QUANTUM TECHNOLOGIES, METAMATERIALS, AND THE FUTURE OF CB SENSING

Deployable Integrated Microsensor Evaluation System (DIMES)

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Current CBRN sensors employ point detection capabilities that require soldiers to enter the CBRN hazard to detect potential threats and lack the capability to monitor multiple named areas of interest and larger areas in real-time. In response, DoD research initiatives aim to miniaturize chemical detection, develop novel engineering solutions, low or cost unique manufacturing methodologies and provide integrated framework by providing persistent remote CBRN sensing and detection. U.S. Army DEVCOM Chemical Biological Center (DEVCOM CBC) is part of a collaborative effort to advance microsensor technology to create smaller, lighter, low cost yet capable, sensors to detect CBRN hazards across multi-domain operations.

The DEVCOM CBC Deployable Integrated Microsensor Evaluation System (DIMES) is a modular and interoperable sensor technology engineered into a compact form factor that facilitates the evaluation of novel sensors and sub-components at various Technology Readiness Levels. DIMES allows for a variety of sensor sub-components to be evaluated without re-engineering the entire system. It also provides a platform to evaluate deploying and dispersing of
CBRN sensors throughout an area of operation, from the rear support area to the forward edge of the battlefield, through various methods such as Unmanned Aircraft Systems (UAS), Unmanned Ground Vehicles (UGV), and projectiles. This eliminates the need for soldiers to enter a potential CBRN threat area. A fully developed micro sensor in the battlefield can provide a real-time layer of threat information over a larger area than traditional handheld methods of detection. The data provided may then be used (pre-positioned) to clear ingress and egress routes, monitor wet gap crossings, and be fused with other detection technologies to increase battle space awareness of CBRN threats.

This approach includes a synergetic investment in whole of center core competencies in strategic vision, chemical and biological sensor subject matter expertise, engineering design, fabrication, and integration, and dedicated system of systems analytic data management and processing. A comprehensive analysis of available and maturing technologies across the GOTS, COTS, and S&T investment portfolio is currently underway on a level playing field with a focus on delivering end user utility and capability. This effort includes the synchronization multiple projects across DTRA RD, JSTO, JPEO, and DARPA.

The final capability will (1) remotely detect and classify CBRN hazards beyond line-of-sight distances, (2) increase time and space for decision-making, (3) conduct persistent surveillance during Large Scale Combat Operations (LSCO), and (4) provide decision-makers with near real-time environmental hazard awareness.