DOD INITIATIVES IN DISTRIBUTED SIMULATION TECHNOLOGY.
A PANEL DISCUSSION

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ABSTRACT

Panelists respond to three questions, " How does your DoD initiative promise to increase readiness for the fighting forces?", "Where will the distributed simulation technology in your program take us by 2005?" and "What changes in available DoD infrastructure would facilitate the use of the system(s) emerging from your program?" The panelists include senior members of the Department of Defense civilian management team working in the Modeling and Simulation field.

1 INTRODUCTION

Consolidation of training resources in the Department of Defense (DoD) was an inevitable consequence of the reduction in total resources made available to the Service Departments after the fall of the Warsaw Pact and the demise of the Soviet Union. Operating tempo has continued at a high level while manpower has been drastically reduced in the services during the last decade of the twentieth century. The result has been a restructuring of training programs within each service, within the training portions of the major combatant staffs, and within responsible offices of the Office of the Secretary of Defense (OSD) and Joint Staff. Initiatives by Joint Staff

Operational Plans and Interoperability Directorate, J-7, and Joint Staff Force Structure, Resources and Assessment Directorate, J-8, to better define the relationships between mission responsibilities and training objectives have resulted in landmark documents such as the Joint Mission Essential Task List, the Joint Training Plan, the Joint Training Management Plan and Joint Vision 2010. Service corollaries to these documents have defined a regulated and consistent means to plan for and conduct training on a prioritized list of assigned areas of responsibility at every echelon of Service organizations. Ultimately a change to the Unified Command Plan has resulted in the establishment of the Joint Forces Command as the single DoD Joint Force Integrator responsible for preparation of Joint Task Force packages in the continental US. As these changes have taken place there has been continual pressure to leverage technology in the information marketplace to help reduce the cost and increase the value of training. Congress has at the same time requested assurances that rapid change in the means of training in the DoD will not result in a loss of readiness of the US forces to accomplish their missions. JCS, OSD and Service agencies responsible for training the forces have started to use information technology and Modeling and Simulation advances to produce next generation training systems for the new millennium. OSD offices responsible for

assessing readiness have also decided to leverage the same technology market to improve analysis capability. These large scale, joint development efforts will result in the pooling of reduced resources and reduction in duplication across the training institutions and improved analysis using simulation and analysis tools that are much more capable than has been available. The initiatives that will be presented by panel members therefore include (1) the Joint Simulation System (JSIMS), an emerging simulation system of federates aimed at training Joint Task Forces, (2) the Joint Modeling And Simulation System (JMASS), a simulation support environment based on a collection of well defined standards, (3) the High Level Architecture, a program of standards which includes a Run Time Infrastructure for linking simulations together, and (4) the Joint Warfare Simulation (JWARS) which is an emerging analytical simulation used to assess the value of training, among other things.

2 THE JOINT SIMULATION SYSTEM (FRED HARTMAN)

The Joint Simulation System is an initiative of the Joint Staff Directorate of Operational Plans and Interoperability, OJCS J-7 which was begun at the Joint Warfighting Center through the creation of an Operational Requirements Document in 1996. The goal of the development program is to create a large scale, human-in-the-loop, constructive simulation for staff training and exercises at Level III of the Joint Training Plan, training of Joint Task Force staffs. The user community is represented by a Joint Requirements Control Board chaired by the Joint Forces Command Joint Warfighting Center. During the last Four years the number of Services or Agencies directly involved in the proposed development has grown from four to nine with the addition of intelligence agencies which have created simulation programs during that time (JSIGSIM, NATSIM, DOMINO and WIM). Replacement of the stove piped, legacy simulations that were in use has proved to be a management challenge as well as a technical challenge. The addition of new requirements above and beyond the original ORD has also added to the complexity of the proposed software system. In early FY2000 the JSIMS architecture was changed from that of a single integrated software system to a system of federated components based on the OSD mandated High Level Architecture (HLA) approach. At the same time the JSIMS organization was converted to an alliance of participating organizations under the Program Executive Control of the commanding general of the US Army Simulation Training and Instrumentation Command (STRICOM) in Orlando, FL. In FY2000 the JSIMS program made progress in converting to the new design and has embarked on an aggressive program to meet the initial operating capability date of April 2002.

3 HIGH LEVEL ARCHITECTURE (PHILIP S. BARRY AND PHILOMENA ZIMMERMAN)

The Defense Modeling and Simulation Office (DMSO) was established on June 21, 1991, by the Undersecretary of Defense for Acquisition to serve as the executive secretariat for the Executive Council on Modeling and Simulation (EXCIMS) and to provide a full-time focal point for information concerning U.S. Department of Defense modeling and simulation (M&S) activities. The DMSO is a staff activity reporting to the Director, Defense Research and Engineering (DDR&E), in the office of the Undersecretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)). The DMSO's mission is to lead, integrate and leverage Modeling and simulation (M&S) for the Warfighter. It has been effective in recent years at sponsorship of the creation of standards for the development of M&S including the Synthetic Environment Data Representation and Interchange Specification (SEDRIS), the Requirements/Common Data Model (RCDM), the Data Standardization program, and the High Level Architecture (HLA).

The HLA was developed under the leadership of the Defense Modeling and Simulation Office (DMSO) to support reuse and interoperability across the large numbers of different types of simulations developed and maintained by the DoD. HLA provides rules, an interface specification and an object model template to the development community as well as a run time infrastructure. The HLA itself is generally applicable across the wide range of simulation applications and the HLA specifications and supporting software are freely available to the broader simulation development and user community. The Object Management Group (OMG) adopted the HLA as the Facility for Distributed Simulation Systems 1.0 in November 1998. The HLA is now in the process of becoming an open standard through the Institute of Electrical and Electronic Engineers (IEEE).

4 THE JOINT WARFARE SIMULATION (JIM METZGER)

Analytic models are used by OSD and the Joint Staff to conduct assessments for DoD planning and programming, including the periodic Quadrennial Reviews, for force modernization, and to do operational assessments of key operations or events. The Deputy Secretary of Defense directed the Director, OSD PA& E, with participation from the Assistant Secretary of Defense (Strategy and Requirements) and the Joint Staff, to initiate a phased program to upgrade existing joint analytic models and simulations (near term), develop a set of next generation models (longer term), and to identify an approach and management structure for a modernization program. The PA&E effort resulted in approval for Joint Analytic Model

Improvement Program (JAMIP) in May 1995. In addition PA&E was directed, in cooperation with the Joint Staff Force Structure, Resources and Assessment Directorate, J-8, to set up the Joint Warfare System (JWARS) Office, including defining the manpower, support and funding plan. The JWARS office was formally established in November 1995. One year later in June 1996 OSD/ PA& E (Joint Data Support) was designated as primary data agency for JAMIP. At the close of the century the JAMIP program replaced the venerable Modern Aids to Planning Program.

The JWARS mission is to develop a state-of-the-art, constructive simulation that will provide a multi- sided and balanced representation of joint theater warfare. Using this simulation OSD offices should be able to assess current and future operational concepts such as JV 2010, and to use C4 and ISR as the foundation for how entities perceive and interact with one another. The Joint Requirements Oversight Council (JROC) approved the JWARS Operational Requirements Document in August 1998.

JWARS will be built in three releases, which encompass the 72.5 technical threads specified in the design. These releases will occur in FY2000, FY2001 and at a final date yet to be determined.

5   THE JOINT MODELING A SIMULATION SYSTEM (CINDY PORUBCANSKI)

The Office of the Secretary of Defense (OSD)-led Joint Modeling and Simulation System (JMASS) Senior Steering Group (SSG) agreed to form a Joint Program Office (JPO) for development of a Tri-Service version of JMASS. The JMASS JPO was officially established 14 October 1998 at Wright-Patterson AFB, Ohio. The JMASS program is responsible for developing a standard digital modeling and simulation architecture and tool set as well as a Modeling and Simulation Reuse Library (MSRL) which supports analysis, development, acquisition, test and evaluation of weapons systems.

In early January 1999, the JPO, with help from representatives from the JMASS partners, began the process of defining the acquisition strategy for JMASS. The JMASS Program Office briefed their acquisition strategy to Industry in May 1999. In June 1999, the JMASS Program Office released its Request For Proposals and then initiated its Source Selection in July 1999 to evaluate commercial-off-the-shelf (COTS) tools, Government-off-the-shelf (GOTS) tools and non-developmental items with JMASS98 to meet the JMASS Joint Operational Requirements Document (JORD) requirements. Contracts were awarded in mid-November 1999.

JMASS is a simulation support environment. It is a collection of well-defined, well-documented interface standards to which a model should be built. It also includes a tool kit which allows modelers to build representations of real world systems, configure those models, assemble them into simulations, execute those simulations, and process the results. The architecture uses object-based technology for developing an interoperable common model set. It is designed to support engineering and engagement-level simulations with non-real time interaction among models of varying levels of detail, i.e., analytic, dynamic, and emulative representations. The completed model or simulation can be stored in a local model library, and ultimately JMASS will have a link to the DMSO model and simulation resource repository.

What distinguishes JMASS from other systems is the fact that the yield is common, reusable, and interoperable. JMASS is a tri-service product that is transportable across UNIX and Windows NT. Full customer support is available for the current release of JMASS, namely JMASS 98 version 1.2. The Program Office also provides model integration support. All members of the DoD or academia are eligible to register for free access to the JMASS software.

JMASS fosters the development and reuse of models and simulations supporting the concept evaluation, requirements definition, test criteria derivation, test design and prediction, and operating performance and effectiveness analysis. Currently, the system primarily supports development of detailed digital models of red, blue and gray systems for use in Electronic Warfare Analysis. In the future, the system will be expanded to support other Tri-Service domains.

AUTHOR BIOGRAPHIES

PHILIP S. BARRY is Chief of the Science and Technology (S&T) Initiatives Division for the Defense Modeling and Simulation Office (DMSO). He began his current position in May 2000. Born in Plainfield, New Jersey, he attended the University of Virginia where he earned a B.S. in Aerospace Engineering. He subsequently studied Operations Research at the George Washington University and then earned a M.S. in Systems Engineering and a Ph.D. in Information Technology from George Mason University. Dr. Barry has worked as a systems engineer supporting numerous DoD Programs, the Defense Advanced Research Projects Agency and Defense Information Systems Agency (DARPA-DISA) Joint Project Office, and the Joint Project Office for Special Technology Countermeasures (JPO-STC). Dr. Barry was the software lead for the Aggregate Level Simulation Protocol (ALSP) Program, from 1998-1999, where he headed up the effort to transition the infrastructure of the Joint Training Confederation (JTC) to the DoD's High Level Architecture for simulation. In March 1999, he assumed the position of Deputy Division Chief for the Technology Applications Division for the DMSO. Dr. Barry currently holds the position of Adjunct Professor at George Mason University. He is a trained facilitator,

having directed large requirements elicitation and specification efforts for the IRS, the State of Texas, the Federal Bureau of Investigation, the State of Massachusetts and several commercial customers. Email: `<pbarry@dmso.mil>`.

PHILOMENA (PHIL) ZIMMERMAN received her B.S. in Mathematics from St. John Fisher College. She has worked 18 years in the development and testing of software for the DoD. For the last 9 years, she has worked in the development of simulation software, and the creation and execution of federations, largely for the Test and Evaluation community. She is currently on a rotational assignment, from the Atlantic Test Range division of Naval Air Warfare Center, to the Defense Modeling and Simulation office, working as the High Level Architecture (HLA) Program Manager. Email: `<pzimmerm@dmso.mil>`

JIM METZGER received a Ph.D. in mathematics from the University of Michigan in 1970. He has been an operations research analyst for 25 years, initially for the Department of the Army and later for OSD. Since November 1995 he has been Director of the Joint Warfare System (JWARS) Office which reports to the Director, Program Analysis and Evaluation, OSD. Email: `<jim.metzer@osd.pentagon.mil>`.

FRED HARTMAN is Chief of the Enterprise Division for the Defense Modeling and Simulation Office (DMSO). He joined DMSO on May 1, 2000 as Technical Director of the Joint Simulation System (JSIMS). Mr. Hartman was born in Kansas City and entered the United States Military Academy from Missouri, graduating in 1967 with a B. S. degree. He earned a M. S. degree in Operations Analysis from the Naval Postgraduate School in 1974. During his Army career he commanded an Artillery Battery in Korea, flew intelligence missions for the Military Assistance Command Vietnam (MACV), was the model manager for a high-resolution combat simulation, and developed a study methodology for a major Army study, *Management of Change*, combining automated network analysis techniques with traditional management tools to solve complex force structure allocation problems. While on active duty, Mr. Hartman served as executive assistant and analyst for the Deputy Under Secretary of the Army (Operations Research). Mr. Hartman joined CACI, Inc. in 1981 and progressively grew from Department Manager to Executive Vice President. During this ten-year period, Mr. Hartman conceived, designed and developed a family of resource predictive models, and developed through a series of simulations and data applications, the overarching framework for a high-level decision support system for Army Headquarters. Later he was chief operating officer, co-founder and board member for Applied Solutions

International, Inc. from 1992 to 1995. In 1995 Mr. Hartman joined the Institute for Defense Analyses as a modeling and simulation consultant to the Deputy Under Secretary of Defense (Readiness), primarily responsible for oversight of the JSIMS program. In early 2000, Mr. Hartman led the architecture group for the JSIMS program transition team. Mr. Hartman served for six years as a member of the Army Science Board, led a study panel for the National Academy of Sciences Board on Army Science and Technology, and is a past president and fellow of the Military Operations Research Society. Email: `<hartman@dmso.mil>`.

CYNTHIA A. PORUBCANSKY is a native of Dayton Ohio who began her career in the private sector after graduating from the University of Dayton with a B.S. in Electrical Engineering. Cindy began her government career at Wright-Patterson AFB in 1981 as a Controls & Displays Engineer in the Integrated Controls & Displays Branch of the Directorate of Avionics Engineering. Serving in ever increasing levels of responsibility, including chief avionics engineer for the B-2 program, Cindy is today, the Joint Modeling and Simulation System (JMASS) Program Manager. She is responsible for developing a consistent, reusable engineering and engagement level simulation support environment for the department of Defense. Cindy has won numerous Department of Defense and community awards. She was selected for Women's Executive Leadership Development Program, the B-2 System Program Office Civilian of the Quarter, ASC Engineering Technical Manager of the Year, Subsystems Product Support Group Mid—Level Manager of the Year, and the ASC Engineering Directorate's Director's Award. Most recently, she was the recipient of the 1999 Dayton Daily News Ten Top Women Award. Email: `<cindy.porubcansky@wpafb.af.mil>`.

JOE STEWART (Chair) is a Principal Systems Engineer at The MITRE Corporation, Information Systems and Technology Division, in their Orlando, Florida office. He is a graduate of the U.S. Naval Academy, in 1966, with a B.S. in General Naval Engineering, and of the Naval Postgraduate School, in 1973, with a M.S. in Operations Research. He returned to the Naval Postgraduate School as an Assistant Professor of Operations Research and Director of the Wargaming Laboratory in 1984, after a career in Anti-Submarine Warfare and Weapons Systems Acquisition, and retired from the Navy in 1988. He served as the MITRE Site Leader and Project Leader at the Joint Warfighting Center from 1991 to 1997 and as the MITRE JSIMS Project Officer from late 1997 through early 2000. Email: `<jss@mitre.org>`.