THE SIREN

DHS S&T Partners with Kentucky on Dam Safety to Help Protect Critical Infrastructure

Much of our nation's most critical infrastructure is at risk of and subject to damage from flooding. Repair costs for critical infrastructure, such as roads, bridges, dams and levees, make up a significant part of the costs for public assistance. The Federal Emergency Management Agency (FEMA) seeks to reduce the cost of public assistance for disasters where critical infrastructure repair is a significant portion. Federally-owned dams have advanced monitoring and alert systems. However, many smaller state-, local- and privately-owned dams do not have sophisticated monitoring systems.

The Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) Flood Apex Program recently partnered with the Kentucky Department of Water to investigate new and emerging technologies in flood warning and dam safety to help protect lives and the nation's critical infrastructure, while reducing the cost of such a disaster. Currently, there is no national standard regarding the assessment, monitoring, and reporting of state and municipally owned dams.

The Critical Infrastructure and Flood Risk Management project with the Kentucky Department of Water will also research existing standards and requirements for dam conditions to support monitoring and rapid detection of flood related conditions affecting dam safety. The project includes developing of a prototype dam breach warning system within the next nine months, followed by a community pilot to monitor conditions on a select number of small to medium privately owned dams and levees. The findings and lessons learned from this project support research priorities for the National Dam Safety Program, and will be shared with the stakeholders and other communities at risk across the nation.

In This Issue:

Video Spotlight

ScreenADAPT

View more videos on our Responder Video Page

Homeland Security
Science and Technology

Innovative Training Improves Aviation Security

Portland International Airport (PDX), a Transportation Security Administration (TSA) designated research airport, often tests new technology or procedures. One new technology recently implemented at PDX was ScreenADAPT®, an X-ray image analysis training system that tracks the eye movement of trainees as they inspect simulated bags to enhance visual search skills. This collaborative effort by DHS S&T and TSA, is just one of several DHS S&T projects that is now in operational use with DHS components and first responders.

"The goal with ScreenADAPT® was to develop training methods and tools, through technology innovation, that would be relevant, challenging, intuitive and engaging to enhance Transportation Security Officer (TSO) visual search skills," said DHS S&T Program Manager Darren P. Wilson. "The result is an advanced X-ray image analysis training system that allows TSA to better analyze and understand TSOs visual search effectiveness and efficiency."

After participating in the evaluation and testing, leadership at PDX requested to keep the ScreenADAPT® systems and spearheaded the full implementation of ScreenADAPT® as a permanent part of their hub and training programs. They now use more than ten ScreenADAPT® systems on a daily basis.

"The training effectiveness evaluation indicated that using ScreenADAPT® in X-ray image analysis training not only resulted in TSOs identifying threats faster, but also clearing bags faster," said Wilson. "They were able to make faster decisions with more confidence and fewer false alarms."

The initial hesitation of TSOs was quickly overcome when they were able to see the ease of use, the performance impacts and firsthand benefits. The supervisory TSO at PDX found the simulated X-ray images to be clearer than in previous training programs. Another valuable benefit noted is the instant feedback TSOs receive after sessions. Trainers can help walk through deficiencies with trainees in a way that has made officers at every level more effective. This feedback is based on ScreenADAPT's® eye-tracking ability to show where and how long someone is looking at the X-ray images.

PDX has been so pleased with the improvements since implementing ScreenADAPT® that Portland leadership has sent the machines to its smaller, spoke airports.

New Research Report on Speech Intelligibility in Different Radio Environments

On December 28, 2017, the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA) released the [final report](#) on the [Mission Critical Voice Intelligibility over Long Term Evolution (LTE)](#) project, detailing the results of DHS S&T funded research on speech intelligibility in different radio environments. The intelligibility of speech — the ability to be understood — in difficult environments is critical for public safety stakeholders because speech intelligibility directly impacts first responder operations. High intelligibility can support efficient execution of time-critical public safety operations; conversely, lower intelligibility can lead to requests for repetition that can slow operations, or result in misunderstandings that can jeopardize operations, safety and even lives. Frame erasures and background noise are two factors that can interact with speech coding to reduce speech intelligibility , thus impairing public safety mission-critical voice communications.

NTIA performed two distinct but related speech intelligibility tests on five speech codec operating modes that might be chosen to provide mission critical voice services to public safety users over an LTE based radio access network (such as FirstNet). Both tests used the Modified Rhyme Test (MRT) protocol and comprised over 150,000 trials. By using these large numbers of MRT trials the results showed that the CA codec modes offer small but statistically significant speech intelligibility improvements in numerous environments.

With LTE joining LMR as a major carrier of emergency communications, optimal codecs are integral to maintaining reliable audio quality and ensuring responders can effectively communicate in even the most challenging audio environments. The research and test case results outlined in the report will ultimately help place reliable, high-quality audio into the hands of first responders using LTE devices for mission-critical voice applications.

## NGFR Handbook: Providing Seamless Technology Integration

Every day, first responders across the nation respond to emergencies, protect our communities and save lives while sometimes using outdated technology. Introducing new stand-alone technology, however, is not a good solution and may hinder responders from doing their job efficiently. Responders need seamless technology that increases the focus on their mission and capabilities.

The DHS S&T Next Generation First Responder (NGFR) Apex program has collaborated extensively with responders and industry to identify capability gaps in existing equipment, and to fill these gaps by integrating current and emerging technologies to improve emergency response, responder safety and situational awareness.

In response to providing seamless technology integration, DHS S&T created the *NGFR Integration Handbook,* which outlines the "plug-and-play" standards-based environment that enables commercially-developed technologies to integrate with existing first responder industry. The handbook serves as a guide for industry system developers and vendors on interoperability requirements that may facilitate integration. DHS S&T does not intend to draft new standards; rather, the handbook provides recommendations on existing standards that developers may implement.

The DHS S&T NGFR Handbook is presented in three parts. Part One provides an introduction and overview of the NGFR on-body framework and concepts behind its modular design. Part Two details the engineering design for module-to-module communications and data transfer from on-body systems to agency systems. Part Three provides additional details of the data architecture for modules and their interfaces.

The NGFR Integration Handbook will become publicly available in late February. During this time, NGFR encourages industry to review the handbook and provide feedback to improve the level of detail of the technical specifications that will deliver interoperable technology to the first responder. For more information on how to participate, please email NGFR@hq.dhs.gov.
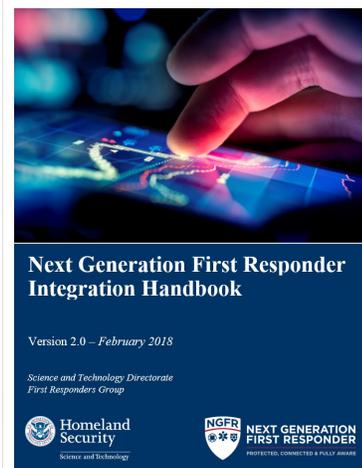
New Web-based Hurricane Decision Support System Helps Train Emergency Managers

In January 2018, DHS S&T achieved a significant milestone in its National Hurricane Program Technology Modernization program. The experimental Web-based HURREVAC-eXtended (HV-X) hurricane decision support platform funded by DHS S&T in collaboration with FEMA, the U.S. Army Corps of Engineers and the National Hurricane Center (NHC), and developed by MIT Lincoln Laboratory (MIT LL) was formally transitioned to the industry operations and maintenance (O&M) provider Sea Island Software. Over the past five years, DHS S&T has been funding research and development of a new hurricane evacuation planning system to provide significant improvements in the decision support products and tools that are used by federal, state and local emergency managers.

The new HV-X system will be called Web-based HURREVAC. In January, the system was used for the first time as part of the annual "Hurricane Preparedness Course for Decision Makers" (called course number "L324") offered to Emergency Managers (EMs) by FEMA and NHC. FEMA's Emergency Management Institute (EMI), FEMA regional hurricane program managers, and NHC training staff host the "L324 Hurricane Preparedness Course for Decision Makers" at the National Hurricane Center in Miami, Florida. There are three course offerings a year, which are each one week long and are held in the hurricane off season from January into February, with 20 state/local emergency managers selected to participate in each course offering. The course is designed to build the capacity and skills of the emergency managers, hurricane planners and operations officers to understand hurricanes and make effective protective action decisions during a threat.

This year marks the first time that the new web-based decision support platform was integrated into that training, and all future course offerings will also now use the system going forward. EMs learned about new tools to visualize and map storm surge uncertainty and variability, evacuation zone-based analytics, clearance times, and many other technical features. This year also marks the first time L324 was run completely online rather than through MS PowerPoint and with extensive paper. DHS S&T developed NHC-selected exercise storms, embedded Web-based training tutorials and scenario play with auto-simulated storms, which allowed all attending EMs to receive hands-on HURREVAC training.

DHS S&T, FEMA, USACE and MIT LL will continue to support the technology transition through Sea Island Software, including development of new products and capabilities for hurricane evacuation studies and post-storm assessments, as well as integrating innovative capabilities for cyber sensing of power outages and off shore precipitation visualization.

TACTIC II: Exercise Puts C-UAS to the Test

From December 2-9, 2017, the Department of Homeland Security (DHS) Science and Technology Directorate's (S&T) of Counter Unmanned Aerial Systems (C-UAS) Technologies in Cities (TACTIC). DHS S&T's National Urban Security Technology Laboratory (NUSTL), as the test agent, executed the event and designed flight operations for the assessment to measure system performance in areas of interest to DHS components and partners. Counter-UAS technologies with varying sensor modes for detecting, tracking and identifying nefarious small-UAS were assessed during the event.

Over the past two years, DHS S&T has focused on guiding, advising and providing technical expertise to the homeland security community – from federal law enforcement to local and state police departments – on the steps they can take and technology they can use to counter unwanted or malicious drones, or unmanned aircraft systems (UAS).

TACTIC not only provides an opportunity for developers to see their counter-UAS technologies put into action under different sets of conditions, it also allows the assessment of the capabilities of these technologies and collect valuable data that will feed into other DHS S&T tools, including modeling and simulation products.

TACTIC drew approximately 200 attendees, including nearly 100 observers from the White House, DHS components, federal agencies, state/local law enforcement, industry, and international partners from the U.K., Canada and Israel, to see

firsthand how counter-UAS technologies work in a test environment replicated as an urban setting.

New SAVER Report on Portable Radiation Portal Monitors

The SAVER Program has published a new report to help responders make more informed purchasing decisions related to Portable Radiation Portal Monitors. Because preparing for worst-case scenarios can be difficult and expensive, NUSTL's SAVER Program had experienced first responders assess portable radiation portal monitors that quickly screen people for the presence of radioactive materials. Their findings are in the Portable Radiation Portal Monitor Assessment Report, which provides advantages, disadvantages, costs and more. The Portable Radiation Portal Monitor Assessment Report is now available along with its companion reports in the SAVER Document Library.

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