

## MILITARY MODELING AND SIMULATION: REFLECTIONS AND DIRECTIONS (PANEL)

### Panelists

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### ABSTRACT

The Department of Defense (DoD) makes extensive use of modeling and simulation technology to generally enhance its operations and decision-making processes. Specific applications include operations planning; research, development, and acquisition; test and evaluation; educations and training; and resource allocation. This panel discussion will reflect on the progress the DoD has made in applying modeling and simulation technology, consider current issues, and reflect on what the future holds. Thus, the panelists will provide a context for the remaining sessions in the Military Applications Track.

### PROGRESS IN MODELING AND SIMULATION

With 50 years of computer simulation behind us, we might ask, "What have we wrought, and what would the

founding fathers have thought?" Computer simulation is now light years removed from the Monte Carlo "runs" of Von Neumann and the Manhattan Project. Now, modeling and simulation (one word) is a *sine qua non* of the operational sciences. Professor Wayne P. Hughes, Jr., the analysts' analyst, in his introduction to the 1989 edition of *Military Modeling*, wrote:

"Lord Rayleigh, a great scientist, said, 'The higher mysteries of being, if penetrable at all by human intellect, require other weapons than those of calculation and experiment.' This appeared in a RAND calendar. I took it as charge to all of us from that pioneer analytical organization to avoid Model Myopia, which is equating the world of abstraction and computation to the world of human endeavor."

Are we right to have such faith in the representations that have been so laboriously built by so

many for so few decision-makers? The discussion, not reflecting **any** official position of the Department of the Army, will review the early history of digital computer modeling, with a side-step or two into analogue simulation, and will argue that great leaps of faith might better have been small steps for mankind.

### **MODELING AND SIMULATION WITH ACCREDITED DATA BASES**

In the acquisition process, test and evaluation (T&E) serves to reduce risk by making information on a developing system available to the decision-maker. Modeling and simulation (M&S), in the same way, provides information to the decision-maker when test information is not available. However, neither T&E nor M&S serve the acquisition process if the picture presented to the decision-maker is inaccurate.

T&E can prevent an inaccurate picture of the attributes of a system with even a "good" test if the test is not representative of system performance over a wide range of conditions. Test results may have to be extended by M&S. M&S, on the other hand, can present a picture with impressive graphics, which may appear quite credible but be totally incorrect if the supporting assumptions are not based upon test data. T&E and M&S must be complimentary and consistent with each other. And both must be credible if DoD is to achieve its cost saving goals.

One of the goals of the Susceptibility Model Assessment and Range Test (SMART) project is to develop a data base of test results and a process for using those test results to validate models. The models selected for the SMART project currently are survivability data used in larger war games and simulations. SMART will result in a verified and validated model-set important to the entire acquisition process--from requirements definition through final operational testing. In addition, the resultant accepted test data base and validation and verification process will be made available for future use.

The discussion will focus on the SMART approach to data gathering, developing data bases in support of model accreditation, and supporting the acquisition process. Finally, the fundamental changes to the T&E and M&S portions of the acquisition process, required to support the SMART project, will be discussed.

### **VISUALIZING DECISION ALTERNATIVES**

Solving the problem is not the issue. Optimizing is not the point. Providing insight to decision-makers so they can choose the best possible alternative in a political world is the goal. We must present modeling and simulation results and decision alternatives in a way that decision-makers both relate to and understand. Visual presentations that clearly present decision alternatives and allow

exploration of the full range of available options tend to illuminate the issues and tradeoffs involved in complex, high-level decisions. Such presentations enhance the credibility of modeling, simulation, and analysis products and genuinely serve to inform the decision-maker of the consequences of each the decision-alternatives.

### **TARGETING TOMORROW: AIR FORCE MODELING & SIMULATION INITIATIVES**

This presentation provides a unique historical perspective of Air Force M&S from a key individual who has been directly involved in influential M&S policy-making since the inception of the Warrior Preparation Center in 1982. His presentation will describe, first-hand, the evolution of Air Force M&S through the last 12 years, including the creation of the Air Force directorate of modeling and simulation in 1993 and the development of the Air Force M&S Roadmap for the year 2000 and beyond. This review of past accomplishments and glimpse into the future will encompass new developmental efforts such as integrating real-time imagery, cockpit mission rehearsal, and real-world command and control into the DoD Distributed Simulation Internet.

### **AUTHOR BIOGRAPHIES**

**EUGENE P. VISCO** is the director of the U.S. Army Model Improvement and Study Management Agency in the Office of the Deputy Under Secretary of the Army (Operations Research). He has held this position since 1989 when the agency was initially established. He first entered Civil Service as a Mathematician at the U.S. Army Dugway Proving Ground. He spent six years in the experimental design, analysis and doctrinal testing fields. Mr Visco has also served as an operations research analyst for The Johns Hopkins University, the United States Metric Board, the U.S. Army Headquarters, and the Office of the Secretary of the Army. In those positions, he has conducted analyses of Army tactical operations and weapon systems performance, public social and health services, and the impact of metric conversion on American Society. In addition, he helped establish an operations analysis office at the Seventh U.S. Army Headquarters in Stuttgart-Vaihingen, (then) Federal Republic of Germany. While attached to the Seventh Army, he built and tested a wargame (*Schnell Spiel*) representing NATO Central Army Group vs. Warsaw Pact forces. Mr. Visco has a B.S. degree from the university of Miami, an M.P.A. degree from the University of Southern California, and is a graduate of the National War College. He is a Fellow of the Military Operations Research Society (serving as the Army sponsor's representative to that society), a founding

member of the Washington Operations Research Council, and a member of the International Institute for Strategic Studies. He serves on a number of Department of the Army committees, including the Army Board for the Correction of Military Records and the Casualty Estimation Steering committee. Mr. Visco is a strong advocate of back-of-the-envelope analysis and application of military history to military analysis. His principal research interests are human behavior on the battlefield, chemical and biological warfare, operations, the etiology of friendly fire events, and human casualty estimation. One of his hobbies is collecting antique maps, particularly those with military contexts.

**ALBERT E. RAINIS** has been employed in the Office of the Secretary of Defense (OSD) since 1987. He is currently the staff specialist for survivability within the Office of the Director of Tactical Warfare Programs/Air Warfare. He is the OSD point of contact for the survivability and battle damage repair of aircraft systems in the acquisition cycle. In addition, he is the principal action officer for the F-15 and aircraft trainers. Prior to his current position, he was a staff member in the Office of the Director of Developmental Test & Evaluation/Live Fire Test. In 1989, he served a one-year fellowship in the Executive Office of the President. During this assignment, he worked with the Vice President's Space Council staff, NASA, DOE, congressional staffs, and other government agencies to develop an approach for the President's Space Exploration Initiative. Before coming to the OSD, Dr. Rainis was employed at the U.S. Army Ballistic Research Laboratory as a scientist and Project manager for a Joint Test. Dr. Rainis received his Ph.D. in nuclear physics from Notre Dame in 1971. He has over 30 publications on a variety of technical and scientific subjects.

**JAMES G. "SNAKE" CLARK** is a lieutenant colonel in the U. S. Air Force, currently serving as the Executive Assistant for Modeling and Simulation to the Assistant Vice Chief of Staff at the U. S. Air Force Headquarters in the Pentagon. Colonel Clark is a fighter pilot and senior air weapons controller with extensive command and staff experience. He has served as Chief of the Operations Requirements Division and Chief of the Combat Simulations Division in the Headquarters for U.S. Air Forces in Europe, Chief of Mission Planning Systems and Chief of the Joint/Tactical Wargaming Branch in U.S. Air Force Headquarters, and Chief of the Command, Control, and Countermeasures Combat Education Branch at the Electronic Security Command Headquarters. Colonel Clark has an M.A. degree in International Relations, and is a graduate of the Squadron Officer School, the Air Command and Staff College, and the Air War College. He has received numerous awards and decorations including the Air Force Association "Man of the Year" (1993), the

General John R. Galvin Excellence Award (1993), the Aviation Week Laurels Award Winner (1993), the Air Force Association Citation of Honor (1992), the Air Force Association National Storz Award (1992), the Association of Old Crows Gold Certificate of Merit (1989), the Air Force Association Jimmy Doolittle Fellow Award (1989), the Air Force Association Medal of Merit (1985), the Electronic Security Command Junior Officer of the Year (1984), and the Kelly AFB Junior Officer of the year (1984).

**R. GARRISON HARVEY** is an analyst with the U.S. Air Force, working with the Studies and Analysis Flight of the Air Mobility Command headquarters at Scott Air Force Base, IL. He received a B.S. degree in mathematics from the U. S. Air Force Academy in 1988 and an M.S. degree in Operations Research from the Air Force Institute of Technology in 1992. His research interests are in decision support analysis and defining variable relationships in complex systems through modeling, simulation, and analysis. He works as a management consultant within and outside of the Air Force.

**STEVEN KIMMEL** is the Vice President and Assistant General Manager of the BDM Engineering Services Company where he is responsible for operational effectiveness analysis, test and evaluation, and crisis response planning. Prior to joining BDM, Dr. Kimmel served on the staff of the Office of the Secretary of Defense and was responsible for development test and evaluation of major weapon program support as well as command, control, communications, and intelligence systems. He received his B.S. in mechanical engineering from the University of Maryland in 1968 and his M.B.A. and D.S.C. from George Washington University in 1972 and 1983, respectively.