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## WARSIM Enters the Scene in Army Training

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*The Warfighter's Simulation (WARSIM) is the U.S. Army's next generation constructive simulation capability. Revolutionary in scope, WARSIM allows commanders and their staffs to train in the contemporary environment they will face in Iraq, Afghanistan, and other trouble spots in the world. WARSIM provides additional needed realism, will decrease the resources' need to train, and when combined with the other systems of the Army's Constructive Training Federation will provide all the capabilities required for a fully integrated live-virtual-constructive training environment.*

The Warfighter's Simulation (WARSIM) is a computer-based simulation that will revolutionize the way the commander and staff train and conduct mission rehearsal in the contemporary operating environment. The program mission is to design, develop, produce, and deploy a training simulation system to support U.S. Army commanders and their staffs. The WARSIM architecture provides flexibility to interface with other live, virtual, and constructive training simulations and to simultaneously interoperate with the organic Command, Control, Communications, Computer, and Intelligence systems and equipment of the training audience. WARSIM, a software-intensive system with more than two million lines of code, provides the Army's next generation command-and-control training environment.

Recent studies recognize a military training revolution that occurred when the Combat Training Centers (CTCs) were created in the 1980s [1]. The collective training at the CTC gives U.S. forces a decided advantage over its adversaries. Those same studies cite the need for a second revolution in training, one that will expand the collective training success of the CTC to home station and deployed units.

WARSIM is part of that second training revolution: It provides a realistic battlefield environment that more closely matches the contemporary operating environment encountered today in Iraq and Afghanistan. WARSIM is perfectly suited to train the geographically dispersed modular Army; Brigade combat teams from different geographic areas will be expected to join in forming Army or Joint Forces command elements. This will demand a distributed training and mission rehearsal capability that WARSIM brings, and with the high operational tempo of today's units, WARSIM will reduce overhead personnel requirements typically levied on training units.

The U.S. Army Program Executive Office for Simulation, Training, and

Instrumentation (PEO STRI), the WARSIM acquisition agent, will meet the Army's training requirements with WARSIM by linking to Army and joint training simulations in the near term, and simultaneously developing increased simulation capabilities applicable to both Army and joint training. WARSIM has an open architecture that enables it to federate with other existing or future simulations.

WARSIM is presently in the engineering and manufacturing development phase of acquisition. The prime contractor is Lockheed Martin Simulation, Training, and Support (LM-STs), which leads an industry team. The intelligence subcomponent of WARSIM was separately developed to accommodate top-secret/sensitive compartmented information requirements and is now completely integrated within WARSIM. The intelligence subcomponent is an integral part of the overall Army strategy for WARSIM.

The initial version of WARSIM was delivered to Fort Leavenworth, Kan., in December 2004. Several factors contributed to the success of the program and the satisfaction expressed by the WARSIM customer. Key among these are the application of concurrent engineering, co-location of project stakeholders, creation of an environment where subcontractors are teamed with the prime contractor, dedication to quantitative management of program processes and measures at Capability Maturity Model® Integration Level 4, an innovative approach to integration and testing, and careful management of the program cost and schedule.

### Concurrent Engineering

From its inception, WARSIM has been dedicated to the concept of concurrent engineering where engineering, program management, acquisition, and user representatives interact throughout the development – from requirements analysis through integration and test – as members of integrated development teams (IDTs). The entire

WARSIM program is organized using IDTs. Every WARSIM IDT includes members from PEO STRI – the materiel developer – the National Simulation Center, the combat developer, and the Lockheed Martin development team. This approach reduces program risk significantly and ensures that every stage of development is validated and correct across the project's stakeholders.

### Co-Location

PEO STRI has been co-located with WARSIM developers from the very beginning of the program. Contractor engineers, customers, user representatives, subject matter experts, and program management shared office space at the development site, which allowed stakeholders to attend all meetings, working groups, and ad-hoc sessions; this made all parties truly integrated members of the WARSIM team.

### Subcontractor Teammates

A strong industry team developed the WARSIM product, and includes Lockheed Martin (prime), Science Applications International Corporation, Dynamics Research Corporation, Northrop Grumman, Veridian (General Dynamics), and Virtual Technology Corporation. Each contractor brings a high degree of technical expertise and competence to the program. Another key to the successful teaming approach is that all subcontractors are co-located at the Lockheed Martin facility, sharing offices with Lockheed Martin engineers. Responsibility for development of work products is shared across the teams, with members from each company developing each computer software configuration item. All teammates followed the same Lockheed Martin standard engineering processes.

### Quantitative Management

WARSIM's *project management tracking metrics* were developed by analyzing Lockheed Martin Simulation, Training, and Support organizational goals, customer needs as doc-

umented in the contractual requirements, and industry standards. Using these goals, the program established quantitative management metrics to objectively monitor process and product quality. These measurements allowed management to assess WARSIM's program status and identify program risks, which then were managed and mitigated in accordance with the WARSIM risk management process.

Quantitative management allowed both WARSIM management and the WARSIM customer to determine in real time that the processes and product development were meeting the project's goals, or to take corrective action as necessary.

## Integration and Test

Eighteen months prior to delivery, the program transitioned from a standard development effort to one focused on evaluating the system from the user's perspective. To accomplish this, an integration and test operability team was established to lead these evaluation efforts with all other engineering functions operating in support.

The operability team was tasked with testing the system as it will be used once delivered to the users. This team was composed of skilled individuals with a strong background in Army training that worked closely with the user's representatives at the National Simulation Center (NSC) to develop thread tests of the functionality. A primary focus of the operability testing was to evaluate and enhance system usability. During this period, the operability team set the priority for changes and worked side by side with the software developers to define the desired changes.

Key to the concept of operability testing was the hosting of frequent Continual User Assessments in the development environment. The benefit is win-win for both users and developers: Users' training time is greatly reduced as they learn the system as it is built; developers gain valuable user feedback and validation while developing code for the next WARSIM build.

Another benefit of active user participation was an improved understanding of requirements. With a better understanding of the users' needs, software developers would often prototype a capability and demonstrate it to the user – a process that turned out to be extremely efficient – allowing the software team to add more capability to the final product in less time.

Three months prior to delivery, the WARSIM integration and test team held a three-week culminating integration event, commonly referred to as the September '04 Event (S4E). Its purpose was to test the system in its intended configuration and under



*WARSIM leadership are, from left, Greg Manross, WARSIM project director, project manager Constructive Simulation PEO STRI; Debra Palmer, vice president Business Development and Advanced Programs, LM-STIS; Ed Payne, WARSIM program manager, LM-STIS; Col. Kevin Dietrick, project manager Constructive Simulation, PEO STRI; Dr. Jim Blake, PEO STRI program executive officer.*

exercise-like conditions prior to delivery. This event was conceived as a process improvement to anticipate problems observed in the user's environment not experienced in the integration lab environment.

To prepare for the S4E, the program built a new, classified facility that mirrored the WARSIM installation at the NSC. Twenty-four experts from the Battle Command Training Program, who were previously unfamiliar with WARSIM, participated in the event to ensure the testing was realistic and valid; the successful outcome of the event enabled WARSIM to identify a final set of changes and quickly incorporate them in the months prior to delivery. Because of its thorough user-oriented focus on integration, the program is confident of continued success as it moves through the next phase of user testing.

## Schedule and Cost

WARSIM has always met or exceeded its commitments to cost, schedule, and performance. After termination of the Joint Simulation System (JSIMS) program in 2002, WARSIM's program was re-baselined to provide a complete training system to the Army. The program made major schedule, budget, and staffing adjustments to accept additional requirements from the JSIMS program. The contractor delivered a complete training system while holding to the committed delivery schedule within government funding constraints. WARSIM delivered its software on Dec. 17, 2004 and

exceeded the user's expectations.

## Conclusion

WARSIM is a key enabling program for the training of the Army's current and future force commanders and staff. It is a critical component in the Army Constructive Training Federation (ACTF) that will help to bring about a second revolution in military training. WARSIM will fulfill the Army requirement for training its forces in all aspects of command and control. ACTF models will provide full training functionality for leader and battle staff computer-based simulation training throughout the Army, joint, interagency, intergovernmental, and multinational spectra. WARSIM's contributions to training today's Army, and tomorrow's future forces, are just starting to be realized.◆

## Reference

1. Defense Science Board. "Training for Future Conflicts." Washington: Defense Science Board, June 2003 <www.

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