Maneuver Support and Protection Integration Experiment 2024

By Colonel Kenneth J. Frey and Mr. David L. Nobles

The U.S. Army Futures Command (AFC), Fort Eustis, Virginia, is the Army organization responsible for modernization efforts for the entire force. AFC includes the Futures and Concepts Center (FCC); and within the FCC, modernization for all regiments is managed by a capabilities development integration directorate, which supports a center of excellence. In the AFC world, life starts with ideas that drive scientific and technological endeavors, which then require experimentation in order to develop requirements. So, concepts, science and technology, experimentation, and requirements—always executed in that order—are the core AFC competencies.

Concepts

The Directorate of Concepts, FCC, evaluates the possible future operational environment and associated threats, including current and emerging violent extremist organizations, and arms military analysts and technologists with technology expected to be widely available in the future. The future world is incorporated into Army concepts, which include concept-required capabilities—short descriptions of capabilities needed to win future wars. Based on the Army concepts (and concept-required capabilities), we ask, "Given the current force structure and capabilities, can the U.S. Army accomplish the mission in the future?" If the answer to that question is "no," then there is a "gap." A thorough review of each gap is conducted during a capabilities-based assessment, but that is not the focus of this article.

Science and Technology

Gaps with a likely materiel solution are referred to the government science and technology community—primarily to the U.S. Army Combat Capabilities Development Command, Chemical Biological Center, Aberdeen Proving Ground, Maryland, and the U.S. Army Corps of Engineers Engineer Research and Development Center (ERDC), Vicksburg, Mississippi. Through the U.S. Army Combat Capabilities Development Command and ERDC, individual capabilities development integration directorates can collaborate with industry. Science and technology and/or industry efforts ultimately yield deliverable weapons or systems needed to fill the gaps—either partially or entirely. The technologies under consideration must participate—preferably, with a Soldier—in a "show me the money" event to demonstrate what they can and cannot do. Soldiers who participate represent the future warfighter who will be expected to use the new technology on the battlefield. These demonstrations are performed in the context of an experiment.

Experimentation

AFC does not carry out exercises; instead, it conducts experiments. Through experiments, AFC can test the unknown, accept failure, perform rework, and then test again. AFC experiments as much as necessary because that approach helps reach the final, functioning, Soldier-acceptable solution most quickly, and that is the ultimate goal. If AFC delivers a solution that Soldiers dislike, cannot understand, or cannot successfully use, then AFC has failed in its mission. Experimentation can take on various forms, including simulation, independent system operation, Soldier interaction (in a limited field environment), and participation in a combat training center rotation. Experimentation helps determine the capabilities that Soldiers and AFC need and provides for documentation of the requirements.

A chemical, biological, radiological, and nuclear (CBRN) Soldier uses a Robotics for Engineer Operations system to conduct mission planning for CBRN reconnaissance at standoff.

The Maneuver Support Battle Laboratory, Fort Leonard Wood, Missouri, conducts an annual Maneuver Support and Protection Integration Experiment (MSPIX) at Fort Leonard Wood. MSPIX is one of four FCC-funded, Army-focused warfighter experiments. The main focus of MSPIX is on addressing protection-based capability gaps. Soldiers have the opportunity to use prototype technologies, capabilities, and systems developed by government laboratories and private industry in an operationally relevant environment. In return, technology developers receive Soldier feedback and insight into Army priorities.

MSPIX 24, the eighth annual MSPIX event, was held 6–23 May 2024. With the assistance of 24 Soldiers provided by III Armored Corps, Fort Cavazos, Texas, and tasked units including the 1st Armored Division, Fort Bliss, Texas;

Soldiers operate an Airborne Ground Mines Detection System, to identify surface-laid and partially buried mines.

the 89th Military Police Brigade, Fort Cavazos; and the 36th Engineer Brigade, Fort Cavazos—along with equipment support provided by the 36th Engineer Brigade and the 5th Engineer Battalion, Fort Leonard Wood—the Maneuver Support Battle Laboratory evaluated the potential use of emerging technologies to address existing protection capability gaps and to provide input for capability development documents. MSPIX 24 exposed Soldiers to 13 different technologies; following is a description of each of the technologies assessed:

- Defense Simulation Analytical Service®, developed by IBM©, is a decision support tool designed to assist protection cells at division and higher echelons. The tool enables the automation of many functions currently performed manually by protection cells at the division and corps levels. It has two very useful features: It uses a large language model to power a "staff assistant" function that can quickly find and summarize technical, doctrinal, and operational documents, and it includes a risk assessment feature that could be extremely helpful to protection cells at higher echelons. Soldiers found it easy to learn about the tool and to intuitively operate it. This technology is being further developed, and more Soldiers will soon experiment with it at division level exercises.
- Warfighter Integrated System for Distinct Domain Operational Missions (WISDDOM)®, developed by Collins Aerospace©, a subsidiary of Raytheon Technologies©, is a decision support tool designed to assist protection cells at division and higher echelons. WISDDOM automates a common methodology of assessing risk for critical assets. It uses the Criticality, Accessibility, Recoverability, Vulnerability, Effect, and Recognizability (CARVER) assessment to develop recommended priority protection lists for the most valuable assets of a division. The Soldiers who used this system found it easy to learn and intuitively operate.
- McQ Inc.© demonstrated unattended surveillance and detection capabilities with its Ranger® and rScene® technologies. The McQ Ranger is a small, lightweight ground sensor puck with seismic, acoustic, and magnetic sensors. The McQ rScene is a small, low-power micro radar sensor. Together, these sensors are combined in a rapidly deployable kit that teams of Soldiers can use for tactical surveillance. Despite the muddy MSPIX 24 field conditions, which limited the seismic range, vehicles and personnel were successfully detected using the sensor kit.
- Scylla® demonstrated its artificial intelligence program that connects to existing camera hardware and provides autonomous visual detection capability. The Scylla artificial intelligence program features a simple user-friendly interface and includes a range of algorithms that allow for facial recognition, weapon detection, slip/fall/fight behavior recognition, and intruder detection. A team of Soldiers was trained to activate and calibrate the software; the Soldiers then conducted fixed-site standoff scenarios with high- and low-resolution cameras. The software successfully detected personnel, weapons, and the stipulated behaviors.
- Gantz-Mountain Intelligence Automation System, Inc.© demonstrated autonomous personnel and vehicle detection using its ground-based MT-5-R surveillance package. The MT-5-R kit fits in a standard pelican case and consists of durable, lightweight cameras capable of automatic detection with built-in day sight and forward-looking infrared sensors. A team of Soldiers deployed the kit to conduct tactical surveillance; the team was able to clearly detect people and vehicles at standoff ranges.
- Autodyne LLC© showcased its flight software control program, which enables a single operator to set mission parameters and input drone taskers using a tablet interface, while the software controls multiple small, unmanned aircraft systems. Each Soldier was trained to conduct multiple flights of four drones, and each successfully carried out tactical surveillance and fixed-site standoff missions.
- The Argos® detector, developed by Alakai Defense Systems©, uses an ultraviolet laser to perform Raman spectroscopic sampling on solids and liquids at standoff ranges. The handheld device is powered by a battery and requires manual operation. To target a sample, a visible red laser is pointed at the sample and then activated. The observed target spectrum is compared to a library of Raman spectroscopy data stored within the unit to identify potential hazards. During the MSPIX 24 exercise, the unit was mounted on an articulating arm of a robot, where it was remotely activated. The Alakai team demonstrated the capability to control the robot, activate the Argos unit to collect the sample data, transmit that data through a radio interconnection, and display the data on standard military interfaces.
- Teledyne FLIR© showcased standoff chemical and radiation detection capabilities by using a drone equipped with standard detection systems. Soldiers were trained on programming the drone for fully autonomous operation and detection of live and simulated chemical and radiation targets using tablets equipped with common military software and integrated plugins for drone control and chemical, biological, radiological, and nuclear detection. Threats were successfully detected at altitudes free of terrain obstacles and at ranges that ensured Soldier safety. Soldiers were satisfied with the autonomous operation and the capability to identify and map chemical and radiation threats in an operational area.
- The U.S. Army Combat Capabilities Development Command provided the Multiutility Tactical Transport®, an 8 x 8 wheeled autonomous decontamination system, for

A Soldier installs an MT-5-R camera for standoff surveillance.

the MSPIX event. The decontamination system is controlled by robotic system control software for autonomous operations, which is displayed through a common machine interface. The platform includes a robotic arm for directing movement and positioning sprayer nozzles. Targeting is achieved through the use of a special camera that indicates the presence of contamination through an interface with the onboard processor. The decontamination applicator consists of fluid tanks for washing and decontamination, fluid controls and a compressor, and associated electronic controls. The experiment demonstrated autonomous operation of the Multiutility Tactical Transport through waypoint routing as well as effective teleoperation, both from the interface control station and handheld controllers on the vehicle itself.

- The Airborne Ground Mines Detection System®, developed by Sierra Lobo Inc©, is an aerial surveillance and detection system designed to provide overhead day/night imagery for the real-time detection of explosive hazards such as landmines, submunitions, bombs, and improvised explosive devices. The system sensor is platform-agnostic and can be mounted to any unmanned aircraft system capable of carrying a payload. The Airborne Ground Mines Detection System demonstrated the ability to detect surface-laid, partially buried, and flush-buried mines as well as other potential explosive hazards from an aerial platform. Soldiers quickly learned to program flight plans and operate the system to execute autonomous scans of a minefield.
- The Robotics for Engineer Operations system, developed by the Construction Engineering Research Laboratory, ERDC, Champaign, Illinois, successfully demonstrated the ability to remotely proof a lane through an obstacle and conduct site characterization and mapping. During the demonstration, Soldiers used a commercial bulldozer and a commercial command station to remotely proof a 100-meter lane through a simulated obstacle. Although no actual mines or obstacles were present, the Soldiers showed that they could remotely operate the bulldozer using the herring bone method required to proof a lane. Remote site characterization and mapping were performed using the Badger® and mobile command station. The Badger, equipped with light detection and ranging (LiDAR) equipment, multispectral cameras, an automated cone penetrometer, and military radios mounted on a common robotic platform, successfully developed site characteristics that could support reconnaissance, breaching, and/or construction efforts and mapped the site.
- Mobile camouflage systems from Leonardo DRS©, Ametrine©, and Fibrotex© were installed on multiple vehicles to assess the ease of their installation and removal, their effectiveness in disrupting sensor detection, and their impact on vehicle drivability. Soldiers found the mobile camouflage kits easy to install and remove. Thermal/infrared scopes and multispectral sensors from satellites were used to test the ability of the systems to disrupt sensor detection.
- Matting for Improved Soil Trafficability, developed by the Environmental Laboratory, ERDC, Vicksburg, is a system that provides road surfaces that allow vehicles to traverse areas with soft or wet soil conditions. The Army faces a significant challenge when approaching and crossing gaps—especially wet gaps—due to unstable soil conditions near the gaps. The roadway consists of a system of interconnected fiber mats that can be anchored over unstable ground, providing a stable surface for vehicles approaching and crossing the gaps. The technology is easy to use, and minimal training is required for mastery. Matting for Improved Soil Trafficability kits can be customized for specific locations and soil conditions.

Requirements

The evaluation of emerging prototype systems is a crucial part of the capability development process. Through experimentation, capability developers gain insights into the latest advancements in technology and learn how the new technologies could address capability gaps. This assists in more accurately defining key system attributes and performance parameters, leading to refined requirements and improved capability development documents. Moreover, military participants provide valuable feedback to science and technology developers, ensuring that the new systems are both relevant and operationally effective.

Conclusion

Army-focused warfighter experimentation events play a vital role in Army modernization by providing a platform for learning about military problems and potential solutions in a multidomain operations-relevant environment.

Colonel Frey is the Director, Maneuver Support Capabilities Development Integration Directorate, Fort Leonard Wood. He holds master's degrees in public administration from Webster University and strategic studies from the U.S. Army War College, Carlisle, Pennsylvania.

Mr. Nobles is a systems analyst for the Maneuver Support Battle Laboratory. He holds a master's degree in industrial engineering from the Georgia Institute of Technology, Atlanta, Georgia.