

**Testimony of Dr. Robert Griffin
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Subcommittee on Emergency Preparedness, Response and Communications**

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Introduction

Good morning Chairman Lungren, Chairman Bilirakis, Ranking Member Clarke, Ranking Member Richardson, and Members of the Subcommittees. Thank you for inviting me to speak with you today about our efforts to develop technologies to assist first responders.

The Department of Homeland Security (DHS) remains committed to helping first responders nationwide by ensuring that they are prepared, equipped, and trained for any situation and by bringing together information and resources to prepare for and respond to a terrorist attack, natural disaster, or other large-scale emergency. The DHS Science and Technology (S&T) Directorate's mission is to strengthen America's security and resiliency by providing knowledge products and innovative technology solutions for the Homeland Security Enterprise (HSE). To meet the diverse needs of the HSE, S&T provides value by pursuing a strategy which is operationally focused, highly innovative, and founded on building strong partnerships. As the primary research, development, testing, and evaluation agency for the first responder community, S&T provides the HSE with strategic and focused technology options and operational process enhancements. S&T provides the technical depth and reach to discover, adapt, and leverage technology solutions developed by federal agencies and laboratories, state, local and tribal governments, universities, and the private sector – across the U.S. and internationally.

This commitment is reflected in S&T's third strategic goal, which charges the Directorate to "strengthen the Homeland Security Enterprise and First Responders' capabilities to protect the homeland and respond to disasters." To meet this goal S&T created the Support to the Homeland Security Enterprise and First Responders Group (FRG) to foster S&T's understanding of the needs and requirements of responders. The responder community consists of more than 60,000 disparate agencies across a variety of disciplines, including but not limited to fire, law enforcement, emergency management, and emergency medical services. By engaging first responders at every stage of the technology development cycle, FRG pursues a better understanding of their functional needs and requirements, and develops innovative solutions to their most pressing operational challenges. Without an effective research, development, testing, and evaluation program that specifically address their needs, responders have largely either done without or relied on vendor-driven solutions.

Since it was created in December 2010, FRG has committed to understanding the mission and operational requirements of first responders, creating high-impact technologies and knowledge products, improving interoperability of equipment, and increasing first responders' access to

technical- and science-based information. To maximize limited funding, FRG is focusing on advanced technologies that address the greatest multi-functional need and that can be developed for first responders within a 12- to 18-month timeframe – providing them access to new technology that meet at least eighty percent of their requirements. FRG has also focused on building methodologically sound processes to define and prioritize first responder needs while engaging responders at all levels of government. This process has allowed FRG to fund the highest priority projects identified by practitioners and leverage resources from partners within DHS and across other levels of government to create the greatest impact.

Guiding Principles

To safely and effectively respond in dangerous environments, first responders need access to better technology and equipment. FRG approaches project solutions with pragmatic criteria in mind. Through direct engagement with first responders, FRG has identified several guiding principles used as criteria to assist with identifying solutions including:

- **Practitioner Driven Approach**: recognizing that initiatives must be based on user needs and driven from the field.
- **Building on Existing Investments**: encouraging efficiencies by building on existing investments saves money by avoiding unnecessary and costly new hardware, software, data development, and training.
- **Leveraging Existing Solutions**: conducting environmental scans to help leverage existing interagency and private sector solutions before any investments in new solutions are made.
- **Daily Use Solutions**: seeking technological solutions that improve not only catastrophic response but daily use by first responders.
- **Non-Proprietary Solutions**: ensuring that technologies from different manufacturers can actually interoperate requires the use of open source, non-proprietary solutions.
- **Affordable and Accessible Solutions**: recognizing that solutions need to be affordable and commercially available for purchase.

Solution Development Process

In 2009, S&T established the First Responder Integrated Product Team (IPT), often referred to as the 13th IPT, to address the most critical needs of the first responder community. Building on the First Responder IPT, FRG established a more methodologically comprehensive process—known as the Solution Development Process (see Figure 1)—to identify and address the most critical needs of the community.

In partnership with first responders, FRG uses the Solution Development Process to identify, validate, and facilitate the fulfillment of needs through the use of existing and emerging technologies, knowledge products, and standards. This process focuses FRG’s limited funding on priorities identified by the first responder community. The process provides methodological rigor and allows for programmatic prioritization before projects are funded. This has helped ensure that related projects are coordinated, thereby consolidating efforts and saving time and money. The Solution Development Process is designed to operate within the broader S&T portfolio review process, which evaluates projects based on impact, transition, technology positioning, clarity of purpose, customer involvement, and innovation. Additionally, this process

supports the S&T Resource Allocation Strategy which includes all activities and processes associated with the timely development and transition/transfer of S&T products.

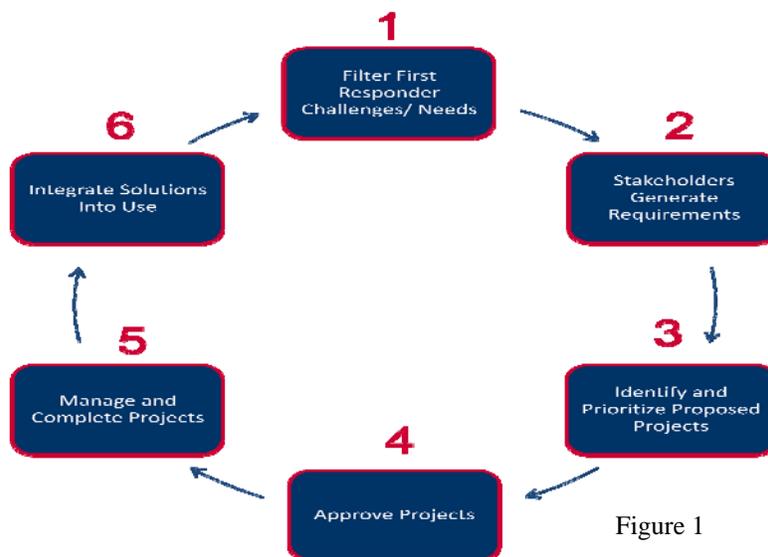


Figure 1

As part of the Solution Development Process, first responders from around the country including those serving on S&T’s First Responder Resource Group (FRRG),¹ the InterAgency Board for Equipment Standardization and Interoperability (IAB),² and Project Responder³ focus groups identify the current capability gaps faced by the community. These capability gaps are used by stakeholders to generate accompanying requirements. FRG uses the capability gaps, requirements, and its own analysis to inform its resource allocation and the private sector’s research and development investments. FRG selects projects for funding based on a number of criteria including: the practitioner-identified gaps, criticality/operational impact, threat likelihood, applicability, state of the science, cost-benefit analysis, ease of integration, transition likelihood, and time needed to prototype. The responders work with FRG program managers throughout the lifecycle of each project and assist DHS in creating awareness of these newly-developed solutions in the field. FRG then works with the first responder community and commercial sector partners to transition the technologies, standards, and knowledge products and integrate them into regular use.

First Responder Coordination

Direct first responder interaction is paramount to S&T’s ability to deliver critically needed solutions and technologies to the emergency preparedness and response community. S&T established the FRRG to aid in this mission by serving as a mechanism for continuous dialogue and the coordination of research, development, and delivery of

¹ The FRRG includes over 120 practitioners from a wide array of professional disciplines representing all levels of the public sector.

² The IAB is a voluntary collaborative panel of emergency preparedness and response practitioners from a wide array of professional disciplines that represent all levels of government and the public sector.

³ Project Responder is a partnership between FRG, the Homeland Security Studies and Analysis Institute, the IAB, and the Federal Emergency Management Agency’s National Preparedness Directorate to identify capability gaps and prioritize areas of investment to address or reduce those gaps.

technology solutions to first responders at the local, state, tribal, territorial, and Federal levels. As part of the FRRG, responders from around the country are engaged throughout FRG's Solution Development Process to identify, validate, and facilitate the fulfillment of first responder needs through the use of existing and emerging technologies, knowledge products, and standards. In addition to being geographically diverse, the FRRG membership represents jurisdictions of varying population sizes and budget size. The membership also represents the wide breadth of professions involved in emergency preparedness and response that includes, but is not limited to, leaders and experts in law enforcement, fire fighting, emergency medical services, emergency management, 9-1-1, public health, hospital preparedness, Geospatial Information Systems, and information security.

One of the areas both first responder and industry leaders identified as needing improvement was a clearer articulation of the funding priorities. Recognizing this, FRG has focused its resources on this critical first step of FRG's Solution Development Process. Project Responder 3 is the third iteration in a series of studies to identify gaps between current and required capabilities to ensure that responders can effectively and safely address catastrophic incidents, both now and in the future. By leveraging Project Responder 3 and the FRRG, FRG is currently focused on the following five highest priority areas:

- Readily accessible, high-fidelity simulation tools to support training in incident management and response.
- The ability to remotely monitor the tactical actions and progress of all responders involved in the incident in real time.
- The ability to know the location of responders and their proximity to risks and hazards in real time.
- The ability to communicate with responders in any environmental conditions (including through barriers, inside buildings, and underground).
- Protective clothing and equipment for all first responders that protects against multiple hazards (e.g., heat, smoke, blood-borne or airborne pathogens, and projectiles).

These priority areas are currently being used to help guide research and development investment by the Federal Government, as well as, local, tribal, state, and territorial authorities, and the private sector.

Realized Solutions

One example of how FRG partners to bring solutions to operations is the Wildland Firefighters Advanced Personal Protection System. Wildland firefighters are often required to respond to emergencies in remote areas. This can involve hiking from a staging area to the fire location. Because the fire season takes place during the warmest months of the year, wildland firefighters frequently must work under extreme heat and humidity. The Wildland Firefighters Advanced Personal Protection System will help to reduce heat stress—a major concern for wildland firefighting personnel who must wear and carry a significant amount of personal protective gear to perform their duties. FRG is working with the U.S. Army Natick Research, Development & Engineering Center's National Protection Center (Natick), the California Department of Forestry and Fire

Protection (CALFIRE), the United States Fire Service, and others to develop a National Fire Protection Association (NFPA) certified garment system that improves radiant thermal protection; reduces heat stress; and improves form, fit, and function when compared to existing garment systems.

Technology Transition

Transitioning technology for regular use by first responders remains a critical challenge for S&T. To help mitigate this challenge, FRG leverages the Center for Commercialization of Advanced Technology (CCAT) process, in coordination with San Diego State University, to solicit proposals from the vendor community for technologies that address gaps identified by first responders. The goal of this process is to develop technologies in 12 to 18 months that meet 80 percent or more of the requirement identified by the first responder community, with transition occurring 6 to 12 months after project completion. Should a capability gap be both unique and one that receives a high priority ranking by practitioners, contracts may then be awarded. By using CCAT, FRG is able to bring first responders, industry, and business professionals together under one focus, which allows FRG to provide solutions more efficiently. This process ensures that each technology development is undertaken with a high probability of successfully transitioning to the first responder community.

A core focus of S&T is the rapid delivery of new technologies that address the mission needs of the first responder community. Over the past year, S&T has used Research, Development, and Innovation funding to develop technologies and knowledge products important to a range of homeland security activities and customers. FRG, with a cost share from industry, has been able to develop and transition technology solutions to the first responder community. Recent transitions include:

First Responder Equipment

- Board Armour™ Backboard Cover: Repurposing the Tyvex™ material used to wrap houses in construction, S&T, in partnership with Advanced EMS Designs, developed a disposable backboard cover to better protect patients and responders from disease and contaminants. This product was developed, tested, and commercialized in less than eight months. It is now commercially available for about \$10.
- Next-Generation Self-Contained Breathing Apparatus (SCBA): S&T partnered with the Mine Safety Appliance Company to integrate and certify S&T's lighter and smaller profile SCBA cylinder array into a full SCBA ensemble that has been certified by the Department of Transportation and tested against National Fire Protection Association standards. This represents the first major redesign in decades of this critical piece of first responder safety equipment.
- First Responder Support Tool (FIRST)-Bomb Response: S&T partnered with Applied Research Associates, Inc. to develop a smartphone application that provides authorized first responders the information necessary to safely control incident locations such as stand-off distances, rough damage and injury contours, nearby areas of concern (e.g., schools and daycare centers), and suggested roadblocks that could help isolate an incident. FIRST-Bomb Response also provides improvised explosive device and HAZMAT guidelines, reference

information, and points of contact to call for questions and assistance. This capability is available through the Apple App store, the Android Market, and the ARA Store for laptops.

- Semi-Autonomous Pipe Bomb End Cap Remover (SAPBER): This technology removes end caps from pipe bombs while keeping operators at a safe distance and collecting video and physical evidence from the pipe bomb. SAPBER is a small, low-cost system capable of remote operation and accommodating a range of possible pipe bomb sizes and configurations.

Interoperable Communications Solutions

- Multi-Band Radio (MBR): To provide a successful coordinated response, emergency responders must be able to effectively communicate with all partners across jurisdictional lines, including local, regional, state, and Federal entities. Until recently, no public safety radio existed that was capable of operating on more than one radio band. S&T developed the requirements for a hand-held MBR that allows first responders to communicate with partner agencies, regardless of the band on which they operate. The first responder communities in Chicago, Illinois, Miami, Florida, and New Orleans, Louisiana participated in highly successful pilots of the technology. S&T's efforts sparked industry interest: MBRs are now commercially available from four manufacturers (Thales Communications, Inc., Harris Corporation, Datron World Communications, and Motorola Solutions, Inc.). Recently the Federal Bureau of Investigation and the United States Marine Corps both announced they would be procuring MBRs for operational use. This project is just one example of how FRG efforts can result in useful market competition.
- Voice over Internet Protocol (VoIP): This project enables legacy analog radio systems to interoperate with similar systems as well as with new digital systems. Given the need for standardized implementations, the VoIP Working Group is producing specifications, or implementation profiles, for the most critical VoIP interfaces. The first VoIP specification developed by the working group is the *Bridging Systems Interface (BSI) Core Profile*, which allows first responder agencies to seamlessly connect radio systems over an IP network regardless of the manufacturer. Thirteen manufacturers voluntarily adopted the BSI platform and others have committed to doing so in their next product cycle. This helps reduce costs for first responder agency's system design and installation.
- Virtual USA® (vUSA): A collaborative effort among S&T, other DHS agencies, and state and local emergency management agencies, vUSA improves information sharing among agencies and other partners. vUSA is a blend of process and technology that provides a virtual pipeline to allow data (such as the operational status of critical infrastructure or emergency vehicle locations) to be shared by different systems and operating platforms with no changes to the current system. Selected as a White House Open Government Initiative and a flagship DHS Open Government Initiative, vUSA is currently in use in 23 states. Earlier this year, FRG initiated a pilot in the Northeast to integrate vUSA and the Next-Generation Incident Command System (NICS). NICS improves first responder situational awareness, collaboration, and interagency interoperability

during disaster response efforts by displaying incident information—such as road closures and fire hot spots—on a shared online map, allowing it to be shared between local agencies and local to state. The San Diego County Board of Supervisors has agreed to use vUSA/NICS as the primary way of sharing information within the County as well as with other agencies outside of San Diego County. The CALFIRE is also adopting vUSA/NICS as their incident command and data sharing system. Partnering with the DHS Office of the Chief Information Officer's Office of Operations Coordination and Planning, S&T plans to make vUSA/NICS available as part of the Homeland Security Information Network (HSIN). vUSA users now have HSIN accounts, which allows them to access a new HSIN Community of Interest that provides a suite of collaboration services such as web conferencing and instant messaging and access to new geospatial data.

- Commercial Mobile Alert Service (CMAS): This program provides a national capability to deliver relevant, timely, and geographically-targeted messages to mobile devices. In December 2011, New York City partnered with S&T and the Federal Emergency Management Agency (FEMA) to conduct the first end-to-end test of the CMAS tool. CMAS has reached its initial operating capability and S&T is working on several research, development, testing, and evaluation activities designed to improve current and future system capabilities.
- Emergency Data Exchange Language (EDXL) suite of standards: These standards help responders share critical data in any form. By sending messages to tablets, computers, and phones with EDXL-compliant software, real-time information arrives at the fingertips of those who need it most. EDXL standards are helping provide the ability to exchange all-hazard emergency alerts, notifications, and public warnings as well as to the exchange of hospital status, capacity, and resource availability/usage information among medical and health organizations and emergency information systems.

In FY12, FRG is working on additional projects including:

- Heads Up Display for HazMat Suits: This device will monitor the internal and external temperatures both inside and outside a responder Level-A suit and will provide a warning when hazardous temperatures are reached.
- Improved Structure Glove: This next-generation high dexterity structural fire glove will dramatically improve water repellency, heat and flame protection, puncture resistance, dexterity, and don and doff ability.
- Wireless Vital Sign Monitoring: This hands-free body-worn system, lacking any external wires, will measure vital signs and properties through a short-range wireless interface, and during transport, will transmit data from the ambulance to a receiving hospital through a long-range wireless interface. In an effort to leverage DoD's work in this area, this project uses the 1401 Technology Transfer Program to make use of similarly developed DoD technology. FRG is in the process of awarding a contract to modify the technology so it can be used by EMT emergency responders on the civilian side.
- Next Generation Textiles for Personal Protective Equipment (PPE): FRG is working across the S&T community to identify current technology and research efforts to determine the feasibility of a material that could provide protection against multiple

threats (e.g., chemical/biological agents, ballistic, puncture, and fire/thermal) while maintaining wearer comfort. By improving the normal response garments, FRG will ensure that first responders have safer PPE that will protect them—even in unexpected incidents. This project is part of S&T’s Small Business Innovation Research Program that was initiated in 2004. Two solicitations are issued per year and consist of topics that address the needs of the seven DHS Operational Units (e.g., U.S. Coast Guard, U.S. Transportation Security Administration, U.S. Customs and Border Protection, Federal Emergency Management Agency), as well as first responders.

- **National Information Sharing Consortium:** FRG is partnering with a core group of leaders in state and local government to build the National Information Sharing Consortium to address and promote statewide information sharing and data interoperability. The purpose of the Consortium is to promote private investment and creativity to enhance data sharing and the creation of collaborative technologies and exchange environments. The Consortium’s activities will include the sharing of software code, applications, and model practices. The Consortium will oversee the ongoing transition of vUSA as an operational capability for local and state use.
- **Virtual Training:** FRG is conducting research to leverage existing government funding investments and technological advances that use capabilities available in the gaming industry, interagency simulations, and virtual interactive training to promote different first responder operating training opportunities. Virtual training can dramatically reduce training costs, help standardize training—especially for multi-agency events—and make it possible to provide more responders the training required to respond to emergencies.

FRG also works closely with other elements of S&T to improve first responders’ operational capabilities. Additional examples of S&T’s recent transition successes include:

- **Controlled Impact Rescue Tool (CIRT):** Decreases by 85 percent the time it takes to breach reinforced concrete walls while increasing first responders’ control and overall safety. S&T demonstrated and transferred CIRT to Fairfax County Fire and Rescue, who routinely deploy internationally to assist in rescues from disasters both natural and manmade. CIRT is now commercially available from Raytheon Corporation, which shared development costs with S&T.
- **Explosives Trace Detection:** For checked baggage screening, this next-generation device is ten times more sensitive than existing systems, can detect narcotics as well as explosives, and is similarly priced to existing machines. The system is currently undergoing operational testing with the Transportation Security Administration and will be commercially available within a year.
- **SportEvac:** This is computer modeling software developed by S&T that provides simulation of evacuations allowing venue operators to determine the safest evacuation and optimum plans and procedures. The Indianapolis Department of Public Safety used SportEvac in their security and safety planning for this year’s NFL Super Bowl. This technology is covered by the SAFETY Act.⁴

⁴ The Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act) provides important legal liability protections for providers of Qualified Anti-Terrorism Technologies – whether they are products or services.

- Geo-spatial Location Accountability and Navigation System for Emergency Responders (GLANSER): A tool which allows incident commanders to locate and track personnel inside enclosed areas. Honeywell, Inc. has begun to commercialize GLANSER.
- Qualification testing on white powder detector: S&T completed qualification testing for a commercially-available system that allows first responders to determine if suspicious white powders contain threat agents. The process relied upon the S&T-developed Public-Safety Actionable Assay standards that ensure local jurisdictions are using technology that meets rigorous specifications for accuracy and sensitivity.
- System Assessment and Validation for Emergency Responders (SAVER): SAVER is an S&T program that provides knowledge products that enable responders to better select, procure, use, and maintain their responder equipment. The SAVER Program conducts objective assessments of commercial responder equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER focuses primarily on answering two main questions for the responder community: “What commercial equipment is available?” and “How does it perform?” The knowledge products produced by the SAVER Program are available to the responder community through FEMA’s Responder Knowledge Base (RKB).

Moving forward, FRG will continue to serve as a voice for the first responder community. While FRG itself stood up in 2010, FRG’s Office for Interoperability and Compatibility (OIC) was established in 2004.⁵ OIC has a long history of developing solutions to help strengthen first responder communications for legacy systems. OIC’s technical capability and firm understanding of first responder needs has resulted in a trusted relationship with the first responder community. Recently, FRG has played a similar role for DHS operational components serving as a technical resource for the DHS Tactical Wireless Communications Modernization Effort (TacNet) as the Department makes critical procurement decisions for communications systems. FRG intends on continuing to play this role for legacy systems as well as emerging systems that use new technology.

Not only is it important to develop and transition technologies, but it is also vital to inform the first responder community about the type of technologies and services that are available to them. FRG is committed to building high levels of trust with the field and does so through direct interaction with first responders. At the same time, FRG is continuing to identify effective, innovative, affordable ways to enhance those efforts, including working to increase the use of virtual meetings, brain storming platforms, and social media to strengthen our contacts with the field.

The Homeland Security Act of 2002 requires DHS to establish a Federal clearinghouse for information and technology, to encourage and support innovative solutions to enhance homeland security.⁶ FirstResponder.gov and First Responder Communities of Practice (FR CoP) are two websites that were developed by S&T to support this mandate. FirstResponder.gov debuted in January 2007 as a “one-stop” portal to enable local, tribal, state, and Federal first responders to easily access and leverage Federal Web services, information on resources, products, standards,

⁵ 6 U.S.C. § 195.

⁶ 6 U.S.C. § 193.

testing and evaluation, and best practices, in a collaborative environment. In 2010, S&T unveiled a newly redesigned and enhanced FirstResponder.gov, which includes original news stories and communication tools to help first responders engage directly with DHS. FirstResponder.gov has more than 200 links to Federal, state, and local resources; is linked from more than 300 external sites; and is either the first or second website listed for a “first responder” query in both Google and Yahoo. FRG also developed the FR CoP. FR CoP is a professional networking, collaboration, and communication platform for first responders and others working in homeland security and provides an opportunity for responders to share lessons learned and best practices to assist other departments. FR CoP has approximately 3,000 members and more than 100 communities.

Conclusion

S&T is committed to developing technologies for and providing technology information to our first responders, to assist them in conducting their mission to protect the Nation more effectively, efficiently, and safely. While we have seen significant results, capability gaps remain and the response environment’s constantly changing, which necessitates S&T to continually evaluate needs, required capabilities, and potential investments and innovations. S&T will continue to work with partners at the local, tribal, state, territorial, and Federal levels to maximize investments as we develop new technologies to meet responders’ highest priority needs. My vision for FRG is grounded in the principles I discussed earlier, and I look forward to achieving that vision for our Nation’s first responder community.

Thank you for inviting me to appear before you today. I appreciate the opportunity to testify and would be pleased to answer any questions you may have.