



First Responder Technologies Program Expenditure Plan

Fiscal Year 2011 Report to Congress

July 13, 2011



Homeland
Security

The Science and Technology Directorate

Message from the Under Secretary for Science and Technology

July 12, 2011

I am pleased to present the following report, "First Responder Technologies Program Expenditure Plan," prepared by the Department of Homeland Security's (DHS's) Science and Technology Directorate (S&T) in response to legislative language accompanying the *Fiscal Year (FY) 2011 Full-Year Continuing Appropriations Act* (P.L. 112-10).



S&T established the First Responder Capstone Integrated Product Team (IPT) in FY 2009 to provide solutions that address capability gaps identified by federal, state, local, territorial, and tribal emergency preparedness and response practitioners. As part of S&T's re-alignment in fall 2010, this effort has been re-named the First Responder Technologies (FRT) Program and is one of the major program areas within the Support to the Homeland Security Enterprise and First Responders Office, commonly referred to as the First Responder Group (FRG). The enclosed report provides an overview of the FRT Program's expenditure plan for FY 2011. Pursuant to congressional requirements, S&T is providing this report to the following members of Congress:

The Honorable Robert B. Aderholt
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable David E. Price
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable Mary L. Landrieu
Chairman, Senate Appropriations Subcommittee on Homeland Security

The Honorable Daniel Coats
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

Feel free to direct all inquiries related to this report to me at 202-254-6033 or to the Department's Deputy Chief Financial Officer, Peggy Sherry, at 202-447-5751.

Sincerely,

A handwritten signature in black ink that reads "Tara O'Toole".

Tara O'Toole, M.D., M.P.H.

Under Secretary for Science and Technology

Executive Summary

The emergency preparedness and response community faces ever-evolving challenges in their efforts to save lives and protect property every day. S&T established FRG in October 2010 to strengthen the emergency preparedness and response community's ability to protect the homeland and respond to disasters. In 2009, S&T established the thirteenth IPT, now known as the FRT Program, to change this situation by systematically addressing needs and capability gaps that are of benefit across disciplines and maximizing the return on investment in research, development, testing, and evaluation (RDT&E) funding. The FRT Program provides practitioners the opportunity to voice these challenges to DHS and become involved in a forum to help identify and define emerging technologies and equipment that help them meet their mission. One of the five main departmental priorities is ensuring resilience to disasters. The FRT Program directly addresses that mission space by enabling responders to be better prepared and equipped for all-hazards incidents with the most effective and efficient technologies. The FRT Program focuses on quickly transitioning key technologies needed in the field, accelerating performance standards, and developing knowledge products¹.

This report documents the progress made in fulfilling the identified gaps of the responder community pursuant to the legislative requirements. In particular, the report highlights the expenditures from FY 2010 to FY 2012 as well as a path forward that builds upon FRG success and takes into account the next evolution in solution development. FRG is instituting processes and practices to ensure it addresses the highest priority needs and capability gaps. At the same time, FRG will continue to catalog needs and capability gaps for future consideration.

The FRT Program works directly with the responder community to identify requirements, develop solutions, and transition those solutions—knowledge products, performance standards, and equipment—to the field within 2 to 3 years. The First Responder Resource Group assessed the needs of responders during its meetings, which resulted in the creation of five key projects that are currently underway and six additional proposed projects. These projects will have a significant impact on notification, responder safety, and improvement of operational capacity.

- The FRT Program has several projects in development (see Figure 1) including:
 - Alerts and Warnings using Social Media
 - Field Biometric Identification
 - Personal Alert and Tracking System
 - Ambulance Safety and Design Standards

- The FRT Program identified the following projects, including follow-on projects from FY 2010, for FY 2011:
 - Personal Chemical Detector
 - Virtual Training
 - Ergonomic Respirator Mask

¹ Knowledge products include methodologies, guidance documents, lessons learned, and best practices gathered from S&T partnerships and pilot projects with the first responder community.

- Satellite Communication Study
- Project 25 and Broadband Laboratory Study
- Technology Foraging



First Responder Technologies Expenditure Plan

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I. Legislative Language

This document responds to the reporting language set forth in the *FY 2011 Full-Year Continuing Appropriations Act* (P.L. 112-10), which states:

Sec. 1601. Within 24 days after the date of enactment of this division, the Secretary of Homeland Security shall submit to the Committees on Appropriations of the Senate and the House of Representatives an expenditure plan for fiscal year 2011 that displays the level of funding by program, project, and activity consistent with the table of detailed funding recommendations contained at the end of the joint explanatory statement accompanying the Department of Homeland Security Appropriations Act, 2010 (Public Law 111-83) and the classified annex accompanying this division: Provided, That all plans for expenditure required in Public Law 111-83 shall be updated for fiscal year 2011 budget authority and submitted to the Committees on Appropriations of the Senate and House of Representatives within 45 days after the date of enactment of this division, notwithstanding the specified withholding of funds and associated approval requirements.

The *FY 2010 Department of Homeland Security (DHS) Appropriations Act* (P.L. 111-83) requires an expenditure plan for S&T's FRT Program. The details for the expenditure plan are further described in the Conference Report 111-298, which accompanies P.L. 111-83, and states:

The conference agreement provides \$46,134,000 for Transition as proposed by the House instead of \$45,134,000 as proposed by the Senate. Within the funds provided, \$10,000,000 is provided for first responder technologies as requested; \$2,000,000 is for the Naval Postgraduate School to design, develop and field test first responder technologies outside of the integrated product team process as requested; and \$1,000,000 is to continue a manufacturing pilot program to identify and transition advanced technologies and manufacturing processes in the homeland security industrial base. S&T shall provide an expenditure plan for the first responder technology program within 60 days after the date of enactment of this Act.

This document also responds to reporting language set forth in the Senate Report 111-31, which accompanies P.L. 111-83, and states:

The Committee recommendation includes \$45,134,000 for Transition, as requested in the budget. Included in the amount requested is an increase of \$12,000,000 for first responder technologies to address gaps identified by the new Federal, State, local, and tribal First Responders Integrated Product Team. Given that this effort is just getting underway, and that project requirements have not yet been decided for any potential projects to be funded from this program, an expenditure plan for these funds is required to be submitted 60 days after the date of enactment of this act.

II. Background

S&T works to strengthen America's security and resiliency by providing effective technology solutions, knowledge products², and performance standards. Through a new strategy and realignment, S&T established the FRG in October 2010. FRG is focusing its direct support on improving the operational capacity and safety of the emergency preparedness and response community. The responder community consists of more than 50,000 disparate agencies across a variety of disciplines, including but not limited to fire, law enforcement, and emergency medical services. Through the engagement of responders at every stage of the development lifecycle, FRG pursues a better understanding of the emergency preparedness and response community's needs and requirements to develop cutting-edge solutions for the most pressing challenges faced during day-to-day incidents and large-scale emergencies. Without an effective RDT&E program that specifically addresses their needs, responders have largely either done without or relied on vendor-driven solutions.

S&T established the FRT Program, formerly known as the FR IPT or thirteenth IPT, in 2009 to change this situation by systematically addressing needs and capability gaps that are of benefit across disciplines thereby maximizing the return on investment in RDT&E funding. The FRT Program works directly with emergency preparedness and response professionals to identify the community's requirements, develop solutions, and transition those solutions—knowledge products, performance standards, and equipment—to the field within 2 to 3 years.

To involve practitioners, S&T established the First Responder Research, Development, Test, and Evaluation Working Group (FRWG), which was composed of 52 active-duty practitioners representing the major disciplines within the responder community and 15 professional associations. Working in close partnership with the associations provides the FRG the unique opportunity to develop strategies and priorities based directly upon valuable information garnered first-hand from representatives of FRG's target stakeholder groups. The combined efforts of the members of the thirteenth IPT, including the FRWG, have currently led to the identification of four key projects (Figure 1) that are currently underway and once transitioned will have a significant impact on how responders approach their work. Following the S&T realignment in the fall of 2010, the FRWG expanded and is now the First Responder Resource Group (FRRG).

² Ibid.



Portable Fingerprint Reader (Mobile Biometrics)

This project supports the the development of a portable fingerprint reader that allows for 10-print fingerprint identification on scene. The device will aid in positively identifying and apprehending criminals and terrorists.



Ambulance Passenger Compartment Design Standards

This project supports the development of safety standards for sitting and standing constraints for emergency medical workers and patients, as well as standards for equipment and cabinet mounting inside an ambulance.



Alerts & Warnings using Social Media

The project supports the development of guidance and best practices, as well as a prototype tool, for emergency responders to better leverage social media to alert and warn the public during emergencies.



Personal Alert and Tracking System

This project supports the development of a small, ruggedized, 2-dimensional device that aids first responders by transmitting and receiving visual alerts and warnings in a rural, limited, or no-communications environments.

Figure 1

Support to the Homeland Security Enterprise and First Responders Office

As one of the four groups established by the 2010 S&T strategic plan and realignment, DHS created FRG, in October 2010 to provide solutions that strengthen the emergency preparedness and response community's ability to protect the homeland and respond to disasters. Through engaging first responders at every stage, FRG continually gains a better understanding of first responder needs and requirements. It is our responsibility to develop innovative solutions to the challenges faced during all types of emergencies from day-to-day to large-scale emergencies. The goals of FRG are to:

- Validate the efforts to ensure that FRG is working in support of the broad and diverse responder community;
- Develop near- and long-term strategic responder needs;
- Improve adaption and adoption of existing technologies, knowledge products³, and research efforts;
- Provide a DHS point of contact and a forum for responders to share their voices, challenges, and needs;
- Institute best management practices to maximize efficiency and build internal and external teams to handle difficult problems; and
- Partner with other departments [e.g., the U.S. Department of Defense (DOD), the U.S. Department of Justice (DOJ)] to leverage FRG's efforts and results. One such partnership with the Federal Emergency Management Agency (FEMA) has led to the inclusion of standards compliance requirements in grant guidance to help build essential capabilities at the state and local levels.

First Responder Resource Group (FRRG)

FRRG, which includes members of the former FRWG, articulates the technological needs of the emergency preparedness and response community, which enables S&T to address the most critical issues. FRRG is a voluntary and collaborative panel of emergency preparedness and response practitioners from a wide array of professional disciplines representing all levels of the public sector. FRRG expanded to include a number of additional subject matter experts and thought leaders, and provides a national platform for identifying and prioritizing technology gaps. It serves as a vehicle for the coordination of research, development, and delivery of technological tools, performance standards, and knowledge products to practitioners at the local, tribal, state, territorial, and federal levels. The responders work with S&T program managers throughout the lifecycle of each project and assist DHS in creating awareness of these newly developed solutions in the field. Participation from the responder community is essential for a complete understanding of their needs and requirements. This engagement ensures the production of sound solutions for the community.

About the First Responder Technologies Program

S&T, and more specifically FRG, is committed to addressing the critical technology needs of the emergency preparedness and response community. To accomplish this goal, FRG established a new rigorous process to ensure success—known as the solution development process (Figure 2)—to address the most critical needs of the community and ensure that the selected approach meets rigorous performance metrics. Practitioner working groups support this process by articulating the needs of the community and providing feedback throughout the lifecycle of the projects. The new process includes the development of strategic overarching priorities; the identification of responder technology requirements; environmental scans, or technology foraging, to locate any existing technologies that might meet those requirements; development of

³ Ibid.

Operational Requirements Documents (ORDs); and engagement of the S&T divisions in developing solutions. These solutions include technologies, knowledge products, and standards, within the framework of S&T and DHS strategic goals and policies. S&T and FRG program managers are involved throughout the entire process and work directly with responders who provide ongoing feedback and validation, allowing for spiral, or rapid prototype, development during the life span of the project.

Solution Development Process

To effectively and efficiently address the most critical needs, FRG established a five-step process for delivering responder solutions, including technologies, performance standards, and knowledge products, that focus S&T's resources on priority projects. The First Responder Solution Development Process incorporates high-level oversight to ensure a strategic and thoughtful approach to addressing the needs of the emergency preparedness and response community, ensure transparency among stakeholders, and enable coordination with other governmental efforts. Beforehand, FRG completed a comprehensive review of former processes to ensure that all FRG projects align with both DHS and S&T missions and goals, while building on first responder needs that enhance overall capabilities. The key differences from the previous IPT process include:

- A strategy to identify and prioritize the large number of responder challenges received and ultimately funded;
- Greater outreach to, and involvement with and by, responders; and
- Greater cross-functional and dimensional work within S&T.

FRG has the responsibility to address the needs of the responder community while applying S&T's technical expertise to ensure those needs are met in the most efficient manner. S&T must also maintain an ongoing awareness of the operational environment in which responders will use these products. The responder community needs applied research that can deliver and transition products to market within 12 to 18 months at reasonable costs to the community. A high-tech prototype that is not capable of going to market or a technology that is not in line with practitioners' budget realities will not meet S&T's obligation or the responder community's need.

The purpose of the process (see Figure 2) is to:

- Create the pathway to be able to link the FRG's projects with those of other DHS programs;
- Maximize the ability of the FRG to spend its funding dollars on those priorities identified by the emergency preparedness and response community;
- Connect similar projects to each other and thereby leverage resources while building programs designed to increase system capacity; and
- Document and answer the strategic objectives defined by the responder community.

This program provides the level of engagement with the responder community that is necessary for S&T to address the most immediate needs with the most practical and cost-effective

solutions. S&T shares the information gathered with other DHS and government agency programs. As a result, the work builds opportunities for synergy and collaboration throughout DHS as well as with partners in the government and private sectors.

First Responder Solution Development Process

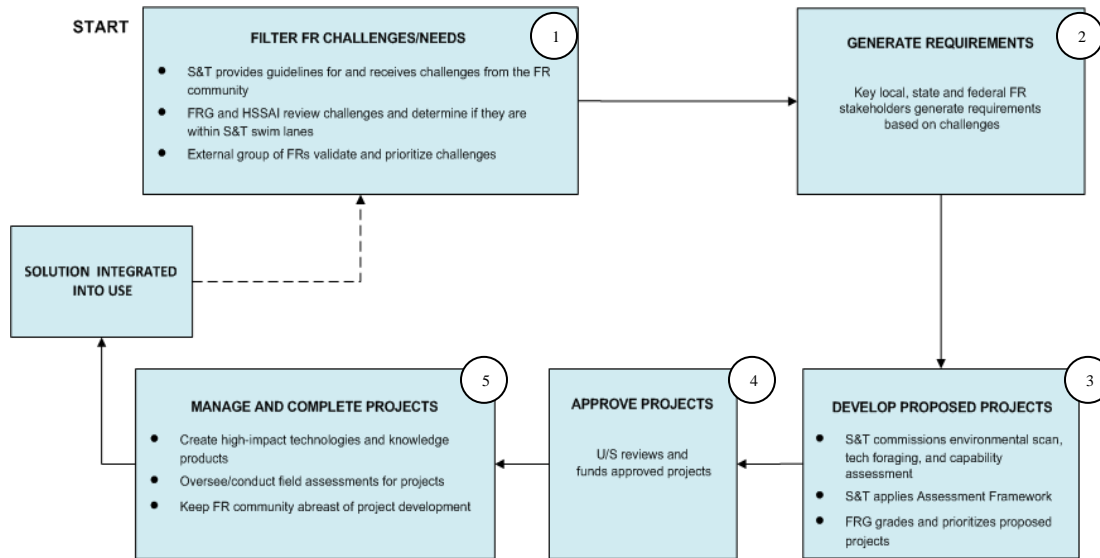


Figure 2

Further detail of the First Responder Solution Development Process follows:

Step 1: Develop Strategic Priorities – This step is actually composed of three activities: 1) identify strategic challenges, 2) prioritize strategic challenges and ensure that these fall within the DHS and S&T focus areas, and 3) validate strategic challenges and priorities. Relevant DHS partners, including FEMA and the Homeland Security Studies and Analysis Institute (HSSAI),⁴ are primarily responsible for the development of strategic priorities in this step. The final output is a list of relevant, prioritized, and validated responder capability gaps.

Step 2: Generate Requirements – This step is composed of two activities: 1) review prioritized challenges to generate requirements, and 2) provide draft requirements to FRG, FRRG, and the Inter-Agency Board for Equipment Standardization and Interoperability (IAB).⁵ The final output is a narrowed list of prioritized and validated draft requirements.

Step 3: Develop Proposed Projects – This step is composed of four activities: 1) develop preliminary ORDs, 2) conduct environmental scans and technology foraging, 3) develop final ORDs, and 4) develop and prioritize proposed project plans. DHS partners, including FRG

⁴ HSSAI is a federally funded research and development center providing independent analysis of homeland security issues.

⁵ IAB assists in the development and implementation of performance criteria, standards, test protocols, and technical, operating, and training requirements for all-hazards incident response equipment.

program managers, all have significant responsibilities in this step. The final output is a list of prioritized project proposals and accompanying ORDs.

Step 4: Select and Approve Projects – This step is composed of three activities: 1) review prioritized projects, 2) evaluate proposals against the S&T Under Secretary’s Portfolio Review Framework that are designed to provide a transparent view of what S&T is doing and which projects are likely to have a high impact and high likelihood of transitioning, and 3) secure final approval from the Under Secretary. The Under Secretary for S&T, FRG leadership, and representatives from Office of the Chief Financial Officer, Office of Acquisition, and the Office of the Chief Information Officer (if IT product) have the primary responsibility for this step. The final output is a set of focused, approved, and funded projects and a Resource Allocation Plan that recommends future-year funding.

Step 5: Manage and Complete Projects – This step, impacted by funding and the maturity of technology solutions, generally takes the majority of time in the First Responder Solution Development Process and is composed of three actions: 1) create high-impact technologies and knowledge products, 2) oversee and conduct field assessments, and 3) deliver final product. Relevant DHS partners, including S&T support functions, all have significant responsibilities in this step. The final output is the completed project(s). Whenever possible, completed technologies will be available on FEMA’s Authorized Equipment List/IAB’s Standardized Equipment List. S&T will use existing programs and communication outlets (Web-based and other tools) to disseminate information regarding all completed technologies and knowledge products to influence solution integration into responder operations.

This new First Responder Solution Development Process builds upon previous successful work and further ensures that S&T takes an overarching view of the emergency preparedness and response community’s needs. It supports DHS’s plan to strategically and thoughtfully engage the responder community with a focus on increasing the efficiency and effectiveness of S&T projects. The enhanced stakeholder engagement also allows FRG to manage projects that address the ever-changing needs of the community by receiving constant practitioner feedback during the spiral development cycles. This helps the program/project managers and performers to move the latest technology advancements into operational use.

III. Expenditure Plan

FY 2010

S&T established FRG in FY 2010 with a budget of \$12 million. P.L. 111-83 specifies \$2 million for the Naval Postgraduate School (NPS) to design, develop, and field test first responder technologies outside of the integrated product team process as requested. However, the *FY 2011 Full-Year Continuing Appropriations Act* rescinded \$1.7 million.

During this year, S&T created FRWG. S&T funded the facilitation of two meetings for FRWG to better inform S&T on responder capability gaps. S&T program managers then evaluated their priority needs for potential solutions. The projects below are a direct result of the input gathered from this working group. Some projects are listed as multi-year projects and some are listed as continuing investments. A multi-year project is a project funded in FY 2010 and FY 2011, and a continuing investment is a support function to the projects, such as meeting support/logistics, invitational travel, and other program support costs.

Public Alert & Warning using Social Media

FY 2010 Funding: \$1,610,000 (multi-year project)

Description: This project helps practitioners maximize the benefits of using social media for alerts and warnings programs. FRG is addressing capability gaps not currently addressed in S&T's efforts to support the Integrated Public Alert and Warning System (IPAWS) and the Commercial Mobile Alert System (CMAS). Specifically, the project is developing guidance for the emergency preparedness and response community focusing on alert origination and dissemination in the areas of usage, community awareness, governance, resources, and partnerships. The project is also conducting behavior research on public response to social media use during emergencies and working with the National Academies of Sciences to investigate potential privacy issues related to increased social media usage. Finally, the project is developing software on the basis of responder requirements to simultaneously send one alert over multiple social media sites. This will enable officials to seamlessly alert the public through various communications methods without re-keying alerts, saving valuable time during an emergency.

For additional information, please see Appendix B.

Field Biometric Identification System

FY 2010 Funding: \$1,610,000 (multi-year project)

Description: Law enforcement personnel face unknown risks as they interact with the general population, unaware of the true identities of the individuals they encounter. They need the ability to accurately identify unknown persons they encounter in the field in real

time. No field biometric identification system currently exists that meets the needs of the law enforcement community. This project is a 2-year effort to provide a lightweight, rugged, mobile, four-finger field biometric and credential validation capability. The initiative will integrate the resulting module into a multimodal device with other off-the-shelf technologies (e.g., iris, facial recognition). This technology will be capable of collection, storage, image quality assessment, wireless transmission of biometric data, and receipt and display of matching biometric data to officers. The system will be capable of accessing the Federal Bureau of Investigation's national fingerprint and criminal history database, the Integrated Automated Fingerprint Identification System. S&T's Human Factors Division provided additional funding for this effort.

For additional information, please see Appendix B.

Personal Alert & Tracking System (PATS)

FY 2010 Funding: \$1,372,391

Description: Firefighters are often in rapidly changing hazardous environments and incident command currently has no way to account for and track personnel in the field. PATS is a 2-year project that provides a two-dimensional location, communication, and alerting capability for wildland firefighters in remote, infrastructure-denied environments. The wearable long-range, low-power device provides the precise location of firefighting teams and the ability to provide distress signals to the incident commander, notify firefighters of impending dangers, and provide firefighter alerts through sensors that identify conditions not immediately recognized by firefighters. The system will accommodate a wide array of medical, location, and environmental sensors with digital and analog interfaces.

For additional information, please see Appendix B.

Virtual Training

FY 2010 Funding: \$415,914 (multi-year project)

Description: Responders have a great need for realistic training to enable them to respond effectively and efficiently to incidents of significance in addition to their more routine calls. Decisions made early in a major event often have a significant impact, either positively or negatively, in the successful management of a disaster. Responders need the ability to train in a cost-effective, multi-discipline, multi-jurisdiction environment. This Virtual Training project will create that capability. This project did not start until FY 2011.

Ambulance Safety and Design Standards

FY 2010 Funding: \$2,134,195 (multi-year project)

Description: Unlike virtually all other commercial vehicles, no standard currently exists to regulate the safety and performance standards of ambulances currently constructed.

For several decades, emergency responders and patients have suffered injuries and even death due to accidents, sudden movements, and structural failures of ambulances. This 3-year effort, conducted in conjunction with the National Institute for Occupational Safety and Health (NIOSH), the National Institute of Standards and Technology, and the National Fire Protection Association, will provide scientifically valid, standardized construction and design standards for ambulances. This project develops human-centered design standards for the ambulance compartment to include equipment and personnel restraint, function performance, crashworthiness, packaging, and the interior environment. The successful completion of this project and design implementation by ambulance manufacturers can significantly reduce ambulance-crash-related injuries and deaths. S&T's Human Factors Division provided additional funding for this effort. Also, NIOSH contributed funding to this effort as part of its mission to improve safety and health in the workplace.

For additional information, please see Appendix B.

Homeland Security Science & Technology Test bed (HSSTT)

FY 2010 Funding: \$150,000

Description: HSSTT is a framework that provides a systematic approach for a wide variety of assessment measures applicable to homeland security experiments in a range of applications (e.g., experiment type, geographic region, operational environment, or type of technology). The framework identifies objective performance measures and provides actionable recommendations. HSSTT assessed three simultaneous full-scale exercises: Golden Guardian 2010, Bay Shield 2010, and the Domestic Nuclear Detection Office West Coast Maritime Pilot. HSSTT assessed the exercise data flow through selected technologies to evaluate information accessibility at multiple levels and assessed the usability of online situational awareness tools to more effectively disseminate accurate critical information to key decision makers and the public. HSSTT was able to identify key performance measures and make actionable recommendations to the exercise participants.

Small Business Innovation Research (SBIR) Program

FY 2010 Funding: \$307,500 (multi-year project)

Description: SBIR supports the Directorate's mission to increase the participation of innovative and creative small businesses in federal research/research and development (R/R&D) programs, to challenge industry to bring innovative homeland security solutions to reality. Likewise, SBIR supports the Directorate's mission to accelerate delivery of enhanced technological capabilities to meet requirements and fill capability gaps to support DHS agencies and responders in accomplishing their missions. Similar to R&D programs of S&T, the SBIR R/R&D areas are chosen for their applicability to support homeland security missions and generally address the needs of the seven DHS Operational Units. These units include: U.S. Coast Guard; U.S. Department of Transportation Security Administration, U.S. Customs and Border Protection, FEMA,

U.S. Citizenship and Immigration Services, U.S. Immigration and Customs Enforcement, and the U.S. Secret Service, as well as responders. S&T program managers work closely with the Components and their end users to identify priorities as programs and as potential SBIR topics.

Program Support Costs

FY 2010 Funding: \$370,000 (continuing investment)

Description: This funding will provide program management support to the FRT Program to develop project schedules and project plans for each initiative, and help administer the SBIR projects. Funding will also fund federal employee training. Additionally, funding will support federal employee travel to attend conferences, seminars, exhibitions, symposia, or similar meetings to coordinate directly with responders to gather requirements and identify capability gaps. Federal employees will also travel to conduct pilots and demonstrations to evaluate and assess new technology in real-world environments.

Meeting Support/Logistics

FY 2010 Funding: \$200,000 (continuing investment)

Description: The FRT Program conducted two annual stakeholder meetings to engage responders and identify requirements as part of the First Responder Solution Development Process.

Invitational Travel

FY 2010 Funding: \$100,000 (continuing investment)

Description: The FRT Program held regular FRRG meetings to help gather and prioritize requirements directly from the emergency preparedness and response community. Because of significantly reduced budgets at the state and local levels, the FRT Program will often cover travel expenses for responders and other non-DHS employees to attend meetings since their participation is so critical to these projects.

West Coast Office Space

FY 2010 Funding: \$30,000 (continuing investment)

Description: S&T has recognized a need to reach its underserved customers, among them the local, tribal, state, and territorial responders and intergovernmental agencies in the western United States. In an effort to strengthen communication and enhance its understanding of gaps and needs within this segment of the country and to create a forum for these geographically removed constituents to be able to engage a representative from S&T, FRG has, in collaboration with the Interagency Division, established a West Coast

Office in Sacramento, CA. The office is able to connect on a more personal level with the needs and issues facing the western part of the country and establish open lines of communication with responders and intergovernmental officials to facilitate communication and enhance ongoing and future projects. Additionally, having an office on the West Coast has led to savings in travel costs.

P.L. 111-83 directed that \$2 million be designated for NPS to design, develop and field test first responder technologies. Of this funding, \$256,757 was rescinded by the *FY 2011 Full-Year Continuing Appropriations Act*. The following projects were initiated under this funding:

Command and Control Technology Integration for a Common Tactical Picture by the Salinas, California Police Department

FY 2010 Funding: \$375,000

Description: The project focuses on using and transferring knowledge gained in past use of technologies and procedures to create a Common Tactical Picture (CTP), for the benefit of the Salinas Police Department. This development is intended to be performed in phases, leaning most heavily on NPS military oriented technology at first, then shifting to a CTP developed with resources expected to be available to the police department. Its purpose is to analyze current capabilities and propose technology solutions to reduce heavy gang-related violence and loss of life.

California Homeland Security Consortium (CHSC)

FY 2010 Funding: \$100,000

Description: This project focuses on reconstituting CHSC to represent the Central California emergency response community as stated in the MOA between DHS/S&T and NPS. NPS will use the CHSC to set priorities and evaluate progress against those priorities through deliberations of the CHSC. NPS will define solutions that will be provided to DHS/S&T in the form of research proposals. On the basis of approved and funded research activities, NPS will provide the evaluation and assessment of their efforts by the CHSC.

Monterey County Pelican Surveillance

FY 2010 Funding: \$112,037

Description: To provide Pelican aircraft flight time and Mobile Ground Control Station support for two approved CHSC projects – “Geo-TIVO” and “Situational Awareness: Persistent Tracking & Surveillance.”

Independently Powered Command Control Communications (IPC3)

FY 2010 Funding: \$400,000

Description: This project will develop a command, control, and communications (C3) system to enable responders to manage incident response while coordinating operations with state or federal agencies outside the incident area. NPS will establish baseline requirements for communications for Monterey County and research and develop C3 components and alternate power sources. Additionally, NPS will demonstrate state-of-the-art deployable, short-term backup communication systems to improve emergency preparedness and response.

Geo – TiVo and Live Event Video Management Architecture

FY 2010 Funding: \$315,000

Description: The system proposes integrating wide scale surveillance systems for small cities to fight gangs by videotaping and recording through aerial surveillance. The system can tag abnormal behavior and provide the capability for backtracking vehicles and activities through time to determine criminal involvement.

Situational Awareness: Persistent Tracking and Surveillance (SATrac)

FY 2010 Funding: \$190,000

This project will create a blue force tracking capability with ad hoc mobile mesh network systems capable of working in adverse conditions. Mesh network will be able to incorporate both cellular and GPS technology, integrate with ultra-wideband capability, and utilize multiple input/multiple output. The system will rely on a backhaul of four types of communication systems mesh network, ground-based relay, aerial platforms and satellite to coordinate on scene weather data, fire behavior prediction, video imagery (both ground-based and aerial) information to inform Next Generation Incident Command System.

Lighthouse

FY 2010 Funding: \$251,206

Lighthouse is an information management and intelligence system based on developing social networks to gain intelligence and inform law enforcement. The system was modeled after a project developed for the United States Marine Corps in Afghanistan. The system will modify smart phones to collect and transmit data that would be collected on Field Interview cards and feed the information into a database where analysis is conducted to discover relationships between subjects. This information can be used in crime investigations, suppression of potential criminals, and possibly the prevention of criminal activity based on increased intelligence.

FY 2011

The FY 2011 budget decreased to \$8,669,167 under the *FY 2011 Full-Year Continuing Appropriations Act*. Funding continued for several existing programs and included several new starts.

Public Alerts and Warnings using Social Media

FY 2011 Funding: \$75,000 (multi-year project)

Field Biometric Identification System

FY 2011 Funding: \$1,750,000 (multi-year project)

Ambulance Safety and Design Standards

FY 2011 Funding: \$1,725,000 (multi-year project)

Emergency Data Exchange Language (EDXL) Standards

FY 2011 Funding: \$250,000 (multi-year project)

Description: EDXL standards facilitate data sharing across disparate public safety systems. This project develops standards requirements, specifications, and technical documents for the Organization for the Advancement of Structured Information Standards (OASIS), a standards development organization, to adopt for enhanced interoperability. For example, OASIS adopted the EDXL Hospital Availability Exchange standard, which allows the communication of the status of a hospital, its services, and its resources including bed capacity and availability. Responders, federal agencies, and industry collaborated to develop data.

Personal Chemical Detector

FY 2011 Funding: \$811,596 (multi-year project)

Description: Currently no reliable personal chemical detector exists that will detect and alert individuals to the presence of Toxic Industrial Chemicals. A detector alerts and warns field personnel prior to reaching Acute Exposure Guideline Level 2. This device needs to be a part of the firefighter's regular duty ensemble worn on all fire calls. It will need to reliably warn the firefighter of a hazardous environment in sufficient time to take protective measures. The device will also be able to relay the alert information back to the command post.

Virtual Training

FY 2011 Funding: \$500,000 (multi-year project)

Ergonomic Respirator Mask

FY 2011 Funding: \$200,000

Description: The threat of exposure to contagious diseases in the surroundings of the healthcare worker is usually high and tends to intensify even further during epidemic outbreaks. Hence, protective respirators for these healthcare workers are of great importance in the prevention of infections through inhalation, the most risky route of exposure to contagious diseases. The first step of a medical respirator research program includes the gathering of requirements from end users and performing analysis of respirator functionality, ergonomics, and interface with other medical equipment and accessories.

Satellite Communication Study

FY 2011 Funding: \$900,000

Description: This project is a pilot study of local, tribal, state, federal, and private satellite communication capabilities and disaster surge capacity. The initial study in California and will examine existing need and capability, and effective strategies for enhancing surge capacity that are translatable to other jurisdictions. This project will identify communication paths from field operations to California Emergency Management Agency satellites for use when communication infrastructure is destroyed or significantly degraded. Additionally, this capability could help the U.S. Customs and Border Protection in remote areas where no radio or broadband signal is available.

Technology Foraging

FY 2011 Funding: \$250,000

Description: There is a high-priority need to identify user requirements and operational deficiencies in a variety of areas addressed through the application and use of existing technologies. This effort promotes intra-agency (i.e., S&T) and inter-agency (e.g., DOD and DOJ) collaboration to leverage the technology investments and, where possible, facilitates the commercialization of these technologies into the field.

Small Business Innovation Research (SBIR) Program

FY 2011 Funding: \$216,729 (continuing investment)

Stakeholder Engagement Coordination

FY 2011 Funding: \$252,500 (continuing investment)

Description: Stakeholder Engagement Coordination is necessary to build partnerships and identify stakeholders who can represent local, tribal, state, and federal responders across the Nation. FRG gathers stakeholder requirements and expertise to develop solutions that meet end-user needs, and can be widely adopted. This effort also supports FRG outreach with the various national public safety associations to identify additional needs and requirements.

S&T/DOD/DOJ-Sponsored National Conference

FY 2011 Funding: \$350,000

Description: This event brings together responders, representatives from government, industry, academic experts, and state and local associations to share their knowledge, technologies, lessons learned, and best practices on how to strengthen our Nation's ability to prevent and respond to critical incidents however and whenever they occur. Depending on appropriations, DOD and DOJ provide matching funds for this event.

Program Support Costs

FY 2011 Funding: \$422,622 (continuing investment)

Meeting Support/Logistics

FY 2011 Funding: \$200,000 (continuing investment)

Invitational Travel

FY 2011 Funding: \$100,000 (continuing investment)

West Coast Office Space

FY 2011 Funding: \$15,000 (continuing investment)

New Projects

FY 2011 Funding: \$650,720

Description: This funding will fund new projects identified through the new First Responder Solution Development Process.

IV. Discussion

In 2009 and 2010, the FRRG provided S&T with capability gaps. The following chart lists those gaps and the status of funding to address them. While FRG focuses on establishing projects that address identified requirements, current funding levels necessitate prioritization of funding to ensure that the most urgent needs are being met with available resources. FRG will reevaluate funding in FY 2012 for possible new starts to meet additional needs.

High-Priority Capability Gaps Identified by FRG and FRRG

Color code: Red - funded projects; White - unfunded projects; Blue - projects funded or partially funded by other divisions within S&T or other federal agencies; Yellow - out of scope; Green - Science is insufficiently mature at this time; and Orange - need has been resolved

Capability Gap	Potential Solution	Primary Discipline Served	Funded?	Project Name or Project Status	FY Gap Identified
Need to address increased requirements for multi-person interactive training across disciplines and jurisdictions to enhance technical and operational capabilities with reduced budgets	Virtual Training capability	All	Yes	Planned funding for FY11 in collaboration with DOD's U.S. Army Training and Doctrine Command	FY 2010
Need the ability to track fire personnel during an incident (e.g., in a burning building)	3-D Personal location and tracking device	Fire	Yes	Geospatial Location Accountability and Navigation System for Emergency Responders—an ongoing project in the Infrastructure Protection and Disaster Management Division at S&T	FY 2009
Need the ability to track fire personnel in an infrastructure denied environment (e.g., in a wildland fire)	2-D Personal location and tracking device	Fire	Yes	PATS	FY 2009
Need the capability for frontline firefighters to have a personal toxic chemical detector that will alert them to a hazardous environment prior to harmful effects	Personal toxic industrial chemical detector	Fire	Yes	This project is being partially funded at this time due to budget constraints	FY 2009

Need for a portable self-contained breaching tool operable in confined spaces	Portable concrete breaching device	Fire	No	This project is not being funded at this time due to budget constraints	FY 2010
Need for long-term respiratory protection for environments that are hazardous but require less than self contained breathing apparatus	Ergonomic respiratory protection	Fire and EMS	Yes	In collaboration with the Technical Support Working Group and the Israeli Ministry of Defense	FY 2009
Need to detect wildland fires earlier to speed response and help prevent the spread to populated areas	Remote sensing	Fire	No	This project is not being funded at this time due to budget constraints	FY 2009
Need a vehicle mounted less-than-lethal capability to disable vehicles	Less lethal vehicle incapacitation	Law Enforcement	No	The science is insufficiently mature at this time	FY 2009
Need to quickly and accurately identify persons of interest in the field for the safety of the community and the responders	Field biometric identification technology	Law Enforcement	Yes	Mobile Biometrics Program	FY 2009
Need to detect weapons in the field from a safe distance	TBD	Law Enforcement	No	The science is insufficiently mature at this time.	FY 2009
Need to detect explosives at a safe distance	TBD	Law Enforcement	No	The science is insufficiently mature at this time.	FY 2009
Need to efficiently collect and analyze DNA	TBD	Law Enforcement	No	The science is insufficiently mature at this time.	FY 2010
Need to standardize license plate reader platforms to enhance interoperability and integrate data for analysis	License plate reader system integration and data analysis	Law Enforcement	No	This project is not being funded at this time due to budget constraints	FY 2009

Need to identify wanted individuals in large crowds	Portable facial recognition technology for crowd screening	Law Enforcement	No	This project is not being funded at this time due to budget constraints	FY 2010
Need well-maintained and resourced access to technical and proprietary data for emerging and vetted technology; unbiased advice for specific needs	E-Library	All	No	This project is not being funded at this time due to budget constraints	FY 2010
Need an ergonomic assessment for safe operation of modern patrol vehicles with multiple distractions (e.g., mobile video cameras, on-board computer displays)	Holistic review of vehicle ergonomics and displays for safe operations	Law Enforcement	No	This project is not being funded at this time due to budget constraints	FY 2010
Need to understand and exploit vehicle manufacturers' data similar to black box recording on aircraft	Comprehensive index of vehicle concierge and communications system data	Law Enforcement	No	This project is not being funded at this time due to budget constraints	FY 2010
Need to alert and warn the public about potential threats and the appropriate action citizens need to take	Use existing social media tools to alert, warn, and provide directions to the public	Emergency Management	Yes	Alerts and Warnings in Social Media	FY 2009

Capability to assess emergency shelters for appropriate structural integrity and proper access; need a capability to retrofit existing shelters to meet standards	Tool to evaluate emerging technologies necessary to retrofit existing buildings with the appropriate shelter equipment	Emergency Management	No	Out of scope for S&T	FY 2010
Capability to enhance incident predictions on disaster events and human behavior in response; assist decision makers on potential courses of action; enhance training capability	Improved incident modeling	Emergency Management	No	This project is not being funded at this time due to budget constraints	FY 2010
Need to visualize and analyze traffic data to make evacuation and supply route decisions	Real-time traffic modeling and analysis	Emergency Management	Yes	Real Time Evacuation Planning Model funded in FY 2011; this project will require more funding for interactive and real time capabilities	FY 2010
Need to improve ambulance design to promote safety for the crew and passengers	Develop safety standards for ambulances	EMS	Yes	Ambulance Design and Safety Standards	FY 2009
Need for standardized patient tracking and triage tags	Standardize triage tags	EMS	No	The need has been resolved	FY 2009

Need to have an efficient system for labeling, identifying, and scanning patients	Patient medical scanner	EMS	No	The need has been resolved	FY 2009
Need to provide steady flow of intravenous (IV) drugs in any environment or condition	Self- Pressurized IV bag	EMS	No	This project is not being funded at this time due to budget constraints	FY 2010
Need for responders to be able to quickly fill out call log information while keeping their hands available to administer care	Automated response log with speech recognition	EMS and Fire	No	This project is not being funded at this time due to budget constraints	FY 2010
Need for EMS personnel to have their medical qualifications certified nationally for cross jurisdiction deployment on mutual aid for disasters	Standardized national credentialing	EMS	No	Partially resolved with the PIV HERO card; the system is expensive for large-scale inclusion	FY 2010

V. Conclusion

FRG is committed to the mission of the emergency preparedness and response community and will continue efforts to collect and address its needs. The FRT Program allows S&T program managers to interact directly with emergency preparedness and response practitioners to fully understand their needs and to have a practical context for the technologies, performance standards, and knowledge products S&T develops. This benefit is S&T-wide and is not limited to the projects within the FRT Program.

In the current economic climate, declining federal budgets are a reality—even for a critical program such as the FRT Program that focuses on equipping our Nation’s emergency preparedness and response practitioners with the technologies that they need to save lives and protect property. The program started with an FY 2010 budget of \$12 million, \$2 million of which P.L. 111-83 designated to NPS to design, develop and field test first responder technologies. Of this \$2-million funding, \$256,757 and an additional \$1.7 million of prior-year funds were rescinded. The original FY 2011 Continuing Resolution allocated \$8,669,167, which was a reduction of \$1,946,000 from the President’s Budget Request. Currently, the FY 2012 budget request is \$10,717,729.

S&T plans to continue making the most out of its resources by focusing on funding advanced technologies that address the greatest need and transition these to use within a 12- to 18-month timeframe. As a core program of S&T, the First Responder Technologies Program engages emergency preparedness and response practitioners at all levels of government, funds projects identified by practitioners, and works across DHS and other agencies to leverage resources and create the greatest impact.

VI. Appendices

A. List of Abbreviations/Acronyms

CMAS	Commercial Mobile Alert System
CTP	Common Tactical Picture
DHS	Department of Homeland Security
DOD	Department of Defense
DOJ	Department of Justice
DTIC	Defense Technical Information Center
EDXL	Emergency Data Exchange Language
EMS	Emergency Medical Service
FEMA	Federal Emergency Management Agency
FR IPT	First Responder Integrated Product Team or 13 th IPT
FRG	First Responders Group
FRRG	First Responder Resource Group
FRT	First Responder Technologies Program
FRWG	First Responder Research, Development, Test, and Evaluation Working Group
FY	Fiscal Year
HAVE	Hospital Availability Exchange
HSSAI	Homeland Security Studies and Analysis Institute
HSSTT	Homeland Security Science and Technology Test bed
IAB	InterAgency Board for Equipment Standardization and Interoperability
IAC	Information Analysis Centers (IAC)
IPAWS	Integrated Public Alert and Warning System
IPC3	Independently Powered Command Control Communications
IPT	Integrated Product Team
NPS	Naval Postgraduate School
OASIS	Organization for the Advancement of Structured Information Standards
OIC	Office for Interoperability and Compatibility
ORD	Operational Requirements Document
PATS	Personal Alert and Tracking System

RDT&E	Research, Development, Testing, and Evaluation
R&D	Research and Development
SBIR	Small Business Innovation Research
S&T	Science and Technology Directorate
TBD	To Be Determined

B. S&T Portfolio Review Information

Project Name: Alerts and Warnings using Social Media

Division: First Responder Group / Office for Interoperability and Compatibility
 Product Designer: Knowledge Product, IT Application, Public Event

EHC Designator: Alert & Warning System ORD
 Capability Gap Number: FR FY09 02



Project Description

- Social media is a rapidly growing means of communication. Recent studies have shown that growing segments of the public expect emergency information to be disseminated via social media.
- Based on requirements from the First Responder Working Group (FRWG), the project includes prototype technologies and gather best practices and lessons learned to address the homeland security enterprise's (HSE) more immediate, near-term needs.
- The project will also include behavioral analysis research and investigate potential privacy concerns to lay the research foundation in order to address the HSE's future-looking, more aggressive capability gaps.

TRL at Start: 4 (converter) TRL at Transition: 7 (converter)



Project Performers: SRA Touchstone Consulting Group, Johns Hopkins Applied Physics Lab (APL), the Center for Advanced Data Analysis (CCICADA) at Rutgers and the University of Southern California, and the National Academies of Sciences.

Planned Demos & Deliverables/Transitions

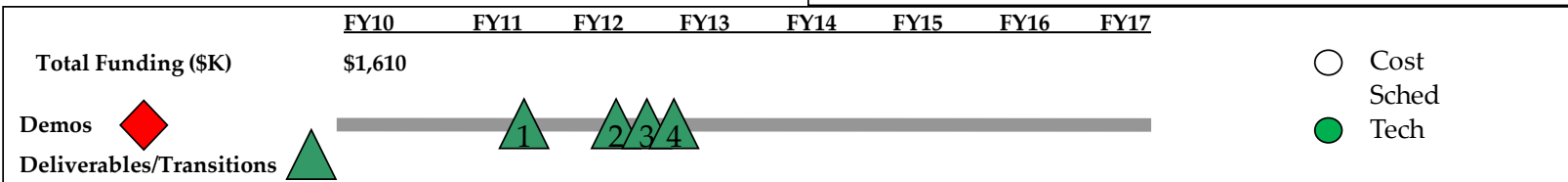
- D1: Guidance and best practices documents published. Q2/FY11
- D2: CAP converter piloted and made available for operational use. Q1/FY12
- D3: Behavioral response research studies published. Q3/FY12
- D4: Privacy forum with National Academies of Sciences held. Q3/FY12

Transition Path: Outreach
T&E Level: N/A

Transition Products

- Guidance and best practices published on the First Responder Community of Practice (FRCoP).
- A prototype tool that will convert Common Alerting Protocol (CAP) messages to alerts disseminated via social media channels to enable emergency managers to seamlessly alert the public.
- A university-based experiment involving real-time, location-based technologies designed to better understand behavioral responses to alerts and warnings.
- A partnership with the National Academies of Sciences to hold a social media and privacy-focused forum.

Customers/Partners: FRWG, Homeland Security Enterprise
TTA Status: N/A



Ambulance Passenger Compartment Design Standards

Division: Human Factors and Behavioral Science EHC Designator:
 Product Designator: Capability Gap Number:



Project Description

This project will create and validate new safety standards focused on crash load characteristics, worker seating and restraints, patient restraint, ambulance interior arrangement and layout, equipment and cabinet mounting, and EMT performance metrics. It will also enhance EMT effectiveness by understanding task performance requirements and optimizing equipment and control design, location and geometry with respect to the seat and other work positions.

TRL at Start: 3 TRL at Transition: 8



Project Performers: NIST, NIOSH, Carlow International, D&P

Planned Demos & Deliverables/Transitions

- Demo 1 - Prototype seats, gurneys, Q3, FY11
- Demo 2 - Complete task analysis, Q4, FY11
- Demo 3 - Prototype seat and floor tracks, Q2, FY12
- Deliverable – Draft UI Design Requirements, Q2, FY12
- Deliverable – Draft UI Design Concepts, Q4, FY12
- Transition - UI and safety standards, Q3, FY13
- Transition - Standards integrated into 2nd version of new NFPA 1917 Ambulance Std, Q4, FY13
- Transition - Standards published by NFPA Q4, FY16
- Transition - Standards published by NFPA Q4, FY16

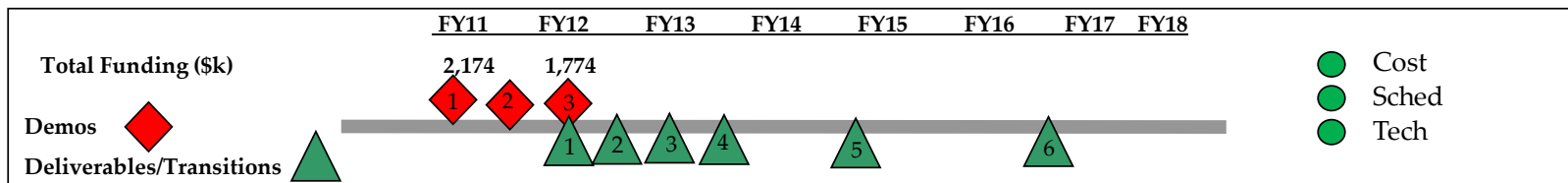
Transition Path: Published Standards

Transition Products

- Design concepts and criteria addressing human performance and safety considerations for EMS personnel and patients ready for incorporation into appropriate ambulance design standards such as NFPA 1917: Standard for Automotive Ambulances

Customers/Partners: First Responders, USFA, NFPA, NIOSH and NIST

TTA Status: Not Applicable



Mobile Biometrics

Division: Human Factors/Behavioral Sciences Division



Product Description

- Develop a multi-modal mobile biometric device that is capable of 10 Print/Face/Iris/card collection, storage, image quality assessment and wireless transmission. It will be compliant with NIST standards and the NIST Mobile Best Practices Guide and will provide high performance in a compact, light weight, rugged unit.
- HFD has funded two phase 1 efforts. IAD has funded two phase 2 efforts thereby reducing technical risk by allowing for two separate scientific approaches for a novel 10 print capture capability. In addition, IAD funded mobile device pilots with state, local, tribal law enforcement. IAD & HFD also provided funding for mobile biometric device certification by independent labs to produce a qualified product list.

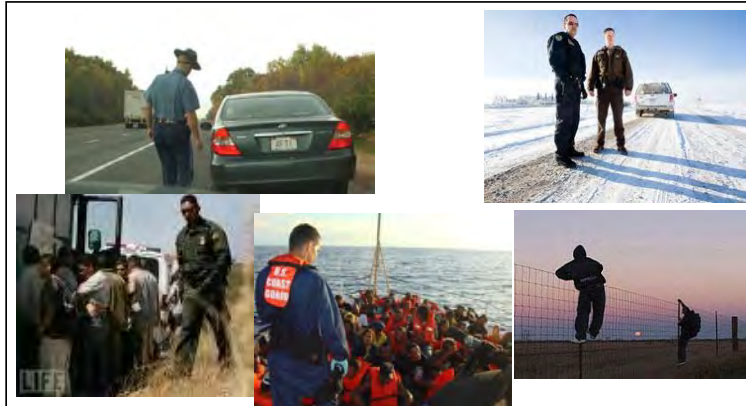
TRL at Start: 5

TRL at Transition: 8

Planned Demos & Deliverables/Transitions

- ◆ Conduct pilots of current/future state of the art mobile devices with Federal, State/Local/Tribal First Responders – FY11 &12
- ▲ Perform component testing on developed products to assess ability to meet performance metrics – FY11 4Q
- ▲ Certification testing of mobile devices – FY12 4Q
- ▲ Integrate module components into Mobile Biometric Device – FY12 4Q
- ◆ Conduct Demonstration and Operational Testing of the Integrated Mobile Biometrics Device - FY13 2Q
- ▲ Conduct public perception focus groups – FY13 3Q
- ▲ Deliver Integrated Mobile Biometrics Device prototype (including face & iris & card reader components), as well as technical specifications and standards – FY13 4Q
- ▲ Conduct focused evaluations of mobile devices– FY 14 2Q
- ◆ Field test Integrated mobile device in operational setting - FY14 1Q
- ▲ Integrate Partner feedback into operational device ready for acquisition - FY14 3Q

Transition Path – Component Acquisition, Commercialization



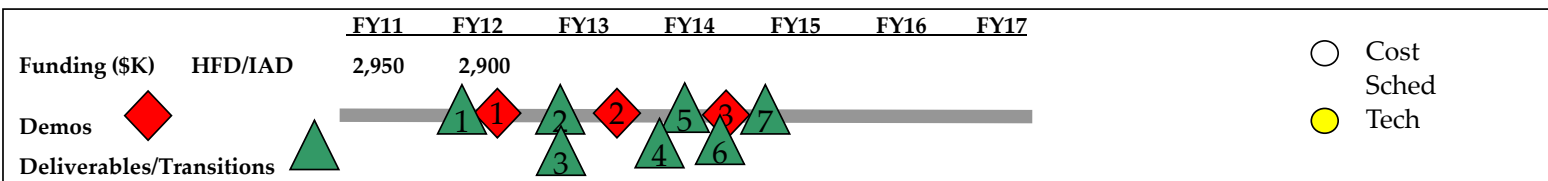
Project Performers: L1, SwRI, PNNL, Noblis, Sandia National Labs.

Transition Products

- Multi-Modal Biometric Device and Test Reports that will provide:
- Screening beyond U.S. borders, preventing foreign and domestic threats from physically entering U.S.
 - Improved federal, state, local and tribal officer safety through the ability to identify dangerous people in near real-time while increasing efficiency by conducting identity checks in the field rather than in the station
 - Provides federal, state, local and tribal officers with a list of qualified mobile biometric devices that will address the needs of end-users
 - Increased accuracy and processing speed over current operational capabilities

Customers/Partners: CBP, USCG, First Responders, US-VISIT, USCIS, ICE, SCO

TTA Status: Signed, US-VISIT



Project Name: Personal Alert and Tracking System (PATs)

Division: IDD

Product Designator: Personnel Protection

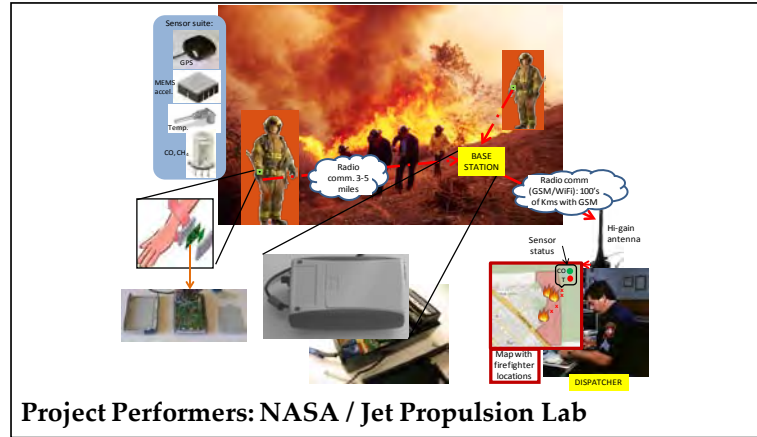


Project Description

- Small ruggedized 2D device capable of transmitting and receiving visual alerts and warnings in a rural, limited or no communications, environment; Capability for visualization and display of 1000s of personnel
- Two way alerts and warning easily integrated and overlaid with the incident command systems; Currently not available in traditional wild land firefighting radios, personnel not equipped with radios, or personnel outside the radios communication's range.
- Design robust sensor web PATs to relay information between front line wild land firefighters and command center; Sensor web design uses a 3-tier system: Tier 1 is the firefighter mesh network; Tier 2 is the first level command-control; Tier 3 is the Emergency Operations Center, link to FEMA, etc.

TRL at Start: 3

TRL at Transition: 7



Project Performers: NASA / Jet Propulsion Lab

Planned Demos & Deliverables/Transitions

- Laboratory demonstration of device (4Q FY11)
- Initial demonstration of intermediate device with comm (1Q FY12)
- Initial Visualization tool demonstration (2Q FY 12)
- Field demonstration PATs devices (4Q FY12)
- Field testing and analysis by user community (4QFY12)
- Design finalization and technology transition (3QFY13)

Transition Path: Technology transition to private sector

T&E Level: B

Transition Products

- Multiple field tested prototypes under wild land fire conditions -- analytically rigorous technology field trial
- Design sufficient for manufactured of stand alone or integrated communication boards
- This products benefits both wild land firefighters and search and rescue personnel

Customers/Partners: CALFIRE, National Interagency Fire Center, National Fire Academy

TTA Status: Pending

