

RES 2010 Day Session Abstracts

Session 1: Cornerstone Projects: 1000-1200, Tues. July 13th

Session Chair: Amela Sadagic

Title: Application of a Multi-Agency Incident Command Control System Game Simulation for Tactics Validation

Presenter: Tony Ciavarelli

Abstract: This presentation reviews progress on an R&D project related to the development of a software framework and visualization platform for doctrine validation and training of first responders to natural and manmade disasters. The purpose of the system will be to: (1) Address military and civilian needs in managing responses to emergencies and for validating existing or proposed Standard Operating Procedures, (2) Enable de-risking and/or evaluation the effectiveness of various (military or first responder) insertions -- given defined scenarios, (3) Exercise scenarios defined by use cases -- in order to address issues of concern in Asymmetric warfare in an open, modular and extensible software environment, and (4) At the conclusion of the Planned R&D -- we will have a defined and built an Architectural Framework and Use Case Library. A prototype system will be developed on an open-source game platform, such as Delta 3-D which will serve as an experimental test bed.

Title: New Generation of Physical Ranges for Infantry Training: Bringing in Sensor Systems and Virtual Reality Technologies

Presenter: Amela Sadagic

Abstract: The talk presents our work on two MOVES research efforts focused on a new generation of instrumented ranges for training of urban warfare combat skills. We comment the use of large scale multi-sensor system for quantitative analysis of training performances on outdoor training environments, and the use of physical (3D) avatars as an alternative for role players in live/ virtual training environments.

Title: Persistent Surveillance and Cyber Forensics

Presenter: Mathias Kölsch

Abstract: Cyber forensics involves extracting data and information from computer networks and media, often under tight time constraints and with reliable estimates of accuracy. Persistent surveillance necessitates reliable automated processing to catch important events and to avoid overloading human operators with years and years of video data. We show our recent efforts to utilize computer analysis in support of these two objectives: embedded video processing in small unmanned aircraft and automatic weapon detection in potential terrorist network recruiting videos.

Title: Modeling Social Influence in Large Populations

Presenter: Steve Lieberman

Abstract: This 10 minute synopsis of the full HSCB presentation (session 4) examines a theory-driven method for abstracting the social structure of a large population such as a nation-state. Model-ready theories from macrosociology and cognitive identity theory are used to create a probabilistic influence network representing the population. I will demonstrate how this network can facilitate large-scale influence analysis (e.g., using topological characteristics) and methods for use as simulation input for multi-agent systems.

Title: Web Tools for Fostering and Analyzing International Collaboration

Presenter: Steve Lieberman

Abstract: DoD continues to emphasize the need to “build and strengthen a global network of CT experts and practitioners” in order to effectively combat transnational terrorism, while the limited reach of current international military engagement programs severely limits the collaboration capabilities of the US and partner nations. Considerable regional differences in language capabilities, internet connectivity, and information-sharing readiness create a rich environment for the investigation of international teambuilding and ad hoc (hastily formed) networks. I will overview the first year of research efforts and findings related to the development and deployment of web-based collaboration and engagement tools for international CT collaboration, along with the development and application of analysis techniques for studying collaboration effectiveness.

Title: Using Code You Didn't Write: Redefining Composable, Interoperable Simulation

Presenter: Rudy Darken

Title: Behavior Synthesis for Small Unit Infantry

Presenter: Chris Darken

Abstract: We review recent MOVES research progress on detailed models of the behavior of small units of infantry, with an emphasis on fireteam movement, awareness of potential threats, and visual search. This research has been applied to ONR's BASE-IT project and to TRAC's Combat XXI simulation.

Session 2a: Certificate Programs and Continued Education: 1330-1500, Tues. July 13th

Session Chair: Mathias Kölsch

OVERALL Session Abstract: The Naval Postgraduate School is meeting the Navy's desire for diverse education programs through short courses at the senior level, through distance learning course offerings, and through graduate-level certificates that segue into degrees. In this session, we discuss NPS' vision for sailor education, highlight some established and new programs in Modeling & Simulation, and explain the admission process for service members and civilians. We will also present the findings of a survey of the FA-57 community's views on M&S skill importance and observed skill levels.

Title: Updates from the MOVES PhD Program

Presenter: Don Brutzman

Abstract: Pending

Title: Advanced Simulation Course for Senior Leadership

Presenter: Gene Paulo

Abstract: Pending

Title: Education for the Acquisition Workforce

Presenter: Pending

Abstract: Pending

Session 2b: Delta3D: 1330-1500, Tues. July 13th

Session Chair: Perry McDowell

Title: Moving Beyond a Commodity Engine

Presenter: Perry McDowell

Abstract: Delta3D was originally envisioned and constructed as a commodity engine, designed to tie together in a single API functionality that was available freely elsewhere. However, the power of the open source community has elevated the engine beyond commodity status to the point where Delta3D has advanced functionality that some of the best game engines lack. Additionally, the engine is being used in more advanced simulations by many outside of MOVES, including as the underlying software for VESSEL, a simulation for the Navy's Recruit Training Center, which won best Industry Game at the Serious Games Showcase at I/ITSEC last year.

This talk will discuss recent additions to the engine, the recent projects built using Delta3D, and the direction the engine is heading.

Title: Improving Learning in Virtual Worlds

Presenter: Brent Smith, Engineering and Computer Simulations

Abstract: Recent years have seen huge increases both in computing power and the number of people able to access computers and the Internet. This proliferation of information and communication technologies has enabled higher levels of collaborative learning through increasingly sophisticated modes of presentation. Virtual Worlds and Serious Games are products of these improvements in technology. However, learning is a comprehensive process that does not simply consist of the transmission and learning of content. The next generation of instructional technologies will need to have the ability to track and assess individuals and teams at varying levels as well. Our objective in the presentation is to discuss an underlying model for assessment being implemented into the Nexus Virtual Worlds platform that can apprehend the different relationships between players, player actions, groups and group actions across the spectrum of learning activities.

Session 3: Use of M&S in Distributed Learning: 1515-1630, Tues. July 13th

Session Chair: Bob Wisner

Title: Models of Cognition in Distributed Learning Environments

Presenter: J. Dexter Fletcher, Institute for Defense Analyses

Abstract: Scalable, technology-based instruction that incorporates the substantial efficiencies of one teacher for each student must employ models that represent both the current and objective states of the learner. These models must be applied in real-time and on demand. Both implicit and explicit cognitive models have been used to accomplish these ends, and both types are briefly reviewed. Implicit models generally bind content and presentation strategy together while explicit models keep the two separate. Early explicit models were largely quantitative, involving relatively simple learning paradigms. Current explicit models are more qualitative and deal with more complex and comprehensive learning objectives. They may be particularly suitable for today's uncertain, asymmetric operational environments, which typically require rapid adaptation to events and situations that instructional designers can neither foresee nor prepare for in advance.

Title: M&S in Distributed Learning Architectures

Presenter: Paul Jesukiewicz, Director, Advanced Distributed Learning (OSD), Angelo Panar, ADL Co-Lab Hub

Abstract: The Sharable Content Object Reference Model (SCORM) has accomplished the initial goals of the ADL Initiative in solving problems of interoperability, durability, and reusability for Web-based instruction. However, the steady advancement of information and communications technology and a growing interest in "Web 2.0" approaches to learning put into question the power of the original assumptions that were the basis for SCORM. In this presentation, we will consider a maturity-based approach to determining the capabilities and future standards to be



included in the evolution of SCORM with a focus on how best to include simulations, games, and immersive environments into a seamless learning experience that can be replicated on any SCORM-conformant system.

Title: M&S for Cross Cultural Communication

Presenter: Ed Sims, CTO Vcom3D, Judy Brown, Immersive Learning Technologies Team: Mobile Learning, ADL

Abstract: The successful execution of peacekeeping and humanitarian missions requires the ability to identify civilians' needs and intentions, and to successfully influence or direct their actions. In order to perform successful interviews, rapport building, and negotiations, it is important to recognize and produce non-verbal cues and to understand and observe the social protocols of the region. However, when interacting with persons of different cultures, we often see behaviors that we think we understand, or use behaviors that we think are understood, but which really have a very different meaning in the other culture. The ability to successfully model and simulate these behaviors has been a long-standing challenge. In this presentation, we will review recent work in developing cognitive, affective, and physical models of culturally influenced behavior, and in using these models to create effective experiential learning.

Session 4: HSCB Modeling: 0815-0945, Wed. July 14th

Session Chair: Curt Blais

OVERALL Session Abstract: The Department of Defense policy states that “stability operations are a core U.S. military mission that the Department shall be prepared to conduct with proficiency equivalent to combat operations” (DoD Instruction 3000.05, September 16, 2009). Stability operations encompass “various military missions, tasks, and activities conducted outside the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, [and to] provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.” This new emphasis on “other-than-combat” operations presents new modeling and simulation challenges in support of training, analysis, experimentation, and mission planning. One response to this challenge has been an Office of the Secretary of Defense and Office of Naval Research initiative titled, “Human Social Cultural Behavior (HSCB) Modeling”. This has been a major growth area for the MOVES Institute over the past few years. This session will describe several current HSCB Modeling activities in NPS supported or performed by MOVES researchers and students.

Title: Developing Social Networks from Survey Data for Multi-Agent Simulations

Presenter: Steve Lieberman

Abstract: Authentically and actionably representing large social collectivities (such as the population of a nation-state) remains a preeminent challenge throughout social computing, and HSCB modeling and simulation. I will demonstrate a simple theory-driven technique that uses survey and polling data to embed agents with attributes and endogenously elicit an authentic simulation social structure. A social network indicating probabilistic interactions among agents is synthesized via a data transformation using the distributions of social factors across a collectivity as a method for abstracting the dynamic social structure of a target population. The significance of Popperian rejectability in HSCB model development and validation will be discussed.

Title: NPS Initiatives in HSCB Modeling

Presenter: Chris Darken & Jeff Appleget

Abstract: The MOVES Institute is a principal participant in the Office of Naval Research HSCB Modeling program. This presentation describes FY 10 accomplishments and work in progress in outreach, education, and research, and describes planned FY 11 activities. Building on the success of the FY 10 HSCB Modeling Initiative at NPS, the FY 11 research will develop methods, models, and tools (MMT) that will provide operational and tactical leaders a better

understanding of populations and adversaries in irregular warfare and counterinsurgency operations. These MMTs will be developed through basic and applied research focused in three key task areas: System Modeling, Data Modeling, and Cultural Training. Additionally, the Education task area will sponsor the development of the requisite knowledge and techniques for understanding and applying new methods, models, and tools to identified warfighter HSCB modeling needs.

Title: Crowd Behavior Modeling in COMBAT XXI

Presenter: Imre Balogh

Abstract: The use of digital pheromones to facilitate interaction and coordination of agents has been demonstrated to provide a rich set of behaviors and interactions. The work described investigates how such models can provide a way to effectively model the dynamic behavior of large numbers of non-combatant individuals in entity level simulations. This presentation describes how such a model has been integrated into a combat simulation (COMBAT XXI).

Session 5: NMSO Sponsored Work: 1015-1200, Wed. July 14th

Session Chair: Kevin Maher

Title: Discrete Event Component Architecture for Modeling Ships

Presenter: Arnie Buss

Abstract: This work lays out the initial design of an architecture for modeling surface ships for use in analysis. The methodology is based on a Discrete Event Simulation (DES) component framework using Event Graphs as the underlying representation of the components. A key element is the loose coupling of the components based on a simple, yet powerful listener pattern. This allows for considerable flexibility in representing various elements, such as sensors, weapons, and tactics, and for new components to easily be applied. Specific implementations are easily created in any package that supports DES components. Two such packages are the Java-based Simkit and the newer Python-based SimPyKit. The loose coupling approach allows a straightforward interaction with distributed elements through DIS. An exemplar for this approach will be the DES model of the proposed TCraft ship and the display of a single run of the scenario in both Delta3D and XJ3D. An advantage of this approach is that for analyzing scenarios that include randomness, the graphical displays can easily be disabled and many replications performed faster than real-time.

Title: Interoperability Standards Cost Effectiveness Analysis Tool

Presenter: Wolfgang Baer

Abstract: There is an absence of quantitative metrics and measures that can help us evaluate the cost effectiveness of implementing interoperability standards. In the absence of such metrics standards are being implemented because “we all know they are good and necessary” not because we have a clear guide as to when and how such implementations will save us time and money. The first phase of this research has provided a mathematical cost model for standards implementation along with a set of standards criteria required to execute the model. The phase II research presented in this talk is designed to archive several objectives. First, to test a cost and benefits model that has been developed in previous years against a set of actual standards and verify the accuracy of the cost estimates as well as the algorithmic ease of use for the questions and parameter defined in that model. Second, to expand the cost model include the case of adding a single node to an existing standard. Thirdly, to automate the mathematical calculations and criteria gathering tasks in a prototype software tool that can be applied by decision makers in order to help them evaluate the cost of implementing specific interoperability standards. I plan to discuss the prototype

software development status, provide an outline of the general methodology, discuss the result of test cases utilized, and present the next steps we expect to accomplish.

Title: Extending Indoors the Automated Performance Assessment of Marine Integrative Training

Presenter: Neil Rowe

Abstract: Our current BASE-IT Project (sponsored by ONR) is developing a system for automatically monitoring Marine performance during integrative exercises in urban warfare. This work addresses outdoors activity on training ranges. But at some point, Marines need to enter buildings, as during cordon and search operations. There is doctrine that applies to such activities which can be formalized much as with outdoor activities. We are studying methods for monitoring using a sensor network within buildings to see how well Marines are following doctrine. Nonimaging sensors can avoid problems of darkness and occlusion by walls and people by tracking the rough positions of Marines while being unobtrusive.

Title: Training Effectiveness Evaluation Methods: Marksmanship Training as Test Bed Application

Presenter: Tony Ciavarelli

Abstract: The Navy and Marine Corps are rapidly developing VE training systems which purport to enhance, and maybe replace, traditional live training exercises. The US Army's Engagement Skills Trainer (EST) and US Marine Corps Indoor Marksmanship Trainer (ISMT) are examples of such systems. Each provides the means to teach basic and advanced marksmanship skills, and to monitor performance progress from novice to expert. Questions remain, however, about how best to use such trainers whether for enhancing or possibly replacing or reducing the need for extensive field training (on live fire ranges). This presentation reviews research related to the development and application of human performance measurement methods for use in simulated marksmanship training. Instructional strategies and measurement methods were developed for rifle marksmanship training based on the understanding of skilled performance requirements. The author believes that the methodology identified has broad application in simulation training.

Title: Training Simulation for Complex Cognitive Tasks

Presenter: Ji Hyun Yang

Abstract: This project investigates the application of neurophysiological markers to cue instructional systems. Using helicopter terrain navigation as a representative task we are investigating if scan pattern provides sufficient insight into trainee's cognitive state to indicate when and what type of instructional intervention is appropriate.

Healthcare Keynote Speaker:

Title: Modeling and Simulation in Healthcare – Future Directions

Presenter: Dr. Richard M. Satava

Abstract: Modeling and simulation is finally beginning to emerge in the field of Healthcare. There are a number of future directions that can be anticipated, based upon current status/direction in healthcare, as well as the historical use of simulation in non-medical fields. Just as important are the civilian requirements in medical simulation which must be followed, otherwise the military training and assessment would not be acceptable for civilian certification, which is required by all military personnel – by the National Association of Emergency Medical Technicians (NAEMT) and the specific medical and surgical boards who provide the certification to practice surgery and other specific specialties. The key issues of outcomes measures, curriculum development and certification requirements will be followed by emerging applications and future needs for medical simulation – both in the military and civilian communities.

Session 6a: Healthcare: 1430-1630, Wed. July 14th

Session Chair: McCauley/Adams

Title: Psychological Health Outreach and Treatment: Simulation, Social Networks, Games, and Other New Media

Presenter: Russell Shilling, CAPT, MSC, USN. Program Manager – IPTO. Defense Advanced Research Projects Agency (DARPA).

Abstract: Pending

Title: Medical Education Modalities at National Capital Area Medical Simulation Center

Presenter: Dr. Al Liu, Director for Virtual Medical Environments at the National Capital Area Medical Simulation Center (SimCen), Uniformed Services University.

Abstract: Pending

Title: The California Simulation Alliance: An Academic/Service Partnership

Presenter: Dr. KT Waxman, President and CEO of Waxman and Associates and currently the program director for the Bay Area Simulation Collaborative (BASC) and the California Simulation Alliance (CSA) at the California Institute for Nursing & Health Care (CINHC).

Abstract: Pending

Title: The Future Vision of Simulation in Healthcare

Presenter: Dr. David Gaba, Associate Dean for Immersive and Simulation-based Learning and Professor of Anesthesia (with tenure) at Stanford University School of Medicine.

Abstract: Pending

Session 6b: SAVAGE Research Group Session: 1430-1630, Wed. July 14th

Session Chair: Brutzman

Title: A Scalable Cloud-Based Architecture for Physically Based Virtual Environments

Presenter: Loren Peitso

Abstract: This dissertation describes a simulation architecture which addresses five properties: latency mitigation, scalability, multi-domain capability, repeatability and high reusability; via a homogeneous distributed peer architecture. Network latency mitigation is accomplished through projections of future motion which also reduce network traffic volume required, benefiting network scalability while providing repeatability as all necessary information is provided in the projective event packets. Scalability of simulation size is gained through an architecture designed for massive distribution and parallelism. Or additional compute resources may be used to compute in higher fidelity. The architecture also encompasses evaluation of multi-domain physics, sensor interactions with objects are treated as a form of collision within the unified collision detection system. Reusability is provided by a homogeneous shared environment providing a common baseline for shared models accessed via repositories and references to appropriate environmental data. This provides an overall software infrastructure conducive to models being formulated as components with shared consistent assumptions.

Title: SAVAGE Team Progress

Presenter: Don Brutzman

Abstract: Pending

Title: Ultra-High Resolution 4K Video

Presenter: Jeff Weekley

Abstract: In 2009, through a remarkable collaboration among NTT Labs, the Monterey Bay Aquarium, the city of Monterey, CineGrid and the Naval Postgraduate School, an 8K moving image (7680 X 2160 pixels) was streamed live from the Monterey Bay Aquarium to Atkinson Hall on the campus of University of California San Diego during the annual CineGrid Workshop. Although it has been technically possible to stream 4K images and sound, very few live events have been captured and never before has an 8K image - two side-by-side, seamlessly-stitched 4K images been transmitted, because the network requirements and appliances, the cameras, the compression algorithms, and the display technologies are all new. In our presentation, we shall discuss the technical challenges and successes, and the partnerships that emerged from a broad spectrum of entities to produce the live event at the CineGrid Workshop. In addition, we shall share the artistry of capturing and exhibiting an underwater habitat in 4K, and offer a unique opportunity rarely, if ever, seen — to view undersea habitats through the lens of a two 4K cameras at 60 frames per second in ultra-high resolutions.

Title: Tools for Web-Based Learning and Assessment

Presenter: Jeff Malnick

Abstract: Introduction to the NPS OptiPortal running Scalable Adaptable Graphics Environment (SAGE) for local and remote collaboration using well-known media types such as X3D, streaming video, and high resolution 2D imagery.

Title: Information Exchange Model (MIEM) XML Editor for Tracking Merchant Ship Information

Presenter: Mike Bailey/Rick Hayes-Roth

Abstract: This presentation describes work done to produce a graphical editor for XML documents written against the Maritime Information Exchange Model, a schema describing vessels, events, and persons of interest to the maritime intelligence community. The initial project was expanded into a task to write an XML editor which could be customized to a particular document type without customized software. The elements within the target schema were annotated with visual clues for the editor so the content could be properly rendered at runtime. A plug-in architecture was implemented so that custom renderings for particular document types can also be used. An example of this is a document editor built for a Coast Guard intelligence unit which produces hard copy vessel descriptions to be used by boarding officers at sea.

Title: X3D Earth Visualization using Hamming Supercomputer Workflow

Presenter: Dale Tourtelotte

Abstract: Pending

Session 7: MOVES Students, Current and Former: 0800-0930, Thurs. July 15th

Session Chair: Falby/Darken

- **Updates from Current Students**
- **Updates from MOVES Alumni**
 - Major Craig R. Schwetje, USMC
Expeditionary Warfare Training Group Pacific (EWTGPAC), N-7
Wargaming & Information Technology Department Deputy Director
 - LCDR Rommel Toledo, Mexican Navy
Modeling, Simulation and Virtual Environments Researcher

Session 8: M&S Sponsors: 0945-1130, Thurs. July 15th

Session Chair: Sullivan

Title: Counter-Insurgency to Counter-IED: A Tale of Two Sims

Presenter: Todd Richmond, USC, Institute for Creative Technologies

Abstract: Simulations and/or "serious games" come in various shapes and sizes. There are often many different ways to approach a training problem, and a variety of resulting solutions. To illustrate the breadth of applications, two examples are presented. UrbanSim is a single player turn-based simulation focused on battalion-level decisions in a counter-insurgency environment (with particular emphasis on understanding second- and third-order effects). The Mobile Counter-IED Interactive Trainer (MCIT) includes a multiplayer (up to ten) red vs. blue first-person shooter environment targeted at training c-IED techniques to novice (E1-E4, O1-O2) users. The MCIT simulation is the practical skills application that is part of a larger immersive training environment. Despite the differences in the final applications, the pathways for development are markedly similar and represent a generalized path that combines computer science, learning science, and entertainment expertise.

Title: Fleet Synthetic Training

Presenter: Gary Wentz, M&S and Joint Training Officer, Pacific Fleet

Abstract: Fleet Synthetic Training (FST) provides the Type Commanders, SECOND FLEET, THIRD FLEET, and SEVENTH FLEET with individual through strike force level training among Navy, Joint, and Partner Nation participants. FST is conducted within the Navy Continuous Training Environment (NCTE) connected to the Joint Training and Experimentation Network (JTEN) and other training environments. Shore-based and platform-embedded simulation and stimulation systems interoperate across myriad networks and architectures. FST is integral to integrated training, and demand for FST is increasing across the Fleet. Research focusing on FST is required. Experts in key positions serving in operational and training commands knowledgeable on the science supporting FST are required. Both (research and expertise) will serve to enhance current training and also prepare the Navy, US Joint forces, and Partner Nations for the inevitability of future increased reliance on synthetic training environments.

Title: Navy Modeling and Simulation Office Update

Presenter: John Moore, NMSO

Abstract: Pending...