naval Research Laboratory  
NSA National Security Agency  
NSWC Naval Surface Warfare Center

### O

OAFME Office of the Armed Forces Medical Examiner  
OBO Overseas Building Operations  
OEA Office of Energy Assurance  
OLES Office of Law Enforcement Standards  
OSI Ocular Scanning Instrument  
OSI Office of Special Investigations  
OUSD (P&R) Office of the Under Secretary of Defense for Personnel and Readiness

### P

P-ACARS Protected Aircraft Communications Addressing and Reporting System  
PCD-LV Pallet Charge Disruptor for Large Vehicles  
PD Preparedness Directorate  
PDA Personal Digital Assistant

## Glossary of Acronyms

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PDC	Protective Design Center
PFPA	Pentagon Force Protection Agency
PI	Polygraph Institute
PM-FPS	Product Manager for Force Protection Systems
PPE	Personal Protective Equipment
PS	Physical Security

### R

R&D	Research and Development
RCIED	Radio-Controlled Improvised Explosive Device
RCV	Remote-Controlled Vehicle
RCVOA	Remote-Controlled Vehicle Operational Assessment
RDECOM	Research, Development, and Engineering Command
RF	Radio Frequency
RFW	Radio-Frequency Weapon
RSDL™	Reactive Skin Decontamination Lotion
RSS	Really Simple Syndication

### S

S/CT	Department of State Office of the Coordinator for Counterterrorism
S&T	Science and Technology
SAFETY Act	Support Anti-Terrorism by Fostering Effective Technologies Act of 2002
SAVER	System Assessment and Validation for Emergency Responders
SCBA	Self-Contained Breathing Apparatus
SCOS	Surveillance, Collection, and Operations Support
SERVANT	Sense and Report Vehicle Anti-Tamper
SO/LIC	Special Operations and Low-Intensity Conflict
SPAWAR	Space and Naval Warfare Systems Command
SSC	Soldier Systems Center (Natick)
SSD	Special Services Division
STF	Shear Thickening Fluid
SWAT	Special Weapons and Tactics

### T

TACOM	Tank-Automotive and Armaments Command
TACR	Tactical Rebreather
TIC	Toxic Industrial Chemical
TOS	Tactical Operations Support
TOVA™	Totally Optical Vapor Analyzer™
TRADOC	Training and Doctrine Command
TSA	Transportation Security Administration
TSD	Technical Security Division
TSWG	Technical Support Working Group
TTD	Training Technology Development

### U

UCSD	University of California at San Diego
UMN	University of Minnesota
USA	United States Army

## Glossary of Acronyms

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USAF	United States Air Force
USAISR	United States Army Institute of Surgical Research
USAR	United States Army Reserve
USCG	United States Coast Guard
USMC	United States Marine Corps
USMS	United States Marshals Service
USN	United States Navy
USSOCOM	United States Special Operations Command
USSS	United States Secret Service
UV	Ultraviolet

### V

VBIED	Vehicle-Borne Improvised Explosive Device
VIP	Very Important Person

### Z

ZBV	Backscatter X-Ray Van
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