Homeland Security

Science and Technology

S&T IMPACT:
FIRST RESPONDERS

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The Department of Homeland Security Science and Technology Directorate (S&T) works closely with first responders to improve their safety and effectiveness – ensuring our nation's law enforcement, fire protection, and emergency medical services are well-equipped to provide aid in times of crisis.

First Responders are the *real-life superheroes* who rush towards danger rather than away from it. They protect and serve. They expect the unexpected. And though they may not have super powers or wear capes, they do have some serious back-up support in the form of S&T innovation. In addition to their skills and training, first responders rely on various technologies developed by S&T to help them save the day.

The following scenarios showcase innovation in action to highlight various ways the research and development efforts of S&T impact an emergency response situation.

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LIFESAVING GEAR HELPS RESPONDERS TAKE THE HEAT

A two-story, suburban home is burning down. There are flames and dark smoke billowing out of the windows as a firetruck pulls up in front. The sirens nearly drown out the loud crack as part of the roof starts to collapse. Firefighters spring into action. They douse the home with water from a nearby hydrant to smother the flames and bring the blaze under control. They've already noticed two cars parked in the driveway. The family is home. They're going to have to go in.

There is no hesitation as the team begins search and rescue operations. In addition to the standard self-contained breathing apparatus (SCBA) for respiratory protection, each member of the team has a **Burn Saver Thermal Sensor** attached to their SCBA strap. These wireless devices continuously monitor heat exposure, logging temperature data in real time. An alarm is sent if dangerous levels are reached, which gives firefighters one less thing to worry about. The sensors weigh a mere 12 ounces and run on a single AA battery.

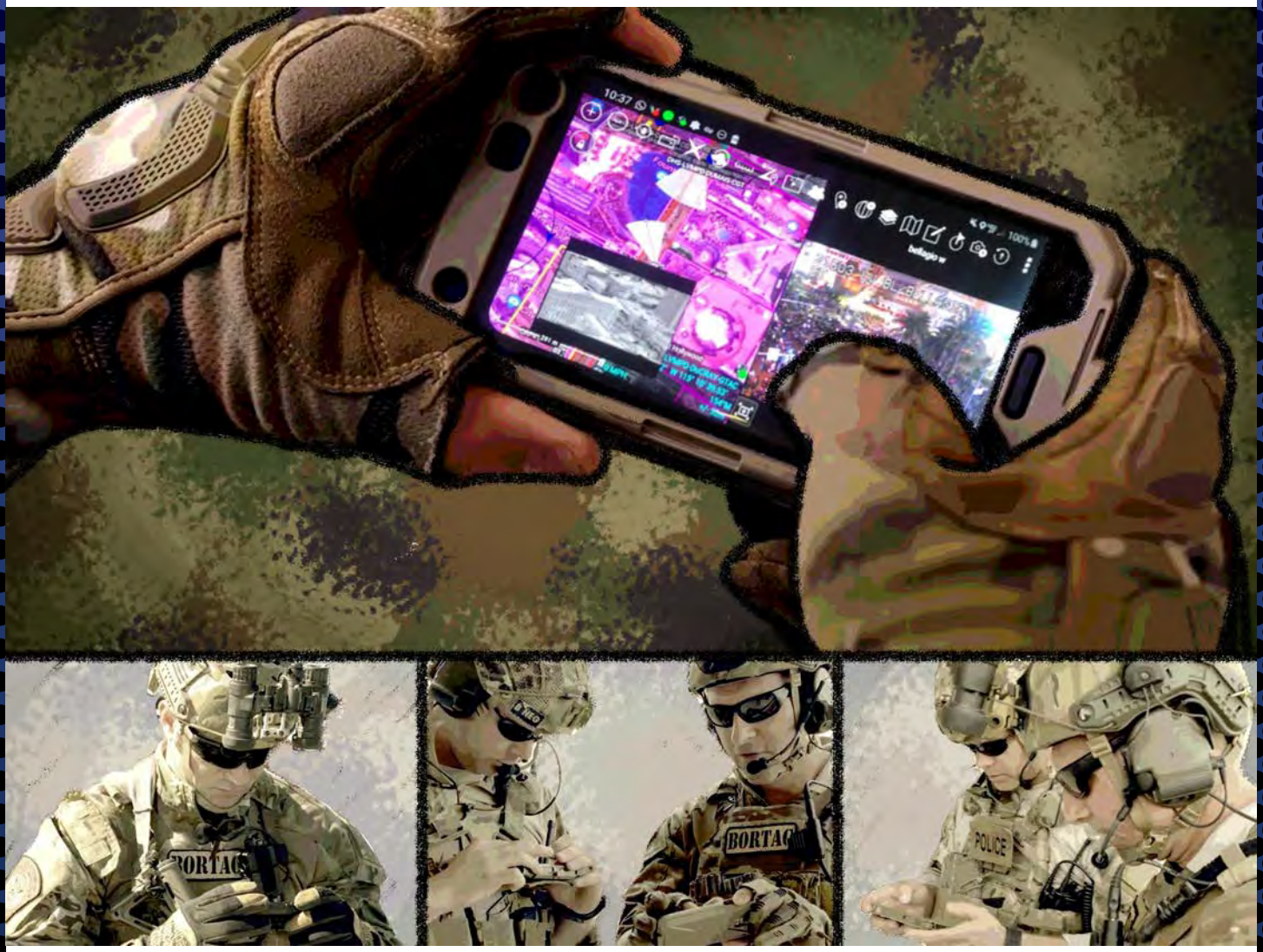
For added protection, the team is wearing **RedZone™ Particulate Blocking Firefighter Turnout Gear**. This specialized uniform prevents toxic substances in the air from entering through vulnerable spots, like arm and leg holes, and depositing on the skin. Hazardous particulates in smoke and soot are no match for their elasticized ankle and wrist shields.

Flex-Tuff Improved Firefighter Structure Gloves protect their hands with infrared, thermal reflective, and flexible materials that provide enhanced dexterity, water repellency, and fire resistance.

Visibility is poor as the firefighters enter the house, but they are equipped with **Precision Outdoor and Indoor Navigation and Tracking for Emergency Responders (POINTER)** receivers that send their coordinates on the X, Y, and Z axis to a transmitter on the firetruck outside. This information allows command post to track everyone's exact location. The trapped family is successfully rescued, but one of the team members doesn't make it back out of the house…

There's no response over the radio. POINTER alerts command that the firefighter is no longer vertical, which means he is likely lying unconscious on the floor. The display screen shows he is still on the second story. The firefighters quickly locate their fallen comrade and bring him to safety. Sure enough, he was knocked out by fallen debris, but comes back around as the united team makes their way out of the house.

ENHANCED COORDINATION GETS THE JOB DONE MORE EFFICIENTLY



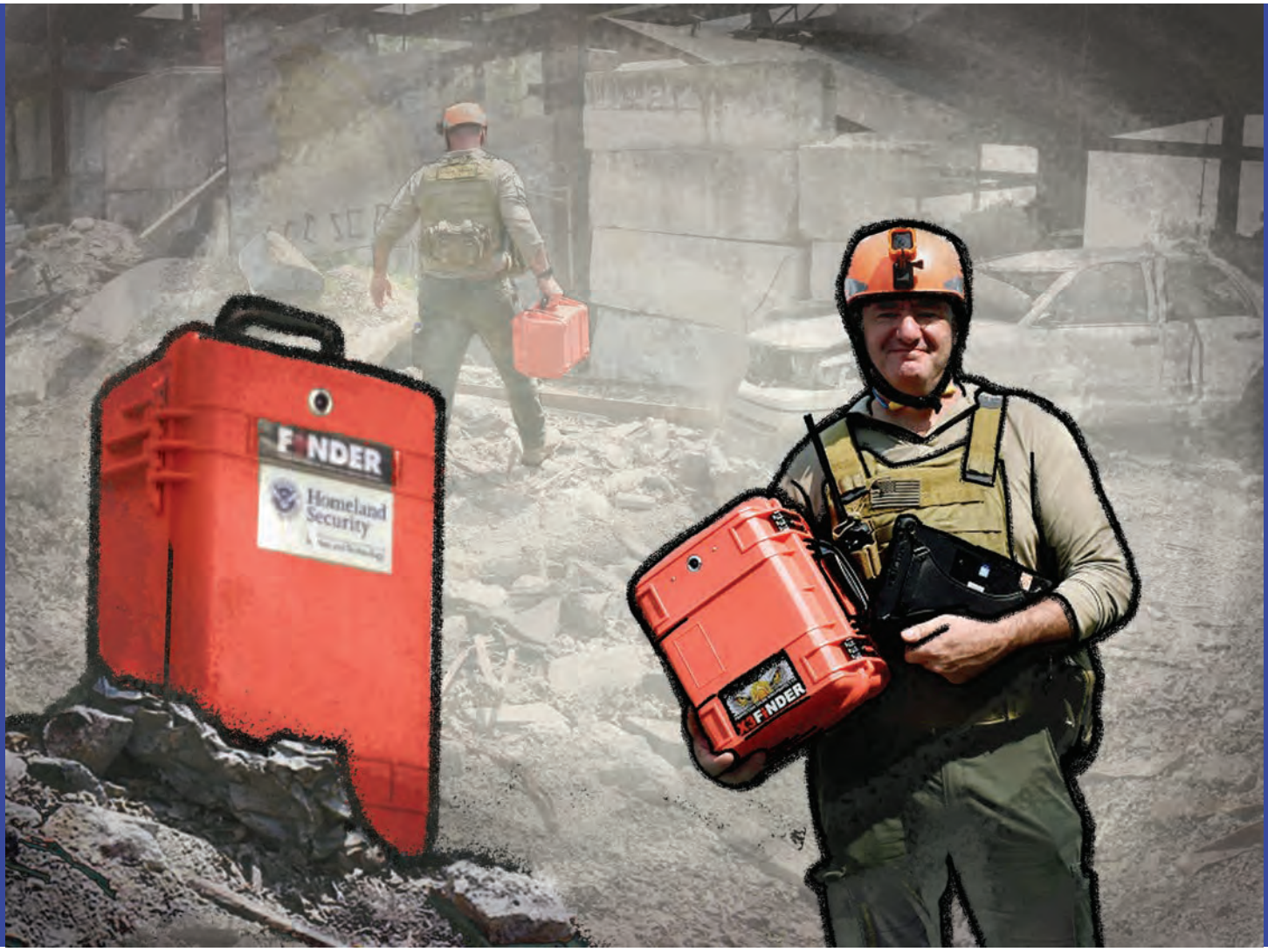
It’s an ordinary morning on a sunny spring day when, suddenly, the ground begins to shake. Cracks race up and down the street. Car alarms start to go off, a stream of water shoots into the air from a disrupted fire hydrant, and an office building begins to crumble.

The local dispatch center is bombarded with calls. Good thing the nearby responding agencies completed the online **Information Sharing Assessment Tool (ISAT)** just last year and addressed their most pressing capability gaps it identified. Multiple members of law enforcement, fire protection services, and paramedics teams completed the free ISAT assessment, providing an objective picture of their current information sharing capabilities related to governance, standard operating procedures, technology, training, and usage. The resulting reports served as useful guides and resources for improving their information sharing, and now they’re prepared to seamlessly communicate with each other during the current incident.

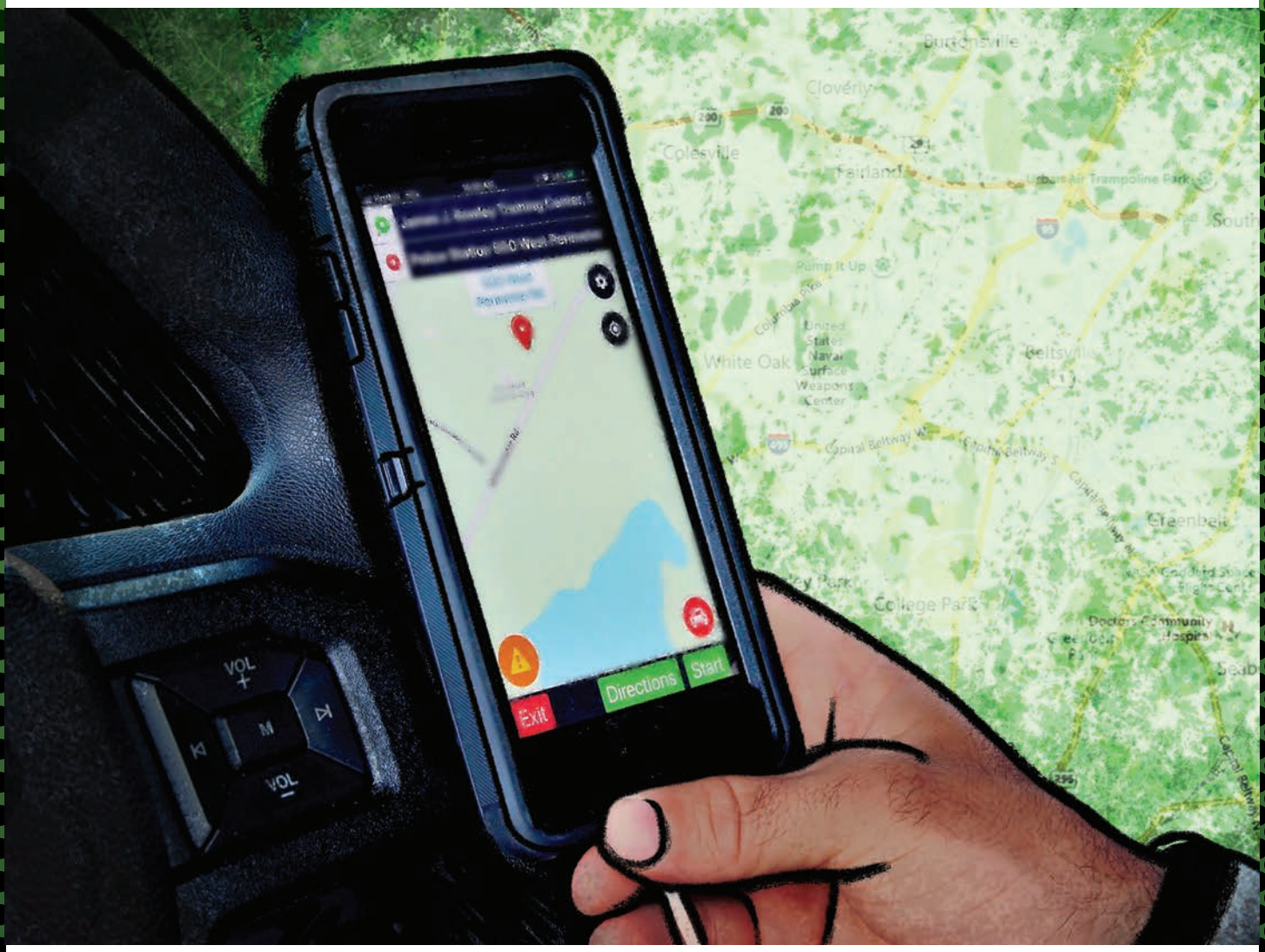
The Incident Command Center identifies the epicenter of the earthquake on the **Team Awareness Kit (TAK)** system, allowing it to be viewed by responders across DHS as well as state and local public safety personnel who have adopted the shared situational awareness solution. TAK enables responders in the field to communicate with each other and the Incident Command Center, continuously adding to the collective operating picture as photos and videos are taken and instantly shared with colleagues. Roadways are blocked, power lines are down, and data keeps streaming in, boosting situational awareness for everyone involved.

In conjunction with the emergency alert sent to public safety personnel, alerting authorities also send a mass notification to citizen mobile devices using the Federal Emergency Management Agency (FEMA) **Integrated Public Alert & Warning System (IPAWS)** to make them aware of possible aftershocks and immediate action that should be taken to preserve life. Alert originators were able to quickly disseminate this critical information as a result of training guidance developed in collaboration with S&T, FEMA IPAWS project management office, and the public safety community.

As responders work to secure the area, calm the chaos, redirect traffic, and provide first aid, a firefighter using **Finding Individuals for Disaster and Emergency Response (FINDER)** technology detects a heartbeat within a partially collapsed building. Even though the woman is unconscious and buried beneath 30 feet of rubble, the low-power microwave radar of FINDER makes it possible for responders to locate the trapped civilian and save her life.



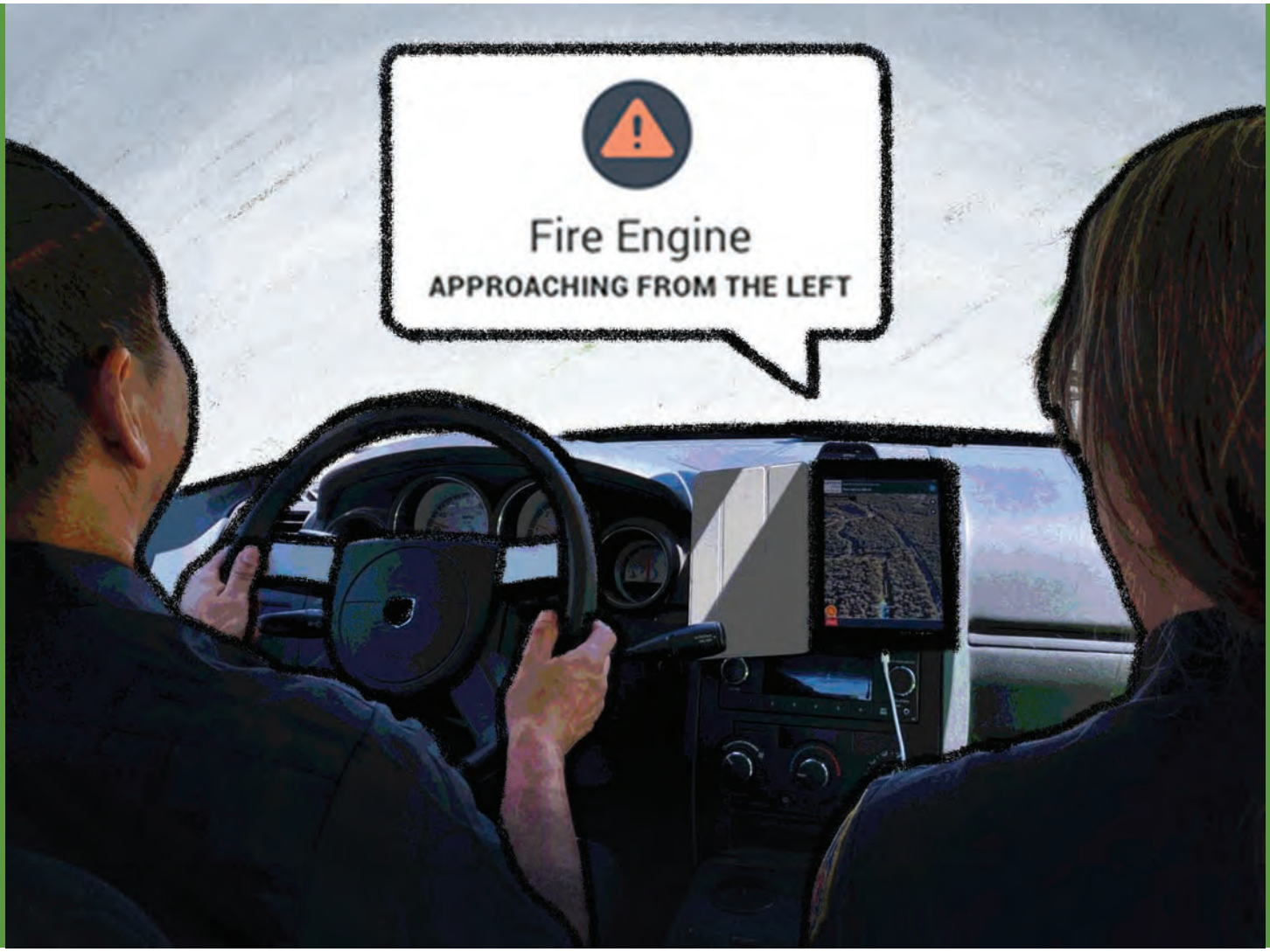
EASY ACCESS TO INFORMATION BOOSTS OPERATIONAL READINESS



An outdoor concert is in full-swing. The crowd is tightly packed and there's excitement in the air. And then suddenly, a frenzied voice breaks through. She's screaming a single word: bomb.

Chaos begins to erupt, but the local police are already there, serving as security for the event. As the crowd fractures and people run in all directions, the officers take charge. The entire block is cleared of civilians. The local bomb squad receives exact coordinates for the scene from their Public-Safety Answering Point and they start navigating there using the **QuickRoute mobile application**. It calculates the best possible directions for driving to the scene of the incident. By tracking real-time traffic, weather, construction, and other hazards, the app lets them easily avoid road closures and even sidestep an underpass with clearance too low for their emergency vehicle.

Along the way, the bomb squad receives a **HAAS Alert Collision Prevention for Emergency Responders** notification on their smartphones, as do the other drivers in the area. A few moments later, they see the flashing lights and hear the sirens of the approaching firetruck in their rear-view mirror. Both vehicles are responding to the concert situation and, thanks to the alert, everyone on the road is aware. Far too often, tragedy strikes as first responders meet an untimely end in collisions with civilian vehicles or other first responders while on the way to an incident.



The explosives experts and more first responders arrive on the scene. The responders are equipped with **Handheld Explosives Trace Detectors (HETDs)** that have an extensive explosive library and require no assembly, so they can quickly characterize the threat. They are able to locate a dark backpack stuffed behind a garbage can that contains the improvised explosive device. Responders conduct a sweep of the surrounding area using their lightweight HETDs, along with the specialized bomb squad and their canines, to search for any additional explosives. Responders then begin screening individuals using the HETDs to find whomever is responsible for this near-tragedy.

These fictional scenarios are just a glimpse at what S&T innovation can do when it's in the hands of a first responder: it can mean the difference between life and death.

What is definitely not fiction is the fierce dedication of our first responders. They are out there on the front lines risking their lives for all of us. They deserve the best possible technology to help them get the job done safely and effectively. The researchers, tech scouters, testers, and evaluators at S&T are honored to serve as their sidekicks.

There are many more projects currently in development or already transitioned to commercialization, making a difference throughout our nation. S&T proudly partners with first responders through the **First Responder Resource Group (FRRG)**. This direct line to our end users is a valuable resource. FRRG is essentially an emergency response and preparedness think tank, guiding research and development efforts based on the expertise of experienced responders from a broad range of disciplines, government levels, and geographic regions.

You can learn more about **S&T's support of first responders** on our website.

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