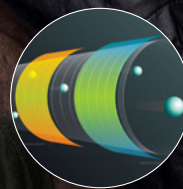


JST in the News

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A Pipeline to Success



Beyond a Bandage

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DTRA MISSION



DTRA provides cross-cutting solutions to enable the Department of Defense, the United States Government, and international partners to Deter strategic attack against the United States and its allies; Prevent, reduce, and counter Weapons of Mass Destruction (WMD) and emerging threats; and Prevail against WMD-armed adversaries in crisis and conflict.

CHEMICAL AND BIOLOGICAL TECHNOLOGIES DEPARTMENT MISSION

Lead DoD science and technology to enable the Joint Force, nation, and our allies to anticipate, safeguard, and defend against chemical and biological threats.

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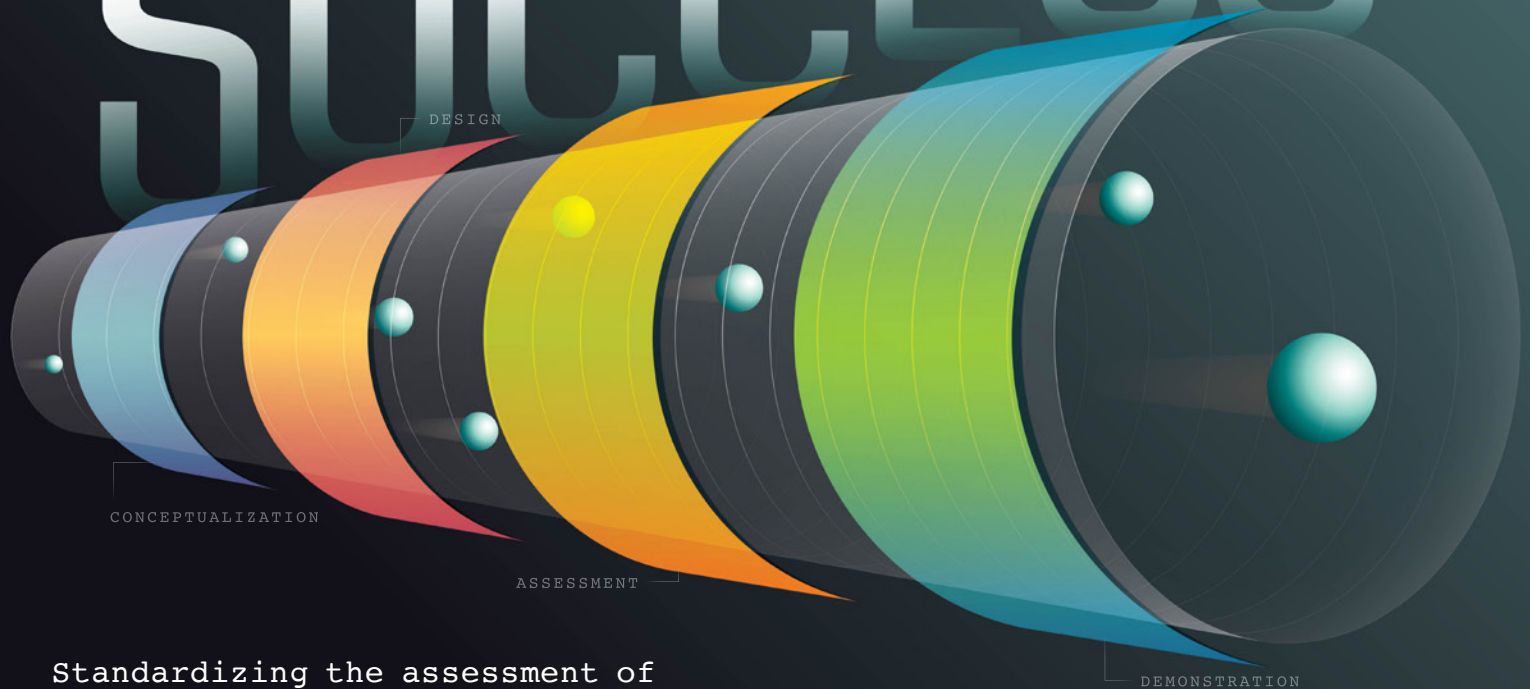


Front cover: U.S. Marines with Headquarters Company, Chemical Biological Incident Response Force, conduct decontamination procedures on a simulated casualty during exercise Arctic Edge 2023, Port MacKenzie, Alaska. Arctic Edge 2023 is a U.S. Northern Command-led exercise demonstrating the U.S. military's capabilities in extreme cold weather, joint force readiness, and U.S. military and local homeland defense commitment to mutual strategic security interests in the Arctic region. (U.S. Marine Corps photo by Staff Sgt. Jacqueline A. Clifford)

Inside cover: The Joint Services Lightweight Chemical Agent Detector (JSLSCAD) mounted on a Point Sensor Enclosure at Dugway Proving Ground (DPG), which began testing the JSLSCAD in the early 2000s. The Next Generation Chemical Detector, which will eventually replace the JSLSCAD, is currently undergoing testing at DPG. (U.S. Army photo by Albert Vogel)

Back cover: Medical airmen wheel a simulated victim into the decontamination tent during an exercise at Eglin Air Force Base, Fla. The chemical/biological exercise was part of required deployment training for U.S. Air Force medics. More than 60 completed the three-day training course. (U.S. Air Force photo by Samuel King Jr.)

A PIPELINE TO SUCCESS



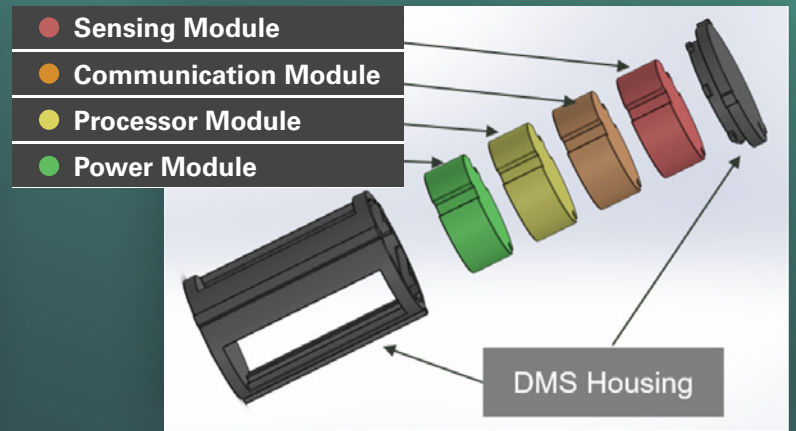
Standardizing the assessment of detection technologies to safeguard the Joint Force from chemical and biological hazards

Academic and industrial research into microelectronics and chemical, biological, radiological, and nuclear (CBRN) detection methods has rapidly advanced the development of low-size, weight, and power (SWaP) sensors that can provide integrated early warning and situational awareness of potential hazards for the Joint Force with a reduced logistical burden. While these microsensors offer significant promise for the next generation of CBRN threat-detection methods, inconsistent standards for evaluating sensor performance have hindered transitioning the sensors from the lab to the field. The new Deployable Microsensor Pipeline will focus on identifying and systematically evolving detection technologies through continual market research, component-through-system-level testing, and operational assessments to quickly deploy this essential function.

To further drive innovation in CBRN threat sensors, the Defense Threat Reduction Agency's (DTRA's) Chemical and Biological Technologies Department in its role as the Joint Science and Technology Office (JSTO) for Chemical and Biological Defense, an integral component of the Chemical and Biological Defense Program, has partnered with the U.S. Army Combat Capabilities Development Command – Chemical Biological Center (DEVCOM CBC) to create a more standardized sensor assessment method called the Deployable Microsensor Pipeline to ensure that the technologies best suited to provide improved CBRN detection capabilities reach the field as soon as possible.



Example of microsensors attached to an unmanned aerial vehicle for strategic placement. (DTRA JSTO photo)



Representation of deployable microsensor (DMS) with a swappable sensing payload. (DTRA JSTO image)

This integrated early warning capability will help keep the Joint Force safe in an operational environment by distancing warfighters from potential threats.

Microsensors are non-recoverable and readily deployable CBRN sensing capabilities that the Joint Force can strategically place around important routes, zones, and other areas. Installed either through staffed or unmanned platforms, the microsensors will communicate with one another, generating a networked array that can provide continuous area monitoring and mapping of CBRN threats. This integrated early warning capability will help keep the Joint Force safe in an operational environment by distancing warfighters from potential threats.

The Deployable Microsensor Pipeline focuses on four efforts to identify and evolve sensor technologies:

- 1. Conceptualization and identification:** continuous technology canvassing and horizon scanning across industry, government laboratories, and academia
- 2. System architecture and design:** early prototyping, fabrication, integration, and algorithm/analytics and information management encoding
- 3. Assessment:** system-level testing of the reliability, maturity, and performance of the candidate technologies
- 4. Demonstration:** periodic technical and operational demonstrations of the technology for service-appropriate applications

DEVCOM CBC currently uses the testing protocols developed as part of this effort to evaluate the performance of other DTRA JSTO microsensor technologies on actual chemical warfare agents.

In addition to rigorous testing protocols, the Deployable Microsensor Pipeline also focuses on developing a common sensor architecture that will allow for swappable sensor payloads, standardizing the way disparate sensors communicate, and for assessing different methods of precise sensor placement such as unmanned platforms. With these capabilities, the Joint Force will be able to choose the specific sensing capability needed for a given mission—be it chemical, biological, radiological, or nuclear—to provide them with an agile integrated early warning capability without burdening them with unnecessary gear.

DTRA JSTO's investment into the Deployable Microsensor Pipeline aims to help drive the next generation of low-SWaP CBRN sensors and establish a framework for the continual assessment and evaluation of emerging technologies. This sensor technology should soon join DTRA JSTO's proven history of successfully providing the Joint Force with critical capabilities. ●



Veriox wipes provide early
wound decontamination
right when it's needed.

BEYOND A BANDAGE

Joint Force members injured by or contaminated with chemical/biological warfare agents (CBWs) should be treated as soon as possible after exposure, preferably within 2 minutes, for the most effective decontamination. This timeframe also refers to decon solutions using reactive chemistry to allow for neutralization. Quick application of Veriox DECON solution may provide a difference between survival and death from CBWs.

The Defense Threat Reduction Agency's (DTRA) Chemical and Biological Technologies Department in its role as the Joint Science and Technology Office (JSTO) for Chemical and Biological Defense, an integral component of the Chemical and Biological Defense Program, is investing in this alternative technology to support wound decontamination. This endeavor illustrates how DTRA JSTO is transforming CB S&T to prepare for current CBW threats and anticipate emerging threats the Joint Force may face in the future. The Veriox DECON solution created by Armis Biopharma is a liquid topical antimicrobial, anti-infective disinfectant that has been proven to destroy chemical warfare agents in two studies conducted by the U.S. Army Medical Research Institute of Chemical Defense. It is also an effective biocide and will destroy bacteria, fungi, and most viruses.

DTRA JSTO organized a user event at Camp Bramble, Joint Base San Antonio Lackland in San Antonio, Texas, with the hospital decon team of the 59th Medical Wing. The hospital decon team's mission is to save the lives of individuals possibly affected with CBWs while also preventing the spread of CBWs to others in the treatment facility. DTRA personnel worked with the 59th Medical Wing and other experts of military decontamination to create a realistic scenario based on current military decon procedures. Veriox can be applied directly to contaminated skin with a pretreated wipe or in a liquid form. The prototypes consist of 6-inch-square wipes and 10-inch-square wipes saturated with the Veriox liquid. The medics reviewed different wipe prototypes packaged in individual tear-open pouches and in a bottle that provided additional liquid.

For this user event, the hospital team set up a basic decon line and had three different versions of the Veriox wipes to use on manikins with mock wounds. The team wore protective garments and tested three different versions of the decon wipe packaging to see which version was more efficient to use when wearing mission-oriented protective posture (MOPP) gear. The decon personnel evaluated the ease of opening the wipe packets while using heavy, protective rubber gloves and having the poor vision that MOPP gear can present. When the team finished evaluating the decon wipes, they discussed the benefits of the wipes, how they could be improved, and provided the results to the technology developer.



A technology developer observes test participants using a sprayer, soap, water, sponges, and Veriox wipes. (DTRA JSTO photo)

This technology could help save lives and extend the opportunity to move the severely wounded to an appropriate level of care.

The most important and effective decontamination of a chemical exposure is done within the first minute or two after exposure, typically at the point of exposure, potentially by the wounded individuals themselves. The severely wounded cannot do this, however, and will be in greater danger from the CBW agent getting into an exposed wound. DTRA JSTO's investment in Veriox wipes could help the wounded individual, warfighters providing buddy aid, or medics treating wounded warfighters and civilians in mass casualty events with an efficient means of decontaminating and treating casualties to help neutralize CBW threats. This technology could help save lives and extend the opportunity to move the severely wounded to an appropriate level of care. ●



Within the Defense Threat Reduction Agency's Research and Development Directorate resides the Chemical and Biological Technologies Department performing the role of Joint Science and Technology Office for Chemical and Biological Defense, an integral component of the Chemical and Biological Defense Program. This publication highlights the department's advancements in protecting the Joint Force, our nation, and allies from chemical and biological threats through the innovative application of science and technology.

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