... information for the Defense modeling and simulation community ...

DMSO NEWS

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M&S News e-Clips

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The mailing list is used to distribute 3-4 sentence summaries of quarterly ***DMSO News*** articles with links to the complete articles and *.pdf* versions of the newsletter; periodic news releases and announcements of DMSO-sponsored events, such as the annual ***Executive Forum for Modeling and Simulation*** and the ***DoD M&S Awards*** program; and weekly ***M&S News e-Clips*** (summaries of the week's online M&S news with links to the complete articles on the publishers' Web sites).

'Executive Forum on M&S' set for June 17-19 in Norfolk, Va.

The Defense Modeling and Simulation Office (DMSO) and U.S. Joint Forces Command (JFCOM) will co-host the 11th annual , Executive Forum on Modeling and Simulation June 17-19, at the Norfolk Waterside Marriott, 235 E. Main Street, Norfolk, Va.

The forum, formerly the DMSO Industry Days, is the Defense Department's premier event for federal government, senior Department of Defense (DoD), industry and academic executives, strategic planners, program managers and senior technical managers to gain insight into the Department's modeling and simulation (M&S) policies, plans, programs and emerging initiatives. The forum also provides the DoD with the opportunity to obtain feedback and insight into the views and plans of key warfighters, decision-makers and technology leaders in Congress, the DoD, industry and academia.

Dr. Ronald M. Sega, Director, Defense Research & Engineering, will present the keynote address. Army General William F. Kernan, Commander in Chief of the U.S. JFCOM, is invited to keynote as well.

The 2001 M&S Awards will be presented on Tuesday afternoon. *(See details below.)*

The Executive Forum on M&S is sponsored by the DMSO with the support of the National Training Systems Association (NTSA).

Visit the NTSA Web site at *www.trainingsystems.org/events/21D0/index.cfm* for an agenda, online registration, hotel information and more about the event — NTSA Event #21D0.

- For program/agenda information contact the conference project lead at (703) 824-3404, Fax (703) 998-0667, or e-mail *efms@dmso.mil*.
- To speak to someone about conference registration information contact NTSA at (703) 247-9471, Fax (703) 243-1659.

DoD, NTSA to present M&S Awards June 18 at Executive Forum on M&S

The 2001 Department of Defense (DoD) Modeling and Simulation (M&S) Awards will be presented June 18 during the 11th annual Executive Forum on M&S in Norfolk, Va.

The National Training Systems Association (NTSA) sponsors a corresponding set of awards for non-DoD/non-government M&S practitioners in industry and academia.

DoD awards will be presented in four categories for accomplishments during calendar year 2001. A winner –- individual, team or organization –- will be selected in each category. 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 two or more of the functional areas.

All units, organizational elements and individuals –- both civilian employees and active duty service members –- of the DoD Components that are involved with the development and/or use of M&S are eligible.

The awards program, now in its fourth year, was initiated by the DMSO in 1998:

- to enhance M&S awareness throughout the DoD, and
- to recognize excellence, innovation and achievement in advancing the *state of the art* of M&S and/or in contributing to interoperability and reuse in support of DoD M&S objectives.

This includes, but is not limited to, the development of standards and architectures; techniques and tools; synthetic environments; and new military applications.

For more information

For information about past DoD award winners visit *www.dmso.mil/public/community/awards/*.

For information about Industry awards visit *www.trainingsystems.org/nomform.cfm*.

Director's Corner

By Captain Michael G. Lilienthal, MSC, US Navy

Warfighters need better M&S tools for OOTW

When I wrote last November for the winter issue of the newsletter, I provided a short status report on a number of course corrections, given post-9/11 hindsight, that the DMSO was taking to better support the warfighter in the war on terrorism. I'd like to talk more about those efforts, specifically those directed at improving the warfighter's modeling and simulation tools for conducting operations other than war (OOTW).

The current M&S tools available to warfighter for OOTW need to go further to meet the user needs. The combatant commands have told us where they need help so we need to reassess our efforts and see what we can do to meet their needs as soon as possible. Here is are some examples of their requirements that we must focus on providing:

- A model(s) that can be used for a variety of missions that range from disaster relief, refugee, peacekeeping, counter-drug to stability operations. Current models don't provide the capability to train to all missions – particularly non-force-on-force and peacekeeping.

> ***"Our goal is to provide the warfighter with a composable toolbox of models and simulations that meets (OOTW) needs as immediately as possible."***

- A federated simulation for Commander-in-Chief (CINC) battle staffs that provides the detailed resolution needed in today's non-linear, asymmetric warfare environment.
- A standardized, collaborative and distributed crisis-action planning tool for analyzing courses of action, especially for OOTW.
- An OOTW simulation for Special Operations missions.

Our goal is to provide the warfighter with a composable toolbox of models and simulations that meets the above needs as *immediately* as possible. The DMSO effort will develop technologies to leverage M&S developments to support modeling OOTW; provide a framework to enable the use of a multitude of tools and technologies in support of OOTW modeling; populate an architecture with existing and emerging M&S tools; and transition tools to the warfighter and other M&S programs as appropriate.

One of the tools that we're looking at that is already available is the United Kingdom's *Diplomatic and Military Operations in a Non-warfighting Domain* (DIAMOND). DIAMOND, developed by the Ministry of Defence's Science and Technology Laboratory (DSTL) appears to be designed to represent joint OOTW campaigns. Its scope, maturity and usability make it the best model available. Some of the features that make it an excellent tool are its ease of use and its treatment of non-combatants and their behavior, infrastructure impact (damage, repair, reconstruction), and multiple factions.

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DMSO NEWS

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Direct comments or questions about the newsletter and requests to receive a hard copy subscription to the editor at the above address, via telephone at (703) 998-0660, or via e-mail at *editor@dmso.mil.*

ASK DMSO

ASK@dmso.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.mil**. We'll sort it out, send your question to the right people and get you an answer.

Electronic News

To receive an electronic copy of the quarterly *DMSO News*, periodic news releases and weekly *M&S News e-Clips* visit

https://lists.dmso.mil/mailman/listinfo/announce

Current and archived copies of the hard copy newsletters are also available in *.pdf* format on the World Wide Web at

http://www.dmso.mil/public/pao/articles/browse

Commentary

10 Things You Just Can't Blame the RTI for ...

Well folks it's that time of year again. We all have our New Year's resolutions in hand and a fresh start to change the world. Well, at least the modeling and simulation (M&S) part. Thinking back to late last year though, I had a chance to have many good long chats with the Joint Battle-Space Environment (JBE) demonstration team as we all consoled each other about how we could do things better next time, and as we all know, there is always a next time.

After sorting through the many fault reports that were generated during the integration for the JBE demonstration, a U.S. Joint Forces Command initiative, at the Interservice and Industry Training, Simulation and Education Conference (IITSEC) in December, it dawned on my JBE cohort and me that few of the issues we had to deal with were actually the fault of the dreaded DoD High Level Architecture (HLA) Run Time Infrastructure (RTI). No, it isn't perfect, but then what software is? After numerous discussions about integration we started to come up with a sort of David Letterman approach to RTI philosophy … you know, *the 10 things you just can't blame the RTI for.*

We all tend to be under pressure to perform, and in many instances with a less than optimal time window. The first thing that we tend to do when things go awry is to jump to conclusions and forsake our ability to be systematic by applying fault-finding techniques to solve problems that arise. Instinct is a great thing but it can lead us astray when we are stressed out. So, down to business, here are those *10 things you just can't blame the RTI for*:

10. *SCSI Air Gap* – The RTI can do a lot for you but peripheral monitoring isn't one of them. Check your hardware first! Be systematic and ensure that all your systems are solid!

9. *Non-existent Network* – The RTI tries its best to execute a distributed simulation in the face of network problems but it has a hard time if there is no network. So far, we haven't found a way to break the laws of physics and make computers talk without having some form of connectivity. Yeah, we know about wireless LANS (802.11b), but it helps if you actually intended to use them.

8. *Insufficient Development Time* – Why, yes, it can take a while to get your Federation Object Model (FOM) sorted out, and when playing with others agreeing is paramount, and I'll even concede that the RTI does time management, just not *"your"* time management. There are some really hot tools coming out (and already out) that can help you get your act together.

7. *Bad Code* – Coding standards are really neat things, and yes, there are more standards than you can poke a stick at. But, a lot of us are integrating FORTRAN and other legacy code with this new fangled C++ stuff. Make sure your own back yard is tidy before you blame the RTI for your crashes. Load testing is a good start.

6. *Failed Marriages* – As that great lyricist MC Hammer once said: "Can't touch that!" We try to be responsive on the RTI Help Desk so that you don't have to spend 20 hours a day working on your federates and not attending to your significant other.

5. *The Evils of MS Borg Empire* – Since *Windows(TM)* won't core dump with segmentation violations as all good *Unix(TM)* systems do, they decided to throw non-C++

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Director's Corner

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While DIAMOND's early use and data are based on UK operational experience, we've demonstrated that when its capabilities are coupled with those of the Joint Conflict and Tactical Simulation (JCATS) we have a viable OOTW tool that provides multi-resolution simulation for analysis and training.

We're also working with the Joint Warfighting Center (JWFC) at Joint Forces Command (JFCOM), Lawrence Livermore National Laboratory (LLNL) and Roland and Associates to establish a Joint Theater Level Simulation (JTLS) and JCATS federation using the High Level Architecture (HLA) Runtime Infrastructure (RTI). The JTLS-JCATS federation will support aggregate and entity level training requirements simultaneously, allowing joint staffs to exercise using both a theater-wide perspective (JTLS) and tactical perspective (JCATS). The federation design was completed last fall. We expect the prototype to be completed by September.

By the time you read this the kick off meeting for the DMSO-led OOTW Project will have been held on April 3-4 here at the DMSO. The objective of the project is to leverage existing and emerging models and simulations like DIAMOND and JTLS-JCATS to develop a computer-based capability for conducting analysis of OOTW. The focus of this effort will be to provide capability to forward deployed forces, joint task forces and CINCs. The project aims to develop the composable M&S toolbox I mentioned earlier that will make it possible for the warfighter to rapidly access the necessary capabilities required to accomplish his missions in the critically short time that a rapidly shifting international situation requires.

The meeting will be a combined User and Developer forum with emphasis on discussing how the project team plans to attain the needed capability. We hope to close the meeting with a coordinated, detailed plan for proceeding with OOTW toolbox development.

We obviously still have a long way to go, but we feel confident we're on the right track responding to warfighter M&S needs. We're closer to the CINCs' *now* than we were.

I would like to encourage each of you to drop by and visit with us as your schedules permit or contact us by e-mail. Our doors are always open and your comments and suggestions would be greatly appreciated.

Regards,

Michael Lilienthal, Ph.D, CPE
CAPT MSC USN

RTI Update

First IEEE 1516-compliant commercial RTI in level 2 testing

The DoD High Level Architecture (HLA) Runtime Infrastructure (RTI) Verifier Team is busier than ever. All tests have been written for IEEE (Institute of Electrical and Electronics Engineers) 1516 verification testing (about 1800 total) and Pitch AB of Sweden has submitted the first IEEE 1516-compliant RTI – called *pRTI* – for verification. It is now in level two testing.

Pitch has also recently announced a business alliance with Aegis Technologies Group making Aegis an exclusive software distribution agent for the pRTI and Visual Object Model Template (OMT) products in the United States and Canada.

Meanwhile the RTI Verification Team is busy testing several additional versions of 1.3 specification RTIs. These include an RTI submitted by Mak Technologies and three new platform versions from Mitsubishi Space Software Co. of Japan. Mitsubishi has also indicated that they can now make their RTI products available outside of Japan, increasing the number of RTI options available to the modeling and simulation (M&S) community.

RTI 1.3NG v5?

So what's the status of RTI 1.3 Next Generation, version 5? The V5 release was originally scheduled for the end of December 2001, but a problem was uncovered with the new version of the Adaptive Communication Environment (ACE)/The ACE Object Request Broker (ORB), or ACE/TAO, software that required resolution and another set of tests by the Verification Team. The problem has been diagnosed and a release is available now from the HLA Software Distribution Center at *sdc.dmso.mil*.

For more information on the commercial products discussed above, please contact the companies directly.

For more information about the RTI visit the Defense Modeling and Simulation Office Web site at *www.dmso.mil/public/transition/hla/rti,* or the RTI Help Desk Web site at *helpdesk.dctd.saic.com*.

10 RTI THINGS

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standard exceptions instead. Imagine that, non-standard. So when you let one of these non-standard exceptions propagate out of your federate Ambassador callbacks, the RTI (up to RTI-NGv4) isn't quite sure what to do with it. RTI-NGv5 will help you find these by catching (...) around your callbacks and warn you when it catches one of these and what callback it came from.

4. *Speed of Light Barrier* – We've tried to optimize the RTI-NG code for the general community use, but we still can't quite get that negative latency or the zillion jillion bagillion (*is that a word?*) time-advance-grants-per-second that some of our users are looking for. The electrons and photons can only go so fast through those cables. We'll re-evaluate these requests when the quantum networks arrive.

3. *Bugs* – Yeah, we have some, and I guess you can blame us for those, we are human after all ... well, most of us. Since a successful federation execution is a partnership between the RTI and the federate, sometimes it is hard to know where to place the blame. But as we all know, *the RTI is guilty until proven innocent*. (And I always thought in the U.S. it was "innocent until proven guilty.")

2. *Power Failures* – It's hard for the RTI to maintain the federation and data flow when the power fails. We have determined that this is an oversight in the interface specification and are looking at adding some perpetual power services based on cold fusion (*Shhh!, Don't tell anyone!).*

1. *Bad Network* – We can't emphasize the network enough. Without a properly setup, sized and maintained network, nothing good is going to happen. The #1 advice for setting up a distributed simulation is to have the best team of network engineers you can afford to design and maintain your network! Network problems have been the downfall of many federations. But don't forget, the RTI is guilty until proven innocent and *the network guys know this*.

So, there you have it. I suppose the world is now a safer place for the wisdom that has been afforded in this article. As my old boss used to tell me, "it's a poor tradesman who blames his tools." I assume he was referring to my attempt to embed a screwdriver in a non-screwdriver-shaped thing, but I digress.

There really are a lot of resources out there and the RTI Help Desk – *helpdesk.dctd.saic.com* — to track faults and to assist with resolutions. Don't wait until the last second to get to know the help desk and build yourself a little tool kit to help when you hit a non-fault tolerant wall (even a file comparison tool is a good start).

Have a great year and best of luck with your next big HLA project. Oh, stay tuned for "How to be politically correct in the face of certain failure!" or "Of course, we can build you that simulation!"

For more information about the visit the RTI Web page at *www.dmso.mil/public/transition/hla/rti/*, and the HLA Web page at *www.dmso.mil/public/transition/hla/*.

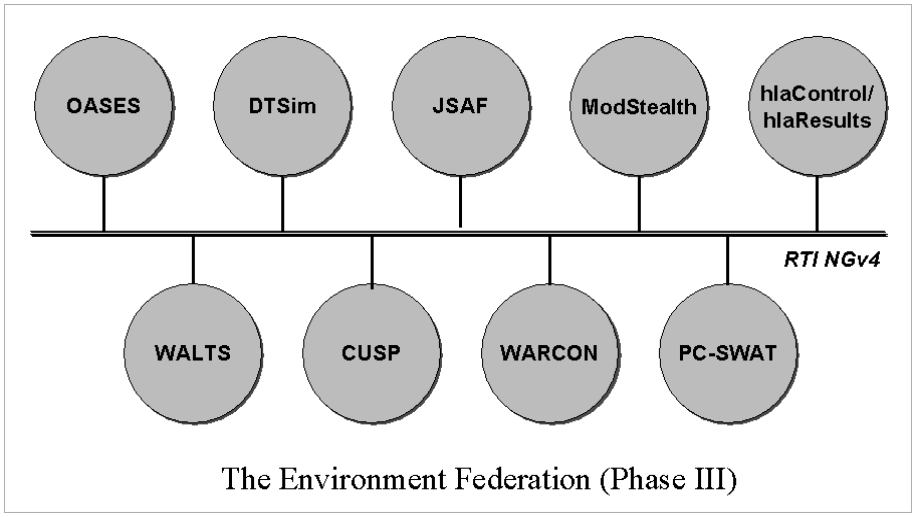
EnviroFed Phase III demonstrates impact of natural environment on military operations

On November 8, the Defense Modeling and Simulation Office (DMSO) conducted a demonstration of the third phase of the Environment Federation (EnviroFed) project. The demonstration was held at the Joint Precision Strike Demonstration (JPSD) Integration and Evaluation Center (IEC) at the U.S. Army Topographic Engineering Center, Alexandria, VA.

The primary goal of the EnviroFed project is to develop and deliver a generic, reusable set of runtime software components for representing the natural environment in military simulations. EnviroFed makes extensive use of existing standards in achieving this goal, such as the use of the DoD High Level Architecture (HLA) for runtime data exchange, and the use of the Environmental Data Coding Specification (EDCS, developed as part of the Synthetic Environment Data Representation and Interchange Specification, or SEDRIS, program) for Federation Object Model (FOM) construction and SEDRIS Transmittal Files (STF) for environmental scenario ingestion.

Four main federates

The EnviroFed consists of four main federates, each derived from software products developed under the Defense Advanced Research Projects Agency's (DARPA) Synthetic Theater of War (STOW) program. The Joint Semi-Automated Forces (JSAF) is a platform-level combat simulation designed to simulate the physical characteristics and behaviors of vehicles, weapon systems, and sensors operating in the Synthetic Natural Environment (SNE). The Dynamic Terrain Simulation (DTSim) calculates runtime changes to terrain and terrain features (e.g., buildings, bridges) caused by environmental changes (e.g. precipitation) or the intentional or unintentional actions of other federates. The Ocean, Atmosphere and Space Environmental Services (OASES) system supports the ingestion, tailoring and runtime distribution of time-phased environmental information within an HLA federation. The Modular Stealth (ModStealth) provides 3-D visualization of the state of the environment and all synthetic forces. In addition, EnviroFed employs the Virtual Impact suite of commercial HLA tools for execution monitoring and data collection/playback purposes.



The Environment Federation (Phase III)

More federates added

In addition to the EnviroFed core federates, several other federates were added during this past year. The inclusion of these federates was the result of formal partnerships established with user organizations. The purpose of these partnerships was to facilitate technology transition. In particular, selected user organizations were invited to identify one or more "environmentally-sensitive" M&S tools (i.e., those that could benefit from EnviroFed capabilities), and directly participate in EnviroFed integration events with these tools. In this way, users could gain hands-on experience with the EnviroFed components, and build the skills necessary to apply them in future applications.

Primary partners: DTRA, ONR, NRL, NWDC

The primary partners in EnviroFed III were the Defense Threat Reduction Agency (DTRA), the Office of Naval Research (ONR), the Naval Research Laboratory (NRL), and the Naval Warfare Development Center (NWDC). The DTRA sponsored two federates in Fiscal Year 01: the Weapons Analysis and Lethality Toolset (WALTS) and the Combined UDM and SciPuff (CUSP) agent dispersal model. The WALTS is designed to provide physics-based calculation of the effects of various classes of weapons. The CUSP is designed to dynamically switch between a model that predicts the effect of chemical or biological releases in an urban environment (Urban Dispersion Model, or UDM) and a model that simulates the flow of gas clouds in a more open environment (Second-Order Closure Integrated PUFF, or SciPuff). The two naval federates integrated into EnviroFed this past year were a high-fidelity carrier simulation provided by the Warfighting Concepts (WARCON) program, and a side-scanning sonar simulation called Personal Computer Shallow Water Acoustic Toolset (PC-SWAT).

The purpose of the November 8 demonstration was primarily educational. That is, it first provided a mechanism for educating the general public on the current state-of-the art with respect to runtime environmental capabilities. Second, it provided a means of demonstrating the importance and potential impact of the environment on military operations. The morning provided a 3.5-hour technical session, highlighting the features and capabilities of each individual federate and the details of the federation integration. The afternoon provided two 1.5-hour executive-level sessions, each focusing on the combined capabilities of the integrated system. In addition, the integration laboratory for EnviroFed was opened after each session for individualized federate demonstrations and open question-and-answer discussion with EnviroFed developers.

The scenario used as the basis for the EnviroFed exercise involved an attack on an enemy airfield located in the Camp Pendleton area of southern California. In the early phases of the mission, Blue (friendly) mine-hunting operations were conducted to prepare for Logistics Support Vehicles (LSV) and other utility landing craft bringing Blue land forces ashore. In later phases, an aerial attack on rear-area targets of opportunity (shortly before the main armor battle) resulted in a release of chemical agents in the vicinity of the airfield, affecting the pace and effectiveness of the main assault. Numerous variations of environmen-

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Service Academy Outreach Program on track; plans include gaming event between academies

Almost two years ago, the Service Academy Outreach program was conceived in a workshop at the Defense Modeling and Simulation Office (DMSO).

Representatives of the three Service academies, Service modeling and simulation (M&S) offices, Naval Postgraduate School (NPS), Air Force Institute of Technology (AFIT), Joint Forces Command, the DMSO, and other members of the M&S community met to develop a program that would enhance the awareness and knowledge of modeling and simulation initiatives and capabilities among DoD's future military leaders.

Impetus came from warfighters

The impetus for this came from the DMSO's discussions with warfighters in the field, where commanders were concerned that young lieutenants and ensigns did not have an adequate awareness of, or appreciation for, the benefit of using models and simulations in training, experimentation and analysis. The DMSO believed the easiest place to initiate an M&S education and awareness program would be at the Service academies. The first step was to hold the workshop.

Most important projects

In the workshop, all agreed the most important projects to be pursued in the academies were:

- Enhance M&S hardware and software.
- Enhance educational coursework, leveraging M&S education courses developed by DMSO, NPS, and AFIT.
- Fund a cadet/midshipman summer intern program at Joint/Service M&S laboratories and centers.
- Fund an M&S *Visiting Professor* at each academy.

The DMSO kicked off the program with Fiscal Year 00 funding for purchasing hardware and software at the U.S. Military Academy (USMA) and U.S. Naval Academy (USNA). The U.S. Air Force Academy (USAFA) had already obtained USAFA funding for the establishment of a simulation lab.

The USNA established a Joint Semi-Automated Force (JSAF) laboratory within the Department of Mathematics. This new laboratory has been used to support newly developed M&S courses, one being a seminar for midshipmen interested in using computer models to simulate naval exercises and war games. Students gain experience using JSAF in creating scenarios and in analyzing naval tactics.

The USMA expanded and enhanced its Warfighting Center (WARCEN) capability. The Department of Military Instruction (DMI) worked closely with the Department of Systems Engineering (DSE) to set up local-area-networked commercial-off-the-shelf (COTS) games that had been modified to portray Army Land Warrior performance characteristics. One benefit of the expansion was that it allowed the DMI to double its capacity to run simulation-based small unit tactics exercises during its annual military "Intersession" in January – exposing more than 2,000 cadets to the simulations, as opposed to about 1,000 cadets the previous year.

In FY01, the DMSO provided funding to each Service academy for half the annual salary of a visiting professor and for summer travel for approximately eight cadets/midshipmen at each academy. The M&S visiting professors teach M&S courses, assist in establishing new M&S courses and act as M&S subject matter experts for other instructors.

Cadets and midshipmen who have focused their curriculum on operations research, systems engineering and other courses closely related to M&S were selected to participate in the summer 2001 intern program. The Service academies have reported that these individuals have had very rewarding experiences and have learned much about the use of M&S in training, experimentation, analysis and acquisition. It is rumored that a few participants also managed to visit labs and centers in choice locations, like the two cadets who worked in Australia last summer. Cadets and midshipmen will again participate as interns this summer.

FY02-03 programs approved

The DMSO Director approved the continuation of the program in FY02 and through FY03. He also assigned a DMSO government lead for the program. To bolster the visiting professor aspect of the program in FY02, the Army M&S Office (AMSO) agreed to support the other half-year salary of the USMA visiting professor. The DMSO plans to transition the entire program to the Services in FY04.

Gaming event planned

As an enhancement to the program, the DMSO Director recommended a "joint" event among the three academies. The training objective for the joint event will be deter-

See ACADEMY OUTREACH, p. 7

Smart Sensor Web

Experiment demos network centric warfare for small unit ops in urban environment

The Defense Modeling and Simulation Office (DMSO) conducted the final live experiment in the Smart Sensor Web (SSW) project at the Ft. Benning McKenna Military Operations in Urban Terrain (MOUT) village January 14-25.

The experiment demonstrated the utility of providing enhanced situation awareness information to a dismounted infantry platoon in an urban environment. Many of the demonstrated technologies, using both live and simulated assets, will be useful for various aspects of military operations.

As the U.S. continues its war on terrorism, in peacekeeping missions, and in future small- and large-scale operations, the ability for individual combatants to quickly understand the friendly, enemy and civilian situation and intent; to visualize the natural environment and manmade features; to identify obstacles; and to fight in an urban environment will be key. These elements can be enhanced by employing the concepts of network-centric warfare demonstrated and investigated by the SSW project.

The experiment was conducted using soldiers from the 1st Battalion, 15th Infantry and 2nd Battalion, 69th Armor, and personnel from the Army's Dismounted Battlespace Battle Lab (DBBL), the Army Research Laboratory Human Research and Engineering Directorate (HRED), the DMSO and several other organizations. While infantry soldiers were used for the experiment, the resulting information and findings can benefit ongoing and future weapons, sensors and situational awareness programs of all the Armed Services.

Experiment objectives

The objectives of the experiment were to:

- Assess technical issues (power, bandwidth, queuing, sensor density, sensor mixes, etc.) associated with the development of an enhanced situational awareness system.
- Determine information requirements for individual combatants and small units in an urban environment.
- Assess the impact of SSW information on enhancing the situational awareness of individual combatants and small units in an urban environment.
- Assess the impact of SSW information on the decision-making processes of individual combatants and small units in an urban environment.

Detailed scenarios, differing levels of info

Using detailed scenarios developed by the HRED and DMSO, the soldiers conducted an operation to secure several buildings in the MOUT village and rescue detained civilians. The scenarios were run with differing levels of available SSW information:

- A baseline level with information and technology currently available to today's military.
- A technology level I with technology predicted to be available in the next 2 to 5 years.
- A technology level II with technology predicted to be available more than 5 years from now.

Linked wearable computers

To obtain these varying levels of information, the soldiers were outfitted with commercially available wearable computers linked through a radio frequency local area network (RF LAN) to a database that provided real-time and archived information from a network of

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ACADEMY OUTREACH

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mined by the academies so as to complement their curricula (i.e., educational benefit).

After discussion with the Service academies, the Service M&S offices, the Marine Corps Combat Developments Command (MCCDC), and others, it was decided the joint event would include competition among cadet/midshipmen teams using COTS games. All the Service academies currently use games in military training, education and clubs, so the games would not be new to them. The Services, especially at the MCCDC, are also exploring the use of commercial games for training and other uses.

It is anticipated that this event will be held in the early fall 2002 at either the USMA or USAFA (the USNA simulation-based training facilities are being upgraded). A planning meeting will be held at the USMA at the end of May. At that meeting, a commercial game advisory committee will recommend games for the event. The game advisory committee will include young military officers from each of the academies and one officer from each of the Service M&S offices and MCCDC.

The Academy Outreach leads from the DMSO and each of the academies will oversee the event.

For more information

For additional information on the Academy Outreach effort contact (703) 824-3450 or *academy@dmso.mil*.

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SMART SENSOR WEB

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imaging sensors, location sensors, weather sensors, unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs), detailed simulations and other significant military information.

An SSW user application (SUAP) was developed and integrated into the wearable computers and operated with wrist-mounted touch screen displays. With the SUAP, soldiers also had the ability to send "spot report" information for dissemination across the SSW network to other soldiers for better visualization of the enemy situation.

Constructive simulations were used to inject simulated forces – both friendly and opposing forces (OPFOR) – into the exercise to provide adjacent friendly units and knowledge of OPFOR movement in the surrounding area.

Simulated sensors were used to augment imaging sensors by generating simulated pictures of live targets that pass in front of them. Similar to the alert procedures for live sensors, an image of a simulated person was then sent out as part of an alert to the combatants with wearable computers.

Situational awareness increased

To determine the increase in situational awareness and usefulness of the information provided by the SSW, exercise participants and controllers filled out questionnaires developed by the HRED at several stages of the exercise. Soldier feedback on the usefulness and usability of the technologies employed was also collected. Initial findings show a marked increase in situational awareness – more than 100% – due to information available using the SSW system.

The impact of the technologies employed by the SSW was also studied to identify the technical issues associated with the development of enhanced situational awareness systems. The technical issues studied include information sources (sensors, simulation and soldier input), information integration (data fusion and de-confliction), information management (networking and databases), and information presentation (soldier interface). Prior to and during the experiment these and other technical aspects of the SSW, such as power consumption, bandwidth measurement, information queuing, sensor density and sensor mixes, were investigated by Massachusetts Institute of Technology, Lincoln Laboratory. These results, along with soldier feedback on the SSW, will provide valuable lessons learned for future system development.

Three virtual experiments

In addition to the live experiment, three virtual experiments are also being used to assess critical information requirements, different approaches for information presentation and the impact of automatic target recognition (ATR). These virtual experiments use the Squad Synthetic Environment (SSE) at the Fort Benning DBBL Simulation Center. The SSE provides nine individual booths (one for each squad member) that allow humans to shoot, move, squat and lie down, while conducting military operations against a synthetic OPFOR in a high fidelity representation of the McKenna MOUT Site. Each player is emulated as a synthetic player within the simulation, and can be killed or wounded by direct and indirect fires.

Next step: analysis of data

The next steps for the SSW project will be analysis of the data collected at the final live experiment and production of a final report, due in May 2002.

The findings and conclusions that will result from the SSW project can be applied to many of the challenges that the Armed Forces are facing today and that must be addressed in the future. The experiment showed that soldiers at the lowest echelons having access to detailed battlefield information in real time were able to enhance force security and improve the effectiveness of small unit operations.

For more information

For more information about the SSW project, contact *smartsensor@dmso.mil* or 703-998-0660, or visit *www.sainc.com/ssw*.

Troops maneuver through the McKenna Military Operations in Urban Terrain (MOUT village at Fort Benning, Ga. (page 8 and above). A soldier uses his wearable wrist computer during the experiment (below). ***Photos courtesy of Smart Sensor Web project.***

Chemical-Biological M&S transforming, transitioning within Defense Department

Chemical and Biological (CB) Modeling and Simulation (M&S) are transforming and transitioning within the Department of Defense (DoD).

Background

Two years ago, senior leaders within the DoD recognized that fielding CB M&S products directly from science and technology (S&T) efforts was causing unmanaged model competition, confusion at the warfighter level and unmet warfighter requirements. At the recommendation of those senior leaders, the Deputy Secretary of Defense directed the consolidation of CB M&S management oversight by assigning to the Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)) the responsibility for approving all CB models and simulations developed by or for, or used by or on behalf of, any Department organization in support of DoD planning, decision support, training and operations. The Under Secretary delegated this authority to the Deputy Assistant to the Secretary of Defense for Chemical and Biological Defense (DATSD (CBD)).

In implementing these new responsibilities and authority, the DATSD (CBD) established the DoD CB M&S Advisory Council (CB MSAC) and the CB MSAC Working Group and assigned execution of requirements generation and programs to the Chemical and Biological Defense Program (CBDP). The CBDP structure includes the Joint Service Integration Group (JSIG), responsible for requirements, and the Joint Service Materiel Group (JSMG), responsible for program execution.

In response to this enlarged CB M&S mission (not just CB Defense M&S), the JSIG stood up the CB M&S Requirements Panel (MSRP), and the JSMG stood up a CB M&S Commodity Area Manager. The CBDP also made a major down payment by increasing CB M&S S&T funding in Fiscal Year 01 through the Program Objectives Memorandum (POM) period, as well as fully funding development and acquisition for Block 1 of the first two CB M&S programs. As requirements are more fully articulated, total funding, including S&T, is expected to increase over the POM period.

CB M&S activities

This rest of this article describes the subsequent activities and plans of the DoD CB M&S Program emerging from the above decisions. These activities include the interim accreditation reviews of existing CB M&S tools, the development of a CB M&S Master Plan (CB MSMP), and the development of an acquisition strategy for fulfilling CB M&S requirements and the CB MSMP via a CB M&S system of systems.

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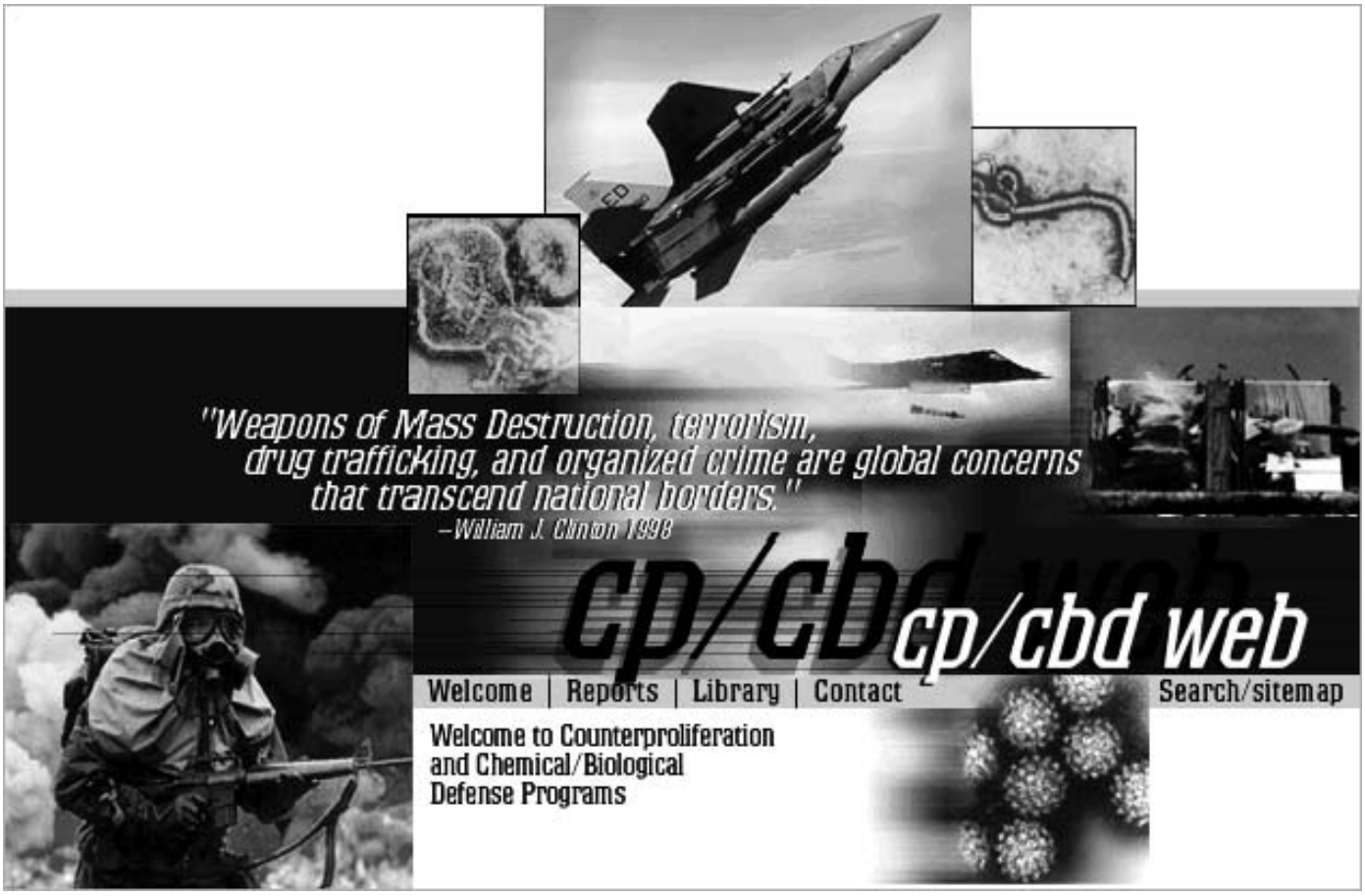

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Since 1996, there have been three models designated as DoD Interim Standard Hazard Prediction Models. The DATSD (CBD) continues to support a policy of interim-accreditation until formal requirements and formal programs can deliver CB M&S systems that have been through rigorous independent Verification, Validation and Accreditation (VV&A) and Test and Evaluation (T&E). The DATSD (CBD) is currently sponsoring six interim VV&A reviews.

The most extensive of these reviews to date is for the commercial-off-the-shelf (COTS) Meteorological Information and Dispersion Assessment System Anti-Terrorism (MIDAS-AT) system, owned by ABS Consulting and used by the Marine Corps' CB Incident Response Force (CBIRF). An independent Integrated Product Team (IPT) is conducting this review and is scheduled to complete its task in mid-July. This review includes the first ever DoD attempt to validate an urban hazard prediction capability using data from full-scale urban tracer releases. This review directly funded some of these tracer releases and, because of concerns after September 11th, was provided accelerated funding to use additional tracer release data available from the Department of Energy.

Olympics review

The most rapid review to date was conducted under an urgent requirement related to the recent Salt Lake City Olympics. The Defense Threat Reduction Agency (DTRA) had teamed with the United Kingdom (UK) to support the Federal Bureau of Investigation (FBI) using the UK developed Urban Dispersal Model (UDM) coupled with DTRA's Hazard Prediction Assessment Capability (HPAC/UDM). Because of the short turn-around required, that review was conducted by the CB MSAC Working Group instead of a special IPT. In reviewing HPAC/UDM, the MSAC WG found that there is sufficient software verification to show the model is working as intended and there is sufficient model validation conducted to date to suggest that it provides an improved level of accuracy for urban hazard prediction compared to HPAC alone. However, the MSAC WG found that unlimited interim accreditation was not merited because there was no full-scale test data to judge the model's real world validity. Based on the MSAC WG review and recommendation, the DATSD (CBD) accredited HPAC/UDM only for use by DTRA experts in support of National Security Special Events in Salt Lake City during 2002, to include the Winter Olympics and Paralympics. Plans for more deliberate VV&A of UDM are currently being developed by DTRA.

The third formal review currently underway is for the Missile Defense Agency's (MDA's) Precision Engagement Ground Effects Model (PEGEM), in response to the field requests to use the model outside of its original intended use for evaluating missile effectiveness. The Institute for Defense Analyses is supporting the IPT conducting this review.

The remaining three reviews are updating the 1996 DoD Standard Hazard Prediction Model designation of the Navy's Vapor, Liquid, Solid Tracking model (VLSTRACK), DTRA's HPAC, and the Army's Chemical Stockpile Emergency Preparedness Program D2PC model. After this review, specific versions will be designated as interim-accredited as supported by the extent to which they have been through adequate V&V.

The Joint Service Integration Group and the Joint Service Materiel Group began the process of developing a DoD CB MSMP by providing inputs to the office of DATSD (CBD). Using those inputs, the office of DATSD (CBD) completed Version 1.0 and approved that version for CBDP programming and planning during the upcoming POM cycle. The DATSD (CBD) also approved Version 1.0 to begin the formal coordination. This plan looks at modeling and simulation efforts as fundamental to meeting Service requirements to perform analysis, acquisition and training. The master plan calls for a robust science and technology program to meet long-term technical needs and a comprehensive acquisition program that will meet operational requirements.

CB M&S system of systems

The DoD CB MSMP outlines the DoD acquisition strategy for developing a CB M&S system of systems. The top-level system will be comprised of four independent but supportive M&S systems: the Joint Effects Model (JEM), Joint Operational Effects Federation (JOEF), Virtual Prototyping System (VPS) and the Training Simulation Capability (TSC). The resulting acquisition strategy has been articulated in the CBDP Research, Development, and Acquisition Plan and the Annual Report to Congress. These plans focus on addressing the needs and deficiencies identified in the DoD Nuclear, Biological, and Chemical Defense Joint Mission Need Statement dated 16 July 1999, as well as requirements in emerging CB M&S specific Operational Requirements Documents.

Addressing Analysis, Acquisition, Training

This four-program architecture will also address the three basic M&S application areas as established by the Defense Modeling and Simulation Office (DMSO): Analysis, Acquisition and Training. The JEM and JOEF programs will address two unique analysis regimes: JEM will address physics based analysis requirements; JOEF will address operational effects analysis requirements. VPS will provide the acquisition community with generic CB methodologies for using virtual simulations to aid acquisition. Similarly, the TSC program will provide both the Service schools and operational commands with the training capabilities they need to train CB operations. Each program is expected to use a spiral blocked development process to meet their full spectrum of operational requirements as the necessary technologies mature enough to transition from S&T to Engineering and Manufacturing Development (EMD).

The JEM Program was initiated in May 2001 with a successful Milestone A decision and the stand-up of the JEM Program Office in August 2001. This was a landmark event for DoD CB M&S. This is the first CB M&S system managed by acquisition professionals instead of S&T modelers and scientists. This will be the first CB M&S system to undergo independent T&E hand-in-hand with the VV&A process. This rigor, here and for subsequent programs, is expected to provide CB M&S tools that better meet warfighter and DoD user needs in the classical terms of effectiveness, suitability, interoperability, and sustainability. Block 1 will seek to combine the best capabilities of the current three DoD Standard Hazard Prediction Models (VLSTRACK, HPAC, and D2PC). Subsequent blocks will add hazard prediction for urban and missile intercept scenarios and increased accuracy via advanced high-resolution now-cast (vice forecast) weather data.

JOEF is the next CB M&S system to enter the Milestone A process. The Chairman of the JSMG forwarded that recommendation to the Milestone Decision Authority (MDA) in February of 2002. This recommendation is making its way to the USD (AT&L), who is the MDA authority for all CBDP programs pending completion of an on-going reorganization of the CBDP to a Program Executive Officer (PEO) structure. In parallel, the JSMG Lead Service selection

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process is underway to provide a recommended Program Manager. The current year objective is a successful Milestone A decision and the stand up of the program management team to initiate JOEF Block 1 efforts such that Milestone B can be achieved by first quarter of fiscal year 2004. Block 1 will provide very high-resolution analysis capabilities for CB effects on fixed site operations (e.g. airbases and ports). Subsequent blocks will add maneuver forces and real-time decision support.

All four programs – JEM, JOEF, VPS, and TSC – will function independently for some requirements and together to meet more complicated requirements. JEM will provide a stand-alone analysis tool for hazards analysis, but will also be an input engine to the operational effects federates and an integrated component of the operational NBC C4I system, the Joint Warning and Reporting Network.

Likewise, while JOEF will be a stand-alone capable analysis tool, it will also feed warfare simulations such as JWARS and, in the end state, reside on information systems to provide real-time mitigation recommendations to counter-act the effects of CB attacks. JOEF will also provide a constructive simulation for developing scenarios to drive acquisition analysis efforts conducted using VPS and training events using the TSC. All will be required to meet appropriate interoperability requirements such as the DoD High Level Architecture (HLA) Run Time Infrastructure (RTI).

As envisioned in the CB M&S master plan, all four will become a federation of capabilities used across the domains of training, analysis and acquisition. This system-of-systems approach will identify requirements, prioritize, develop/reuse, test, evaluate, procure, field, train and maintain CB M&S federates or CB components within existing non-CB federates.

The DoD CB M&S Program management structure is in place to meet the challenges that these programs present. There is a clear vision and the technology is being developed to make it a reality. Requirements are firming up and programs standing up. During the next ten years, the DoD CB M&S Program will deliver robust capabilities that will make significant contributions to the safety of our warfighters and our nation.

For more information

For more information visit the DATSD(CBD) Web site at *http://www.acq.osd.mil/cp/*.

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ENVIROFED III

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tal conditions were simulated within this context to determine the potential effect of the environment on the engagement outcomes. The results of these excursions clearly highlighted the importance of the environment in military modeling.

Although the yearly EnviroFed exercises and associated technology integration efforts will not continue in FY02, efforts are now underway within DMSO to define a clear transition strategy for the EnviroFed components. Software maintenance and configuration management issues will be addressed as part of the transition plan. The intent is to ensure an available set of reusable environmental software components for general use within the DoD for many years to come.

For more information

For more information about the EnviroFed contact *environment@dmso.mil* or (703) 998-0660.

(Editor's Note: The EnviroFed is in the process of being transitioned to other DoD M&S community technology development efforts this fiscal year. Funding is available to complete the additional development and documentation necessary to make the modular components available for transition.)

• HLA Help Desk •

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