R-TECH™ NEWSLETTER
The Newsletter of the First Responder Technologies Program

Volume 3 • Issue 4 • April 2010

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Homeland Security
Science and Technology

This Newsletter discusses technologies of interest to first responders that have received funding, in part, from the government. Mention of these technologies should not be construed as an endorsement of either the technology, or the entity producing it, by the Federal government.

COMMITTED TO COMMUNITY

DHS Creates Broad-Reaching Mechanism to Identify Technology Gaps

First responders need and deserve the best tools and practices available to help save lives and protect property. The responsibility of identifying the gaps in existing technology – and working to fill those gaps – belongs to the Department of Homeland Security (DHS) Science and Technology Directorate (S&T). DHS S&T knows that first responders need to be part of the process. As a result, DHS has created a new First Responder Integrated Product Team (IPT) specifically for first responder needs. The First Responder IPT was established to address the highest priority research, development, test, and evaluation needs of the nation's first responders, using a process driven by the first responder community.

DHS S&T already has IPTs in place to identify the research priorities of DHS components, such as the Coast Guard and the Federal Emergency Management Agency. IPTs identify, prioritize, and work to fill capability gaps. In short, they ask what their stakeholders need in order to perform their jobs more safely and effectively. IPTs also work with stakeholders to rank which of those needs is most important.

DHS has collaborated with first responders through programs such as TechSolutions, a component of the First Responder Technologies program that funds the development of prototypes to bridge capability gaps identified by first responders. While these individual efforts have reaped rewards, DHS S&T wanted to have broader and more direct involvement with the first responder community – through tribal, state, local, and territorial responders. The new First Responder IPT does exactly that.

The First Responder IPT relies on members of the first responder community to help identify the most pressing needs facing first responders and to suggest ways to address those issues. In pursuit of this goal, the IPT created the First Responder Working Group (FRWG). The FRWG comprises 38 professionals who represent the first responder disciplines of fire, law enforcement, emergency management, and emergency medical services. These working group members hail from communities across the nation and agency sizes ranging from rural to metropolitan, according to Sheriff Paul Fitzgerald of Story County, Iowa, who serves as FRWG chairman. Although members represent a variety of disciplines and geographic areas, they often face similar challenges in the field. The members meet quarterly to identify capability gaps and help pinpoint the development of technologies that could mitigate those gaps. At a September 2009 meeting, the FRWG identified overall gaps that affect all disciplines as well as needs in each specific discipline. "We work on issues that improve safety and allow us to do our jobs better," Fitzgerald said. "Scientists at DHS S&T [and partner agencies and organizations] will then take that information away and start working on a product or a widget to address our needs."

The FRWG works with DHS S&T to establish requirements to meet those needs. FRWG members continue to collaborate with DHS throughout the process to develop solutions to the most pressing issues. Later in the development process, DHS often holds pilot programs

The fire service is one of the four disciplines represented by the First Responder Working Group, which identifies technology needs in the first responder community. Photo courtesy of the U.S. Coast Guard.

Committed to Community (continued)

in different parts of the country to validate a new technology and ensure the design is effective for first responders in the field. Based on the input gathered, DHS makes adjustments to the technologies as needed.

"This is an iterative process," said Randy Zeller, director for Interagency and First Responder Programs Division at DHS S&T. "It will take some time to get it right, but we are well underway. The first responder community is large and diverse, and we are counting on our FRWG advisors to represent their larger communities. That is a challenge for them, and we are very grateful that they are willing to help us out in this way."

In addition to supporting the development of technologies, DHS S&T collaborates with other federal agencies and the first responder community to help identify and, if necessary, assist in the development of national standards that will govern the equipment used in the field. Standards guide the development, use, and implementation of technologies. National standards give the federal government and the private sector common standards or benchmarks to judge individual technologies. The standards help ensure that equipment not only meets the needs of the first responder community but that it can be integrated with legacy systems and hardware from vendors that first responders have already purchased.

Standards development is badly needed in the areas of communications and information management. The FRWG ranked data integration and interoperability among the capability gaps that affect all first responders, regardless of discipline. Given the importance of this gap, DHS S&T and FEMA have already made significant investments in this area and will continue to do so.

DHS S&T recognizes that while technology can make first responder communities safer and more efficient, technology created without an eye towards real world problems and conditions can be, at best, an exercise in futility and frustration. Therefore, it focuses on developing technological solutions that meet the needs of first responders and can be deployed in the field.

For more information, first responders can download a guide to the First Responder IPT at www.rkb.us/contentdetail.cfm?content_id=222028.

CRITICAL CARE ON THE GO

Military Project Tests Portable Case Containing ICU Equipment

Paramedics currently use multiple pieces of medical equipment to give patients oxygen, monitor vital signs, and administer fluids. When the patient reaches the hospital they need to be disconnected from each piece of equipment and then connected to a different set of monitors and equipment in the emergency room. This process is repeated if the patient is admitted to the intensive care unit (ICU) or other hospital accommodations.

In the future, patients could be connected to a single piece of equipment that would handle the functions of multiple medical devices and follow them from the field all the way to a hospital room. The U.S. military is testing

Thornhill Research, Inc. designed its critical care device, MOVES, to hook on the side of a stretcher. Photo courtesy of Thornhill Research, Inc.

Critical Care on the Go (continued)

critical care trauma and transport designs that combine these functions into a single unit, said Eric Abbott, project manager with the U.S. Army Medical Materiel Agency (USAMMA).

The military wanted to streamline the patient transport process and fund the development of a multi-function medical device that could accompany combat casualties from the field to military hospitals, according to Glenn Fogg, director of the Department of Defense (DoD) Rapid Reaction Technology Office (RRTO). RRTO, the Defense Advanced Research Projects Agency (DARPA), the U.S. Army Medical Research and Materiel Command (MRMC), the U.S. Air Force, and the U.S. Marine Corps contributed funding to critical care trauma and transport projects, which could field commercialized devices by the end of 2010.

The devices would benefit civilian first responders as well as military medical personnel, according to Abbott. Paramedics using the device would have less equipment to manage. "Everything that the patient is going to be hooked up to in the [emergency room] will be contained in one unit," Abbott said. "Instead of having to worry about two or three separate items, you just grab this one unit, and it provides the information of two or three items."

According to Abbott, the U.S. Army and Air Force are testing several devices, including the LS-1 by Integrated Medical Systems, Inc. (IMS) and MOVES by Thornhill Research, Inc. These tests will determine which design or designs best meet the military's needs. A successful critical care trauma and transport device will monitor vital signs, such as heart rate and blood pressure; provide fluids infusion and oxygen to patients; and alert medical personnel to any weakness in a patient's vital signs. MRMC also would like the final device to potentially incorporate a defibrillator and other ancillary equipment, Abbott noted.

The LS-1, created by IMS, is a 2-cubic-foot modular, customizable, and remotely-controllable device that incorporates several pieces of state-of-the-art equipment paramedics and emergency medical technicians (EMTs) rely on in the field, said Matthew Hanson, Ph.D., vice president and co-founder of IMS. Approved by the Food and Drug Administration (FDA), the device is designed to run on batteries for extended periods and has a single power adaptor for when facility or vehicle power is available, he noted. Although first responders have not yet tested the device, Hanson sees potential for EMTs and paramedics to use the LS-1 when responding to natural or manmade disasters. "They can move the hospital effectively with the patient," he said.

MOVES, a self-contained life support system created by Thornhill Research, takes a different approach. MOVES sits within a 40-inch by 5-inch by 9-inch case that fits alongside a stretcher, according to Cliff Ansel, the firm's president. The device contains a ventilator, a suction system, a critical care patient monitoring system, and

Critical care trauma and transport devices, such as the LS-1 shown here, combine several medical devices, data systems, and utilities into one smaller, lighter, modular piece of equipment. Photo courtesy of Integrated Medical Systems, Inc.

Critical Care on the Go (continued)

an oxygen concentrator, as well as an optional infusion system. The oxygen concentrator eliminates the need for first responders to carry tanks to provide oxygen to patients. This greatly increases overall mobility, Ansel noted. "One issue you have right now is everybody's running around carrying oxygen tanks," he said.

Despite their advantages, these devices could present logistical problems. Paramedics cannot always hand off equipment to the hospital, said Gary Wingrove, president of the National EMS Management Association. In many communities, the ambulance service and hospital are run by different entities. In those situations, it could be problematic for an expensive piece of equipment to change hands.

The potential benefits of a small, lightweight, portable ICU device could entice paramedics to try it, according to Wingrove. The devices could be helpful in situations where first responders must carry equipment up several flights of stairs to reach patients. "That is [currently] a major obstacle for us," Wingrove said.

Beyond the basic tests of functionality, the military's testing will ensure the critical care trauma and transport devices can perform in extreme temperatures and weather conditions paramedics sometimes face. The U.S. Army and U.S. Air Force are testing to see how the equipment performs in helicopters, fixed-wing aircraft and ground vehicles. That information could be applied to future use in civilian air and ground ambulances.

DoD eventually would like to see the technology evolve to incorporate closed-loop control, according to Abbott. With closed-loop control, if the device detected a problem with the patient's vital signs, it would automatically take action to compensate, such as increasing the concentration of oxygen or fluids administered to the patient. "It would free up the [healthcare] provider or the paramedic to attend to other needs that can't be addressed by the machine," Abbott said.

For more information about the critical care trauma and transport devices, visit www.lstat.com/Content/Products.asp and www.thornhillresearch.com.

HEALTHY EATING

Public Health Officials Use Online Platform to Protect Food Supply

When public health experts trace the origins of illness to a food, government officials rush to protect the public by having the item removed from store shelves. Representatives from the U.S. Food and Drug Administration (FDA) as well as state officials visit or call thousands of retailers to ensure they are complying with the FDA food product recall. FDA reviews the information from these checks to ensure the recall is completed in an effort to prevent additional cases of food-borne illness. The process of conducting these recall audit checks involves significant communication among federal, state, and local public health officials.

To streamline the process, FDA officials are now working on a pilot program to coordinate food recalls on a secure

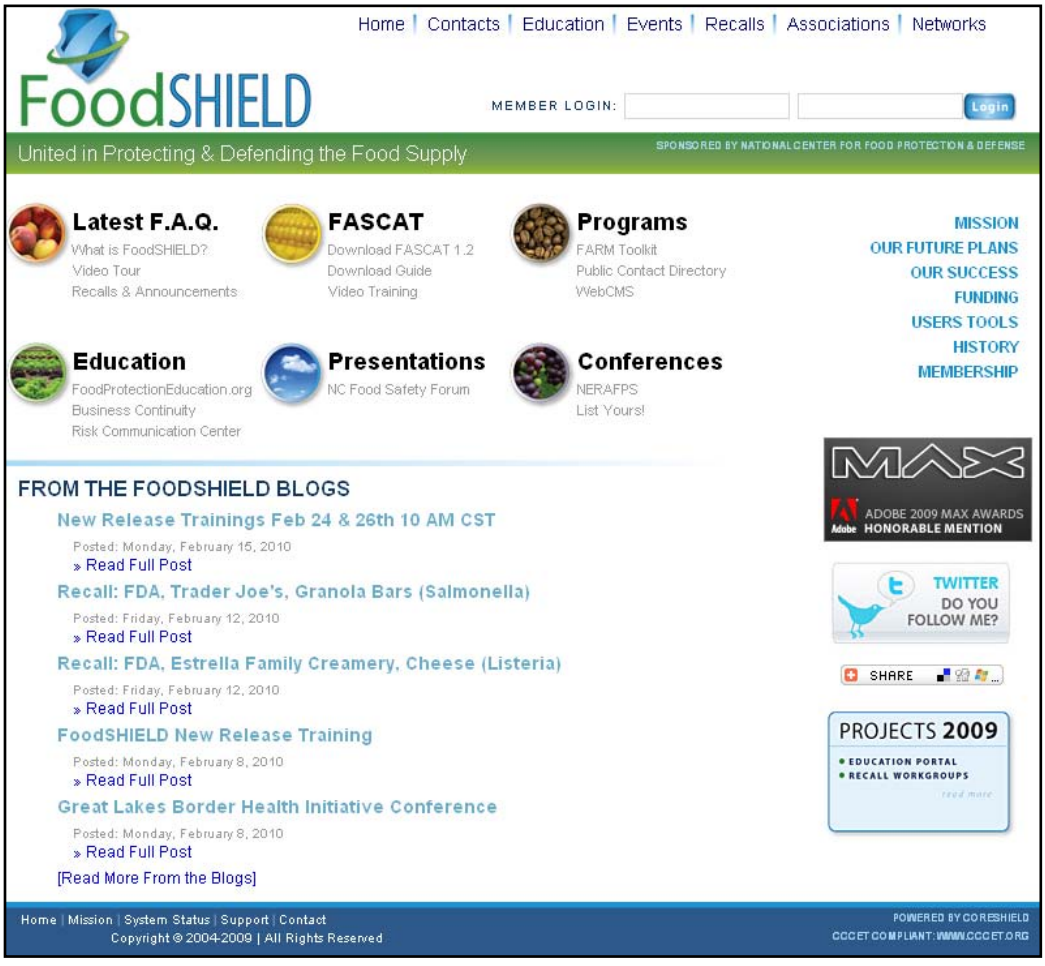
A farm manager cultivates a soybean field to control weeds. When an emergency jeopardizes the nation's food supply, public health officials can discuss it on the FoodSHIELD platform. Photo courtesy of USDA Agricultural Research Service.

Healthy Eating (continued)

online platform sponsored by the National Center for Food Protection and Defense (NCFPD), a Department of Homeland Security (DHS) Center of Excellence. This online platform, called FoodSHIELD, provides a place for federal, state, and local public health officials, state laboratory personnel, and regulatory authorities to collaborate on drafting preparedness and response plans. During food system emergencies, this specifically includes the ability to quickly network and communicate with each other.

In May 2009, FDA officials conducted a simulation of a recall audit check, using FoodSHIELD to coordinate the effort, according to Jacqueline Little, Ph.D., team leader in the Office of Enforcement within the FDA Office of Regulatory Affairs. Using data from a recent recall, officials from seven states uploaded audit check results into FoodSHIELD. FDA officials in field offices reviewed the information and either approved it or contacted the states to request additional information. In all, the pilot successfully demonstrated the use of FoodSHIELD as a data sharing and communications tool for recalls, and its potential use in the future appears promising. "[The pilot] is a great example of our efforts to collaborate across agencies and on all levels of food protection," according to Heather Brown, program analyst with the Office of Resource Management in the FDA Office of Regulatory Affairs.

While FDA uses FoodSHIELD for coordination during recalls, the U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS), which inspects meat, poultry, and processed egg products, uses the online platform's working group feature to provide valuable information to state officials to help them prepare for emergency situations. In a new effort, FSIS Food Defense Assessment staff is launching a workgroup for sharing vulnerability assessments of its regulated commodities with the states for official use. State officials intend to use the documents to support their own food defense activities and improve their communication with industry. FoodSHIELD provides an ideal platform for this activity because it allows for a vetting process, access controls on documents, and record keeping.



FoodSHIELD provides an online platform where public health officials can communicate and discuss threats to the nation's food supply. Photo courtesy of National Center for Food Protection and Defense.

Several federal agencies supported FoodSHIELD's creation. The Association of Food and Drug Officials co-sponsored FoodSHIELD with the DHS-funded NCFPD. DHS awarded a grant in February 2010 to continuing funding the Center of Excellence through 2015, with the University of Minnesota continuing as the lead. USDA, including FSIS, funded FoodSHIELD's development with a four-year National Integrated Food Safety Initiative grant. The NCFPD will support the platform's ongoing operations beginning in fiscal year 2010 using funding from DHS, FDA, and USDA. The Food Emergency Response Network (FERN) – a group of federal, state, and local food testing

Healthy Eating (continued)

laboratories – also provided funding for the creation of its own portal within FoodSHIELD. FERN, which is co-managed by FSIS and FDA, integrates the nation's food-testing laboratories into a network that is able to respond to emergencies involving biological, chemical, or radiological contamination of food. Members of the Federal Interagency FoodSHIELD Workgroup, which includes FDA, FSIS, and the DHS Office of Health Affairs (OHA), are developing a charter and business plan for the continued use and funding by federal agencies for the FoodSHIELD platform.

Federal, state, and local officials can use FoodSHIELD's communication capabilities to quickly mobilize in an emergency, according to Travis Goodman, food defense coordinator for the Indiana State Department of Health. Before NCFPD launched FoodSHIELD four years ago, public health officials had to find and collect the contact information needed for urgent communications. Now officials can contact representatives from FDA, DHS, USDA, and relevant state agencies through the FoodSHIELD interface. The platform gives access to about 4,000 contacts, enabling widespread recalls or other actions to be broadcast widely and therefore undertaken quickly. "If you manage to save [response] time, you may just save lives," Goodman said.

Wheat is harvested at the USDA Agricultural Research Service Central Great Plains Research Station in Akron, Colo. Public health officials can discuss threats to the nation's food supply on a secure online platform called FoodSHIELD. Photo courtesy of USDA Agricultural Research Service.

FoodSHIELD's communications environment allows public health and food regulatory officials to share real-time information during an emergency, Brown explained. FoodSHIELD can create working groups for specific threats or set up a Webinar to deal with an emerging threat in minutes, said Shaun Kennedy, director of the NCFPD and a professor at the University of Minnesota. "When there are emerging food-borne illness outbreaks, you'll have folks sharing information back and forth to identify the source," Kennedy said. "[FoodSHIELD] gives them a common portal to go through to share information."

Another tool being deployed on FoodSHIELD that is useful in a food supply emergency is the Consequence Management System, a visual modeling tool for predicting the potential effects of a particular incident. The system helps public health officials understand how severe a threat to the food supply could be and how rapidly a contaminant could spread. Developed through a public-private partnership between BTSafety and the NCFPD, the Consequence Management System calculates and displays the potential morbidities, mortalities, and economic impact from a contaminant in the food supply, according to Kennedy. Public health officials can also use the tool to experiment with potential responses to the scenario.

"The FoodSHIELD site has uses beyond food supply emergencies. Officials can use FoodSHIELD to find information on issues such as food defense, regulatory programs, public health, laboratory testing, and other related topics," according to Dr. Patrick McCaskey, executive associate for laboratory services at USDA FSIS. "FoodSHIELD offers members several ways to collaborate online, such as video conferencing as well as online review and editing of documents."

Healthy Eating (continued)

Public health officials working on preparedness plans to keep the food supply secure can use the platform as a virtual workspace. Officials working on the 2010 DHS Food and Agriculture Sector annual report – an update to the nation's risk management plan designed to protect food supply infrastructure – have used FoodSHIELD to discuss progress and ideas for food preparedness initiatives, according to Goodman.

Within DHS, the Office of Infrastructure Protection (OIP), OHA, and the Science and Technology Directorate all use FoodSHIELD's capabilities. OIP obtains food system critical infrastructure information from the states using the platform. The OHA Food, Agriculture, and Veterinary Affairs Defense Division collaborates with states to develop food event capability assessment tools.

Federal, state, and local food regulators, laboratory staff, military personnel, and academics are eligible to join FoodSHIELD, located at www.foodshield.org. Government members must be vetted to obtain access to secure portions of the Website and to participate in FoodSHIELD working groups. FoodSHIELD currently offers more than 200 working groups.

For more information, visit www.foodshield.org.

Farmers harvest cranberries in New Jersey. Public health officials can draft preparedness plans to protect the nation's food supply using a tool called FoodSHIELD. Photo courtesy of USDA Agricultural Research Service.

RESPONDER KNOWLEDGE BASE

RKB Enhances its Products Module

Based on feedback from multiple Responder Knowledge Base (RKB) users, RKB implemented design enhancements to the products module in January 2010. These changes are intended to make the site easier to use, increase browsing, and make it simpler to determine whether or not a product has received third party certification.

The products page can be accessed via the "Products" tab located near the top left of the Website at www.rkb.us or by visiting the page directly at www.rkb.us/ProductsMain.cfm. The products page contains information that manufacturers have submitted about a variety of items used by first responders.

RKB (continued)

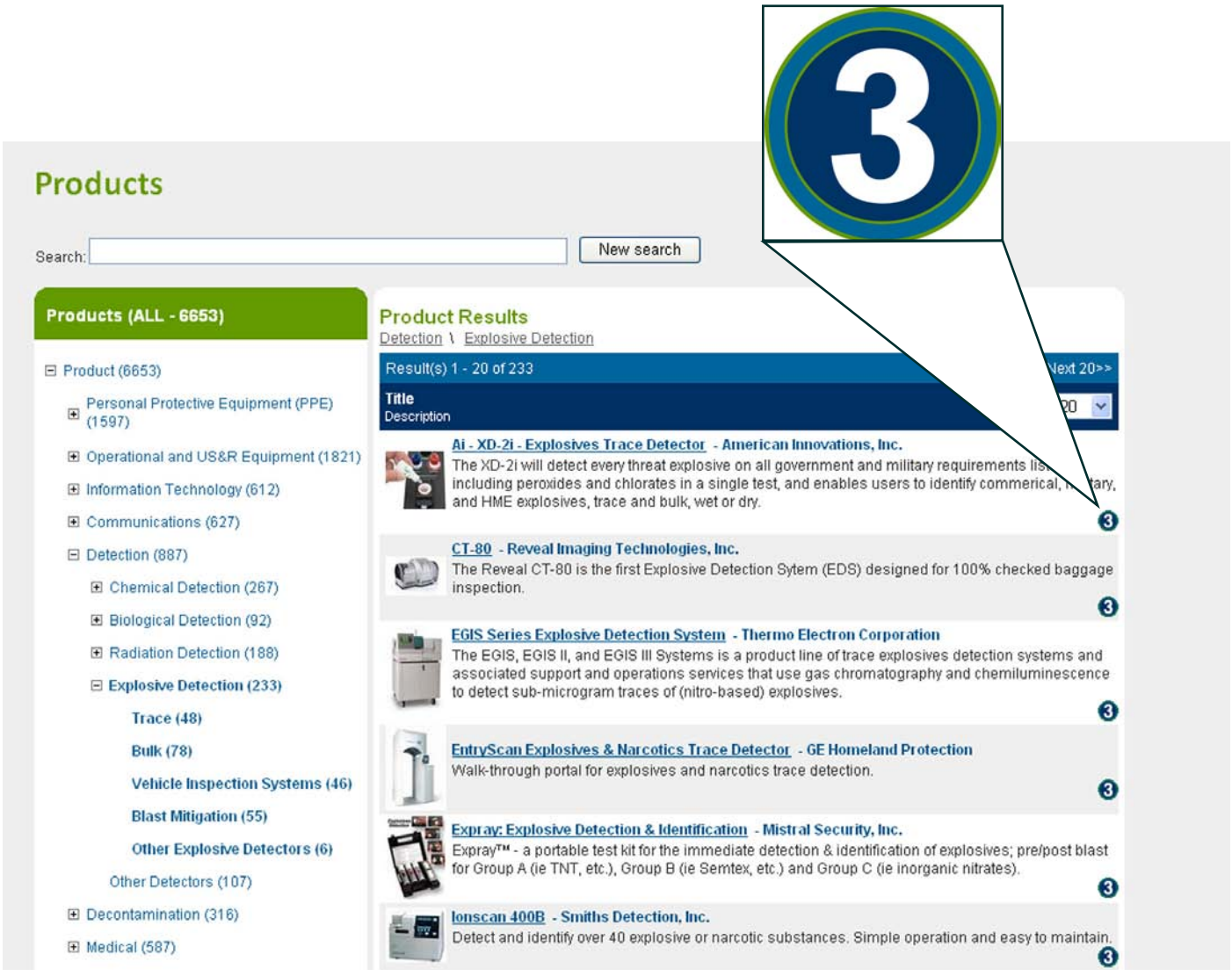
Updates to the products module include:

- A Recently Added box on the products page that lists the new products and technologies most recently uploaded to the RKB Website. Clicking on "More" will show a listing of more than 6,500 products available on RKB in order of their uploading, starting with the most recently uploaded products.

- Images were added to the product description section of the search results. This will help users find what they need more efficiently and speed up searches.

- A redesigned symbol to identify which products were certified by third parties. A white number three in a blue circle in a product's listing indicates that the product received a third-party certification. This design change makes it clearer which products are certified to existing standards, part of an ongoing effort to help responders make informed equipment decisions. This icon is located in the search results and also is more prominently located on the product page.

For more information, e-mail RKB at RKBMailbox@us.saic.com or call 1-877-FEMA-RKB (1-877-336-2752).



Product images displayed with search results will make it easier for first responders to find equipment in the Responder Knowledge Base's product listing. Also visible are symbols marking certain products as having third-party certifications. Photo courtesy of RKB.