



**WELCOME TO THE SEPTEMBER 2013 EDITION** of the M&S Newsletter. This issue presents articles about using modeling and simulation (M&S) to improve weapons testing, soldier training, and weather prediction. Additional articles describe applying M&S to reduce stress and to increase understanding of energy production and the environment. This edition also includes a list of upcoming events within the M&S Community. Please note that the full articles are available through the links provided.

We hope the September 2013 M&S Newsletter provides valuable insight into the world of M&S and we welcome your comments.

—M&S Newsletter Staff

## Army Tests Lethality Against Moving Targets with New Software Model



Photo Credit: US Army

*A Soldier assigned to the 3rd Brigade Combat Team, 25th Infantry Division, aims his M320 40 mm grenade launcher at a target during Bronco Rumble, a company-level combined arms live-fire exercise, at Schofield Barracks, Hawaii, May 8, 2013.*

**MILITARY ANALYSTS NOW HAVE A TOOL** that brings together unprecedented modeling and simulation features to help them better choose or build weapons to overpower future threats.

Such features allow military researchers to analyze, for example, how a grenade, artillery round or any other weapon performs -- or falls short -- against moving targets in complex battlefield scenarios, which is one of the biggest challenges the military faces today.

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## Army Tests Lethality Against Moving Targets with New Software Model

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With this information, researchers say, Army leaders can identify future technology investments early on, whether that is modifications to existing weapons or replacing them altogether.

“The Smart Weapon End-to-End Performance Model, or SWEEPMP, developed by the U.S. Army Research Laboratory, known as ARL, is a set of files and software that cover all impacts associated with firing a round and anything that affects the delivery of that round,” said William F. Oberle, Ph.D., Advanced Weapons Concepts branch chief within ARL’s Weapons and Materials Research Directorate.

Oberle said the model’s versatility sets it apart from other force-on-force models that military planners use to practice sustained operations. With SWEEPMP, as it’s called, researchers can model the overall effectiveness of all types of munitions throughout the entire target engagement, from target detection through damage estimation with a modular Monte Carlo simulation.

Using the model, researchers can look at a conceptual or actual guided artillery round, its guidance system and its performance, for example. Ballistic engineers provide information on how the round would be used in an attack, against a tank or truck for instance, and insight on the current inventory of the round. Other variables such as material composition of the round, muzzle velocity, how Soldiers aim and fire weapon systems, weather, stationary or moving targets are incorporated as part of a total system analysis that once encoded, helps researchers determine effectiveness scenarios, or situations that indicate the amount of damage the round causes.

“One of the missions of the Advanced Weapons Concepts Branch is to develop modeling and simulation tools to perform our performance/effectiveness analyses. Being able to perform these analyses in a timely manner requires that we look out and forecast what type tools we will need in the future,” Oberle said.

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*This article originally appeared on the U.S. Army website. For complete article, [click here](#).*



## Struggling With Stress? There’s an App For That

**A NEW STRESS MANAGEMENT IPAD APP** is meant to teach users not just how to cope with stress caused by factors from war, such as PTSD, but also how use it to increase mental resilience.

Funded by the Defense Advanced Research Projects Agency and the Office of Naval Research, it is being developed by California-based Perceptronics Solutions and is currently being tested by the Naval Center for Combat and Operational Stress Control.

The Stress Resilience Training System uses games and videos to teach stress reduction techniques. The app consists of four sections: an overview of stress and resilience; techniques for handling stress and building resilience; games that allow users to practice these techniques; and a review section that tracks their progress.

Users clip a heart monitor to their earlobe as they play the games, which get progressively harder. When their heart rate

becomes irregular, denoting stress, the app will guide users toward relaxation techniques. The game-based portion of SRTS uses multiple levels, beginning with a series of videos that show peaceful progression, such as plants growing. If the user’s heart rate doesn’t steady, the videos will slow and then reverse. This is followed by a series of slides that show anger management and display values such as loyalty. The speed of the slides also depends on the user’s heart rate.

Then comes an asteroid shooter game: If the user’s heart rate stays regular, he gets more missiles and the game controls are more responsive. Finally, there is a race car game where a regular heart rate rewards the user with a more powerful vehicle and a better ability to avoid obstacles.

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*This article originally appeared on the Training & Simulation Journal website. For complete article, [click here](#).*



## Defense Department Wants Customizable Virtual Training

**THE SERVICES ARE LOOKING FOR VIDEO GAME TRAINING** where scenarios can be easily and rapidly customized by commanders, squad leaders and troops, said the Defense Department official in charge of military training readiness.

Too many of the available games are built on proprietary software that takes years to alter, said Frank C. DiGiovanni, Defense Department director of training, readiness and strategy.

“You’ve got to have agility, to be able to give the end user the ability to use the system the way they want,” he said in a keynote speech April 17 at the Defense GameTech Users’ Conference in Orlando.

Often times, simulations are fielded for a specific purpose, DiGiovanni said. But if they can be modified easily, operators and trainers can find new ways to incorporate the product into their training.

“If you don’t allow the end user to play with it, you won’t get that information,” he told the largely industry crowd. “So I really encourage you all to think about the business models you are using.”

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*This article originally appeared on the National Defense Magazine website. For complete article, [click here](#).*

## Army Takes Another Baby Step Toward the LVC Dream

**AS A 10TH MOUNTAIN DIVISION BRIGADE COMBAT TEAM** waged mock warfare at Joint Readiness Training Center in Fort Polk, La., its members sent periodic bursts of logistics data back home to Fort Drum, N.Y. Instead of requests for beans or bullets, however, the messages were part of another baby step on the US Army’s road to seamless live-virtual-constructive exercises.

Someday, Army leaders say, units scattered around the country will routinely come together virtually in exercises that test all aspects of the warfighting enterprise yet consume just a fraction of the travel budget. Ultimately, long-term projects such as the Live, Virtual, Constructive — Integrating Architecture will smoothly handle the complex coordination of all different kinds of networks, simulations and technology.

But before that dream comes true, there are a lot of smaller problems to work out. For the moment, the military’s simulation leaders are working on shorter-term, less ambitious projects such as this one.

“It’s more of an intermediate objective to the LVC-IA,” said Maj. Brian Hanley, an exercise planner with the Global Simulation Capability, part of the National Simulation Center. “The LVC-IA is looking a little bit further down the road. We’re looking at how we can do it right now with the capabilities that

we have, without requiring additional research or resources.”

In the June 10-14 exercise, planners practiced moving logistics data — such as how much food, water, or ammunition the units have — into a constructive simulation meant for the sustainment brigade staff without erasing crucial information or leaking secret data onto an unclassified network.

So far, the data flows in only one direction, which may seem a far cry from the rapid back-and-forth linkages one would expect. But the transfer is complicated because the data is collected in one format at the combat training center and must be transformed into another format for plugging into the constructive simulation at home station. It requires a few hours and several computers talking to one another to organize the data, export it, and place it safely into the constructive simulation without accidentally affecting other information in the system.

This exercise was phase two; phase three will actually see the data put into a simulation where it will provide additional realistic data and create a richer experience for the division command staff. No date has been set yet.

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*This article originally appeared on the Training & Simulation Journal website. For complete article, [click here](#).*



## The Big Assist In Storm Predictions



**WITH THE ARRIVAL OF THE ATLANTIC HURRICANE AND PACIFIC TYPHOON SEASON**—and the often dangerous storms that can accompany it—new technology sponsored by the Office of Naval Research (ONR) will be used to help Navy and civilian officials alike plan for stormy weather.

Called the Coupled Ocean/Atmosphere Mesoscale Prediction System-Tropical Cyclone (COAMPS-TC), the groundbreaking new weather prediction model offers forecasters a detailed look at tropical storms and gives accurate predictions of a storm's intensity from one to five days out.

The new model went fully operational June 6 at the Navy's Fleet Numerical and Meteorology and Oceanography Center—the naval command that provides meteorological data to U.S. forces. "COAMPS-TC will be invaluable to Navy leadership," said Dr. Ronald Ferek, the ONR program officer who helped sponsor the project.

"It will give them detailed intensity and wind fields for site-specific damaging wind forecasts: 'This upcoming storm will exceed hurricane-force winds at X time, for Y hours.' For naval installations, that kind of forecast is really useful." The program was developed by researchers at the Naval Research Laboratory (NRL), primarily to support the mission of the Department of Defense's Joint Typhoon Weather Center.

Accuracy has improved dramatically in recent years when it comes to predicting the path, or track, of tropical storms. However, until now, the ability to forecast a storm's strength, or intensity, has been much less reliable. The new model will help close that capability gap.

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*This article originally appeared on the Department of Defense Armed with Science website. For complete article, [click here](#).*



## Lawrence Livermore and Rensselaer Polytechnic Institute Scientists Set a New Simulation Speed Record on the Sequoia Supercomputer



Lawrence Livermore scientists, from left, David Jefferson and Peter Barnes.

**COMPUTER SCIENTISTS AT LAWRENCE LIVERMORE NATIONAL LABORATORY (LLNL) AND RENSSELAER POLYTECHNIC INSTITUTE** have set a high performance computing speed record that opens the way to the scientific exploration of complex planetary-scale systems.

In a paper to be published in May, the joint team will announce a record-breaking simulation speed of 504 billion events per second on LLNL's Sequoia Blue Gene/Q supercomputer, dwarfing the previous record set in 2009 of 12.2 billion events per second.

Constructed by IBM, the 120 rack Sequoia supercomputer has a peak performance of 25 petaflops and is the second fastest supercomputer in the world, with a total speed and capacity equivalent to about one million desktop PCs. A petaflop is a quadrillion floating point operations per second.

In addition to breaking the record for computing speed, the research team set a record for the most highly parallel "discrete event simulation," with 7.86 million simultaneous tasks using 1.97 million cores. Discrete event simulations are used to model irregular systems with behavior that cannot be described by equations, such as communication

networks, traffic flows, economic and ecological models, military combat scenarios, and many other complex systems.

Prior to the record-setting experiment, a preliminary scaling study was conducted at the Rensselaer supercomputing center, the Computational Center for Nanotechnology Innovation (CCNI). The researchers tuned parameters on the CCNI's two-rack Blue Gene/Q system and optimized the experiment to scale up and run on the 120-rack Sequoia system.

Authors of the study are Peter Barnes, Jr. and David Jefferson of LLNL, and CCNI Director and computer science professor Chris Carothers and graduate student Justin LaPre of Rensselaer.

The records were set using the ROSS (Rensselaer's Optimistic Simulation System) simulation package developed by Carothers and his students, and using the Time Warp synchronization algorithm originally developed by Jefferson.

*This article originally appeared on the Lawrence Livermore National Laboratory website. For complete article, [click here](#).*



## Rivers Act as “Horizontal Cooling Towers,” Study Finds



Photo Credit: ASSIST Aviation Solutions

*Coal-fired power plant on the Merrimack River in Bow, N.H. The plant discharges warmed water to the river which then transports, dilutes, and re-equilibrates heat.*

**RUNNING TWO COMPUTER MODELS IN TANDEM**, scientists from the University of New Hampshire have detailed for the first time how thermoelectric power plants interact with climate, hydrology, and aquatic ecosystems throughout the northeastern U.S. and show how rivers serve as “horizontal cooling towers” that provide an important ecosystem service to the regional electricity sector — but at a cost to the environment.

The analysis, done in collaboration with colleagues from the City College of New York (CCNY) and published online in the current journal *Environmental Research Letters*, highlights the interactions among electricity production, cooling technologies, hydrologic conditions, aquatic impacts and ecosystem services, and can be used to assess the full costs and tradeoffs of electricity production at regional scales and under changing climate conditions.

Lead authors of the study are Robert Stewart of the UNH Institute for the Study of Earth, Oceans, and Space (EOS) and Wilfred Wollheim of the department of natural resources and environment and EOS.

Thermoelectric power plants boil water to create steam that in turn drives turbines to produce electricity. They provide 90 percent of the electricity consumed nationwide and an even a greater percentage in the Northeast — a region with a high density of power plants.

Cooling the waste heat generated during the process requires that prodigious volumes of water be withdrawn and makes the thermoelectric sector the largest user of freshwater in the U.S. — withdrawing more than the entire, combined agricultural sector. Water withdrawals are either evaporated in cooling towers or returned to the river at elevated temperatures. Rivers can help mitigate these added heat loads through the ecosystem services of conveyance, dilution, and attenuation — essentially acting as horizontal cooling towers as water flows downstream.

Says Stewart, a research scientist in the EOS Earth Systems Research Center, “Our modeling shows that, of the waste heat produced during the production of electricity, roughly half is directed to vertical, evaporative cooling towers while the other half is transferred to rivers.”

The study also shows that, of the waste heat transferred to rivers, only slightly more than 11 percent wafts into the atmosphere with the rest delivered to coastal waters and the ocean.

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*This article originally appeared in the journal *Environmental Research Letters* and is on the University of New Hampshire website. For complete article, [click here](#).*



## Making Sailors Sharper Shooters

**THE U.K. IS TESTING A NEW SIMULATOR AS IT INVESTIGATES** techniques to improve the accuracy of sailors using machine guns on naval and auxiliary vessels.

Simulation specialist NSC [Editor's Note: NSC is a commercial company] pulled together a deactivated weapon, projectors and software and delivered the completed system to the U.K.'s Defence Science and Technology Laboratory (DSTL), according to NSC head of business development Steve Yates. It also built an instructor operating station that will allow DSTL to gather information from the system.

The simulator is based around the General Purpose Machine Gun (GPMG), an elderly but much-loved 7.62mm weapon used widely in the U.K. armed forces.

The GPMG is frequently shipped on simple mountings around warships and used to provide close-in fire; it was widely used in this role against attacking Argentinian aircraft during the Falklands conflict.

Like the U.S. and other western navies, the U.K. Royal Navy is concerned by the prospect of Iranian swarm attacks by small speedboats in the Arabian Gulf. The new simulator can replicating scenarios that include defending against small, fast-moving vessels, supporting anti-piracy missions, and protecting ports and vessels within them.

DSTL awarded NSC the contract to develop the new simulator for use in trials of "novel training methods" for Royal Navy and Royal Fleet Auxiliary (RFA) personnel. The RFA is a civilian-manned fleet owned by the U.K. Ministry of Defence (MoD) that supports Royal Navy ships with fuel, ammunition and supplies.

The simulator is the first in the U.K. to use the newest version of Bohemia Interactive Simulations' Virtual Battlespace 2. It puts users' fingers on the trigger of a deactivated GPMG as the action unfolds on an almost seven-foot-tall, 180-degree curved screen.

Compressed air provides recoil feedback from the deactivated GPMG, while hidden electronics track the weapon's movements, allowing operators to tackle engagements in an immersive environment.

The simulator does not include motion, but the projected image can reproduce varying factors such as sea states, solar glare, surface reflections and sea spray.

"The U.K. MoD is a big user of the earlier VBS2 1.6," said Yates. VBS 2 2.0 had a number of improvements in visual reproduction, "particularly in areas such as reflections on the sea and visualisation of objects at long distances."

The DSTL is collaborating with sports psychologists from Exeter University for the trials testing this method of training. In a written statement, the DSTL said that the NSC synthetic environment "provides specific performance data on the accuracy of the participants, allowing the researchers to compare two training approaches: traditional mechanical instructions, in comparison to instructions relating to the participant's eye movements during the task.

The DSTL also noted that successful eye movement training could introduce a way of increasing skills development and reducing the time spent in synthetic environments during training, but declined to give further details.

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*This article originally appeared on the Training & Simulation Journal website. To access the article, [click here](#).*



## OBVA Laboratory to Test Aviators' Visual Capabilities



Photo Credit: Mr. Rick Eldridge

*View of cockpit display and scene generated in the OBVA Laboratory.*

**THE UNITED STATES AIR FORCE SCHOOL OF AEROSPACE MEDICINE** (USAFSAM) at Wright-Patterson Air Force Base recently completed the installation of a high fidelity flight simulator in its Operational Based Vision Assessment (OBVA) laboratory. The simulator will be used to quantify the relationship between an observer's visual capabilities, such as acuity and color discrimination, and their performance in simulated operational scenarios.

To generate meaningful data, performance limited by visual capabilities measured during the simulated operational scenarios must closely approximate that in the real world. Therefore, the design specifications of the OBVA simulator were much more demanding than those of a current training simulator. For example, the OBVA simulator displays 16 pixels for every 1 pixel in a typical training simulator. To maintain this high-pixel density in a visually immersive environment, the current system uses 9 high-pixel-count projectors to generate approximately 90 million pixels--approximately the same number of pixels in 40 high definition televisions. The high pixel density was required to ensure that the measured performance was due to the observers' limitation, not the limitations of the simulator.

Initially, research at the OBVA laboratory will be concentrated on three visual capabilities: acuity, contrast sensitivity, and color discrimination. For the acuity and contrast sensitivity assessment, pilots will be tested on their ability to detect or identify potentially hazardous runway objects under a variety of conditions, including day or night and hazy or clear atmospheres. The color assessment procedures will measure pilots' speed and accuracy in various scenarios to include aircraft landing using colored runway lighting and friend or foe identification using color coded symbology.

Assessments such as these serve a variety of purposes. First and foremost, they help train and select the best pilots for the U.S. Air Force. Secondly, they help USAFSAM build operational rigor into current Air Force vision standards. Because aviation technology is constantly evolving, the OBVA's relationship quantification of visual capabilities and operational performance furthers USAFSAM's ability to determine if vision standards should tightened or loosened. As such, the new OBVA simulator will offer superior testing of warfighter abilities, helping pilots complete their missions safely and successfully.

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*This article originally appeared on the U.S. Air Force website. For original article, [click here](#).*



## FEATURED HIGH LEVEL TASK

High level tasks are special technology-related projects that will enhance the applications of M&S throughout the DoD for the benefit of our Warfighters. By focusing on the goals stated in the “Strategic Vision for DoD Modeling and Simulation,” these high level tasks are delivering solutions that will contribute to closing fundamental gaps in current M&S capabilities.



### The M&SCO Updates the DoD M&S Glossary

#### MODELING AND SIMULATION (M&S) HAS ROOTS

in many technical disciplines and is used across a diverse range of applications. One of the consequences of such diversity is that the language used to describe important concepts may differ from community to community, in both obvious and subtle ways. Finding specific meanings and using the best technical terms for your professional work can make all the difference. To ensure modeling and simulation professionals have a common reference, the DoD Modeling and Simulation Coordination Office (M&SCO) has an available resource that standardizes technical terms. M&SCO’s newly revised glossary provides uniform modeling and simulation terminology for use throughout the Department.

The DoD M&S Glossary is a compilation of specific modeling and simulation terms. It’s a resource for DoD technical and managerial personnel that can assist with all facets of their work tasks. Foremost, the DoD M&S Glossary helps communicate modeling and simulation ideas and concepts. With uniform modeling and simulation terminology, users can be assured of using the correct word and of following the best practices from within the DoD. The DoD M&S

Glossary serves as an excellent technical reference for the entire M&S community, and it also helps users who search for DoD issuance definitions.

The DoD M&S Glossary contains approximately 300 modeling and simulation terms on a searchable website. The glossary is indexed so the user can easily find a particular word or the user can use the website search capability to find all references to a word or phrase.

M&SCO has streamlined the number of entries in the DoD M&S Glossary to improve the quality of its terms. We’ve also eliminated redundancies and cross checked and edited defined terms with experts and leaders in the modeling and simulation field.

For users who prefer to research using the 1998 printed document, the DoD 5000.59M is still available and remains an official resource. M&SCO is retiring it in the near future. When the document is retired, the on-line glossary will be the Department’s official reference for the DoD M&S Glossary.

To access the DoD M&S Glossary in our M&S online library, visit

<http://www.msco.mil/MSGlossary.html>.

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## M&S WHAT AND WHEN

### MODELING & SIMULATION CALENDAR OF EVENTS

#### **2013 Precision Strike Technology Symposium (PSTS-13)**

October 22-24, 2013  
The Johns Hopkins University Applied Physics Lab  
Laurel, MD

#### **50th AOC International Symposium and Convention**

October 27-30, 2013  
Marriott Wardman Park Hotel  
Washington, DC

#### **16th Annual Systems Engineering Conference**

October 28-31, 2013  
Hyatt Regency Crystal City  
Arlington, VA

#### **Aircraft Survivability Technical Forum 2013**

November 5-7, 2013  
Naval Postgraduate School  
Monterey, CA

#### **30th Annual International Test and Evaluation Symposium**

November 12-15, 2013  
Crystal City, VA

#### **10th Annual Disruptive Technologies Conference**

Nov 13, 2013  
Federal Gateway - Navy Yard Metro  
Washington, DC

#### **I/ITSEC 2013 (Interservice/Industry Training, Simulation & Education Conference)**

December 2-5, 2013  
Orange County Convention Center  
Orlando, FL

#### **30th Annual Flight and Ground Vehicle Simulation Courses**

January 20-24, 2014  
Binghamton University  
Vestal, NY

#### **Promote an Event**

If you would like to promote an M&S event on the Calendar, please email the event information to [Ask.MSCO@osd.mil](mailto:Ask.MSCO@osd.mil).



## The M&S Newsletter

The M&S Newsletter is a DoD Modeling and Simulation Coordination Office (M&SCO) bi-monthly publication that provides the most recent information concerning interesting M&S articles and a calendar of events for the M&S community.

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