

Project Stories

MITRE SIMEX™ Live-Action Simulations Test Ideas, Save Money

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Topics: [Joint Operations](#), [Command and Control](#)

Will your new technical capability actually work in a joint mission? What about a natural disaster or other civil emergency? Our MITRE SIMEX process uses advanced simulations and the latest tactics to increase mission success using realistic scenarios.

In the Decision Theater, MITRE personnel experiment with various presentation styles in preparation for a MITRE SIMEX. The rails in the ceiling allow the nine stacks of displays at the front to move forward and backward to change operational scenarios.



Imagine you're a Navy officer who needs to see if a new joint mission capability involving underwater drones is feasible.

Or a civil-agency manager who wants to test out new communications processes for first responders. How do you assess complicated ideas quickly without spending a fortune?

If you're that Navy officer, will your machine-to-machine communication conflict with the need for human decision-making? And if you're using new processes and devices, will interoperability between joint commands be an issue? If you're a civil agency manager, will your communications connect your cooperating agencies without delay or misunderstandings?

One way to find out is with a MITRE SIMEX session, a simulation that offers a special mix of technical and operational capabilities for government agencies that want to try out new ideas by using dedicated, state-of-the-art laboratories.

A MITRE SIMEX allows mission personnel to develop concepts of operations, or CONOPS, in a realistic, controlled synthetic environment at our facilities in McLean, Virginia. Operators practice techniques and procedures using the latest technology. A MITRE SIMEX session uses real command-and-control systems with simulated weapons and sensors so military and civilian operators can execute the various crisis scenarios.

Save Time, Keep Costs Down

A MITRE SIMEX allows agencies to wring out a proof-of-concept faster and at lower cost than a full-blown in-the-field exercise. For example, in a recent classified session, the sponsor noted: "In three experimental runs, operators made real-time decisions for weapon assignment, engagement timing, and movements. The interaction of live operators, with high-fidelity engagement simulation, enabled weapon tactics to evolve rapidly and iteratively over the course of the session."

In another classified experiment, representatives from different military organizations worked with personnel sitting in multiple locations. The MITRE SIMEX addressed 36 different scenarios related to an advanced weapon system. Participants gained new insights into operations and identified areas for improvement in their current systems. The event reduced overall costs and avoided hundreds of unnecessary staff hours. The activity also set the stage for a live demonstration—all before burning a single gallon of fuel.

"A MITRE SIMEX provides quantitative analysis while still allowing for innovation and serendipity," says Jim Dear, who manages and coordinates all the MITRE SIMEX laboratory experiments. Dear has been involved with nearly 60 sessions since they began in 2001. He's overseen experiments on important topics ranging from joint surface warfare, [bio-security](#), and [maritime domain awareness](#), to special operations, missile defense, irregular warfare, and more.

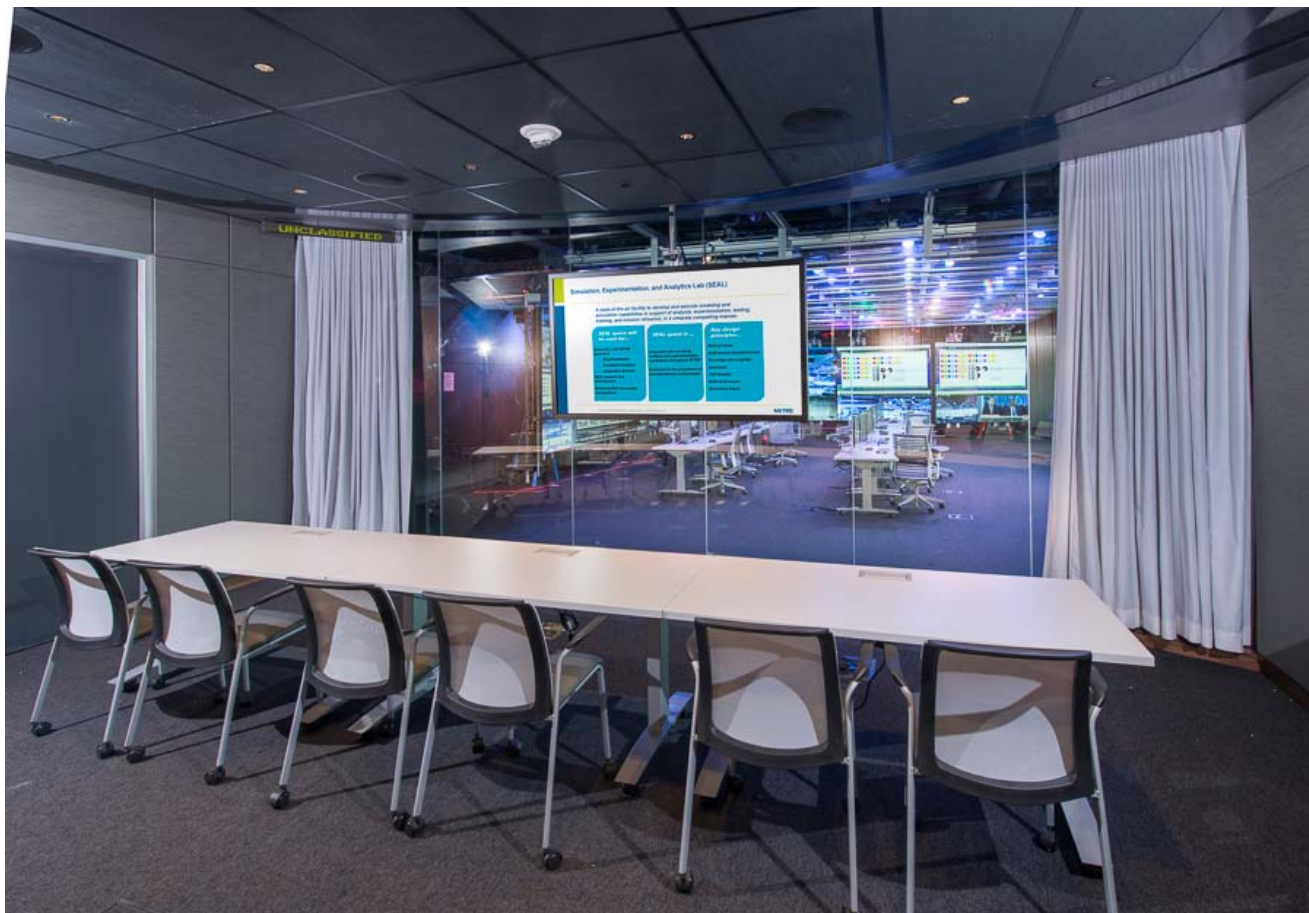
Many of them are classified, but MITRE also conducts unclassified simulations for agencies such as the [Census Bureau](#), Border Patrol, Homeland Security, and IRS. For example, a few years ago, MITRE worked with national law enforcement agencies and Virginia state agencies to conduct a MITRE SIMEX to [demonstrate how social media could help or hinder response times](#) during a crisis.

Two Exceptional Labs: NSEL and SEAL

The events typically occur in two MITRE labs, both in McLean, Virginia. The first lab is the National Security Experimentation Laboratory, or NSEL, which is sponsored by the Office of the Secretary of Defense. Created in 2001, it's the computational workhorse for a MITRE SIMEX. Mission managers can connect to several government and contractor facilities to run experiments that are service-specific, or joint in operation.

NSEL uses real command-and-control systems with simulated weapons and sensors. Military and civilian personnel can execute crisis action scenarios to improve their planning and reaction times. To test interoperability in a distributed environment, the NSEL uses a variety of secure networks.

The newest Simulation, Experimentation and Analysis Lab, or SEAL, opened in early 2017. The SEAL supports analysis, experimentation, testing, training, and mission rehearsal for classified and unclassified operations. It puts sponsors (friendly Blue Cell operators) in a visual environment that shows how their new mission capabilities will



The Observation Room separates visitors from the Decision Theater (far background) so that Blue Cell operators can work without interruption. The monitor hanging in front of the window to the Decision Theater can show what the Red Cell operators are doing during a SIMEX.

work against opposing forces (Red Cell operators). Huge, high-definition monitors can be moved to change the look of command centers for the Blue Cell. Observers can see a MITRE SIMEX in action without disturbing operators in either the Blue Cell or the Red Cell. (See "The SEAL—Where the Action Is," below.)

To assure a consistent quality outcome for every MITRE SIMEX, Dear picks the MITRE team members himself. He chooses members from our [seven research and development centers](#) to acquire the ideal mix of skills. Required experience can range from operations research to software development, from 3D gaming to systems integration. "I have the flexibility to bring in a lot of unique talent," he says.

From Scenario Planning to Post-Event Analysis

"The whole MITRE SIMEX process from planning to final report is normally five to six months," Dear says. "First, MITRE staff work with our sponsors to design the simulation infrastructure. During the integration and testing process, our data collection team leader builds the Data Collection and Analysis Plan that defines essential data collection to support the exercise's objectives."

The MITRE SIMEX itself takes place over two weeks. The first week includes operator training on the new MITRE SIMEX CONOPS and technology. The second week includes 8 to 10 three-hour scenarios when mission operators execute the session. MITRE staff capture participants' observations and experiences for reference. These can be used to develop strategy, tactics, and related technologies.

In parallel, the NSEL data collection team executes the Data Collection and Analysis Plan and produces incremental After-Action Reviews. Post-session analysis captures lessons learned, operator feedback, and data driven measures of effectiveness. This gives program managers, science and technology directors, and warfighters, the information to make informed decisions. About a month after the event, the data collection team produces a briefing and final report on the MITRE SIMEX results, using the agreed-upon data collection plan. Augmenting the written reports for every MITRE SIMEX are 8-10-minute video highlight reels depicting the crucial moments during the plan's execution.

"Each MITRE SIMEX is custom-designed to test a new mission capability to its maximum," Dear says. "As new technology rapidly comes along, there's a good chance of interoperability problems, or man-machine interface issues. Every simulation teaches our sponsors and us something new. We have a great combination of capabilities that allow our sponsors to simulate any situation."

The SEAL—Where the Action Is

The Simulation, Experimentation and Analysis Lab, or SEAL, manages the presentation portion of a MITRE SIMEX. "It's where the Blue Cell, the good guys, take on the Red Cell guys," says Jim Dear.

About half of the SEAL's 5,000 sq. ft. is the **Decision Theater**, where Blue Cell operators interact with the simulation. The Red Cell operators, using the latest field tactics against the Blue Cell, work in the **Event Support** area that is smaller and separate from the Decision Theater.

The Decision Theater holds SEAL's rapidly reconfigurable A/V equipment. In the front are nine ceiling-mounted tracks, each carrying a stack of three 55-inch displays. Each stack can move 30 feet back and forth. At the side of the room are six ceiling-mounted tracks that carry a stack of three large displays, and can move 10 feet back and forth.

"We reconfigure the stacks to represent various kinds of command centers and different set-ups depending on the missions," Dear says. "We can also divide up the commands and isolate command elements by moving the displays around. So, every MITRE SIMEX is a little different." The Decision Theater also has fully customizable ceiling-mounted theater lights to provide a huge combination of ambiance settings for simulation purposes.

The **Observation Room** allows visitors to watch MITRE SIMEX scenarios without distracting operators. The A/V capability presents various rooms on a display in the Observation Room so that visitors can see and hear what the operators are saying.

The SEAL's embedded audio and video recording capability captures everything that happens during the MITRE SIMEX, classified or unclassified. "That's important," Dear says. "It allows us to capture insights as they occur, and supplement our briefings and after-action reports."

There's also a **Unit Operations** area that supports simulated individual unit operations, and a **Reception Room** for visitors, credentialing, and lab overviews.

—by David Van Cleave

If you work for a government agency and want to learn how a MITRE SIMEX can support your military or civilian missions, contact MITRE at simexinfo@mitre.org.

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