

DMSO NEWS

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Summer 2000

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See back page for information about this year's DMSO Industry Days, May 22-24, at Sheraton Premiere Hotel at Tysons Corners in Vienna, Va.

Eight M&S Award winners selected from 88 nominees

By Sherrel Mock
DMSO Public Affairs

Eight winners were selected for the second annual Defense Modeling and Simulation Office (DMSO)-sponsored Modeling and Simulation (M&S) Awards. Awards will be presented on May 23 at 4 p.m. during the ninth annual DMSO Industry Days, May 22-24, at the Sheraton Premiere Hotel at Tysons Corner in Vienna, Va.

This year an additional 13 nominees were selected for honorable mention from the 88 received during the two-month nomination period that ended Dec. 10.

The awards recognize both government and non-government achievement during Fiscal Year 1999 in support of Department of Defense (DoD) M&S objectives. Eight individuals or teams – one government and one non-government – were selected in each of four categories.

The first three categories correspond to specific M&S functional areas – *training*, *analysis* and *acquisition*. The fourth category, a *cross-functional* area, considers those broader endeavors that impact all aspects of the overall DoD M&S effort.

Winners by functional area and category are listed below. Honorable Mentions are listed on page 4. Program details and points of contact for each winner and honorable mention are available for download in .pdf format online at http://www.dmsomil/~pao/NewsReleases/MS_Awards_Winners_99/ and http://www.dmsomil/~pao/NewsReleases/MS_Awards_Honorable_Mentions_99/ respectively.

See M&S AWARD WINNERS, p. 12

See page 4 for the list of 13 nominees selected for "Honorable Mention."

FY99 DMSO M&S Awards Winners

ACQUISITION FUNCTIONAL AREA

- *Government Team:* Integrated Ship Defense High Level Architecture (HLA) Pilot Team – U.S. Navy, Program Executive Office - Theater Surface Combatants, Crystal City, Va.
- *Non-government Team:* Advanced Ram Analysis Method (ARAM) Ballistic Impact Simulation – Lockheed Martin Aeronautics Company, Joint Strike Fighter (JSF) Vulnerability Reduction Team, Ft. Worth, Texas.

ANALYSIS FUNCTIONAL AREA

- *Government Team:* Robust Collateral Damage Estimation Tool Development and Implementation – Joint Warfare Analysis Center (JWAC) and Joint Warfare Applications Department/Naval Surface Warfare Center, Dahlgren Division, Dahlgren, Va.
- *Non-government Team:* Consolidated Air Mobility Planning System (CAMPS) Time-Phased Force Deployment Data (TPFDD)-in-an-hour – Logicon Systems and Integration Technology, Joint Expeditionary Force Experiment (JEFX) 1999 Team, San Pedro, Calif.

TRAINING FUNCTIONAL AREA

- *Government Team:* The Effects of Vegetation on Line-of-Sight (LOS) for Dismounted Infantry – U.S. Army Training and Doctrine Command Analysis Center (TRAC) - White Sands Missile Range, N.M. and the U.S. Army Topographic Engineering Center (TEC), Ft Belvoir, Va.
- *Non-government Individual:* Daniel Bacon, Joint Simulation System (JSIMS) Maritime Domain Architect – Sonalysts Inc, San Diego, Calif.

CROSS-FUNCTIONAL AREA

- *Government Team:* Synthetic Theater of War Advanced Concept Technology Demonstration (STOW ACTD) Support to Joint Experimentation – U.S. Joint Forces Command (USJFCOM), Suffolk, Va., and the Defense Advanced Research Projects Agency (DARPA), Arlington, Va.
- *Non-government Team:* Joint Conflict and Tactical Simulation (JCATS) Team – University of California, Lawrence Livermore National Laboratory, Livermore, Calif.



Director's Corner

By Colonel Wm. Forrest Crain, U.S. Army

"Phase II of the New Vector"

When I wrote my comments for the last Director's Corner I laid out an ambitious "plan for the plan" for the development of a "new vector" for the DMSO. I'm glad to report we're on schedule for achieving the changes that focus our efforts to better fit the needs of the modeling and simulation (M&S) community and better serve the Warfighter.

We've done some reorganizing within the DMSO to accomplish the new tasks. We completed Phase I, our internal transition, in April with new alignments effective on May 1. I won't rehash my previous column here, but I would like to provide a quick update and introduce the DMSO players. See Figure 1 for our new organization. **LtCol Mac McKeon** heads up our new *Warfighter Requirements Division*. **Fred Hartman** has joined us as chief of the new *Enterprise Division*. **Phil Barry** is the chief of our new *Science and Technology (S&T) Initiatives Division*. The chief of the *Community Support Division* is **Phil Abold**, Director of

" I'm glad to report we're on schedule for achieving the changes that focus our efforts to better fit the needs of the modeling and simulation (M&S) community and better serve the Warfighter."

the M&S Information Analysis Center (MSIAC). And, finally, **Dave Cantrell** is chief of the new *Policy, Plans and Integration (PP&I) Division*.

LtCol McKeon continues to work Phase II, development of an integrated DoD M&S Implementation Plan, folding in guidance we received from the Executive Council on M&S (EXCIMS) at its April meeting. We'll present a final brief of the plan to the EXCIMS in July and if approved we'll begin Phase III, the execution phase. We'll update the EXCIMS on our progress at the October meeting.

Phil Barry has moved out with a purpose to set the stage for our S&T Initiatives program. We're on track to begin a limited look this fiscal year at promising M&S technologies, pending EXCIMS approval in July. We'll use the lessons we learn in setting up this fiscal year's effort to build a more robust program for Fiscal Year 2001. See Phil's article on page 10 for program details.

I'd like to welcome Fred Hartman to the DMSO team. Fred is well known in the M&S community. He has served as president of the Military Operations Research Society (MORS) and previously supported **Mike Parmentier**, Director for Readiness and Training, and **Dan Gardner**, in the Office of the Deputy Under

See *DIRECTOR'S CORNER*, p. 3

DMSO NEWS

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Director's Corner

Continued from p. 2

Secretary of Defense (Readiness), working issues for the EXCIMS' Training Functional Area Council. Most recently he served as technical director of the Joint Simulation System (JSIMS). He'll be overseeing our ongoing enterprise programs like Integrated Natural Environment (INE), the High Level Architecture (HLA), Conceptual Models of the Mission Space (CMMS), Data Standards and Human Behavior Representation. From this position, Fred will have great visibility to those program efforts which have potential utility and application for the JSIMS program as well as the JWARS and JMASS efforts. Fred is a great addition to the team.

You can contact him at hartman@dms0.mil or (703) 998-0660.

When you look at the new organization chart you'll see that those divisions providing external support to the Warfighter and M&S Community report to **CAPT Dave Johnson**, DMSO Deputy Director. **Gary Yerace**, DMSO Chief of Staff, oversees both the PP&I and the Budget and Financial Management divisions. In addition to the internal housekeeping work, we've also pulled some of the disparate staff activities like outreach and international affairs together under Dave Cantrell's PP&I umbrella to allow CAPT Johnson and his division chiefs to concentrate on their Warfighter, enterprise, S&T and community support missions.

Finally, I hope to see you at this year's *DMSO Industry Days*, May 22-24. We have an excellent agenda planned, an impressive list of senior DoD leaders to discuss the state of DoD M&S and a variety of exhibits. See page XX for details. We'll also be honoring the eight winners of the DMSO M&S Awards. See you there.

Respectfully,
Forrest

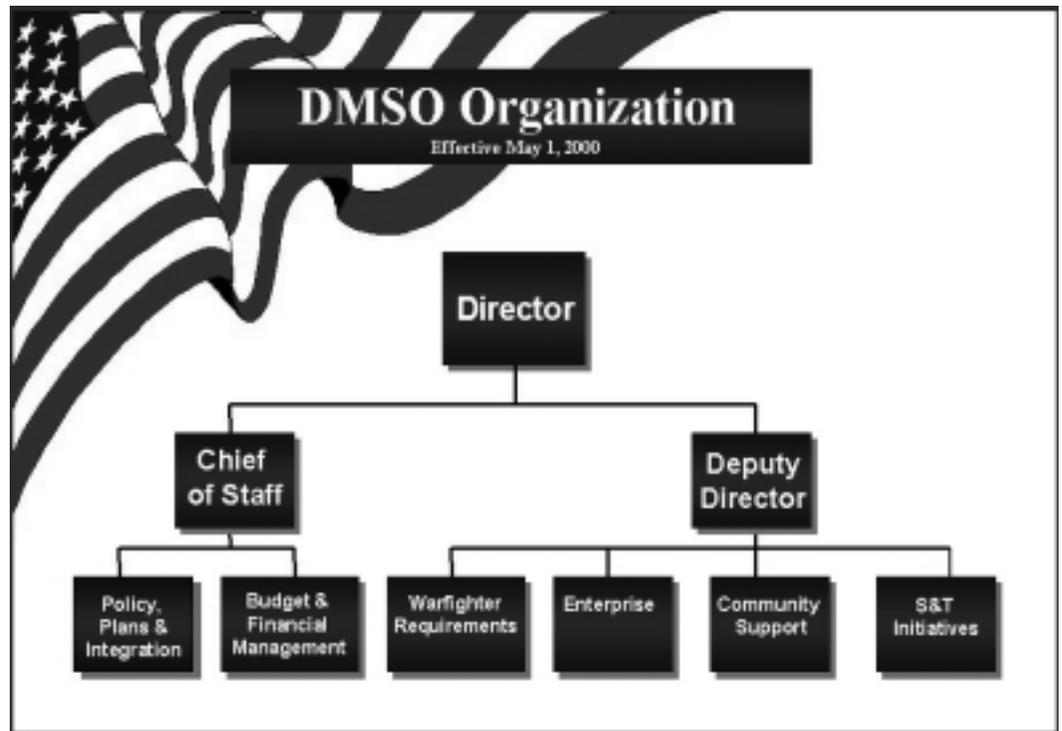


Figure 1

Your one-stop shop for M&S information and assistance!



The MSIAC is a Department of Defense Information Analysis Center sponsored by the Defense Technical Information Center and the Defense Modeling and Simulation Office.

Its mission is to assist DoD activities in meeting their M&S needs by providing scientific, technical, and operational support information and services.

Contact the MSIAC direct at (888) 566-7672 or e-mail at msiac@msiac.dms0.mil

ASK DMSO • ASK_DMSO@dms0.mil

Have a question about the DMSO, its programs or DoD M&S policy, but don't know who to call? Send your query to ASK_DMSO@dms0.mil. We'll sort it out, send your question to the right people and get you an answer.



Lead, integrate & leverage M&S for the Warfighter

DMSO Industry Days

Continued from p. 12

Tutorials

Six M&S tutorials are scheduled on Monday afternoon, May 22.

- M&S 101 / M&S Orientation for Program Managers
- Verification, Validation and Accreditation
- Synthetic Environments Data Representation and Interchange Specification (SEDRIS)
- Data Provisioning for Modeling and Simulation
- High Level Architecture (HLA) IEEE Specification 1516
- HLA - Tuning Your Federation for Performance

All tutorials will run from 2-5 p.m., with the exception of the two HLA tutorials which are 90 minutes long -- the "IEEE Specification 1516" session will begin at 2 p.m.; "Tuning Your Federation for Performance" will follow it.

Exhibits

In addition to the presentations a series of demonstrations and exhibits will be available as well in the Junior Ballroom adjacent to the Lord Fairfax Grand Ballroom (location of General Sessions).

- Integrated Natural Environment (INE)
- Master Environmental Library (MEL)
- Environmental Scenario Generator (ESG)
- Synthetic Environments Data Representation and Interchange Specification (SEDRIS)
- Environment Federation (EnviroFed)
- High Level Architecture (HLA)
- Verification, Validation and Accreditation (VV&A) Recommended Practices Guide (RPG) (This link will be active -- without username/password prompt -- effective May 22)

Conceptual Models of the Mission Space (CMMS) Knowledge Acquisition Tool (KAT)

- CMMS Data Library
- Data Engineering (DE) Tools
- Six Modeling and Simulation Resource Repository (MSRR) nodes:
 - DMSO MSRR
 - Army MSRR

- Navy MSRR
- Air Force MSRR
- Ballistic Missile Defense Organization (BMDO) MSRR
- Joint Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) Decision Support Center MSRR

- Modeling and Simulation Information Analysis Center (MSIAC)
- U.S. Joint Forces Command's (USJFCOM) Joint Warfighting Center (JWFC)

- Defense Threat Reduction Agency (DTRA)
- Joint Warfare System (JWARS)
- Simulation Based Acquisition (SBA)
- Army Threat Systems Management Office (TSMO) (name was recently changed from "Threat Simulator Management Office")
- Air Force Threat Representation and Validation (TR&V) Office

Proceedings

Proceedings will be placed on CD-ROM and mailed to all attendees within two weeks following the conference. Additional copies will be available at a cost of \$30, as the supply lasts. For information about proceedings contact Barbara McDaniel, NTSA, at (703) 247-2569, Fax (703) 243-1659, or e-mail her at bmcdaniel@ndia.org.

For more information

For information about the DMSO Industry Days contact the DMSO program lead, Larry Alexander at (703) 824-3404, Fax (703) 998-0667 or e-mail him at lalexander@dmsomil.

ASK DMSO • ASK_DMSO@dmsomil

Have a question about the DMSO, its programs or DoD M&S policy, but don't know who to call? Send your query to ASK_DMSO@dmsomil. We'll sort it out, send your question to the right people and get you an answer.

FY99 DMSO M&S Awards Honorable Mentions

Nominees selected for honorable mention are listed below. Program details and points of contact for each selectee are available for download in .pdf format on the DMSO Web site at http://www.dmsomil/pao/NewsReleases/MS_Awards_Honorable_Mentions_99/.

ACQUISITION FUNCTIONAL AREA

Government Category Honorable Mention:

- Crusader Simulation Coordinating Group - U.S. Army Materiel Systems Analysis Activity (AMSAA), Aberdeen Proving Ground, Md.
- Air Force Instruction (AFI) 16-1002, Modeling and Simulation, Support to Acquisition Integrated Product Team (IPT) -- U.S. Air Force - SAF/IAQI, Information Dominance Directorate, Pentagon, Washington, DC.

Non-government Category Honorable Mention: None.

ANALYSIS FUNCTIONAL AREA

Government Category Honorable Mention:

- Indian Ocean Channel Simulation -- Air Force Studies and Analysis Agency (AFSAA), Pentagon, Washington, DC.
- Joe Puckett, Operations Research Analyst, Warrior Preparation Center, U.S. Air Forces in Europe.

Non-government Category Honorable Mention:

- Edward L. Coleman, Site Manager, Computer Sciences Corporation, supporting the U.S. Air Force - Force Protection Battle Lab at Lackland Air Force Base, Texas.

TRAINING FUNCTIONAL AREA

Government Category Honorable Mention:

- Gene Newman, Technical Director, Joint Training Analysis and Simulation Center (JTASC), USJFCOM, Suffolk, Va.

- Dr. Jacqueline R. Henningsen, Associate

Director for Modeling, Simulation and Analysis, Directorate for Command and Control, Headquarters U.S. Air Force, Pentagon, Washington, DC.

Non-government Category Honorable Mention:

- The C-5B Distributed Mission Training (DMT) Prototype -- The Boeing Company, St. Louis, Mo.
- Aggregate Level Simulation Protocol (ALSP) Systems Engineering Support to the Joint Training Confederation (JTC) -- MITRE Corporation, McLean, Va.

CROSS-FUNCTIONAL AREA

Government Category Honorable Mention:

- Simulation Throughout the Life Cycle (SimTLC), U.S. Army Tank-Automotive Research, Development and Engineering Center -

See **HONORABLE MENTIONS**, p. 5

A Case Study

TRAC will use enhanced version of sim-based S-DLRC to train commander, staff of new BCT

By Chris Turrell
DMSO HLA Cadre

This summer the Army's Training and Doctrine Command (TRADOC) Analysis Center (TRAC) at Ft. Leavenworth, Kan., will use an enhanced version of its simulation-based Staff Digital Leader's Reaction Course (S-DLRC) to train the commander and staff of the Army's newly developed Brigade Combat Team (BCT).

The breakup of the Soviet Union and the resulting re-emergence of nationalism in Eastern Europe have given rise to political instability fueled by repressed political, religious and ethnic hatred. U.S. forces are being called upon more and more to enter into these volatile situations to restore order and maintain the peace in an effort to provide stability while local factions come to terms with their differences and forge more lasting relationships.

To address these challenges the Army has committed to a program of restructuring some of its combat elements to provide a faster, more lethal and more sustainable response to these Small Scale Contingencies (SSC) and Stability and Support Operations (SSO). This new force, known as the Brigade Combat Team, will be created through a series of evolutionary steps beginning with an *initial* Brigade, to be fielded this year at Ft. Lewis, Wash., followed by an *interim* Brigade fielded in the 2007 time frame and finally by the *objective* Brigade force. Both the interim and objective Brigades will take advantage of technology advances and new procurements, while the initial Brigade will rely, for the

most part, on available equipment and materials.

This new force structure and organization presents a series of challenges to the combat development community. The proposed organization of the Interim BCT (version 4.0a) came from the Army analytical community and the instructional staffs at Ft. Benning and Ft. Knox, and is based on the results of simulation-based analyses performed by the entire Combat Developments community. The challenge now for the TRAC at Ft. Leavenworth is to further test the Organizational and Operational concepts with full-scale, simulation-based, human-in-the-loop exercises designed to train the Brigade commander and staff to deal with the rigors of the SSC and SSO environments.

One of the simulation environments used to train the initial Brigade will be a modified version of the S-DLRC. This environment was developed initially to teach and allow leaders to practice the Adaptive Thinking Process; in short, to capitalize on and take advantage of the vast amounts of information available on the digitized battlefield. This environment, built on the DoD's High Level Architecture (HLA) for simulation, relies on simulations to drive "real world" command and control (C2) systems in the brigade tactical command post. The DLRC implementation has evolved over time and was used this past year as the simulation driver for Army Experiment 6, which provided a simulation-based, tactical environment that replicated the modern, digitized battlefield.

Federations of simulations are developed with specific goals and objectives in mind. While the environment used to support the initial Brigade is based on a previous federation execution, it is by no means an exact copy. In addition to integrating the latest version of the DMSO-sponsored runtime infrastructure, RTI 1.3NG, into the federation a number of scenario and database changes will also occur. A Kosovo digital terrain database will be developed as will a force and systems/munitions database. Both Army Forces (ARFOR) and Brigade scenarios, to include exercise vignettes, will also be developed. Functionality changes will also be made to the principle simulations. The EAGLE simulation federate resolution unit will be the platoon. At present, EAGLE represents forces at the company level. This simulation will also receive the enhanced air

assault functionality and air resupply functionality developed for the Strike Force exercises. Enhanced Combat Service Support (CSS)/Logistics functionality will also be added to the simulation for initial Brigade exercises. A big change will be the addition of the Reconnaissance Surveillance and Target Acquisition (RSTA) functionality to the simulation environment. The ModSAF simulation component will add the prototype Medium Armored Vehicle (MAV) behaviors and visuals. Additionally, the behaviors of the air and ground units will be further enhanced to meet federation requirements. Simulation to C2 interfaces will also be improved to include the ability to control CSS units.

The role of modeling and simulation is pivotal in the development of the interim BCT. The ability to prototype, test and train in a world that, short of war, only exists virtually is perhaps one of the best arguments for the use of M&S within the DoD today.

For more information

For additional information on this exciting program read the June edition of the Modeling and Simulation Information Analysis Center (MSIAC) M&S Journal Online at <http://www.msiac.dmsomil.com/journal/>.

Honorable Mentions

Continued from p. 4

National Automotive Center (TARDEC/NAC), Warren, Mich.

- Advanced Climate Modeling and Environmental Simulations (ACMES) Development Team, Air and Space Natural Environment M&S Executive Agent (ASNE MSEA), U.S. Air Force Combat Climatology Center (AFCCC), Asheville, N.C.

Non-government Category Honorable Mention:

- Systems Engineering Team for the Transition of the JTC from the ALSF to the HLA -- MITRE Corporation, McLean, Va.

- Discrete Event System Specification (DEVS) Formalism as a Framework for HLA Predictive Contract Methodology -- Center for Integrative Modeling and Simulation, University of Arizona, Tucson, Ariz.

M&S Journal Online



Looking for more news and information about DoD M&S? Visit the MSIAC's "M&S Journal Online" at <http://www.msiac.dmsomil.com/journal/>



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JSIMS Update

Transition activity intense since December ACAT-1D designation

By Fred Hartman
Chief, Enterprise Division

In December, as the result of an Office of the Secretary of Defense (OSD) Technical Review, the Joint Simulation System (JSIMS) program received detailed direction from the Under Secretary of Defense for Acquisition, Technology and Logistics. The “JSIMS Program Acquisition Decision” Memorandum designated the program as ACAT – 1D, directed the immediate transition to a new systems architecture based on the Department of Defense’s (DoD) High Level Architecture (HLA) for simulation, and directed management changes which included transferring program management from the Air Force to BG(P) William L. Bond, Commander, U.S. Army Simulation, Training and Instrumentation Command (STRICOM).

Efforts by the JSIMS Transition Team since January to produce an executable program plan based on the revised HLA-based architecture have been intense. The resulting program baseline will meet the intent of OSD guidance and user requirements. The JSIMS Alliance is working to resolve unfunded requirements across the program and is taking corrective action in the Program Objectives Memorandum (POM) submission for Fiscal Years 2002-2007.

Laura Knight, head of the JSIMS Transition Team, will provide a program update, to include a description of the new technical architecture, on Wednesday afternoon, May 24, at the Defense Modeling and Simulation Office (DMSO) Industry Days (see article on page XX).

The JSIMS is the DoD’s flagship modeling and simulation (M&S) program to provide the next generation of training, mission planning and mission rehearsal tools for warfighting commanders-in-chief (CINCs), their staffs and subordinate elements, and other joint organizations, Services and agencies. The JSIMS environment will allow joint interoperable training by linking live, virtual and constructive simulations in a synthetic battlespace where all Service warfare domains will operate in a single, seamless, integrated system to conduct simulated Joint Training Exercises.

The Services and CINCs have been working since 1994 to create a standardized simulation system that will

improve economies of scale with credible, joint and interoperability training. The JSIMS program will support the Chairman of the Joint Chiefs of Staff’s “Joint Vision 2010” that says, “Simulations must be interconnected globally—creating a near-real-time interactive simulation superhighway between our forces in every theater. Each CINC must be able to tap into this global network and connect forces worldwide that would be available for theater operations.”

Or put more succinctly: “move more electrons and fewer troops.” The JSIMS will not only allow us to move fewer troops for training, it will provide a robust training environment that will require far fewer technical control personnel than those required in the current legacy systems used to support joint training. It will increase the training resources available to commanders for both joint and Service training worldwide, reduce the time required to prepare for training exercises, and expand the number of tasks that can be trained using simulation.

The JSIMS is the means by which M&S capabilities keep pace with the increasingly complex training environment facing joint and service commanders in the post Cold-War world.



MEL Library

Continued from p. 9

MEL runs a Z39.50 server, any other Z39.50 client, which may not be part of the clearinghouse, can search it. The functionality of the MEL and that of the Environmental Scenario Generator is being combined to provide a more robust set of common services in support of the INE Strategy.

For more information

For more information contact Dr. Fred Newman at fred.newman@jhuapl.edu, visit the MEL Web site at the URL above, or contact the MEL Help Desk at mel_help@msiac.dmsomil or (888) 566-7672 (toll-free). Help Desk hours are 7 a.m.- 4 p.m. EST, Monday through Friday.

HLA draft standards back in IEEE hands for review

By Phil Zimmerman
DMSO HLA Program Manager

The IEEE High Level Architecture (HLA) draft standards are once again in the hands of the IEEE. Surprised? Don't be. This is all a part of the IEEE process of community consensus balloting.

The first round of balloting by the Institute of Electronic and Electrical Engineers (IEEE) did not pass the draft standards. This was not unexpected. In fact, it shows the positive side to community consensus balloting. Through this approach, we are able to reach a greater number of people who are interested in the standards than had participated in its earlier development. The balloting for those three draft standards resulted in over 750 modification suggestions, with a majority of those

suggestions being submitted against the Interface Specification (P1516.1).

During the past months, the three draft standards have been undergoing changes based on those suggestions. Led by the ballot resolution committees for each of the draft standards, comments have been combined, modified, rejected and accepted as is, and the results put in place in each of the draft standards. The work has been far from simple, but the draft standards are better for the effort. More descriptive text was generated; changes were made to make sure that the three documents were complete and consistent; services were made more complete and other modifications were undertaken to ensure consistency; and the data interchange formats and application program interfaces were improved. Not all of the changes have been major, but not all of

them have been simple either. Great care was taken in the combined work of the three ballot resolution committees to ensure that the documents remained consistent.

Shortly after the Architecture Management Group (AMG) meeting in May the recirculation packages began to be assembled, and recently were delivered to the IEEE. This recirculation follows the same rules as the original balloting; packages are distributed to the original balloters – but only the changes are to be reviewed. Because the changes, in some cases, modified large parts of the documents, the choice was made to recirculate the entire documents. Other material describing the comments and the resolution was also included in the package.

So, whether or not you're in the balloting group, standby. Hopefully we're in the home stretch.

Define performance ...

RTI just one factor affecting HLA performance, optimization can be had without modifying RTI

By Chris Turrell
DMSO HLA Staff

As the DoD High Level Architecture (HLA) for simulation continues to gain acceptance throughout the modeling and simulation (M&S) community, a frequently heard concern is that it does not offer the required performance to meet some federations objectives. These complaints are often attributed to the Runtime Infrastructure (RTI) without looking further to determine if the federation itself is contributing to the problem.

In fact, experience has shown that the RTI is only one of a number of federation components that can affect performance. Other factors include the federates themselves, local-area network/wide-area network (LAN/WAN) environments, hardware, processors and network interface cards. In other words, the performance of an HLA federation can often be improved substantially by optimizing the federation itself without modification to the RTI. The RTI was designed to work across a broad range of federation applications and is not intended as a "silver bullet" for federation performance. The remainder of this article will discuss federation design issues and their impact on federation performance.

Before an HLA federation can be "tuned" for better performance, it is necessary to define the term "performance" in the context of the federation in question. Dictionaries contain multiple definitions for the noun "performance" that range from "the execution of an action" to "the manner of reacting to stimuli." The most useful definition of performance for HLA federations, however, is "the ability to perform," or in a single word, "efficiency." The central question for the federation development team and its sponsor is "how efficiently does the HLA federation exchange data during its execution?"

Now, having decided that performance has the connotation of efficiency, it is necessary to define how efficiency will be measured and assessed. To begin, it should be noted that each of the principal DoD M&S domains, like training, analysis and experimentation, test

and evaluation, etc., stress the importance of different aspects of a federation execution. For the training federations the important aspects are typically the advancement of simulation time in conjunction with real "wall clock" time, while accommodating human-in-the-loop and their C4I devices, and preserving the causality of the simulated events. For the analytical federations the important aspects are often the advancement of simulation time as fast as possible, while being able to obtain repeatability of the results to achieve a high degree of credibility in their results. For test and evaluation federations the important aspects are usually the ability to operate the simulation in "real time" while accommodating hardware-in-the-loop with minimum latency of data transmission. Each of these domains is interested in seeing their federations operate in a specific manner, and therefore will need to optimize a federation implementations in different ways.

Additionally, it is important for the federation development team to understand that federation performance is not solely dependent upon the performance of an RTI to pass data. Federation performance is complex because a distributed federation is the integration of many different components that interact during a federation execution. A federation can be composed of multiple federates operating individually or in groups on one or more networks using an RTI. Further, within a federation the individual federates are operating in a unique manner because they have been written in a particular computer language and reside in a specific hardware and software computing environment. Changes made in any of these areas can affect overall federation performance. For example, experience has shown that in spite of a carefully structured federation object model (FOM) development process, some federates continue to publish data that is not used by any other members of the federation. Flooding the RTI with unwanted data impacts performance. In other cases where the published data is required, the rate of publication may be far in

See HLA PERFORMANCE, p. 8

February demo of EnviroFed shows SEDRIS helps make environmental feds re-usable

By Bob Lutz
EnviroFed Program Manager

On February 23-24, the Defense Modeling and Simulation Office (DMSO) sponsored a successful demonstration of the Environment Federation (EnviroFed) at the U.S. Army Topographic Engineering Center (TEC) in Alexandria, Va.

The primary purpose of this federation is to examine the use of the Synthetic Environment Data Representation and Interchange Specification (SEDRIS) Data Representation Model (DRM) and the Environment Data Coding Specification (EDCS) from SEDRIS in a High Level Architecture (HLA) federation. The hypothesis is that using the unambiguous syntax and semantics from SEDRIS to describe the data exchanges will make individual environment federates more broadly re-usable in the DoD modeling and simulation (M&S) community. The project also serves as a useful demonstrator of the scope and nature of dynamic environment and terrain modeling capabilities that are available today.

The EnviroFed is composed of four distinct federates: *Joint Semi-Automated Forces (JSAF)*, *Modular Stealth (ModStealth)*, *Environment Data Server (EDS)* and *Dynamic Terrain Simulation (DTSim)*.

The JSAF is an entity-level combat simulation that models the physical charac-

teristics and behaviors of all vehicles, weapon systems and sensors operating in the synthetic natural environment (SNE). In the federation, the JSAF subscribes to and receives data about the dynamically changing environment and terrain and uses this data to influence the decision-making and behavior of the battlefield entities. The *ModStealth* subscribes to data about the terrain, environmental processes, and simulated forces represented in the federation, and renders an appropriate 3-D visualization. The *EDS* provides dynamically changing values for key environmental state variables (atmosphere, ocean, and space) to other federates based (in this case) on the Global-98 Meteorologic and Oceanographic (METOC) database. The Global-98 METOC database contains a correlated set of 4-D atmospheric and oceanographic state variables derived from authoritative, operational, model-based forecast products obtained from the Master Environmental Library (MEL). The *DTSim* calculates the effects on terrain and features (e.g., buildings, bridges) caused by the actions of other federates, and publishes data about the changes to terrain and features to the rest of the federation. A graphical representation of the EnviroFed is provided below.

The EnviroFed project was initiated in May 1999. The first phase of this project focused on Federation Object Model (FOM) development, designing and implementing

appropriate Runtime Infrastructure (RTI) interfaces for DTSim, ModStealth and EDS, and resolving other relevant design issues. Results and observations from EnviroFed Phase I have been documented in a set of papers published at the March 2000 Simulation Interoperability Workshop (SIW).

In Fiscal Year 2000 (FY00), the primary emphasis for the EnviroFed project is on increasing the re-use potential of the environmental federates. The approach is to stabilize the capabilities that were recently demonstrated at TEC, to update legacy capabilities of the federates that were not applied in FY99, and to demonstrate the availability of the federates on low-cost workstations. The federation will also serve as a test case "consumer" for the Integrated Natural Environment (INE) generation process being prototyped by the INE Program. The INE program is exercising its technology components in an end-to-end experiment to produce an environmental scenario. The Environment Federation will consume or apply that environmental scenario.

For more information

For more information, contact Bob Lutz at (240) 228-7599 or robert.lutz@jhuapl.edu.

HLA Performance

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excess of the subscriber's needs. Again these activities cause the RTI to waste cycles and adversely impact performance.

The federation development team will need to establish a performance baseline for their federation prior to adjusting any aspect of their federation implementation. The Defense Modeling and Simulation Office (DMSO) has provided two sets of software tools to assist federation developers in the establishment of their performance baseline. The Federation Execution Planners Workbook (FEPW) is a documentation tool consisting of a series of inter-related tables, which the federation developers can use to describe how their federation is implemented. Once they have captured characteristics of their federation, managers can use that information to gain deeper insight into federation performance-related areas. Two such areas may be the relationships among their federates, and timing and coordination requirements for their federation.

The second set of tools that the DMSO provides consists of four performance benchmark programs that can be used as performance indicators for the major categories of inter-federate data exchange through the RTI. These categories are *update latency*, *update throughput*, *time synchronization*, and *ownership management*. The performance benchmarks are intended to be simple and unambiguous

tools that can be applied by general users. Each provides easy-to-understand metrics that aid in the comparison of federation performances. However, some care does need to be taken when using these benchmarks. The results from the benchmarks are representative of performance in controlled, near-ideal conditions for the federations. Such conditions will not normally be present during a full-up federation scenario execution. The DMSO continues to evolve these performance benchmarks based upon input from the user community. The FEPW and Performance Benchmarks are freely available through the HLA Software Distribution Center at <http://hla.dmsmo.mil/sdc/>.

For more information

For more information review the following Simulation Interoperability Workshop (SIW) papers, "*Optimizing Performance of an Analysis Federation*," (00S-SIW-025), "*RTI NG and pRTI Performance for Simulated Aircraft, Real Time Updates*," (00S-SIW-058), and "*Application-Specific Network Performance Analysis using the Navy's HLA Federation TestBed*," (00S-SIW-098) from the proceedings of the Spring 2000 Simulation Interoperability Workshop. These papers can be downloaded at <http://www.sisostds.org/siw/00spring/rpts-papers.htm>.

ESG releases first of three builds for 2000

By Dr. Richard Siquig
ESG Project Lead

In April 2000, the Environmental Scenario Generator (ESG) project released the first of three builds scheduled for calendar year 2000.

The ESG is intended to provide an integrated, physically consistent environmental data set meeting a Modeling and Simulation (M&S) customer's requirements for an authoritative and realistic representation of atmospheric, oceanic, and/or space natural environment elements for specified regions, time frames and conditions

It is part of the Common Services Component of the Integrated Natural Environment (INE) Authoritative Representation Process. The goal of the ESG program is to provide a comprehensive solution to the problem of matching available DoD resources to the specific requirements of modeling and simulation (M&S) programs. This involves the development of customer interfaces to gather requirements and review potential options, and a distributed architecture for the production of environmental databases from available data and modeling resources.

The essential features of ESG Build 1 are as follows. The ESG Customer Interface was modified from a locally hosted Java application to an entirely web-based client that communicates with ESG functionality via Java Servlets. The data mining capability to locate comparable scenarios in past environmental conditions exists for the atmosphere, space, weather, and to a limited extent, for the ocean. The data mining interface includes a basic visualization capability to assist the user with the review of candidate data sets. There is an initial just-in-time (JiT) production capability for the atmosphere that can include off-the-shelf ocean components. The resulting environmental database can be transmitted to the user in Gridded Binary (GRIB) or Synthetic Environment Data Representation Interchange Specification (SEDRIS) format. The

process of defining a custom environmental database that meets a user's requirements is still a manual process, as is the delivery of the final product but both these capabilities will be evolved significantly in later builds to a more automated version.

The current ESG customer interface allows the user to specify environmental conditions of interest (e.g., rocky terrain, rainy weather, high waves, solar disturbances) and through the use of data mining, or other appropriate techniques applied to reference data sets available at the Master Environmental Library (MEL) Resource Sites, to locate instances when the desired conditions occurred. The user then has the option of obtaining data sets directly from MEL (such as the reference data set itself), or working with a Subject Matter Expert to develop a Scenario Generation Template (SGT) to meet their specific requirements for a scenario database. The ESG architecture then has the ability to use this SGT as the schematic for building a custom scenario database from multiple MEL data resources and/or JiT models, and perform value-adding functions such as regridding, interpolation, and adding additional requested parameters through the use of authoritative transforms.

The ESG continually demonstrates its utility by working with customers such as the Joint Warfare System (JWARS), the Naval War College and the U.S. Joint Forces Command's Joint Training, Analysis and Simulation Center (JTASC) to deliver the data and products which support their needs.

For more information

For more information on the ESG please visit the newly launched project web site at <http://www.aesmry.com/esg/>, or contact Dr. Richard Siquig at (831) 656-4732 or siquig@nrlmry.navy.mil.

MEL library growing, upgraded to version 2.2

By Dr. Fred Newman
MEL Associate Project Lead

The power of the MEL, the Master Environmental Library, continues to grow. The MEL, the data access and discovery element of the Common Services component of the Integrated Natural Environment (INE) Authoritative Representation Process, has been upgraded to Version 2.2. This version is implementing numerous enhanced facilities provided to the users, and has added support to allow some datasets to be delivered in SEDRIS.

The more powerful MEL data query now includes a full text search of all the indexed fields in the metadata. Previously this type of search was limited to only eight specific fields in the metadata. A "Search" button option on the query page allows the user to view the extensive list of searchable keywords. This more powerful query reduces the average time required to locate the dataset(s) of interest. Furthermore, the MEL has also enhanced the Federal Geographic Data Committee (FGDC) type of query, now called "Fielded Query," by increasing the number of search terms that may be logically combined from two to four. Users of this

type of query can now be much more specific in their initial searches.

The earlier MEL data query was already very effective: Naval Research Laboratory - Monterey, one of the more popular resource sites, served over 50,000 orders in a 12-month period, totaling 143 GB of digital data. Furthermore, the Naval Oceanographic Office (NAVOCEANO) will become a MEL Resource Site. This site will become the primary site for distribution of oceanographic and lower atmospheric analyses and forecasts from both NAVOCEANO and the Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC).

A new browse capability, available on the MEL home page at <http://www.mel.dmsomil/> allows users to scan selected categories of metadata without having to develop a specific query, in much the same way that we scan across the shelves in a section of a library covering a subject of interest.

A new online tutorial on how to use the HTML Query Results pages is now available. This tutorial, complete with illustrative animations, leads the new user step by step through understanding and

using the results of the metadata search. In addition, the metadata are now easier to read because the FGDC element tags are now in a colored bold-face font and graphical borders separate the major sections.

In order to better serve the needs of joint commands, the availability data through the MEL over the Secret Internet Protocol Router Network (SIPRNET) is becoming a reality soon. In addition, availability of data from MEL in Synthetic Environment Data Representation Interchange Specification (SEDRIS) Transfer Format (STF) is expected soon.

Finally, the MEL is now a node on the National Geospatial Data Clearinghouse. This means that the MEL's holdings can be discovered and searched using one of several entry points to the clearinghouse. To reach one of these entry points, visit the clearinghouse at <http://130.11.52.184/>, then select the type of search interface desired. The MEL can be selected in that search interface in the "Select Data Servers to Search" section. It appears in the listbox under the name "DOD Master Environmental Library." Since the

See MEL LIBRARY, p. 6

New S&T Initiatives moving out to look at new technologies in FY00

By Philip Barry, Ph.D.
Chief, S&T Initiative Division
and Bob Mills
DMSO M&S Policy

On March 1, the Defense Modeling and Simulation Office (DMSO), under its new Director, COL Forrest Crain, USA, began an innovative change in course and magnitude for the DMSO through the implementation of the "New Vector" for DMSO. The new vector is the basis for an almost wholly new organizational structure that's being optimized to support DoD Warfighter requirements for modeling and simulation (M&S) applications. This article focuses on one of the five new divisions that have been created within DMSO to respond to this challenge. This article introduces you to the Science and Technology (S&T) Initiative Division and some of its initial efforts.

The breadth, scope, and pace of technology change today is such that we often find ourselves with solutions to problems we didn't initially recognize. This is the heart of the challenge facing the S&T Initiatives Division: how to best anticipate what science and technology innovations can be leveraged to best serve future Warfighters. True technological innovation is hard to find and harder yet to institutionalize—there are innovators to be found in any number of likely spots: various government offices, some warfighting units, DoD laboratories, academia and industry. The S&T Initiatives Division is responsible for achieving cognizance of these technological developments and innovation to determine how their employment can enhance the missions and capabilities of DoD warfighters.

Current DoD policy, as stated in DoD Directive 5000.59, "DoD Modeling and Simulation [M&S] Management, section 4.4. states:

Investments shall promote the enhancements of DoD M&S technologies in support of operational needs and the acquisition process; develop common tools, methodologies, and databases; and establish standards and protocols promoting [interoperability], data exchange, open systems architecture, and software reusability of M&S applications....

One way of ensuring that the Department supports future Warfighters' S&T requirements in support of this policy is to provide targeted investment in promising tools and technologies. That is the task of the S&T Initiatives Division.

When the Division was designated to lead the S&T Initiatives Task Force (S&TITF) it set an aggressive agenda for identifying projects that could begin almost immediately to bear fruit. Due to the late start in Fiscal Year 2000 and legal limitations on research and development (R&D) funding (two years), the Task Force's first objective is to identify those projects with assistance from the four military Services and Joint Staff. The initial call went out on April 19, and inputs are due from the Service M&S offices by May 17. This is clearly a pilot program that will provide us insights into structuring a more comprehensive and integrated approach to S&T

investments in M&S in FY 2001 and the out years. Our goal is to synchronize this process with the Program Objectives Memorandum (POM) cycle so that funding can be provided as soon as it is legally available to initiate a larger program that will advance the state-of-the-art of M&S usage across the scope of the DoD's operations and missions.

In the first week of June, the S&TITF will evaluate and prioritize proposals for review and final approval by the DoD Executive Council for Modeling and Simulation (EXCIMS). Successful proposers will have provided a technically solid and innovative proposal that can begin immediately with receipt of funding. The S&TITF's recommendations will be passed to the EXCIMS for approval by July 12. The winners of this initial competition will be notified as quickly as possible after they are approved.

In FY01, we will build on the lessons learned from the FY00 program, expand the scope of the program and funding, and open the program to all of DoD as well as industry and academia. Further announcements and information will be announced during the DMSO Industry Days, May 22-24.

We in the S&T Initiatives Division look forward to working with the broader research and development community to best meet the future M&S needs of the Warfighter, help the Department achieve new efficiencies and contribute to greater effectiveness in DoD S&T spending. The S&T Initiatives Task Force is the first step toward a robust, integrated and productive S&T program that more closely links the operational warfighting and S&T communities.

For more information

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M&S Education

Continued from p. 11

The MSEWG has expanded its original membership to include several non-DoD agencies in an attempt to reach out to the greater M&S community.

M&S education will play an important role in DMSO's new vector as an agent for integration, execution and awareness.

For more information

For more information on M&S Education, contact: Charles Snead, DMSO-sponsored courses, csnead@msiac.dmsomil, (703) 933-3342; Denny Murphy, non-DMSO sponsored courses, dmurphy@msiac.dmsomil, (703) 933-3330, or

Tom Stanford, MSIAC M&S Education Division Manager, tstanfor@msiac.dmsomil, (703) 933-3343, or visit the M&S Education Web site at <http://www.education.dmsomil/>.

M&S Education

Program key role in DMSO's 'new vector'

By Tom Stanford
MSIAC Division Manager, Education

Education plays a key role in DMSO's new vector. An important element of DMSO's vision is to "integrate" the modeling and simulation (M&S) community. The education program contributes to this integration effort by gathering students from all across the M&S community to learn, to share their experiences and to leave with a greater appreciation for the breadth and depth of the world of M&S.

M&S Staff Officer Course (MSSOC) classes are by design filled with students from the DoD staff, the Joint staff, all services and a wide variety of agencies and activities. Student applications are screened to ensure the right mix because a major benefit of the course is for graduates to leave with a list of contacts throughout the M&S world that can assist them with integration and information.

The DMSO's core capabilities include "Lead in the development and execution of DoD M&S Policy and the M&S Master Plan." Attendees at all of the M&S education courses receive a thorough overview of DoD M&S policy and become knowledgeable in the various objectives of the Master Plan. Students develop a sense of awareness of the issues and challenges facing the DoD as it strives to execute the M&S Master Plan and moves toward developing a new Master Plan.

Finally, education is a mainstay of the DMSO's community support efforts. Over 5000 people have attended DMSO M&S education courses in the past year, either at the DMSO or at one of the many locations worldwide where M&S courses have been taught. M&S education will continue to play an important part in the execution of the new vector. In the coming months, look for upgrades to existing courses, as well as several new courses and expansion into the world of Advanced Distributed Learning (ADL).

NATO M&S Orientation Course

M&S Information Analysis Center (MSIAC) educators have been busy this year. Of particular note is the NATO M&S Orientation Course that was completed, presented at the International Training and Education Conference in The Hague, The Netherlands in April, and then handed off to the NATO M&S Coordination Office for execution. A team of developers, led by M&S Information Analysis Center (MSIAC) team members Charles Snead and Ed Degnan, delivered a product that will serve as a centerpiece for NATO's M&S education and outreach program.

MSSOC

Led and coordinated by Paul Murtha, the MSIAC education team has conducted three DMSO-sponsored MSSOCs, the five-day flagship course, at Edwards AFB, Calif.; Norfolk, Va.; and at the DMSO in Alexandria, Va. Upcoming DMSO-sponsored MSSOCs include:

- MSSOC 00-4, June 19-23, DMSO, Alexandria, Va.
- MSSOC 00-5, Aug 28-31, Warrior Preparation Center, Germany
- MSSOC 00-6, Sep 25-29, DMSO, Alexandria, Va.
- MSSOC 00-7, Oct 16-20, DMSO, Alexandria, Va.

- MSSOC 00-8, Dec 11-15, Orlando, Fla.

Those interested in attending one of these courses should go to the DMSO M&S Education Project Web site at <http://www.education.dmsomil/>, click on "MSSOC," and register on line. As with all DMSO courses, there is no registration fee.

The MSSOC has also gone on the road to Lackland AFB, Texas and Eglin AFB, Fla. under the banner of the MSIAC's M&S University (M&S U.). Activities at those installations contracted the course through the MSIAC.

PMO M&S Workshop

Steve Hicks, MSIAC, led the presentation of the DMSO-sponsored Program Management Office (PMO) M&S Workshop, a one-day course designed to support the M&S Acquisition community, three times this year. Acquisition audiences at Eglin AFB; Kirtland AFB, NM.; and at the Apache PMO at Redstone Arsenal, Ala. have benefited from learning about using M&S throughout a product's lifecycle. A fourth presentation is scheduled June 14 at Arnold AFB, Tenn. In addition, the M&S U. took the course to Hanscom AFB, Mass. in March.

PfP Support

A MSIAC education team effort that promises to be of great international importance is the developmental work done this spring to support the Partnership for Peace (PfP) Simulation Network. Working with representatives from the Office of the Secretary of Defense (OSD) and Joint Forces Command (JFCOM), the MSIAC education team created a concept for developmental conferences to be conducted in several PfP nations starting in Fiscal Year 2001. These conferences will address Advanced Distributed Learning (ADL) and simulation-supported Command Post Exercises (CPX), and will create a network of knowledgeable persons in these areas throughout the PfP members.

MSEWG

An important element of the M&S education effort is the M&S Education Working Group (MSEWG). Finishing up its first year, the MSEWG, coordinated by Denny Murphy, MSIAC, can point to an impressive list of accomplishments. These include:

- development and approval of a charter;
- draft education input to the revised M&S Master Plan;
- development and approval of an implementation plan with near-, mid-, and long-term goals;
- updated information on Service M&S education opportunities; and
- a concept for a new course that addresses M&S from the operational viewpoint.

See M&S EDUCATION, p. 10

M&S Award Winners

Continued from p. 1

The DMSO initiated the M&S awards program in 1998 as a way to appropriately recognize the exceptional work being done in the DoD M&S community by both government and non-government people and organizations.

The criteria for each of the awards were derived from the charters and other defining documents of the three M&S functional area councils and the DoD M&S Working Group (MSWG), all subordinate organizations of the DoD's Executive Council for M&S (EXCIMS).

Nominations in the functional areas were reviewed by awards boards established by the corresponding functional area councils of the EXCIMS. A select subcommittee of the MSWG reviewed nominations in the cross-functional area. To ensure an equitable representation in the non-government sector, selected members of the M&S Industry Steering Group (ISG) of the National Training Systems Association (NTSA) participated in the selection process. Finally, the EXCIMS, chaired by Dr. Delores M. Etter, Deputy Director for Defense Research and Engineering, reviewed the various groups' recommendations for approval of the awards.

For information about the DMSO M&S Awards program contact the DMSO program lead, Larry Alexander at (703) 824-3404, Fax (703) 998-0667 or e-mail him at lalexander@dmsomil.



ODDR&E / DMSO
Office of the Secretary of Defense
Washington, DC 20301-3040

DMSO Industry Days will showcase DoD M&S, May 22-24

By Sherrel Mock
DMSO Public Affairs

The Defense Modeling and Simulation Office (DMSO) will host the ninth annual "State of Modeling and Simulation Briefing to Government and Industry," or DMSO Industry Days, May 22-24, at the Sheraton Premiere at Tyson's Corner, 8661 Leesburg Pike, Vienna, Va.

The conference provides an opportunity for the Department of Defense (DoD) to update industry and government/military executives, strategic planners and senior technical managers on the various programs and initiatives in modeling and simulation (M&S) within the DoD. The briefing will include the status of, and goals and plans for, DoD M&S under the purview of the DMSO, as well as information from the DoD, Military Services, Joint Staff, Unified Combatant Commands, other government agencies, and representatives of the M&S Industry.

Keynote addresses will be presented by Dr. Delores M. Etter, Deputy Director for Defense Research and Engineering; Dr. Vitalij Garber, Director of Interoperability in the office of the Undersecretary of Defense for Acquisition, Technology and Logistics; and Mr. James R. Oyler, President and Chief Executive Officer of Evans and Sutherland Computer Corporation.

DMSO Director, Army Col. Forrest Crain, will review the year in M&S, focusing on the accomplishments in the training, analysis and acquisition domains; look at the current state of affairs in DoD M&S; discuss common needs and cautions; and conclude with the challenges facing industry, academia and government.

A series of general and flag officer-level panels will review:

- Joint and Service Perspectives

- M&S Requirements to Support the Quadrennial Defense Review (QDR)
- Joint M&S Program Reports and
- Use of M&S in Major Systems Acquisitions

A highlight of the conference will be the recognition of the eight winners selected for the second annual DMSO-sponsored M&S Awards. The awards recognize both government and non-government achievement during Fiscal Year 1999 in support of DoD M&S objectives. Eight individuals or teams -- one government and one non-government -- were selected in each of four categories. The first three categories consist of the M&S functional areas -- training, analysis and acquisition. The fourth category, a cross-functional area, considers those broader endeavors that impact all aspects of the overall DoD M&S effort. Awards will be presented on Tuesday, May 23 at 4 p.m.

Support for Industry Days is provided by the National Training Systems Association (NTSA), an affiliate of the National Defense Industrial Association (NDIA), and the M&S Industry Steering Group (M&S ISG).

Briefings presented during Industry Days will be available on the DMSO Web site at <http://www.dmsomil/events/> as they become available beginning on May 23.

See DMSO INDUSTRY DAYS, p. 4

See page 4 for a list of tutorials and exhibits slated for this year's DMSO Industry Days.