

Whereas the United States of America is a great and prosperous Nation, and Modeling and Simulation contribute significantly to that greatness and prosperity;

HRES 487 EH H. Res. 487 In the House of Representatives, U. S., July 16, 2007

Whereas the United States of America is a great and prosperous Nation, and modeling and simulation contribute significantly to that greatness and prosperity; Whereas modeling and simulation in the United States is a unique application of computer science and mathematics that depend on the validity, verification, and reproducibility of the model or simulation, and depends also on the capability of the thousands of Americans in modeling and simulation careers to develop these models; Whereas members of the modeling and simulation community in government, industry, and academia have made significant contributions to the general welfare of the United States, and while these contributions are too numerous to enumerate, modeling and simulation efforts have contributed to the United States by—

- 1) expanding the understanding of nuclear chain reactions during the Manhattan Project through use of the earliest simulation, including the neutron process, which ultimately contributed to the end of World War II;
2) serving as a fundamental element of the National Security Agency, which enabled the Director of the Special Source to verify the safety security and reliability of the nuclear design for more than three years without the use of live nuclear testing which would have been unacceptable to the American people;
3) understanding the effectiveness of joint, coalition, and adversary training exercises, which ultimately reduced the risk of full-scale war, as demonstrated by United States Joint Force Command, over homeland emergency exercises;
4) understanding the effectiveness of joint, coalition, and adversary training exercises, which ultimately reduced the risk of full-scale war, as demonstrated by United States Joint Force Command, over homeland emergency exercises;
5) increasing the quality of health care through the development of medical simulation training which led to the First Lady's Commission to report and training for physicians to reduce high-risk procedures to their lowest possible risk;
6) reducing the risk of health care, as demonstrated by medical simulation exercises, which ultimately reduced the risk of health care, as demonstrated by medical simulation exercises;
7) understanding the effectiveness of joint, coalition, and adversary training exercises, which ultimately reduced the risk of full-scale war, as demonstrated by United States Joint Force Command, over homeland emergency exercises;
8) providing joint, coalition, and adversary training exercises, which ultimately reduced the risk of full-scale war, as demonstrated by United States Joint Force Command, over homeland emergency exercises;
9) providing joint, coalition, and adversary training exercises, which ultimately reduced the risk of full-scale war, as demonstrated by United States Joint Force Command, over homeland emergency exercises;
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2010 Modeling & Simulation Leadership Summit Report

February 1 2010 ▶ Virginia Beach, VA

In cooperation with the Congressional Modeling and Simulation Caucus

Led by: J. Randy Forbes VA, 4th District, Founder and Chair Solomon Ortiz TX, 27th District, Co-Chair

Whereas modeling and simulation frequently complements or replaces experimentation alone; Whereas the modeling and simulation industry provides well-engineering and mathematics to contribute to the progress; Whereas other countries have recognized the value of modeling and simulation; Whereas modeling and simulation efforts are essential to the progress of the Nation; Whereas the modeling and simulation industry provides well-engineering and mathematics to contribute to the progress; Whereas other countries have recognized the value of modeling and simulation; Whereas modeling and simulation efforts are essential to the progress of the Nation;

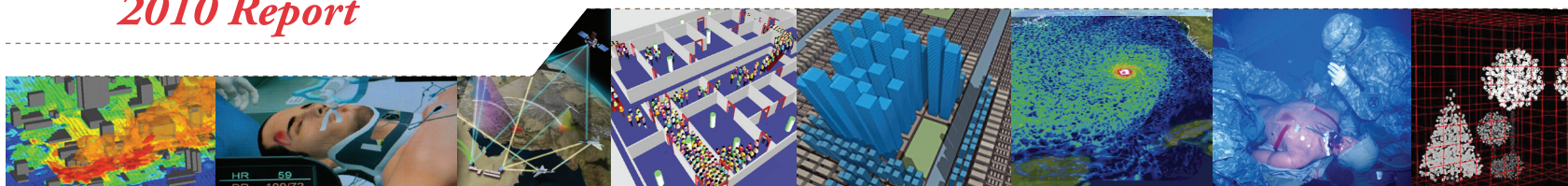


M&S Leadership Summit

FEBRUARY 1 2010 ▶ WWW.TRAININGSYSTEMS.ORG HILTON VIRGINIA BEACH OCEANFRONT HOTEL ▶ VIRGINIA BEACH, VA

EVENT #01C0





Acknowledgments

The fifth annual Modeling and Simulation Caucus Leadership Summit, sponsored by the National Training and Simulation Association (NTSA), was held in Virginia Beach, Virginia on Monday, 1 February 2010. RADM Fred Lewis USN (Ret.), President of NTSA, and his organization, provide support to the Modeling and Simulation Congressional Caucus, co-chaired by Congressman J. Randy Forbes and Congressman Solomon P. Ortiz. In order to support the furtherance of recommendations made through this summit, and in planning for future events, NTSA formed a standing committee to provide the interface to the Caucus for the planning of this event and others throughout the year in support of the Caucus. Members of this committee commit significant time and effort to ensure these events accomplish both the agendas of the Caucus and of the community of practice. In addition to RADM Lewis, the members of this standing committee, and their business affiliations, include:

Mr. Benn Aaronson, Modeling and Simulation
Coordination Office, OSD
Ms. Lisa Bair, WernerAnderson, Inc.
Lt Gen Tom Baptiste, USAF (Ret.), National Center for
Simulation
Dr. Linda Brent, Chair, The ASTA Group
Mr. Rich Bensinger, General Dynamics
Mr. Jesse Citizen, Modeling and Simulation
Coordination Office, OSD

Mr. Michael Finner, L-3 Communications
Mr. Tom Frost, Joint Forces Command
Mr. Fred Hartman, Institute for Defense Analyses
Mr. Michael Papay, Northrop Grumman
Mr. Thomas Reese, VMASC/Old Dominion University
Dr. John Sokolowski, Virginia Modeling, Analysis and
Simulation Center
Mr. Bill Tucker, The Boeing Company
Mr. Bill Waite, Aegis Technologies

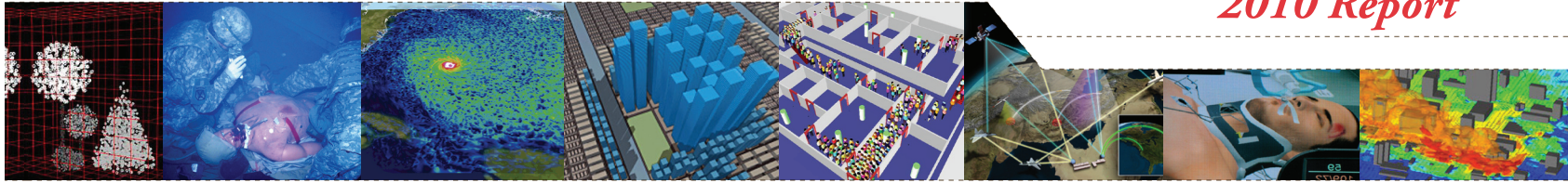
Sincere thanks to all the committee members and participants for their continued dedication and commitment to furthering the national agenda of modeling and simulation.

Congressional Modeling and Simulation Caucus Current Members (Spring 2010)

Congressman Randy Forbes, Co-Chair - Virginia
Congressman Solomon Ortiz, Co-Chair - Texas
Congressman Robert Aderholt - Alabama
Congressman Vern Buchanan - Florida
Congressman Ken Calvert - California
Congressman John Carter - Texas
Congressman Mike Conaway - Texas
Congresswoman Susan Davis - California
Congressman Bill Foster - Illinois
Congresswoman Virginia Foxx - North Carolina
Congressman Jim Gerlach - Pennsylvania
Congressman Phil Gingrey - Georgia
Congressman Alan Grayson - Florida
Congressman Martin Heinrich - New Mexico
Congressman Maurice Hinchey - New York
Congresswoman Suzanne Kosmas - Florida

Congressman Doug Lamborn - Colorado
Congressman Jim Matheson - Utah
Congressman Jeff Miller - California
Congressman Glenn Nye - Virginia
Congressman Todd Russell Platts - Pennsylvania
Congressman Bill Posey - Florida
Congressman Adam Putnam - Florida
Congressman C.A. Dutch Ruppersberger - Maryland
Congressman Bobby Scott - Virginia
Congressman Joe Sestak - Pennsylvania
Congressman John Sullivan - Oklahoma
Congressman Tim Walz - Minnesota
Congressman Zach Wamp - Tennessee
Congressman Joe Wilson - South Carolina
Congressman Rob Wittman - Virginia

From doctors performing hands-on simulated surgeries, to homeland security models that account for details such as wind direction and construction sites, to transportation models that show projected traffic patterns in your hometown decades into the future, modeling and simulation is on the verge of breaking out of the defense industry and into the everyday lives of Americans. The Modeling and Simulation Caucus showcases M&S initiatives, promotes the M&S industry, and serves as a forum to understand the policy challenges facing this growing and versatile technology.



M&S Caucus Leadership Summit 2010 Legislative Priorities

MODELING AND SIMULATION: A NATIONAL ENTERPRISE

“Realizing the Promise of House Resolution 487”, the theme of the 5th Annual M&S Caucus Leadership Summit, invites a fresh look at how the participants of this year’s summit desire to move forward the agenda for a National Enterprise with HR-487 as its foundation.

A call for continued action to meet these challenges was brought forth from the 2010 Summit Working Groups. The key legislative focus areas to achieve their objectives include:

FUNDING

Create a national office to serve as the proponent for M&S: The budget should foster projects and outreach. The likely government sponsor for this office is the Executive Office of the President, Office of Science and Technology Policy.

Establish an enterprise network: The budget should be used to conduct research and test new M&S technologies. Likely sponsors for this action would include the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA).

Net Present Value of M&S: Initiate an empirically-based program to obtain operational data to calculate M&S return on investment.

POLICY

Technology Acquisition Reform: Encourage the House Armed Services Committee Acquisition Reform Panel in its support of rapid prototyping to define requirements and the use of contract incentives to combat requirements creep.

Export Control Reform: Seek an opportunity for the M&S Community of Practice to be represented in the reform process as presented in President Obama’s 2010 State of the Union address.

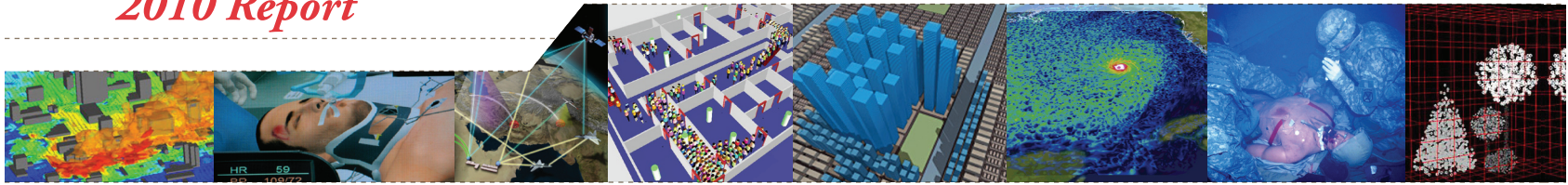
Department of Labor Occupation Handbook: Add M&S technical codes to the Department of Labor Occupation Handbook. This action recognizes the fact that the practice of M&S is reaching a stage of maturity similar to engineering and other professions.

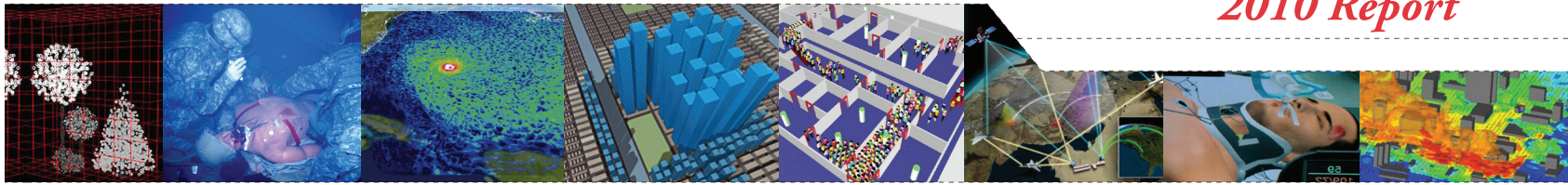
For further information, please contact:

National Training and Simulation Association • 2111 Wilson Boulevard, Suite 400, Arlington, VA 22201-3061
(703) 247-2569 • bmcdaniel@ndia.org



M&S LEADERSHIP SUMMIT
2010 Report





M&S Leadership Summit 2010 Proceedings Summary

Background

The National Training and Simulation Association (NTSA) conducted the Fifth Annual Modeling and Simulation (M&S) Leadership Summit on February 1, 2010 in Virginia Beach, Virginia. RADM Fred Lewis, USN (Ret.), President, NTSA, provided opening comments and greeted the meeting participants and attendees.

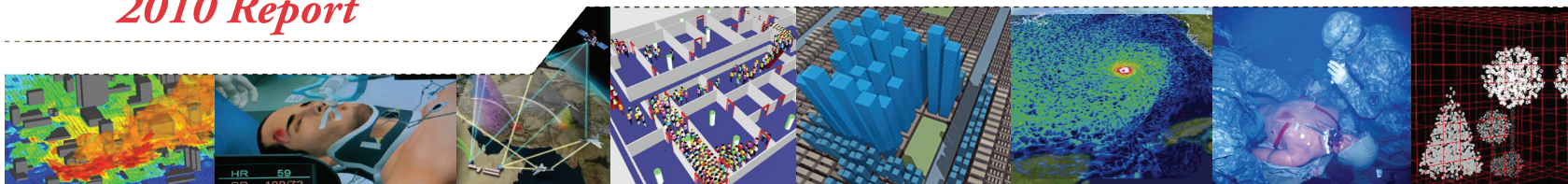
The spirit of the 2010 M&S Leadership Summit resonated throughout the distinguished panel presentations focused on the theme, Modeling and Simulation: A National Enterprise, “Realizing the Promise of House Resolution 487.”

We are indebted to Congressman J. Randy Forbes, VA, 4th District, M&S Caucus Founder and Co-Chair for lending support for this event. Congressman Forbes, Congressman Glenn Nye, VA, 2nd District, Congressman Bobby Scott, VA, 3rd District, and Congresswoman Suzanne Kosmas, FL, 24th District provided commentary during the luncheon to update current and future M&S initiatives in their respective districts as well as report on the status of “Proposal to Add a North American Industry Classification Code (NAICS) for the M&S Industry”. This proposal recommends the creation of new NAICS codes for the Modeling and Simulation industry in both the Services and Manufacturing areas by the Office of Management and Budget through the Economic Classification Policy Committee (ECPC) in a potential 2012 revision.

Discussions surrounding a National Enterprise for Modeling and Simulation continued after lunch during four facilitated, structured working group sessions:

- Research and Development / Technology
- Workforce Development
- Industrial Development / Organization Relations
- Economics / Business Practice (Enterprise-wide)

The balance of this meeting report summarizes the panel presentations and the four working group sessions, both committed to the challenges of the design and methodology of modeling and simulation in training and education.



Summit Keynote Address

Mr. Michael Schrage, Fellow, Sloan School's Center for Digital Business, MIT, and Senior Advisor, Security Studies Program, MIT, delivered the summit keynote address. He observed that modeling and simulation problems are not with technologies, but are educational, economic and social in nature. Mr. Schrage relayed the thought that organizations need to gain more value from the modeling and simulation world. He presented three main themes toward advancing that objective:

Empower procurement. The procurement process needs to shift from request for proposal to request for prototype. Prototypes should drive the procurement process and refine the product. Prototype-driven requirements deliver more value than requirements-driven prototypes.

Invite interoperability. The internet is a wonderful tool that permits, and invites, the exchange of ideas across the entire network; it is not confined to a point-to-point exchange. Procurement processes should demand interoperability from the beginning by including a requirement for logical, semantic, and physical interoperability.

Mirror modeling. Multimedia mirroring should be used to push government agencies to build virtual agencies to use in driving innovation.

Mr. Schrage noted that the future of modeling and simulation is to be an enabler of interoperability and innovation. It can improve the way systems are developed and acquired. The full range of interoperability is required up front in the process and persistent throughout the entire process to achieve the best results. In the past, analysis was the best instrument for risk management. That role can be overtaken by rapid prototyping. Fast, early prototyping allows the modeling and simulation community to get closer to the customer and lets each embrace the other as a part of the solution.

Panel Presentation: Articulating a Path to the Future for a National M&S Enterprise

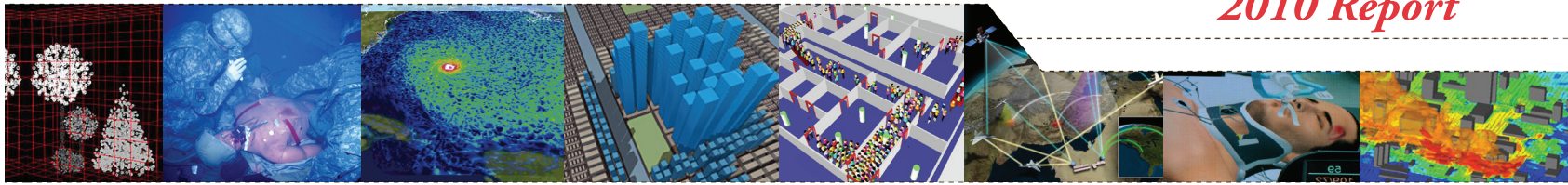
Moderator: Dr. Linda J. Brent, CEO and Senior Managing Associate, The ASTA Group, LLC

Panelists: Professor Jennifer T. Bernhard, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign

Dr. Dexter Fletcher, Senior Research Staff Member, Institute for Defense Analyses

Dr. Lesa Roe, Director, NASA Langley Research Center

Dr. Kristina Stillsmoking abd, Director, Seeger Surgical Simulation Center, Baylor University Medical Center, Dallas, Texas



Summary

The distinguished panel demonstrated that the emerging discipline of modeling and simulation blurs interdisciplinary lines. It blends the sciences and humanities, engineering and medicine, and crosses disciplines within the sciences to address large-scale complex systems. Use of the technology requires standards for data sharing, new algorithms to handle complex systems, and distributed development. M&S plays a role in the training of the medical workforce as a way to improve on-the-job training and in the Department of Defense (DoD) for complex tasks to enable reduced training time, improved speed of learning, and increased practice, which reduces errors. However, there are still challenges in determining both how to design M&S training and how to develop methods for using M&S in training so that it is most effective.

All of these uses require a Science, Technology, Engineering and Mathematics (STEM) educated workforce, both to develop and to effectively use the technologies. Many of the technological challenges require innovation, which the upcoming workforce will need to solve. This STEM education includes the underlying science of application, underlying application technologies, and computer simulation technologies. The gap in US National and female STEM graduates remains an issue. While the gaming industry has grown, there remains a difference between the realm of the possible and the perception of the possible. Further, the need for research in how to leverage games for useful education and training still exists.

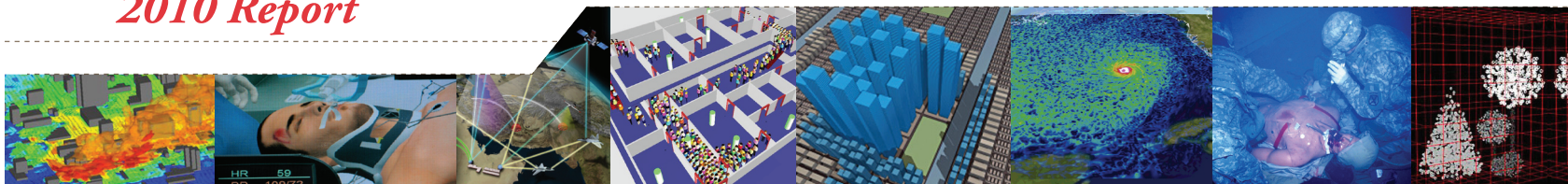
Individual Panelist Highlights

Professor Jennifer Bernhard

- In her area of antenna science, Professor Bernhard leveraged her leadership in a professional society to conduct a study of the aging workforce in science
- STEM – the critical sub-disciplines need special attention and emphasis
- Key questions - Are today's graduates coming out “good enough” to be able to maintain the nation's critical technical lead in a wide range of areas? Do you know the source of your pipeline and their ability? Will they have the right skills, in addition to STEM education?

Dr. Dexter Fletcher

- Two distinct, complementary cultures, simulation and training, must learn from each other
- Technology makes an educational imperative for one-on-one tutoring to be economically possible (intelligent tutoring systems)
- Studies show that one can save 1/3 of the time when using computer tutoring and increase learning by 1/3

**Dr. Lesa Roe**

- M&S has several key roles at NASA but, simply stated, it provides an ability to increase capacity and improve safety of missions
- Testing is done largely through M&S and particularly leverages distributed simulation across NASA's geographically dispersed locations

Key challenges include:

- Digital flight
- Skilled workforce to develop new model and to operate the models

Dr. Kristina Stills smoking

- The surgical community needs simulation tools; this is an area where we could incorporate rapid prototyping and borrow from medicine
- Surgeons need refresher training to remain certified and the use of M&S allows them to interoperate and speak to their colleagues
- There is a need to further the development of virtual patients and partner with simulation developers to capture their medical expertise/knowledge

Working Group Sessions

The afternoon of the Summit was spent in four working group sessions focused on delineating key national issues relative to modeling and simulation in a set of four topical areas: 1) technology research and development, 2) workforce development, 3) industrial development/organizational relations, and 4) economics/business practice. The goal of these working sessions is to develop a set of actionable items that can provide the basis for a national-level campaign to further expand the effective use of modeling and simulation across disciplines.

A set of focus questions was developed for each of the groups, in order to guide their discussion. Facilitators and invited subject matter experts also were established for each of the working groups to provide a solid basis for discussion and interaction among all conference participants. Each group met and addressed the key focus questions and issues. The outcome of these sessions was to provide a set of recommendations that can establish a basis for a national plan.

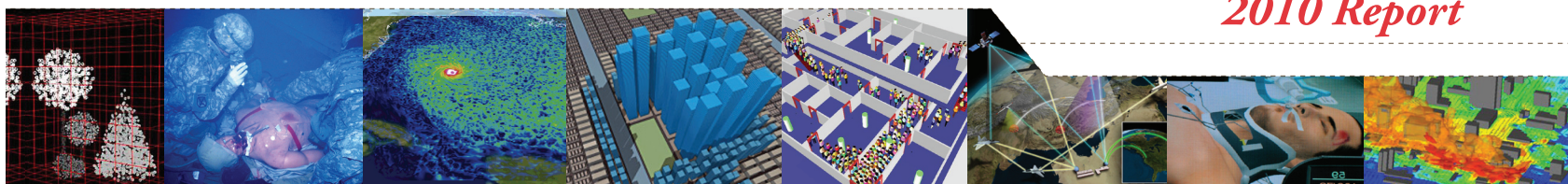


Table 1: Working Group Focus Questions, Facilitators, and Subject Matter Experts

	Research & Development/ Technology	Workforce Development	Industrial Development/ Organizational Relations	Economics / Business Practice (Enterprise-wide)
Focus Questions	<p>What powerful M&S technologies are available?</p> <p>What technology investment is desired?</p>	<p>How can we assure the perpetual sufficient availability of a qualified M&S workforce?</p>	<p>What characteristics are most significant in establishing a recognizable and self-conscious M&S industry?</p> <p>What actions might be taken to improve the coherence, intervisibility, and brand recognition of the M&S industry?</p>	<p>What elements of business practice are most relevant to M&S?</p> <p>What influences on business practices are desirable for the industry and profession?</p>
Facilitators	<p>Mr. Fred Hartman</p> <p>Dr. John Sokolowski</p>	<p>Ms. Lisa Bair</p> <p>Mr. Tom Frost</p> <p>Mr. Bill Tucker</p>	<p>Mr. Rich Bensinger</p> <p>Mr. Bill Waite</p>	<p>Mr. Mike Finner</p> <p>Dr. Mike Papay</p> <p>Mr. Thomas Reese</p>
Subject Matter Experts	<p>Mr. Paul Davis</p> <p>Mr. John Diem</p> <p>Mr. Greg Knapp</p> <p>Dr. Dexter Fletcher</p> <p>Dr. Michael Macedonia</p>	<p>Dr. Amy Henninger</p> <p>Mr. David Olwell</p> <p>Dr. Mikel Petty</p> <p>Mr. Thomas Pinelli</p> <p>Mr. Jody Strausser</p>	<p>Ms. Priscilla Elfrey</p> <p>Mr. John Lacontora</p> <p>Mr. James McCall</p> <p>Mr. Andy Wahlquist</p>	<p>Mr. Bill Broderick</p> <p>Dr. Hector Guerrero</p> <p>Mr. Jeremy Huffman</p>

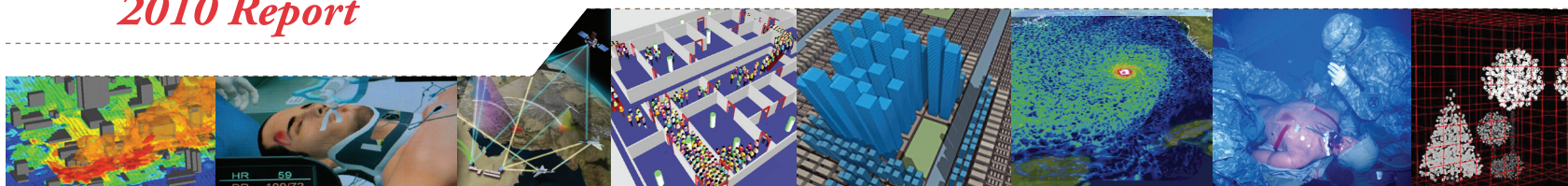
A summary of each working group session is provided below:

The **R&D/Technology Working Group** attendees broke into four functional areas led by core team leaders based on technology content. Each of the four sub-groups discussed an action plan to address the top issues associated with their particular group and expand on the particular M&S technologies they have found both available and useful. The Core Team leaders presented their primary functional areas from the M&S research agenda and the teams then had the freedom during the working group session to shape their actions and issues based on their experience and consideration of the most pressing M&S issues.

The following actions were shaped from a large number of topics recommended from each sub-group:

Create a national office to serve as the proponent for M&S with a budget to foster projects and outreach. It was felt that the likely government sponsor for this office is the Executive Office of the President, Office of Science and Technology Policy.

This action was deemed to be the most effective solution to the problem of standardizing infrastructure, architectures, data, and protocols to facilitate reuse and collaboration across the National M&S enterprise. Several aspects of the problem were discussed to include a consortium of industry and academia with government vice



a single government office. There was, however, a general consensus regarding the need to promote changes to remove sharing impediments and promote the broad applicability of standards for data, metadata and content. Another recommendation would extend the federal coordinator (and portfolio manager) concept to include an instantiation at each federal department or separate agency. A key point was made regarding the need for enterprise-wide interoperability and not just standards.

Establish an enterprise network (a .sim capability) to conduct research and test new M&S technologies. Likely sponsors for this action would include the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA).

A key aspect of enterprise management/coordination of M&S is to provide an effective mechanism to store and share relevant (technical, interoperability, employment) data as well as the Verification and Validation (V&V), certification, and Information Assurance (IA) pedigrees. This action would enable the technology efforts for enterprise M&S to move in parallel with the standards and policy initiatives and provide a persistent capability for collaborating research efforts across the M&S enterprise.

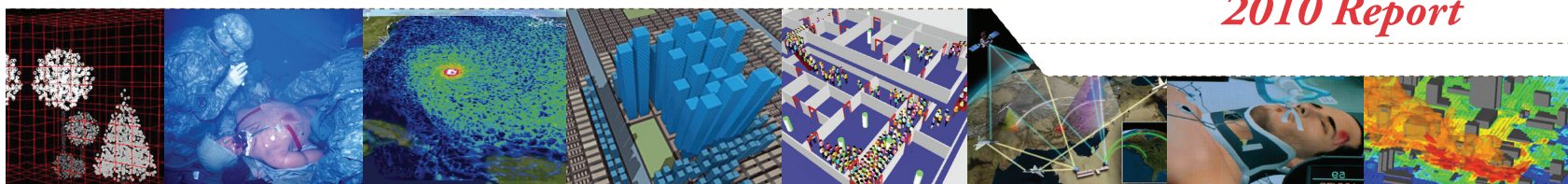
Add M&S technical codes to the Department of Labor (DoL) Occupation Handbook. This action recognizes the fact that the practice of M&S is reaching a stage of maturity similar to engineering and other professions.

This action gets at the wider problem of a dwindling pool of M&S technicians and recognizes the M&S workforce on a professional plane with other scientific and engineering disciplines. A series of recommendations came from the group regarding not only the addition of M&S technicians to the DoL Handbook, but also to promote intern programs in both government and industry and to establish guidelines for M&S curricula for education and training at all levels. This issue was also addressed, perhaps in greater detail, by the Workforce Development Working Group.

Establish a rapid acquisition process for M&S technologies. This action was focused on the Defense Department and specified the Operational Needs Statements process as a model. Responsibility for this action could be undertaken by the Office of Acquisition, Technology and Logistics (OSD AT&L), specifically the Director, Defense Research and Engineering.

Although this specific action was framed in a DoD acquisition context, it is consistent with the Keynote presentation by Mr. Michael Schrage which advocated, among other things, the “empowering of procurement.” The government procurement process should place more rigor in the early stages, prior to Milestone A. The use of rapid prototyping would accomplish several things early on in the process: the prototypes would help drive and flesh out the user requirements as well as provide further details and refine system needs. A number of recommendations in this area also touched on the enterprise perspective of wider use of repositories and integrating current capabilities and investments into a focused effort to integrate baseline technologies into emerging systems and, therefore, avoid unnecessary redundancies.

Establish financial incentives for M&S Standards. It was felt this action should be the topic for a study that could be sponsored by the OSD AT&L, even though the need for M&S standards is recognized as having national and international implications.



This is just one of several recommendations for further study and funding for implementation at the enterprise level that could be undertaken as part of the M&S enterprise coordination office. Other areas included: funding for M&S repositories, metadata tagging, and creating M&S rewards and incentives for furthering the “science of M&S” as well as incentives for sharing of reusable infrastructure, content and data.

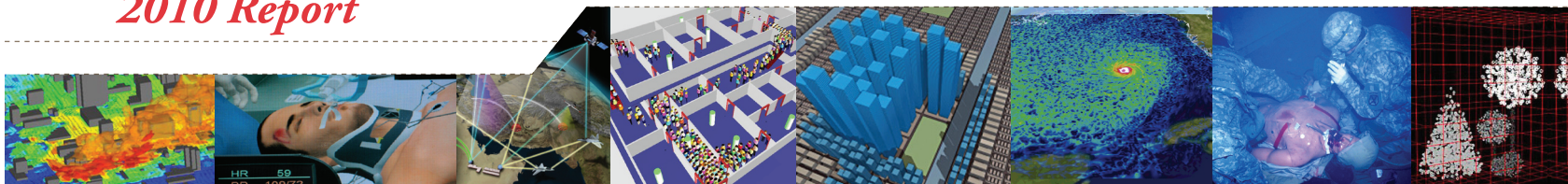
The **Workforce Development Working Group** consisted of participants across the spectrum of industry, academia, and government with a broad array of interests from medical and industry applications to DoD to space applications, including the management of M&S, the use of M&S, and education in M&S. The group had brisk discussions across a range of domain areas.

The M&S field of practice has a diversity that goes beyond engineering, computer science, and the Department of Defense. There was overwhelming acknowledgement that there is a need for M&S trained professionals and that this training requires STEM education. However, the working group came to no consensus on what M&S Workforce Development training should consist of, to whom it should be given, and to what level that training should be geared. This lack of consensus reflected a basic ambiguity of who is the M&S Professional. Managers, users, and developers all participate within and interact with M&S and require various levels of training.

Students seeking education in M&S often self-identify as computer scientists, operations research analysts, engineers, meteorologists, biologists, or other application of practice, but rarely have a focus in the discipline of M&S itself. While this broad spectrum of application richens the field, this also makes it difficult for universities to design curricula, resulting in a broad spectrum of courses. It also results in a lack of definition for the student to self-identify as an M&S professional unless coming from one of a few structured M&S professional institutions.

This lack of clear self-identity creates additional difficulties within the M&S profession as a whole. Without a self-identity, it is difficult for companies, managers, human resource professionals, and customers to identify the requirements they need from M&S, or possibly the need for M&S professionals as a specialty beyond specific domain expertise required to solve a particular problem set. This creates no incentive for companies to provide funding for training, expend human resources to seek specialized skill sets, set up specialized internship opportunities, pay for specialized training or certification, or clamor for government recognition for their company expertise in M&S. If the professionals practicing M&S cannot agree to their common goals, identity, and educational and professional requirements, then neither can those outside the profession.

Several initiatives were identified as key to moving M&S Workforce Development forward. STEM education from elementary school forward is critical. Without STEM-literate students moving into college, the pool of potential M&S professionals is limited no matter their self-identity. Identifying critical research and development areas in M&S and providing funding for them, such as with an M&S Grand Challenge, will support both the moving forward of the research agenda for M&S as well as provide additional educational opportunities for the emerging M&S professional. This dual initiative of research and education relies heavily on the development of a robust Body of Knowledge in the field of M&S and the continued development of post-secondary school educational programs. The last clear initiative from the group was in the need for an M&S Business Case and Branding Strategy. These include developing a clear understanding of Who is the M&S professional?, What does the M&S professional do?, and Why is M&S work relevant



for both the current and future professional?, as well as providing a basis to industry and government for attracting, hiring, and maintaining quality personnel within the M&S workforce.

The **Industrial Development/Organizational Relations Working Group** provided an orientation briefing which included the intention of the group to elicit prospective activities and accomplishment in the scope of analysis for use in compiling a “National M&S Enterprise Campaign” program plan. Candidate topics were introduced, including:

Organizational Collaboration

- State / Regional Groups
- Educational and Research Institutions
- Professional Societies
- Government Executive Departments

New Organizational Forums

- SimSummit
- Coalition
- Government for a Congressional Simulation Office
- National (Charitable) Foundation

The broad strategy ideas that the working group converged on follow:

Adopt best practices; learn from others, and the mistakes and successes they have had in addressing the issues

Focus on needs and activities rather than organizational structure as the first order of business

Marketing, sales, and communications are critical with respect to getting everyone moving in the right direction

Follow the money

Establish success metrics and use for program management

Particular activities identified for the National M&S Enterprise Campaign plan include:

- Conceive a collaborative space - standards; Body of Knowledge; Event calendar; stakeholder/entity information, etc.
- Document stakeholder constituencies and interests
- Consider necessary and sufficient organizations and their respective associational relationships
- Leverage lessons-learned gleaned from exemplars outside M&S (e.g. Capability Maturity Model Integration (CMMI), Semiconductors, Micro-Electromechanical Systems (MEMS) and Nanotechnology (Nano), Materials Science)
- Create a strategic communications plan - Sell value of M&S, facilitate collaboration across entities, resources
- Conduct a national M&S Economic Impact Study

The **Economics/Business Practice Working Group** addressed current issues, business practices and policies that are relevant to the integration of modeling and simulation technologies and of special interest or concern to the business community. It is commonly accepted that the use of modeling and simulation tools and technologies is ever-present throughout the business community.

In support of the working group discussion, copies of the “Proposal to Add a North American Industry Classification Code (NAICS) for the M&S Industry” were made available to all participants.

The working group received presentations on several issues affecting the M&S business community:

Export Controls

Our export laws have changed little over the past 60 years and are mostly a legacy of the Cold War

Understanding export laws is challenging and has become more difficult because of the significant foreign national presence in industry; export laws are found in two sources:

International Traffic in Arms Regulations (ITAR)

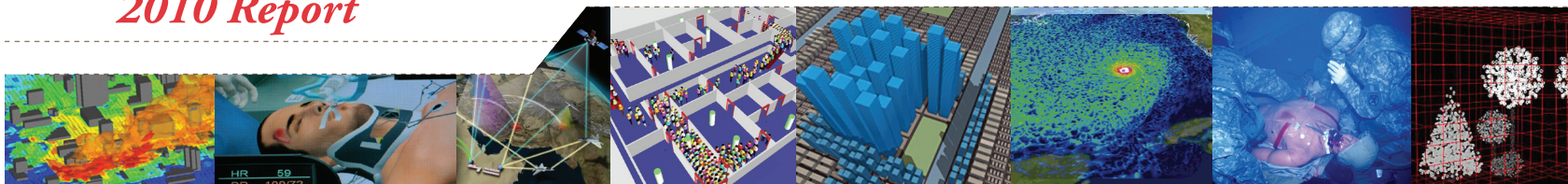
Export Administration Regulations (EAR)

Open source software code is also challenging

Education should be fundamental in understanding how to apply export laws

The president commented about the need for export control reform in his State of the Union address on January 27, 2010.

The M&S Community of Practice (CoP) needs to be involved early in this effort



Reform should include the ability to dynamically update export control laws. It was suggested that elements of M&S technology should be considered separately for export control and those elements could be described as follows:

Content

Broad standards

Infrastructure

It is difficult working with Allies when the export laws restrict the transfer of technology

Small Business is impacted because of the significant overhead costs required to deal with export control

To compete directly with US companies, some foreign companies are now developing technology and advertising it as “ITAR Free”

Technology Acquisition Reform

The House Armed Services Committee Acquisition Reform Panel is considering ways to enable the market force through incentives

Supports the use of rapid prototyping to define requirements and the use of Firm Fixed Price Incentive contracts to combat requirements creep

The concept would pull technology into the acquisition process and encourage the sharing of cost savings and the mitigation of risk through incentives

Without incentives, reinvention occurs and innovation is impeded

Engagement of M&S Business Practitioners

Many business practitioners that participate in modeling and simulation do not think of themselves as M&S professionals

Practitioners that are creating desktop M&S applications rarely consider standards, best-practices, or technical issues when creating models or conducting simulations

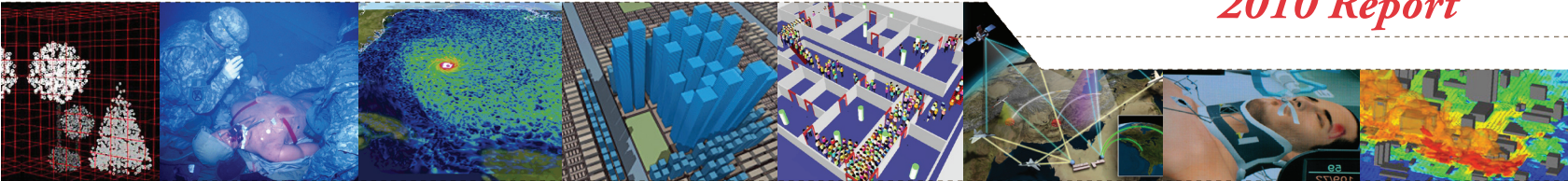
Our CoP has not codified Best Practices for M&S, due in part to the still maturing nature of the M&S industry

Need to define subspecialties

Use software engineering discipline as a guide

Use existing administrative and volunteer structure to establish study groups for business best-practice

Following a summary and closing remarks for the day's events, the meeting was adjourned.



*Whereas the United States of America is a great and prosperous Nation, and
Modeling and Simulation, contribute significantly to that greatness and prosperity;
(Engrossed as Agreed to or Passed by House)*

H. Res. 487

In the House of Representatives, U. S.,

July 16, 2007

Whereas the United States of America is a great and prosperous Nation, and modeling and simulation contribute significantly to that greatness and prosperity;

Whereas modeling and simulation in the United States is a unique application of computer science and mathematics that depends on the validity, verification, and reproducibility of the model or simulation, and depends also on the capability of the thousands of Americans in modeling and simulation careers to develop these models;

Whereas members of the modeling and simulation community in government, industry, and academia have made significant contributions to the general welfare of the United States, and while these contributions are too numerous to enumerate, modeling and simulation efforts have contributed to the United States by--

- (1) expanding the understanding of nuclear chain reactions during the Manhattan Project through some of the earliest simulations replicating the reaction process, which ultimately contributed to the end of World War II;
- (2) serving as a foundational element of the Stockpile Stewardship Program, which enabled the President of the United States to certify the safety, security, and reliability of the nuclear stockpile for more than ten years without the use of live nuclear testing, which demonstrates the Nation's commitment to nuclear nonproliferation;
- (3) accelerating the effectiveness of joint, coalition, and interagency training exercises, while dramatically reducing the costs of such exercises, as demonstrated by United States Joint Forces Command's 2007 homeland security exercise, Noble Resolve, which was conducted virtually and required 5 months, 140 personnel, and \$2,000,000 for development, compared to a 2002 Millennium Challenge exercise that was conducted live and required 5 years, 14,000 personnel, and \$250,000,000 for development;
- (4) preserving countless human lives, as well as military and civilian aircraft, ships, and other vehicles through the rehearsal of repeatable, simulated emergencies that otherwise could not have been practiced;
- (5) increasing the quality of health care through the development of medical simulation training, which led the Food and Drug Administration to require such training for physicians before certain high-risk procedures to treat heart disease and strokes;
- (6) reducing the cost of health care, as demonstrated by medical malpractice insurance rate discounts being provided to anesthesiologists and obstetricians who include simulated procedures in their biennial training requirements;
- (7) simulating large scale natural or man-made disasters to improve the effectiveness of local, State, and Federal first responders, law enforcement, and other agencies involved in a coordinated emergency response;
- (8) forecasting weather and predicting climate change to enable scientists, industry, and policymakers to study the effects of climate change and also to prepare for extreme weather, such as hurricanes;
- (9) protecting rivers, waterways, and endangered species reliant on these waters through the Environmental Protection Agency's hydrology Dynamic Stream Simulation and Assessment Model, which predicts impacts on water quality for the Truckee River, including its effect on Lake Tahoe and other portions of its basin;
- (10) producing analysis that resulted in enhanced designs and construction of critical infrastructure, such as roads, interchanges, airports, harbors, railways, and bridges that increases transportation capacity and safety, and reduces travel time and environmental impact; and
- (11) providing National Aeronautics and Space Administration (NASA) astronauts training to ensure a safe and productive mission in space, including the utilization of the Shuttle Training Aircraft, which simulates real aircraft shuttle characteristics and enables NASA pilots to have 1,000 simulated shuttle landings before they land the Space Shuttle for the first time as a glider;

Whereas these contributions, in addition to numerous contributions that are not listed but that equally have brought prosperity to our Nation, demonstrate that modeling and simulation efforts have, and will continue to—

- (1) provide vital strategic support functions to our Military;
- (2) defend our freedom and advance United States interests around the world;
- (3) promote better health care through improved medical training, improved quality of care, reduced medical errors, and reduced cost;
- (4) encourage comprehensive planning for national disaster and emergency preparedness response;
- (5) improve and secure our critical infrastructure and transportation systems;
- (6) protect the environment; and
- (7) allow the Nation to explore the Earth and space to further our understanding of our world and universe;

Whereas modeling and simulation frequently complements or replaces experimentation where experimentation is hazardous, expensive, or impossible, thus providing far greater capability than experimentation alone;

Whereas the modeling and simulation industry provides well-paying jobs to many Americans and represents an opportunity for Americans with strong foundations in science, technology, engineering, and mathematics to contribute to the prosperity and security of the United States;

Whereas other countries have recognized the value of modeling and simulation as an opportunity to gain a competitive advantage over the United States economically and militarily, and some of these same countries produce more engineers each year than the United States;

Whereas modeling and simulation efforts are critically dependent on a fundamental education in science, technology, engineering, and mathematics;

Whereas modeling and simulation require unique knowledge, skills, and abilities that are not adequately incorporated into governmental occupational classification codes; and

Whereas advances in modeling and simulation can be achieved through innovation in the private sector, and proper export controls and intellectual property rights are critical to the continued growth and innovation in this sector: Now, therefore, be it Resolved, That the House of Representatives—

- (1) commends those who have contributed to the modeling and simulation efforts which have developed essential characteristics of our Nation;
- (2) urges that, consistent with previous legislation passed by this and previous Congresses, science, technology, engineering, and mathematics remain key disciplines for primary and secondary education;
- (3) encourages the expansion of modeling and simulation as a tool and subject within higher education;
- (4) recognizes modeling and simulation as a National Critical Technology;
- (5) affirms the need to study the national economic impact of modeling and simulation;
- (6) supports the development and implementation of governmental classification codes that include separate classification for modeling and simulation occupations; and
- (7) encourages the development and implementation of ways to protect intellectual property of modeling and simulation enterprises.



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