



Case Study: Mil-Spec Imaging System

Silicon Valley Results for U.S. Army's First Responders to a Radiological-Nuclear Attack

Imaging expertise reduces threat impact while new deployment process protects troops more quickly

Customer overview

The U.S. Army owns a fleet of Nuclear, Biological and Chemical (NBC) Reconnaissance Vehicles (NBCRV) which complete route reconnaissance and surveillance in the event of a suspected nuclear, chemical or biological attack. The vehicle houses an integrated NBC sensor suite and meteorological system so the crew can detect areas of contamination and then plot a clean bypass route. The NBCRV can also collect and transport samples of radiological, biological and chemical material for later analysis.

NBCRV crew attend months of training to learn the equipment and tactical elements needed to address domestic homeland and Department of Defense (DoD) emergency response needs, provide technical escort operations and undertake Special Forces Chemical Reconnaissance

Detachment plans.¹ The NBCRV is a critical piece of their training, providing not only protection, but critical information gathering sensors. These externally mounted sensors must be manufactured to withstand harsh elements such as extreme heat or cold, while collecting detailed radioactive, chemical and biological data from the environment.

Challenge: Upgrade the radiological-nuclear point detection sensors for field deployment in 18 months

The radiological-nuclear sensing equipment mounted on the NBCRV dates to the Cold War and consists of AN/VDR-2 and AN/UDR-13 Radiac sets to detect and quantify alpha, beta, gamma, or neutron radiation.² The U.S. Army realized that supporting the old sensing equipment was an infeasible task. The manpower required to locate spare parts when repairs were required, as well as maintaining the personnel expertise, led to the decision to upgrade the systems. Two departments under DoD were tasked with developing and deploying new systems that were ruggedized and networkable for both radiological-nuclear point detection and mobile standoff detection. They had an extremely short 18-month timeline to produce a new NBCRV sensor suite for 12 prototypes.



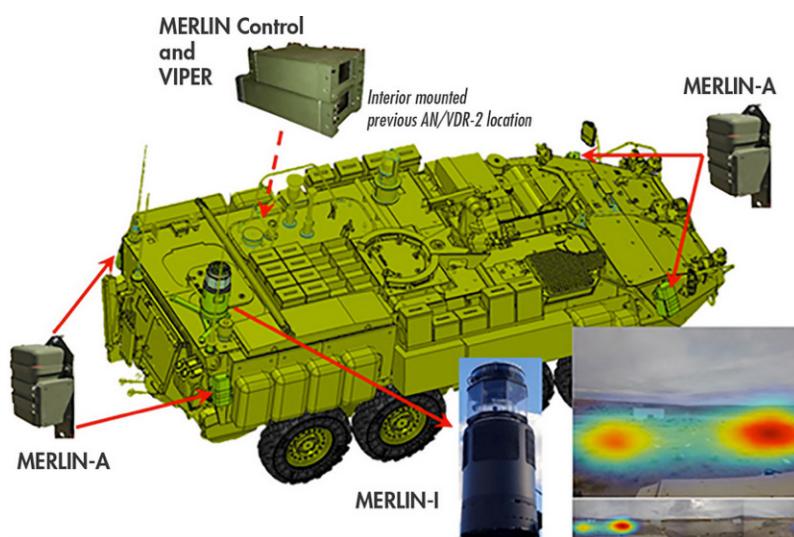
Team members with the NBCRV Stryker crew.



Imaging System on a Humvee during field trials.

Solution: Electronic, mechanical, imaging and project management expertise deliver first in radiological-nuclear detection

One department, the Defense Threat Reduction Agency (DTRA), had a prior relationship with LocoLabs and other DoD contractors for research and development efforts in imaging and radiological-nuclear detection technology. LocoLabs pulled from a treasury of inhouse expertise and developed the visual imaging system for the MERLIN-I³ sensor that is mounted on the outside of the vehicle. MERLIN-I enables rapid stationary standoff radioisotope detection and provides source location and imaging of radioactive hot spots.



NBCRV radiological-nuclear sensor suite upgrades include the MERLIN-I that consists of four NVIDIA GPUs and LiDAR sensors, providing first-of-its-kind distributed source imaging. (Photo source: "The M2PRDS represents an alternative acquisition approach," April 16, 2018, U.S. Army)

LocoLabs, in their development, testing, deployment and support of MERLIN-I, engaged in a wide range of project management and engineering activities that cover the full spectrum of a complicated development cycle. MERLIN-I required the following from the cross-functional team:

Project Management	Engineering
Customer liaison	Multi-processor design with NVIDIA GPUs and LiDAR sensors
Finance/budget	Electromechanical design with robust thermal management
Material acquisition	Firmware and software development
In-house and field trials scheduling	Integrity testing

“With mechanical, electrical, and software expertise, LocoLabs is our go-to resource to provide robust solutions to our customers’ complex, mission-critical challenges. LocoLabs delivered on several Countering Weapons of Mass Destruction (CWMD) contracts involving imaging and sensor technologies that are crucial to keeping first responders and soldiers safe. And equally as important as all of that: those “Loconians” are fun to work with!”

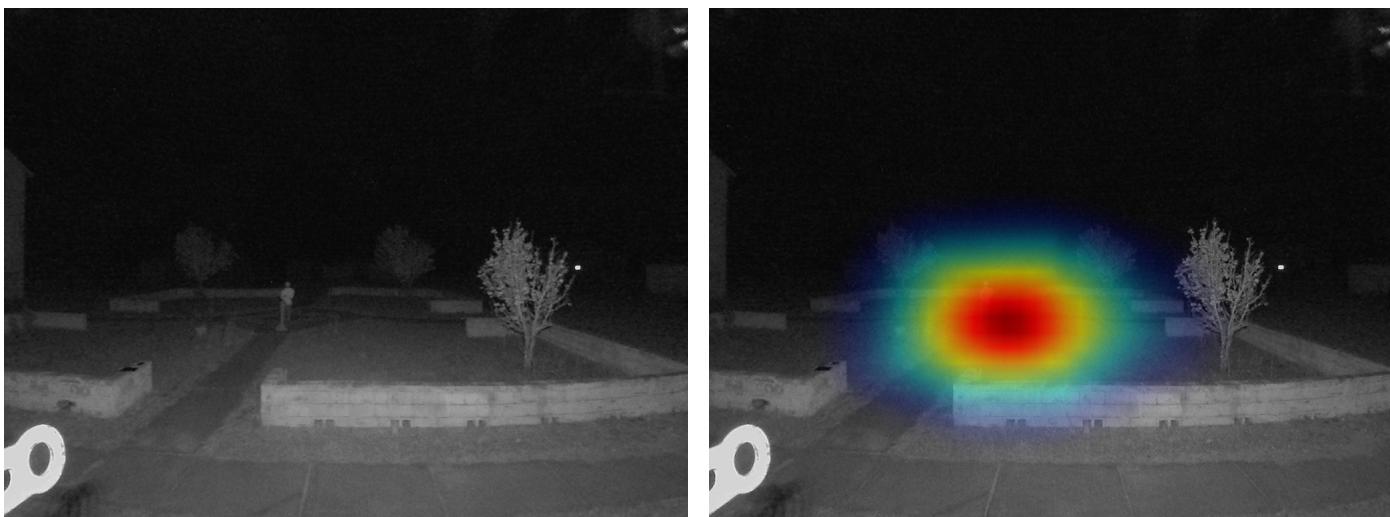
Brad Beatty, Principal Scientist, Alion Science and Technology Corporation

Result: MERLIN-I proves its effectiveness and is deployed years ahead of traditional U.S. Army upgrade projects

MERLIN-I had to conform with physical and electronic hardening requirements to withstand harsh, contaminated military environments with minimal maintenance needs. MERLIN-I is currently completing field trials.

DTRA engaged LocoLabs and “leveraged prototyping, experimentation and other critical developmental activities to mitigate the technical risks inherent in systems acquisition,” according to Mr. Valentin Novikov, who retired from the Army as a lieutenant colonel in 2006 while serving as the director for joint chemical, biological, radiological and nuclear combat developments for the Maneuver Support Center of Excellence and is currently the joint product leader for radiological and nuclear defense at JPEO-CBD, Aberdeen Proving Ground, Maryland.⁴

MERLIN-I is part of the Stryker NBCRV Sensor Suite Upgrade program under the DoD. This program included a mandate to test a new rapid fielding process that included collaborative, upfront user evaluations, mature technologies, early platform risk-reduction events and open involvement of diverse acquisition stakeholders. This streamlined acquisition approach enabled the project to complete a year sooner than the standard approach because it facilitates rapid prototyping and rapid fielding.⁵ LocoLabs played a key role in the radiological-nuclear sensor suite upgrade with the MERLIN-I which will help protect troops in the field.



Night testing with IR illumination, showing the scene before and after 3D spectroscopic imaging. The colored area represents radioactive source and relative intensity.

1. U.S. Army Chemical, Biological, Radiological and Nuclear School (USACBRNS)
2. NBC Reconnaissance Vehicle M1135 Stryker
3. Mounted Enhanced RADIAC Long-Range Imaging Networkable (MERLIN) which has two subsystems: the MERLIN-Imager (MERLIN-I) and the MERLIN-Applique (MERLIN-A).
4. “The M2PRDS represents an alternative acquisition approach,” April 16, 2018, U.S. Army
5. Ibid.

