2019 Simulation Innovation Workshop (SIW)

SISO Simulation Interoperability Standards Organization

"Simulation Interoperability & Reuse through Standards"

Event supported by NTSA

February 11-15, 2019 | Florida Hotel & Conference Center at the Florida Mall, Orlando, FL

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SISO Simulation Interoperability Standards Organization
"Simulation Interoperability & Reuse through Standards"

The Simulation Interoperability Standards Organization (SISO) serves the global community of modeling and simulation (M&S) professionals, providing an open forum for the collegial exchange of ideas, the examination and advancement of M&S-related practices and technologies, and the development and management of standards and other products that enable greater M&S capability, interoperability, credibility, reuse, and cost-effectiveness. As a recognized International Standards Development Organization, SISO, through its members, transforms ideas, proven practices, and innovative technologies into products that can be used and reused by M&S professionals.

SISO provides standards, guidance, and reference products on its website for downloading at no charge. Please visit www.sisostds.org/ for more information.

NTSA A Proud Affiliate of NDIA

The National Training and Simulation Association (NTSA) is America's premier organization representing the interests of the modeling and simulation community worldwide. As such, it serves as a constant point of contact for government, academia, industry, research organizations and the military to exchange information, share knowledge, align business interests and in general stimulate growth and overall advancement of the industry. NTSA pursues these goals through a series of conferences, meetings and exhibitions throughout the year. NTSA produces The Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), which is the world's largest conference and exhibition dedicated to modeling and simulation. While NTSA primarily serves the North American community of practice, many of its members and participants are non-US. NTSA is a key member of the International Training and Simulation Alliance (ITSA), a worldwide group of simulation associations who promotes knowledge and information about training and simulation worldwide.

SCHEDULE AT A GLANCE

MONDAY 2/11

Tutorials
0800-1000

Tutorials
1030-1200

Plenary Session
1330-1500

Paper Tracks
1530-1700

SISO Social
1700-1900

TUESDAY 2/12

Newcomers Orientation Breakfast
0715-0800

Paper Tracks/Tutorial
0830-1000

Paper Tracks/Tutorial
1030-1200

General Session
1330-1500

Paper Tracks/Tutorial
1530-1700

Enumerations Working Group
1900-2100

WEDNESDAY 2/13

Working Sessions
0800-1000

Working Sessions
1030-1200

Working Sessions
1330-1500

Working Sessions
1530-1700

Simulation & Wargaming Group Discussion
1900-2100

THURSDAY 2/14

Working Sessions
0800-1000

Working Sessions
1030-1200

General Session
1330-1500

Working Sessions
1530-1700

Hotwash
1715-1745

REGISTRATION

The Registration Desk is located in the Mezzanine Area on the 2nd floor. All registrants must check in at the registration desk to receive an identification badge and conference materials. Name badges must be worn at all Workshop functions.

The Registration Desk will be open:

Sunday
1500-1700

Monday to Thursday
0700 - 1700

BREAKS

Breaks are scheduled for **1000-1030** and **1500-1530** each day. Coffee/soda and snacks will be provided.

LUNCH

Lunch break is scheduled for **1200 – 1330** each day. Attendees are "on their own" for lunch.

SISO SOCIAL

The SISO Social will take place in Salon 1 at 1700 on Monday, February 11

EXHIBITS – SALON 1

Monday 2/11
1500-1900

Tuesday 2/12
0800-1330 / 1500 – 1700

Wednesday 2/13
0800-1030

EVENT INFORMATION

LOCATION

The Florida Hotel & Conference Center
1500 Sand Lake Rd
Orlando, FL 32819

BUSINESS CENTER/ INTERNET ACCESS

Complimentary wireless internet is now available in the hotel lobby and all the meeting rooms.

The Business Center is located in the lobby on the first floor and is available and open on a 24-hour basis. You will need your room key to access the business center.

Photocopies - Black and White; Complimentary (limited)

Fax Machines - Domestic Fax; Complimentary

International Fax; $5.00 per page

Boarding pass printing is complimentary

EVENT WEBSITE

www.sisostds.org

ATTIRE

Business Casual

EVENT CONTACT

Rebecca Epstein
Associate Director, NTSA Operations
(703) 247-9490
repstein@ndia.org

PAPER PRESENTATIONS

To view a paper presentation that was uploaded to our site before the conference:
www.sisostds.org/DigitalLibrary.aspx?EntryId=48084

SISO MEMBERSHIP INFORMATION

SISO MEMBERS, Please keep your contact information current!

Please verify/update your SISO contact information at the URL: sisostds.org and click on the Membership menu in the top right hand side bar and select: “Update Your Membership”. Don’t forget to select “SUBMIT” to save any changes that you make to your information!

If you have any questions, please email Erica Recktenwald at recktenwald@ist.ucf.edu.

You are automatically enrolled as a SISO Member by being a registered and paid attendee of this workshop. All new SISO members will receive a SISO membership number via email approximately two weeks following this workshop. Your membership number will allow you to download papers and documents from the SISO website, participate in SISO Elections, and participate in the development of SISO Products.

To find information on the many benefits of being a SISO Member, please visit our membership page on the SISO website: sisostds.org/Membership/BenefitsofMembership.aspx

If you should have any questions concerning your membership ID number, please contact Erica Recktenwald at 407-882-1378 or email recktenwald@ist.ucf.edu

MESSAGE CENTER

A Message Board will be located at the registration area Monday-Thursday. All incoming phone messages/faxes will be posted to this message board.

Telephone messages: (407) 859-1500

Request to speak with the Simulation Innovation Workshop (SIW) registration area.

FAX messages: (407) 855-1585

Please be sure to specify the "SIW Workshop" on the cover sheet. If you would like to send a fax, there is one available at the hotel Business Center (across from hotel registration desk).

HOTEL RESTAURANTS

Marcelo's Bistro
Breakfast Buffet: 0700-1100
Lunch: 1100-1400
Dinner: 1700-2200 (TBD)

Starbucks
0600-2100

Cricket's Lounge
Monday-Friday: 1400-2400
Weekends: 1200-2400

Grab & Go
0830-2200

BREAKS

BREAKS are scheduled from 1000-1030 and 1500-1530 on Monday-Thursday.

REGISTRATION & EXHIBITS

The Registration Desk is located in the Mezzanine Area on the 2nd floor. All registrants need to check in at the registration desk to receive an identification badge and reference materials. Name badges must be worn at all Workshop functions.

Be sure to make it a part of your conference plans to visit the SISO exhibit area located in the Salon 1 on the 2nd floor. There will be several companies on-hand to show you their new and evolving technologies.

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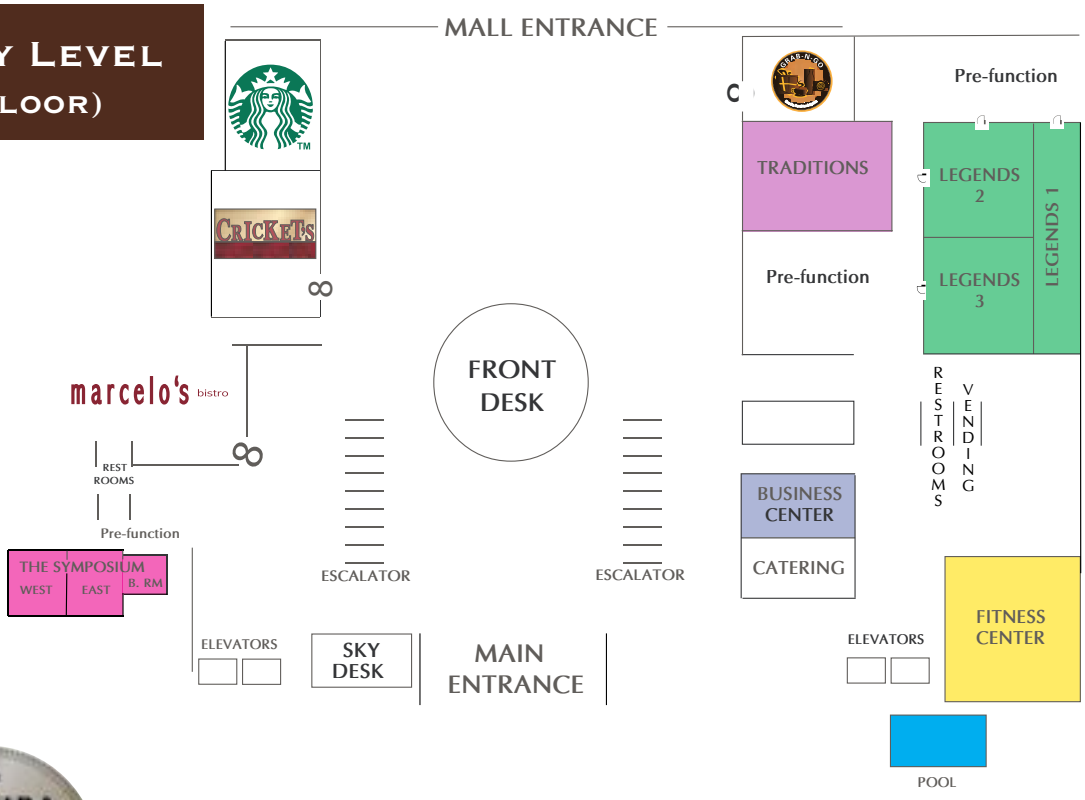
HARASSMENT STATEMENT

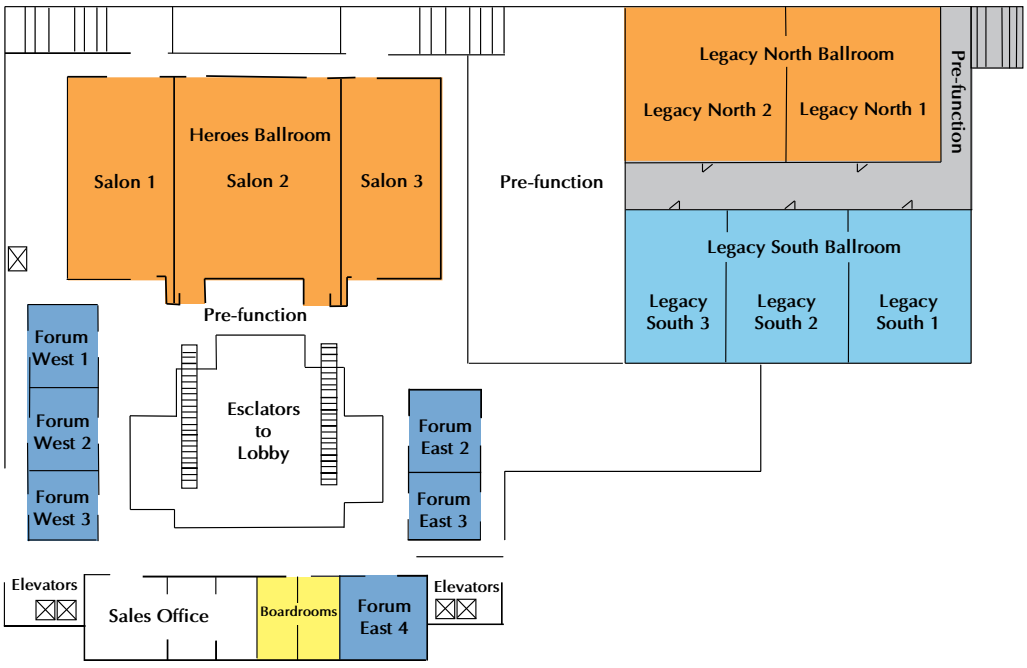
NTSA/NDIA is committed to providing a professional environment free from physical, psychological and verbal harassment. NTSA/NDIA will not tolerate harassment of any kind, including but not limited to harassment based on ethnicity, religion, disability, physical appearance, gender, or sexual orientation. This policy applies to all participants and attendees at NTSA/NDIA conferences, meetings and events. Harassment includes offensive gestures and verbal comments, deliberate intimidation, stalking, following, inappropriate photography and recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome attention. Participants requested to cease harassing behavior are expected to comply immediately, and failure will serve as grounds for revoking access to the NTSA/NDIA event.

VENUE MAP

Lobby Level (1st Floor)



Mezzanine Level (2nd Floor)



SISO EXECUTIVE COMMITTEE

MICHAEL J. O'CONNOR

Welcome to the 2019 Simulation Innovation Workshop (SIW). Last year we held a winter SIW to make up for our postponed Fall 2017 SIW. Based on the success of the 2018 Winter SIW we have moved our workshop to this time for the foreseeable future. For many of us Orlando in February is a nice place to be. Thanks to everyone who made our final Fall SIW the great success it was.

As part of the transition to holding our primary workshop in the February timeframe, we have adjusted the SISO election cycle. Previously we conducted the elections in the spring, with the new officers assuming their positions at the beginning of October just after the SIW. We have now moved the elections to the late summer/early fall, with the officers taking office at the end of the month of February. Officers whose term would have previously ended in September 2019 have been extended to the end of February 2020.

Please welcome Patrick Rowe as the new SISO Executive Director. Most of you know Patrick from his support to SISO while he was with NTSA. Patrick has a strong background in the modeling & simulation community and experience in managing an organization like SISO. I also want to thank Mark McCall for his service to SISO as Executive Director. Mark is continuing to support SISO during the transition for several months.

The Conference Committee worked hard to plan the 2019 SIW so close to the 2018 Fall SIW. We have a great set of papers and presentations for you. The CC is always looking for ways to make the SIW more relevant so please provide your feedback to them. Thanks to the CC for their work in organizing this conference.

The Standards Activity Committee continues its hard work. Standards are a team sport and everyone's input is important. I want to think all of the SISO members that contribute to the development of our standards. SISO is always looking for the next area we need to standardize. We have quad charts for all of the current standards posted in the break area. Please take a look at the full breadth of SISO's efforts.

I want to encourage your organizations to send more people to SIW. SIW is the key venue for the development of standards and their applications. We need to maintain this critical mass of practitioners now and in the future. I hope you enjoy your time at the 2019 SIW.

STANDARDS ACTIVITY COMMITTEE

DR. KATHERINE L. MORSE

On behalf of the SISO Standards Activity Committee (SAC), welcome to the 2019 SIW. I continue to be amazed and heartened by all the progress SISO and the SAC make on all fronts despite it not being our full-time jobs. At the last SIW, we launched our cross-pollination initiative, covering the walls of the vendor room with descriptions of all our groups. This is going to be a continuing feature at the SIWs. Please take a few minutes to peruse the display on the wall of the vendor room, perhaps during the Monday evening reception. We hope it will help you connect with other SISO groups with interests that align with your own.

We're also making progress on the Standards Roadmap. We have a prototype of the interactive roadmap on the SISO website. What we need now is content and that's where you come in. If you would be willing to spend a few minutes to contribute information about your favorite standards or standards, please find a member of the SAC so we can get you engaged in fleshing out this map of all our good work.

And finally, in addition to all of the above, you, our hard-working volunteers, have managed to complete yet more standards even since we met in September. Please join me in congratulating the individuals who continue to contribute to our core mission.

#GoStandards

WELCOME LETTERS

SISO CONFERENCE COMMITTEE

RANDY SAUNDERS

I want to welcome you to the 2019 Simulation Innovation Workshop (SIW). We're so glad you are here. We encourage you to join with our community to connect innovative ideas together and contribute to our shared standards.

Our theme for this year is "Simulation for the Next Generation." We chose this theme to encourage everyone to look past current modeling and simulation (M&S) methods, techniques, and technology to explore new applications.

The call for papers identified topics across a broad spectrum of M&S applications, but the primary focus for this year is to identify new needs and new opportunities where SISO and SISO Standards can contribute. The SIW continues to support current applications, and by focusing attention on new opportunities we hope to nurture more involvement.

The SIW format continues the experiment started last year, where papers are presented continuously with a combined discussion at the end of all the papers in each session. We hope this discussion will surface new ideas. At the Thursday plenary we'll brief a summary of those findings. With a full year of preparation time for the 2020 SIW, the conference committee seeks your feedback on this format, either at the Thursday 1715 hotwash or in any channel you choose.

Join us in our discussions and working groups through the week. Vendors have displays set up on Monday, Tuesday, and Wednesday to share their capabilities. Our social event on Monday evening is an opportunity to meet new colleagues. Share your ideas on the topics discussed and in how we can all better leverage the power of M&S.

CONFERENCE/WORKSHOP ACTIVITIES

MARK MCCALL & PATRICK ROWE

As always, this Workshop represents the efforts of dozens of people. Some of them wear badges with colored ribbons, showing the committees on which they serve. Others, including our support staff, work behind the scenes, producing our published documents, supporting our volunteer committees, maintaining our web site, and keeping dozens of email reflectors up to date. We ask you to talk to us, providing positive reinforcement in areas where you think things are going well, and providing suggestions for improvements in areas where we can do better. If you would like to become active on a SISO committee, Study Group, or Product Development/Support Group, introduce yourself to someone already involved in a related activity. Ask them how to get more involved. Over the history of SISO, no individual with an idea, a willingness to work, and a reasonable level of initiative has ever failed to find a spot within our flexible structure to try to turn their idea into reality!

Finally, don't forget to have some fun this week as you meet colleagues you see only once or twice a year, make new friends, and discover other people who share your enthusiasm for a particular aspect of modeling and simulation.

MR. JESSE CITIZEN

Director
Defense Modeling and Simulation Coordination Office

In August 2007, Mr. Jesse Citizen became the Director of the Modeling and Simulation Coordination Office (M&SCO), where he leverages his broad understanding of DoD missions, professional military operations, and modeling and simulation (M&S). Prior to assuming his role as the M&SCO Director, Mr. Citizen was an Air Force officer completing over 33 years of service. His last military position was Chief, Modeling and Simulation Policy Division, in the U.S. Air Force Headquarters, Washington DC, where he was responsible for developing all modeling and simulation policy for the Air Force and providing oversight for all Air Force centrally-managed M&S programs.

Originally from Beaumont, Texas, Mr. Citizen enlisted in the US Air Force in 1973, and commissioned as a Second Lieutenant in the Air Force in 1979 after graduating from Wayland Baptist University in Plainview, Texas. He has an extensive civilian and professional military education, and an operational and technical background. He completed three Masters Degrees, the Marine Command and Staff College, Air Command and Staff College, attendance at the prestigious Air War College, and recently completed course work toward a doctoral of business administration. Mr. Citizen has held a wide variety of operational positions including Air Battle Manager within the North American Air Defense system Tactical Air Control System and over 1700 hours onboard the NATO Airborne Warning and Control System (AWACS).

His international experience includes Chief of the Air Command and Control Interoperability Section at the Supreme Headquarters Allied Powers Europe (SHAPE), now Allied Command Operations, where he oversaw the development of political-military policy and operational requirements for NATO Air Command and Control System. In addition, Mr. Citizen served as the military assistant to the Air Force Chief Information Officer, readiness evaluator and military assistant to the DOD Inspector General, and Chief, Tactical Control Systems Integrations, Plans and Programs Directorate, Headquarters Air Force.

Mr. Citizen works closely with the Department's coalition partners in the areas of existing and emerging M&S science and technology. Mr. Citizen, among the past chairpersons of the NATO Modelling and Simulation Group (NMSG), continues to support the NMSG. The NMSG mission is to promote cooperation among Alliance bodies, NATO Member Nations and PfP Nations to maximize the effective utilization of M&S. From 2009 - 2015, he also served as Chair, M&S Technical Panel 2, The Technical Cooperation Program (TTCP).

This background in Defense, combined with Mr. Citizen's role as a consultant supporting M&S activities in Department's military training program, provides him a deep appreciation for the direct benefits of M&S toward achieving the Department's missions, operations, and supporting Warfighters to our global partners.

DR ANDREW B. STEFANEK

Lead Systems Engineer, System of Systems Testbed
Johns-Hopkins University Applied Physics Laboratory

Dr. Andrew Stefanek is employed at the Johns Hopkins University Applied Physics Lab and is currently the Lead System Engineer of a System of Systems Test Bed. He is responsible for developing the overall systems engineering framework for this Test Bed as well as implementing a technical integration strategy that enables the simulation to interoperate in a modular System of Systems fashion. He manages all tasks conducted ensuring they are aligned with the purpose of the Test Bed and provide value relative to the pedigree of the various models. Furthermore, it is his duty to oversee the process in which analysis is performed when using the System of Systems Test Bed.

BIOGRAPHIES

MR KENT GRITTON

Team Lead, LVC for Training (LVCt)
Naval Air Warfare Center Training Systems Division

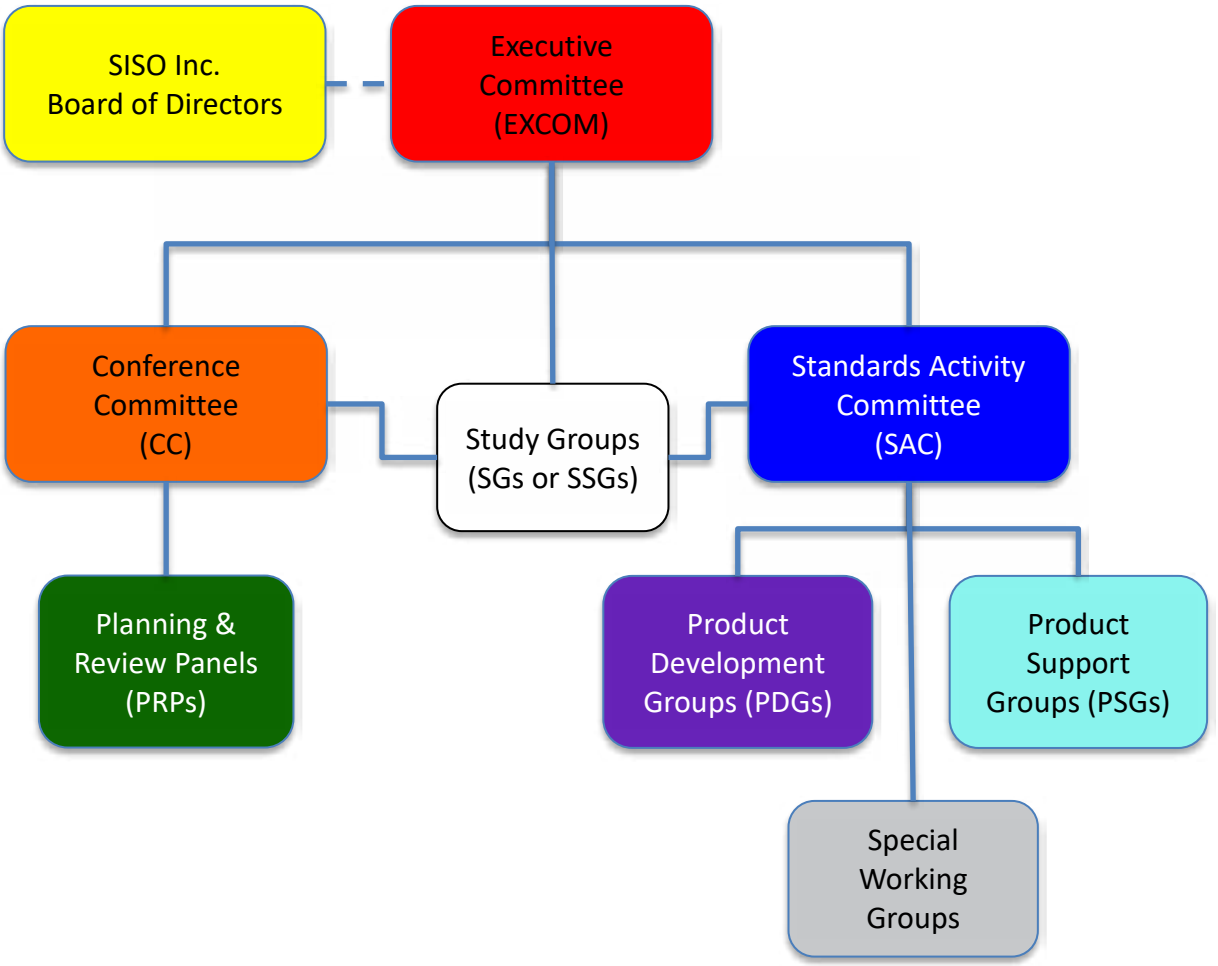
From 2016 to present, Kent Gritton has been the LVC for Training (LVCt) Team Lead for NAWCTSD developing and implementing the NAVAIR LVCTt strategy. As the LVCt Team Lead, he is overseeing the execution of 14 lines of effort designed to accelerate LVC capabilities, focus LVC as an enterprise effort, and to shift the LVC training focus from a platform-centric to a mission-centric approach. Directly related to his current role, he created and directed a three year (2015-2017) LVC Special Event at I/ITSEC called Operation Blended Warrior which was conducted to find ways to improve the set up and operation of LVC environments.

Prior to being designated the LVCt Team Lead, he was the Director of the Joint Training Integration and Evaluation Center (JTIEC) in Orlando Florida. In this capacity, he facilitated and supported Team Orlando's collaborative efforts – both day-to-day and strategic initiatives. An active Serious Games advocate, Kent is the architect of the Serious Games Showcase & Challenge, and continues to remain involved in its production.

Kent enjoyed a 28 year career in the Navy flying the EA-3B Skywarrior, EP-3E Orion, and P-3 Special Mission aircraft. His final tour in the Navy was as the Program Director for Special Emphasis Programs at Naval Air Warfare Center Training Systems Division (NAWCTSD) in Orlando, FL.

While in the Navy, Kent achieved the rank of Captain, graduated from the College of William and Mary in Virginia with a Bachelor of Arts Degree in Anthropology and received a Masters degree in Human Resource Management from Troy State University. He has accumulated over 3500 flight hours and is entitled to wear the Legion of Merit (with gold star) along with multiple other personal, campaign and service medals and awards.

SISO ORGANIZATION



BOARD OF DIRECTORS (BOD) – 2018–2020

The Board of Directors (BOD) is responsible for financial oversight of SISO and for SISO's contractual relationships with other organizations.

Chairman
Lutz, Robert

Vice President
McLean, Angus

Treasurer
O'Connor, Michael

President
Graham, David

Secretary
Sandberg, Stefan

Assistant Treasurer
McCall, Mark (non-voting)

SISO Executive Director
McCall, Mark
PO Box 781238
Orlando, FL 32878-1238
markmccall@sisostds.org

SISO Executive Director
Rowe, Patrick
PO Box 781238
Orlando, FL 32878-1238
patrickrowe@sisostds.org

SISO ORGANIZATION

SISO EXECUTIVE COMMITTEE (EXCOM) MEMBERS – 2018-2020

The Executive Committee (EXCOM) is the policy body that provides overall governance and strategic planning to SISO.

Chair
O'Connor, Michael (2019)

Vice Chair
Lutz, Robert (2021)

Secretary
Abbott, Jeff (2019+)

Gustavson, Paul (2021+)

Konwin, Kenneth (2020+)

Metevier, Chris (A)

McGlynn, Lana (2020+)

Sandberg, Stefan (2020+)

Scrudder, Roy (2019)

Siegfried, Robert (2021)

SAC Chair
Morse, Katherine L. (X)

CC Chair
Saunders, Randy (X)

Liaisons:
DMSCO
Heaphy, Michael

NATO MSG
Huiskamp, Wim

SISO CONFERENCE COMMITTEE (CC) MEMBERS – 2018-2020

The Conference Committee (CC) organizes the Simulation Innovation Workshops and oversees several tracks in which information and new ideas are exchanged within and across various components of the M&S Community.

Chair
Saunders, Randy (2020+)

Vice Chair
Daly, John (2019+)

Secretary
Bachman, Jane (2020)

Coolahan, Jim (2019)

Drake, David (2019+)

Lessmann, Kurt (2019+)

Ruiz, Josè (2020)

Swenson, Steve (2019+)

Youngblood, Simone (2020+)

SAC Vice Chair
Ronnfeldt, David (X)

SISO STANDARDS ACTIVITY COMMITTEE (SAC) MEMBERS – 2018-2020

The Standards Activity Committee (SAC) provides oversight for all standards activities, including the Balloted Products Development and Support Process, and oversees the groups that are studying, developing, and supporting SISO products.

Chair
Morse, Katherine L. (2019+)

Vice Chair
Ronnfeldt, David (2020+)

Secretary
Marrou, Lance (2019)

Bailey, Grant (2019+)

Dillman, Brad (2020)

Graham, David (2020+)

Le Leydour, Patrice (2020)

McGroarty, Chris (2019)

McLean, Thom (Angus) (A)

Prignac, Laurent (A)

Ruben, Katherine (2020+)

Stevens, John (2019)

CC Vice Chair
Daly, Johnl (X)

Liaisons:
NATO MSG
Bailey, Grant

(A) = Appointed Committee member (term expires each year) | (X) = Ex-officio member of committee (term expires each year) | (+) = Not limited to this term

STANDARDS ORGANIZATION LIAISONS

Institute of Electrical and Electronics Engineers

Katherine L. Morse (SAC)

- Distributed Interactive Simulation (DIS)
- High Level Architecture (HLA)
- Distributed Simulation Engineering & Execution Process (DSEEP)

International Organization for Standardization

Katherine L. Morse (SAC)

- Spatial Reference Model (SRM)
- Environmental Data Coding Specification (EDCS)

North Atlantic Treaty Organization

Wim Huiskamp (EXCOM)

Grant Bailey (SAC)

On 24 July 2007, NATO and the SISO signed a formal Technical Cooperation Agreement for coordination and cooperation in the development of M&S standards. The agreement, signed at the Collaboration Support Office of the Science & Technology Organization of NATO just outside Paris, officially recognized SISO as an accredited Standards Development Organization for NATO.

STUDY GROUPS

www.sisostds.org/StandardsActivities/StudyGroups.aspx

- Cloud-based Modeling & Simulation (CBMS) SG
- Cyber Modeling and Simulation (CyberMS) SG

STANDING STUDY GROUPS

- Exploration of Next Generation Technology Applications to Modeling and Simulation (ENGTAM) SSG
- Simulation Australia SSG

PRODUCT DEVELOPMENT & SUPPORT GROUP COMBINED

www.sisostds.org/StandardsActivities/DevelopmentGroups/C2SIMPDGPSG-CommandandControlSystems.aspx

- Command and Control Systems - Simulation Systems Interoperation (C2SIM) PDG/PSG

PRODUCT DEVELOPMENT GROUPS

www.sisostds.org/StandardsActivities/DevelopmentGroups.aspx

- Acquisition Modeling and Simulation Standards Profile (ACQMS) PDG
- Enhanced Position Location Reporting System including Situational Awareness Data Link Simulation Standard (EPLRS/SADL) PDG
- Gateway Description and Configuration Languages (GDACL) PDG
- Guideline on Scenario Development (GSD) PDG
- High Level Architecture (HLA) PDG / IEEE Working Group
- Human Performance Markup Language (HPML) PDG
- Link 11 A/B Simulation Standard Network (Link 11 A/B) PDG
- Real-time Platform Reference FOM (RPR FOM) PDG
- Reuse and Interoperation of Environmental Data and Processes (RIEDP) PDG
- Space Reference Federation Object Model (SRFOM) PDG
- Simulation Reference Markup Language (SRML) PDG
- Interoperability Between Web-based Federates and LVC Federations (WebLVC) PDG
- Urban Combat Advanced Training Technologies (UCATT) PDG
- Verification, Validation & Accreditation/Acceptance Products
- Web Live, Virtual, Constructive (WebLVC) PDG (VV&A Products) PDG

SISO ORGANIZATION

PRODUCT SUPPORT GROUPS

www.sisostds.org/StandardsActivities/SupportGroups.aspx

- Base Object Model (BOM) PSG
- Common Image Generator Interface (CIGI) PSG
- Distributed Debrief Control Architecture (DDCA) PSG
- Distributed Interactive Simulation / Real-time Platform Reference Federation Object Model (DIS / RPR FOM) PSG
- Distributed Simulation Engineering and Execution Process/Multi-Architecture Overlay (DSEEP/DMAO) PSG
- Environmental Data Representation Standards (EDRS) PSG
- Federation Engineering Agreements Template (FEAT) PSG
- High Level Architecture - Evolved (HLA-Evolved) PSG
- Tactical Digital Information Link–Technical Advice and Lexicon for Enabling Simulation (TADIL TALES) PSG
- Urban Combat Advanced Training Technologies (UCATT) PSG
- Verification, Validation & Accreditation/Acceptance Products (VV&A Products) PSG

SPECIAL WORKING GROUPS

www.sisostds.org/StandardsActivities/StandardsActivityCommittee.aspx

- Reference for Enumerations for Simulation (SAC SWG Enumerations)
- Reference for Problem Report / Change Request (SAC SWG PR/CR)
- Reference for XML Schema Naming and Design Best Practices (SAC SWG XML Schema)

EXHIBITORS

711 HPW/RHA – AIR FORCE RESEARCH LABORATORY
Low Cost Accessible Platforms for Virtual Driving Cockpit

711 HPW/RHA – AIR FORCE RESEARCH LABORATORY
Secure LVC Advanced Training Environment (SLATE)

CYBERCENTS
Integrated LVC Cyber Range Environment

EPIC GAMES
Unreal Game Engine

PITCH TECHNOLOGIES
Interoperability Products, Services and Solutions for Development of Distributed Systems

SIMBLOCKS
Geospatial and LVC Interoperability Standards Support in the Unity Game Engine

TRIDEUM CORPORATION
Demonstrating Product Developed for Army Modeling and Simulation Office

VT MAK
Commercial Off the Shelf M&S software systems

SIW TRACKS

The workshop structure for 2019 has been organized into three tracks. SIW tracks provide an opportunity for members of the Modeling and Simulation (M&S) community who share common interests and/or are involved in similar activities or are members of similar organizations to network, exchange ideas and information, introduce new M&S technologies, share lessons learned, and to identify where standardization will improve simulation interoperability and the efficient and effective use of M&S resources and tools.

At the 2019 SIW, the SIW tracks comprise the following:

SYSTEM LIFECYCLE AND TECHNOLOGIES (SLT) TRACK

The System Lifecycle and Technologies (SLT) track encompasses information that provides guidance on the selection and use of M&S standards and practices to support the System Lifecycle and corresponding technologies. The track focuses on the promotion and use of M&S standards and practices that support the system lifecycle. We solicit papers that address the identification, application, and value-added benefits of M&S for analysis, research and development, test and evaluation, training, acquisition, asset management, and system lifecycle strategies.

2018 – 2020 – SLT PLANNING & REVIEW PANEL

These Planning & Review Panel (PRP) members reviewed abstracts/papers designated for the SLT track.

Johnston, Scott
Booz Allen Hamilton

Halinski, Thomas
CAE USA Inc.

Oates, William
AFAMSI

Vacancies (4)

SERVICES, PROCESSES, TOOLS, AND DATA (SVCS) TRACK

The Services, Processes, Tools, and Data (SVCS) track encompasses technologies, frameworks, and methodologies to provide services that support models, simulations, and associated data. The track is interested in both processes and their implementations / tools in the areas of; distributed simulation process, verification, validation, and accreditation; communications infrastructure; and simulation and environment reuse. The SVCS track focuses on evolving a systems engineering solution to simulation problems across the spectrum from design, through implementation and deployment, to validation, use, and reuse.

2018 – 2020 – SVCS PLANNING & REVIEW PANEL

These Planning & Review Panel (PRP) members reviewed abstracts/papers designated for the SVCS track.

Louisell, Chuck Cisco Systems
Cisco Systems

Saunders, Randy
JHU/APL

Vacancies (3)

Morse, Katherine L.
JHU/APL

Siegfried, Robert
aditerna GmbH

MODELING & SIMULATION SPECIALTY TOPICS (SPEC) TRACK

The M&S Specialty Topics (SPEC) track is concerned with using simulation technologies for a specific purpose such as: LVC interoperability; augmented reality; Internet of Things (IoT) integration, system, vehicle, or weapon product development; space travel; understanding and prediction of human behavior; and design of interoperable command and control systems. Present thrust areas center on the application of M&S for Cyber Warfare, Medical, Space, and IoT, but the forum is not limited to these topics.

2018 – 2020 – SPEC PLANNING & REVIEW PANEL MEMBERS

These Planning & Review Panel (PRP) members reviewed abstracts/papers designated for the SPEC track.

Galvin, Kevin
Thales Research & Technologyl

Lemmers, Arjan
Netherlands National Aerospace Lab

Meyer, Sara
453 EWS/EWO

Vacancies (4)

AGENDA

MONDAY, FEBRUARY 11

TUTORIALS

The SISO 101 and SISO Standards 101 tutorials are free of charge to all. To attend any – or all - of the other tutorials, attendees must register and pay the $75 Tutorials fee.

0800-1000

SISO 101 – AN INTRODUCTION TO SISO

FORUM WEST 1

Mark McCall
SISO Executive Director
Instructor

Prerequisite: Interest in learning more about SISO and how to become involved in SISO activities.
Note: No tutorial fee is charged for this session.

This tutorial is hosted by the SISO Executive Director who explains SISO's principles, processes and organizational makeup.

0800–1000

HLA 101 – INTRODUCTION TO HIGH-LEVEL ARCHITECTURE

FORUM WEST 2

Dr. Katherine L. Morse
Instructor

Prerequisite: A general understanding of modeling and simulation.
Note: A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

The High-Level Architecture (HLA) is an international standard for simulation interoperability. It originated in the defense community but is increasingly used in other domains. This tutorial provides an introduction to HLA and these IEEE Standards that specify HLA:

- IEEE Std 1516™ - 2010, IEEE Standard for Modeling and Simulation (M&S) High Level Architecture (HLA) – Framework and Rules
- IEEE Std 1516.1™ - 2010, IEEE Standard for Modeling and Simulation (M&S) High Level Architecture (HLA) – Federate Interface Specification
- IEEE Std 1516.3™ - 2010, IEEE Standard for Modeling and Simulation (M&S) High Level Architecture (HLA) –Object Model Template (OMT) Specification

This tutorial describes the requirements for interoperability, flexibility, composability and reuse, and how HLA meets those requirements. The principles and terminology of an HLA federation are given, including some real world examples.

The tutorial will cover:

- The HLA Rules that federates and federations follow.
- The HLA Interface Specification that describes the services a simulation can use for data exchange, synchronization, and overall management.
- The HLA Object Model Template that is used for describing the data exchange between simulations.

Some practical information is given about current implementations, including commercial-off-the-shelf, government-off-the-shelf, and open source implementations. The continuous development of performance, robustness of the implementations, and available tools are also described. Finally, some advice is given on how to get started with HLA, including the use of the related process standard:

- IEEE Std 1730™ - 2010, IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process (DSEEP)

0800-1000 **ENUMERATIONS 101 – INTRODUCTION TO SISO ENUMERATIONS PRODUCTS AND PROCESSES**

FORUM WEST 3

Lance Marrou
Instructor

Prerequisite*:* An interest in enumerations for modeling and simulation.
Note: A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop

This tutorial session will introduce the SISO Enumerations products (SISO-REF-010 and the OPMAN) and will describe the processes used to update and review enumerations and the reference product.

0800-1000 **LIVE, VIRTUAL AND CONSTRUCTIVE (LVC) SIMULATION INTEROPERABILITY 101**

BOARDROOM 4

Kurt Lessmann
Instructor

Prerequisite*:* A general understanding of modeling and simulation.
Note*:* A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

The tutorial is intended for decision makers who have recently come into contact with distributed simulation and need a top-level understanding of Live, Virtual and Constructive (LVC) interoperability and the supporting standards, technology and processes. The purpose of this tutorial is to provide managers the necessary insight needed to support intelligent decision making. The tutorial will discuss the various domains of the technology and how it can potentially relate to their LVC needs. The tutorial provides a relevant use case as the mechanism to explain the concepts and the solutions required to achieve success. The tutorial will not be an in-depth technology review of LVC interoperability yet will provide sufficient management level insight into interoperability solutions and standards like Distributed Interactive Simulation (DIS), High Level Architecture (HLA), and the Test and Training Enabling Architecture (TENA) product line.

1000-1030 **BREAK**

1030–1200 **HLA 202 – DEVELOPING FEDERATION OBJECT MODELS WITH HLA EVOLVED AND BEYOND**

FORUM WEST 1

Björn Möller
Instructor

Prerequisite: General knowledge about the purpose and principles of HLA corresponding to HLA 101. Some experience with HLA object model development is useful, but not required.
Note: A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop

This tutorial provides an overview of how to apply:

- IEEE Std 1516.3™ - 2010, IEEE Standard for Modeling and Simulation (M&S) High Level Architecture (HLA) –Object Model Template (OMT) Specification
- Additional features for FOM development, provided in the upcoming version of HLA, informally called “HLA 4”.

The Federation Object Model (FOM) specifies the data that is exchanged between federates in an HLA federation. This tutorial shows the principles of good FOM design. It describes how FOMs can be developed, maintained, and reused using the Modular FOM concept, introduced in HLA Evolved (IEEE 1516-2010).

Special attention is given to the modular version of the SISO Real-time Platform Reference Federation Object Model (RPR FOM) 2.0. Other FOMs covered are the NATO Education and Training Network FOM and the upcoming SISO Space Reference FOM.

Finally, it presents new features for developing FOMs that are proposed for the next version of HLA, in particular for extending reference FOMs.

1030-1200

DSEEP 101 – DISTRIBUTED SIMULATION ENGINEERING AND EXECUTION PROCESS

FORUM WEST 2

Dr. Katherine L. Morse
Robert Lutz
Instructor(s)

Prerequisite*:* A general understanding of modeling and simulation.
Note*:* A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

This tutorial provides an overview of:

- IEEE Std 1730™ - 2010, IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process (DSEEP)

DSEEP defines the processes and procedures that should be followed by users of distributed simulations to develop and execute their simulations.

The DSEEP generalizes the Federation Development and Execution Process (FEDEP, IEEE 1516.3) to all distributed simulation environments and architectures, no longer focusing solely on the High Level Architecture (HLA).

This tutorial provides the top-level steps and supporting activities for the entire process. It also introduces and illustrates the inputs, recommended tasks, and outcomes of the activities.

There will be a brief overview of the architecture-specific annexes for HLA, Distributed Interactive Simulation (DIS), and the Test and Training Enabling Architecture (TENA).

Attendees also will be introduced to:

- IEEE Std 1730.1™ - 2013, IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process Multi-Architecture Overlay (DMAO)
- SISO-STD-012-2013, Standard for Federation Engineering Agreements Template

DMAO is the IEEE standard that extends the DSEEP to multi-architecture environments.

1030-1200

DIS 101 – DISTRIBUTED INTERACTIVE SIMULATION (DIS)

FORUM WEST 3

Mark McCall
Instructor

Prerequisite: A general understanding of modeling and simulation. Minimum technical background needed. Familiarity with distributed real-time simulation of vehicles and weapon system platforms is helpful.
Note: A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

This tutorial provides an overview of: IEEE Std 1278.1 ™ - 2012, IEEE Standard for Distributed Interactive Simulation - Application Protocols.

The tutorial includes introductory background material describing what Distributed Interactive Simulation (DIS) is; explains why DIS is a viable standard for distributed simulation; and provides information for joining an active developers group. New features added in the 2012 version, including Directed Energy Weapons, Information Operations, and the general extensibility of Protocol Data Units (PDUs) will be discussed.

1030-1200 **BRIDGES AND GATEWAYS**
BOARDROOM 3

Michael O'Connor
Kurt Lessmann
Instructors

Prerequisites*:* A general understanding of modeling and simulation.
Note*:* A one-time payment fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

Bridges and Gateways are critical to most distributed Live, Virtual, and Constructive (LVC) simulation environments. The role of bridges and gateways is often misunderstood by distributed simulation planners. This tutorial provides an overview of the role of gateways in distributed simulation. A description of how gateways work is also presented. The tutorial covers the process for selecting a gateway that meets the needs of the distributed simulation event. The best practices for using a gateway are also covered. This tutorial will provide the attendees with a better understanding of gateways and how to use them in a distributed LVC event.

1200-1330 **LUNCH**

1330-1500 **PLENARY SESSION**
SALON 2

Call to Order
Randy Saunders
SISO Conference Committee Chair

State of SISO
Michael O'Connor
SISO Executive Committee Chair

Featured Speaker
Dr. Andrew Stefanek
Lead System Engineer, System of Systems Test Bed, Johns Hopkins University Applied Physics Lab

Sponsor Speaker
Jesse Citizen
Director, Defense Modeling and Simulation Coordination Office (DMSCO)

Announcements & Remarks
Mark McCall / Patrick Rowe
SISO Executive Director(s)

1500-1530 **BREAK**

PAPER PRESENTATIONS

1530-1700 **SYSTEM LIFECYCLE AND TECHNOLOGIES (SLT) TRACK**
SALON 2

The System Lifecycle and Technologies (SLT) Track encompasses information that provides guidance on the selection and use of M&S standards and practices to support the System Lifecycle and corresponding technologies that address analysis, research and development, test and evaluation, training, acquisition, asset management, and system lifecycle strategies.

1530-1550 2019-SIW-004
Considerations in Modeling Defense Capabilities at the Mission Level of Performance
John Daly

1550-1610 2019-SIW-028
Advancing M&S as the "Tool" for Digital Engineering
Paul Gustavson

1610-1630 2019-SIW-014
Applying the M&S COI Discovery Metadata Specification to System Repositories for Digital Engineering
James Coolahan

1630-1700 **Discussion**
Scott Johnston

1530-1700 **M&S SPECIALTY TOPICS (SPEC) TRACK**
LEGACY NORTH 2

The M&S Specialty Topics (SPEC) Track is concerned with simulation technologies applied for a specific purpose such as augmented reality, medical, cyber security, space, human behavior, system/vehicle or weapon product development, Internet of Things (IoT), LVC interoperability, and command and control systems.

1530-1550 2019-SIW-025
The Wargaming Process and M&S
Thomas Holland

1550-1610 2019-SIW-020
Modeling, Simulation, and the Hard Problems of Wargaming: Complexity, Cognition, and Computers
Thomas Holland

1610-1630 2019-SIW-022
Simulating the future Megacity: Approaches and standards for representing Pattern of Life modelling
Jonathan Lloyd

1630-1700 **Discussion**
Sara Meyer

1530-1700 **SERVICES, PROCESSES, TOOLS AND DATA (SVCS) TRACK**

Salon 3

The Services, Processes, Tools, and Data (SVCS) Track encompasses Technologies, frameworks, and methodologies that provide service or support for M&S in areas of: distributed simulation process; verification, validation, and accreditation; communication infrastructure; and simulation and environment reuse.

1530-1550 2019-SIW-031

Research on Cloud-Based Simulation: A Literature Review

Charles Sanders

1550-1610 2019-SIW-019

Cloud Based Modeling and Simulation Case Study: Soldier Systems Engineering

Rob Kewley

1610-1630 2019-SIW-032

The UFOS Framework Enabling Formalized Execution of Physics-integrated Descriptive Architecture Languages

Gregory Haun

1630-1700 **Discussion**

Randy Saunders

1700-1900 **SISO SOCIAL**

SALON 1

Please join us for this informal gathering! Food and drink will be available. Renew acquaintances, plan your week, and meet members of the Executive Committee, Standards Activity Committee, Conference Committee, and Planning & Review Panels along with our authors/presenters at the conference. Also, take a look around at the products and technology on display in the exhibitor booths.

TUESDAY, FEBRUARY 12

0715-0800 **NEWCOMERS' ORIENTATION BREAKFAST**
FORUM EAST 4

The Newcomers' Orientation is designed for those who have not previously participated in a Simulation Innovation Workshop (SIW). The session's goal is to help new participants gain maximum benefit from SIW and from their participation in the Simulation Interoperability Standards Organization (SISO). In this session, the SISO Leadership welcome the newcomers and answer questions relating to SISO's organization, principles, processes and SIW.

TUTORIALS

0800-1000 **SISO STANDARDS 101 – AN INTRODUCTION TO THE SISO STANDARDS DEVELOPMENT PROCESS**
FORUM WEST 3

Lance Marrou (SAC Secretary)
Instructor

Prerequisite: A general understanding of modeling and simulation.
Note: No tutorial fee is charged for this session.

This tutorial session is presented by a member of the SISO Standards Activity Committee who will explain how to become involved in the SISO standards development and support process.

1000-1030 **BREAK**

1030-1200 **DIS 201 – NEW EXTENSIBILITY AND DEAD RECKONING FEATURES IN DIS VERSION 7 AND 8**
FORUM WEST 3

Robert Murray
Instructor

Prerequisite: Familiarity with basic DIS PDU usage. Knowledge of dead reckoning is helpful, but the tutorial will include an introduction to the concepts.
Note: A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

This tutorial provides an in-depth review of two features: PDU extensibility and improvements in dead reckoning.

PDU extensibility expands the ability of DIS users to add custom data to PDUs. Some PDUs allow user-defined records to be directly added. Other PDUs can be extended using the Attribute PDU in DIS Version 7. Both methods retain compatibility with older versions of DIS. This allows customized PDUs to be added in new or upgraded simulations while maintaining interoperability to older simulations that cannot be modified. The upcoming DIS Version 8 proposes to add extensibility directly to every PDU, but will not maintain forward compatibility.

Dead reckoning has been enhanced in DIS Version 7, mainly in the extrapolation of entity orientation. A new geometric method of determining the orientation threshold is described using either quaternions or rotation matrices. This method avoids the problems of Euler angle singularities that can cause excessively high PDU transmit rates. DIS Version 8 proposes a new dead reckoning algorithm. It performs as well or better than the traditional algorithms from older DIS versions and is easier to use.

SYSTEM LIFECYCLE AND TECHNOLOGIES (SLT) TRACK

SALON 2

The System Lifecycle and Technologies (SLT) Track encompasses information that provides guidance on the selection and use of M&S standards and practices to support the System Lifecycle and corresponding technologies that address analysis, research and development, test and evaluation, training, acquisition, asset management, and system lifecycle strategies.

0830-0850 2019-SIW-008

MBSE Applied to Tradespace Exploration and Assessment

William "Bud" Robey

0850-0910 2019-SIW-017

A Conceptual Modeling Approach for Threat Analysis and Threat Capability Assessment

John Daly

0910-0930 2019-SIW-005

Taming the Terminator

Robert Lutz

0930-1000 **Discussion**

Scott Johnston

1000-1030 **BREAK**

1030-1130 2019-SIW-036

The Secure LVC Advanced Training Environment Technology Demonstration: Implications for Modeling and Simulation LVC infrastructure and Standards

Wink Bennett

1130-1200 **Discussion**

Scott Johnston

M&S SPECIALTY TOPICS (SPEC) TRACK

LEGACY NORTH 2

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0830-0850 2019-SIW-006

On the Role of Simulation and Simulation Standards in Industry 4.0

Steffen Strassburger

0850-0910 2019-SIW-009

A Discrete Event Simulation-Based Multi-Objective Reinforcement Learning Reward Function for Optimizing Manufacturing Material Handling

Swetha Govindaiah

0910-0930 2019-SIW-012

Command and Control System to Simulation System Interoperation: Technical Approach in Development of the C2SIM Standard

J. Mark Pullen

0930-1000 **Discussion**

Sara Meyer

1000-1030 **BREAK**

1030-1050 2019-SIW-018

A Transformation Process for Generating an Extensible Markup Language (XML) Schema from a Formal Ontology for Practical Application in C2SIM Implementations

Curtis Blais

1050-1110 2019-SIW-013

From Information Description to Information Understanding: The Role of Ontology in Emerging SISO Standards

Curtis Blais

1110-1130 2019-SIW-011

A Robotics and Autonomous System Use Case to Guide Specification of the Command and Control System to Simulation System Interoperation (C2SIM) Standard

Curtis Blais

1130-1200 **Discussion**

Sara Meyer

SERVICES, PROCESSES, TOOLS AND DATA (SVCS) TRACK

SALON 3

The Services, Processes, Tools, and Data (SVCS) Track encompasses Technologies, frameworks, and methodologies that provide service or support for M&S in areas of: distributed simulation process; verification, validation, and accreditation; communication infrastructure; and simulation and environment reuse.

0830-0850 2019-SIW-001

DIS Packet Efficiency Using Bundling

Robert Murray

0850-0910 2019-SIW-034

A Simpler Dead Reckoning Algorithm with Better Performance

Robert Murray

0910-0930 2019-SIW-003

Multi Protocol Time Management Using DIS Version 7

David Taylor

0930-1000 **Discussion**

Randy Saunders

1000-1030 **BREAK**

1030-1050 2019-SIW-023

New Object Modelling opportunities in HLA 4

Bjorn Moller

1050-1110 2019-SIW-024

Developing Space FOM Federation Agreements

Bjorn Moller

1110-1130 2019-SIW-021

Lessons Learned from a French system acquisition experimentation mixing military ground vehicles and simulations

Jose Ruiz

1130-1200 **Discussion**

Randy Saunders

1200-1330 **LUNCH**

1330-1500 **GENERAL SESSION**
SALON 2

Call to Order
Randy Saunders
SISO Conference Committee Chair

Award Presentations
Mark McCall
SISO Executive Director

Keynote Speaker
Kent Gritton
LVC for Training Team Lead. Naval Air Warfare Center Training Systems Division

SISO Standards Overview
Dr. Katherine L. Morse
Chair, SISO Standards Activity Committee (SAC)

1500-1530 **BREAK**

TUTORIALS

1530-1700 **RIEDP 101 – AN INTRODUCTION TO RIEDP CONCEPTS FOR DATA SHARING**
FORUM WEST 3

Jean-Louis Gougeat
Instructor

Prerequisite: Familiarity with environmental data and concepts, and a fundamental understanding of how models and simulations use and process terrain data and databases.
Note: A one-time fee of $75.00 allows you to attend any/all tutorials that are offered at this Workshop.

This tutorial provides an overview of the fundamental concepts and components of RIEDP (Reuse and Interoperation of Environmental Data and Processes). The focus of RIEDP is on the harmonization of environmental/terrain database generation processes, and the means to exchange such generated data. RIEDP promotes reusability of database generation efforts and fosters interoperability between simulations by providing standardized rules, methods, and semantics for sharing data from key stages of the simulation database generation process, while leveraging existing source data formats commonly used in GIS and simulation applications. RIEDP concepts and components are embodied in two SISO Products: the RIEDP Data Model Foundations and the RIEDP Detailed Features Description. The tutorial will highlight key concepts from these RIEDP specifications and will provide an overview of the RIEDP Reference Process Model (RPM), the RIEDP Reference Abstract Data Model (RADM), and how RIEDP uses existing formats and a robust approach to share and exchange environmental data. Both the RPM and RADM are specified in the recently published RIEDP Data Model Foundations document (SISO-GUIDE-007-2018). The tutorial will highlight the key RIEDP data sharing concepts, including: a logical data model for organizing the data, semantics through attributes and attribution, innovative and efficient use of metadata constructs, data organization on media, and a set of profiles for specific application sub-domains. The tutorial will also include the status of the RIEDP Detailed Features Description standard.

SYSTEM LIFECYCLE AND TECHNOLOGIES (SLT) TRACK

SALON 2

The System Lifecycle and Technologies (SLT) Track encompasses information that provides guidance on the selection and use of M&S standards and practices to support the System Lifecycle and corresponding technologies that address analysis, research and development, test and evaluation, training, acquisition, asset management, and system lifecycle strategies.

1530-1550 2019-SIW-037
Artificial Intelligence, Standards, and the Next Generation of Analytic Simulations
Tim Cooley & Ivar Oswalt

1550-1610 2019-SIW-002
Developing Standards and Tools for Including the Cyber Domain in Tactical Training and Exercises
Bert Boltjes

1610-1630 2019-SIW-010
Cross Domain Security for Mission Training through Distributed Simulation
Arjan Lemmers

1630-1700 **Discussion**
Scott Johnston

M&S SPECIALTY TOPICS (SPEC) TRACK

LEGACY NORTH 2

The M&S Specialty Topics (SPEC) Track is concerned with simulation technologies applied for a specific purpose such as augmented reality, medical, cyber security, space, human behavior, system/vehicle or weapon product development, Internet of Things (IoT), LVC interoperability, and command and control systems.

1530-1550 2019-SIW-026
Development and instrumentation of low cost accessible platforms for virtual driving cockpit experience
Jonathan Diemunsch

1550-1610 2019-SIW-016
The Persistent Cyber Training Environment--Cyber Mission Force Training for the 21st Century
Jake Borah

1610-1630 2019-SIW-035
Cyber Battlefield Operating System Simulation (CyberBOSS)
Nathan Vey

1630-1700 **Discussion**
Sara Meyer

SERVICES, PROCESSES, TOOLS AND DATA (SVCS) TRACK

SALON 3

The Services, Processes, Tools, and Data (SVCS) Track encompasses Technologies, frameworks, and methodologies that provide service or support for M&S in areas of: distributed simulation process; verification, validation, and accreditation; communication infrastructure; and simulation and environment reuse.

1530-1550 2019-SIW-030

End User Autonomy in the Generation of Automated Performance Measures

Beth Atkinson

1550-1610 2019-SIW-033

Natural Language Processing and Web Tools for Mapping Units from ClinicalTrials.Gov

Jacob Barhak

1610-1630 2019-SIW-029

Secure Data Exchange In Dynamic Mesh Networks

Deryck Arnold

1630-1700

Discussion

Randy Saunders

1900-2100

ENUMERATIONS SPECIAL WORKING GROUP

FORUM WEST 1

The SAC Special Working Group Reference for Enumerations for Simulation publishes, maintains, and updates SISO-REF-010: Enumerations for Simulation Interoperability. SISO-REF-010 is an important resource for the entire simulation community, and we welcome all SISO members interested in enumerations usage for any standard or guidance products.

Lance Marrou
Chair

WEDNESDAY, FEBRUARY 13

WORKING SESSIONS

HIGH LEVEL ARCHITECTURE (HLA) PDG

FORUM WEST 2

The HLA PDG will be adjudicating comments.

The HLA PDG is developing revisions of these IEEE Standards:

- IEEE Std 1516™-2010, IEEE Standard for Modeling and Simulation High Level Architecture — Framework and Rules
- IEEE Std 1516.1™-2010, IEEE Standard for Modeling and Simulation High Level Architecture — Federate Interface Specification
- IEEE Std 1516.2™-2010, IEEE Standard for Modeling and Simulation High Level Architecture — Object Model Template Specification

0800-1000 **Randy Saunders**
1030-1200 *Chair*

COMMON IMAGE GENERATOR INTERFACE (CIGI) PSG

FORUM WEST 1

The PSG is providing support to maintain the current version of CIGI – the v4 standard SISO-STD-013-2014. In addition, it is developing through a study group which is open to all; the next generation version of CIGI, called CIGInext.

Image generation is a fundamental part of most modern simulator systems. CIGI standardizes the mechanism by which a host simulation computer and an image generator communicate. CIGI v4 is the default standard for host/IG interaction in a number of countries including the US and UK.

During this SIW, the CIGI PSG will meet in two sessions which will consider a number of problem/change requests (PCRs) and vote on their approval to be incorporated into an future interim release of CIGI - v4.1. The meeting will also continue to work on detailed proposals for CIGInext with the aim of generating a product nomination for consideration by SISO later in 2019.

0830-1000 **Simon Skinner**
1030-1200 *Chair*

VERIFICATION, VALIDATION & ACCREDITATION/ACCEPTANCE PRODUCTS (VV&A PRODUCTS) PSG

BOARDROOM 3

The PSG supports these products:

- IEEE Std 1516.4™-2007, IEEE Recommended Practice for VV&A of a Federation — An Overlay to the High Level Architecture Federation Development and Execution Process
- SISO-GUIDE-001.1-2012, Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 1: Introduction and Overview
- SISO-GUIDE-001.2-2013, Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 2: Implementation Guide
- SISO-REF-2013, Reference for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Vol. 3: Reference Manual

0830-1000 **Simone Youngblood**
1030-1200 *Chair*

1000-1030 **BREAK**

SPECIAL SESSION

1030-1200 **DATA STRATEGY FOR NAVY M&St**
SALON 3

Bill Hopkinson
Cathy Matthews
Farid Mamaghani

Today's Navy training systems have tremendous potential to increase readiness for synchronized, multi-platform operations with flexible, data driven simulations and scenarios. But data driven simulation-based training requires massive amounts of data. The associated data management challenge becomes more complex when heterogeneous training systems are networked together to interoperate as a system of systems. Without a data management strategy for Live, Virtual and Constructive training (LVCt) to support Navy's Distributed Maritime Operations, the cost and lack of data availability seriously limit the opportunity for increased readiness.

This presentation provides an overview of the recently developed Data Strategy for Navy M&St (Modeling & Simulation for training) for addressing this data management challenge. The Data Strategy identifies a number of data management processes and technology elements as its primary focus areas. The presentation will highlight the key data topics, along with the vision, goals, and the lines of effort that together provide a unified approach for implementing the strategy.

To further assist with the implementation of the strategy, special attention was given to one of these processes called MAP-DS (Mission Assessment Process for Data Suitability). The complexity of the mission, the complexity of the systems, and the quantity of systems add to the simulation interoperability challenges. MAP-DS provides the starting point for a methodology that helps in identifying common data products for use in M&S and LVC applications. This presentation will also provide an overview of the key elements, steps, and decision-making criteria of the MAP-DS methodology.

WORKING SESSIONS

BASE OBJECT MODEL (BOM) PSG
BOARDROOM 4

The BOM Product Support Group (PSG) supports the approved SISO-STD-003-2006 BOM Template Specification standard and the SISO-STD-003.1-2006 Guide for BOM Use and Implementation. The BOM PSG will serve as a central point for interpretations of product language, providing help desk support to the SISO community, and accepting, developing, and maintaining problem/change reports to support future product revision.

1030-1200 **Paul Gustavson**
Chair

GUIDELINE ON SCENARIO DEVELOPMENT (GSD) PDG
FORUM WEST 3

The PDG has developed a SISO Guidance Product for "Guideline on Scenario Development for Distributed Simulation Environments" and will be discussing transition to a Product Support Group.

1030-1200 **Stefan Vrieler**
Chair

1200-1330 **LUNCH**

DSEEP / DMAO PSG (DISTRIBUTED SIMULATION ENGINEERING AND EXECUTION PROCESS/MULTI-ARCHITECTURE OVERLAY PSG)

FORUM WEST 3

The PSG supports these SISO-sponsored IEEE Standards:

- IEEE Std 1730™-2010, IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process (DSEEP) (Revision of IEEE Std 1516.3™-2003)
- IEEE Std 1730.1™-2013, IEEE Recommended Practice for Distributed Simulation Engineering and Execution Process Multi-Architecture Overlay (DMAO)

1330-1500 **Bob Lutz**
Chair

REUSE AND INTEROPERATION OF ENVIRONMENTAL DATA AND PROCESSES (RIEDP) PDG

SALON 3

The PDG is developing products to harmonize environmental data representations and generation processes at a level after the source data stage, but before the run-time/proprietary stage, recognizing that there is a broad range within this band. This will be achieved by retaining the data form (or format) as close to the source data as possible in order to benefit from GIS tools, while at the same time keeping the internal data consistency (intrinsic correlation factor), and not introducing specific target application constraints at this level that should be addressed separately by each target application during run-time. The PDG is producing two complementary products:

- The RIEDP Data Model Foundations, a SISO Guidance Product, which is now published and available on the website;
- The RIEDP Detailed Features Description, a SISO Standards Product, which is under development.

During the 2019 SIW the PDG will meet with the following agenda: Celebration of approved RIEDP Data Model Foundations publication, Status on RIEDP Detailed Features Description development, Update on other RIEDP related activities. The EDRS PSG meeting will also be hosted as part of the RIEDP PDG Meeting to address the inclusion of Product 1 support phase.

Jean-Louis Gougeat, *Chair*

ENVIRONMENTAL DATA REPRESENTATION STANDARDS (EDRS) PSG

SALON 3

The PSG participates in activities that support the development, extension, refinement, and maintenance of standards for the environmental data community that includes the ISO/IEC SEDRIS family of standards. The PSG maintains liaison with ISO/IEC JTC 1/SC 24/WG 8 Environmental Representation.

Paul Foley, *Chair*

1330-1500 **RIEDP PDG**
1530-1700 **RIEDP PDG / EDRS PSG**

RPR FOM PDG (REAL-TIME PLATFORM REFERENCE FOM)

BOARDROOM 4

- The current RPR FOM version 2 (SISO-STD-001-2015) is the most widely used HLA FOM for interoperability between platform-oriented defense and security simulations.
- The task of the PDG is to produce RPR FOM version 3 that shall facilitate the interoperability with simulations using the Distributed Interactive Simulation standard IEEE Std 1278.1™-2012 ("DIS 7"). The RPR FOM version 3 shall support federations developed using HLA 1.3, IEEE Std 1516™-2000 and IEEE Std 1516™-2010.

1330-1500 **Bjorn Moller**
1530-1700 *Chair*

TADIL TALES PSG/PDG
(TACTICAL DIGITAL INFORMATION LINK–TECHNICAL ADVICE AND LEXICON FOR ENABLING SIMULATION)

FORUM WEST 1

- The TADIL TALES PDG/PSG has been approved by the SISO Standards Activity Committee (SAC) and Executive Committee (EXCOM). This group supersedes the Link 11/11B PDG, EPRLS/SADL PDG, and the TADIL TALES PSG, and will transition both groups discussion board and document library.
- A family of products is being developed and supported by the TADIL TALES PDG/PSG, including SISO-STD-002-2006, Standard for Link 16 Simulations. The PDG/PSG operates as a focused task-organized group concentrating on the development and support of approved data link simulation standards. The PDG/PSG operates in accordance with SISO-ADM-002 and SISO-ADM-003 (including future updates to those and other administrative products).
- The TADIL TALES PDG portion is currently developing standards for Link 11/11B, Situation Awareness Data Link (SADL), and Automated Identification System (AIS).
- The TADIL TALES PSG is currently incorporating approved Problem/Change Requests (PCRs) written for SISO-STD-002-2006. The TADIL TALES PSG portion will also continue to support the approved SISO-STD-002 Link 16 standard for IEEE 1278.1 (DIS) and IEEE 1516 (HLA) by providing a central point for interpretations of SISO-STD-002 product language, providing help desk support to the SISO community, and accepting, developing, and maintaining problem/change reports to support future product revisions.
- This PSG portion will also support other developing tactical data link standards using DIS and HLA, approved for tactical data link simulation.
- During this SIW, the TADIL TALES PDG/PSG will meet in two sessions which will review the draft SISO-STD-002, SISO Link 16 standard with approved PCRs incorporated and vote to go to balloting. The meeting will also continue to work on Link 11/11B, SADL, and AIS product development.

1330-1500 **Joe Sorroche**
1530-1700 *Chair*

1500-1530 **BREAK**

ACQUISITION MODELING AND SIMULATION STANDARDS PROFILE (ACQMS) PDG

LEGACY NORTH 2

Starting 9 Dec 2015, the PDG initiated a 270-day trial use period for two draft products. Users were asked to use the products and to share comments and suggestions about the products. To contribute, visit the PDG webpage, scroll to the bottom, and use the Comment Tracking System to provide inputs on these two draft SISO Products:

- SISO-GUIDE-005-DRAFT, Trial Use Guide for A Standards Profile for the Use of M&S in Support of Acquisition Activities, Volume 1
- SISO-REF-066-DRAFT, Trial Use Reference for A Standards Profile for the Use of M&S in Support of Acquisition Activities, Volume 2

1530-1700 **Kenneth “Crash” Konwin**
Chair

DDCA (DISTRIBUTED DEBRIEF CONTROL ARCHITECTURE) PSG

BOARDROOM 3

The Distributed Debrief Control Architecture (DDCA) Product Support Group (PSG) operates as a focused task-organized group concentrating on the support of SISO-STD-015-2016 and related products..

1530-1700

FEDERATION ENGINEERING AGREEMENTS TEMPLATE (FEAT) PSG

FORUM WEST 3

The Federation Engineering Agreements Template (FEAT) benefits all developers, managers, and users of distributed simulations by providing an unambiguous format for recording agreements about the design and use of the distributed simulation. The FEAT also benefits this community by enabling the development of federation engineering tools that can read the XML schema and perform federation engineering tasks automatically.

The FEAT Product Support Group (PSG) supports the FEAT schema and associated reference products such as examples of application of the schema. The FEAT PSG supports the distributed simulation community by acting as a forum and library for FEAT-related information; providing technical support to users and developers by answering questions; and providing contact information for experts in different areas.

1530-1700 **Katherine L. Morse**
Chair

INTEROPERABILITY BETWEEN WEB-BASED FEDERATES AND LVC FEDERATIONS (WEBLVC) PDG

FORUM WEST 2

This PDG is developing a standard for a WebLVC protocol. The WebLVC protocol defines a standard way of passing simulation data between a web-based client application and a WebLVC server, which can participate in a federation on behalf of one or more web-based federates. WebLVC messages are encoded as JSON (JavaScript Object Notation) objects, passed via WebSockets. WebLVC is flexible enough to support representation of arbitrary types of objects and interactions (i.e. arbitrary Object Models). However, WebLVC does include a "Standard Object Model" definition based on the semantics of the DIS protocol, HLA's RPR FOM, and SISO Enumerations.

1530-1700 **Len Granowetter**
Chair

SIMULATION AND WARGAMING GROUP DISCUSSION

FORUM WEST 3

With the current increased focus on wargaming in the US DoD and NATO, there is a lot of interest in using simulation and digital tools to help the wargaming process. Given the broad areas of expertise in SISO, a discussion of how and where the simulation community can help is the topic of this meeting.

1900-2100 **Chuck Turnitsa**
Discussion Lead

THURSDAY, FEBRUARY 14

WORKING SESSIONS

HIGH LEVEL ARCHITECTURE (HLA) PDG

FORUM WEST 2

The HLA PDG will be adjudicating comments.

The HLA PDG is developing revisions of these IEEE Standards:

- IEEE Std 1516™-2010, IEEE Standard for Modeling and Simulation High Level Architecture — Framework and Rules
- IEEE Std 1516.1™-2010, IEEE Standard for Modeling and Simulation High Level Architecture — Federate Interface Specification
- IEEE Std 1516.2™-2010, IEEE Standard for Modeling and Simulation High Level Architecture — Object Model Template Specification

0830-1000 **Randy Saunders**
1030-1200 *Chair*

SISO/OGC/NGA/DMSCO MEETING

FORUM EAST 4

There have been numerous recent discussions about the geospatial initiatives by NGA, the DoD CDB adoption, and other geospatial efforts in the U.S. and internationally.

There is a critical need for SISO to objectively and technically look at the direction the U.S. DoD is going (funded; and approved/directed by USD(R&E)) in implementing the NGA geospatial data offering using the CDB OGC standard.

There is a need for technical discussion and analysis on implementing these changes, and there is

a need for SISO, OGC, NGA, DMSCO, and others to collaborate on this.

This will be a technical issue study group, with the goal of reporting back to the SISO EXCOM and SAC with recommendations after the work is completed. All interested parties are welcome.

0830-1000 **John Daly**
Lead

COMMAND AND CONTROL SYSTEMS – SIMULATION SYSTEMS INTEROPERATION (C2SIM) PDG/PSG

LEGACY NORTH 2

The Command and Control Systems - Simulation Systems Interoperation (C2SIM) PDG and Product Support Group (PSG) together form one lifecycle product group empowered over the product lifecycle to develop and support products. The functions of the PDG and PSG are distinct, but memberships are common, and administrative reporting will be as one group to consolidate administrative overhead. In addition to new products under development, the PSG supports these two SISO Standards Products:

- SISO-STD-007-2008, Standard for Military Scenario Definition Language
- SISO-STD-011-2014, Standard for Coalition Battle Management Language (C-BML) Phase 1

0830-1000 **J. Mark Pullen**
1030-1200 *Co-Chair*

CLOUD-BASED MODELING & SIMULATION (CBMS) SG

SALON 3

The group plans to accomplish three main objectives: 1) to wrap up the SG's remaining tasks from the prior period of performance; 2) to discuss plans and objectives to transition from a SG to a SSG for the next period of performance; 3) Identify cloud-based M&S early adopters in the community and encourage them to participate in the study group in order to share approaches and lessons learned.

0830-1000 **Jeff Truong**
1530-1700 *Lead*

DISTRIBUTED INTERACTIVE SIMULATION / REAL-TIME PLATFORM REFERENCE FEDERATION OBJECT MODEL (DIS / RPR FOM) PSG

FORUM WEST 1

In 2012, the DIS PDG published:

- IEEE Std 1278.1™-2012, IEEE Standard for Distributed Interactive Simulation - Application Protocols (a revision of IEEE Std 1278.1™-1995 and IEEE Std 1278.1a™-1998)

In 2015, the RPR FOM 2 PDG published:

- SISO-STD-001-2015, Standard for Guidance, Rationale, and Interoperability Models (GRIM) for the Real-time Platform Reference Federation Object Model (RPR FOM) Version 2.0
- SISO-STD-001.1-2015, Standard for Real-time Platform Reference Federation Object Model (RPR FOM) Version 2.0

On 14 Dec 2015, the EXCOM approved the formation of a new PSG from the DIS PSG that would incorporate responsibilities both DIS and RPR FOM products.

Working groups of the PSG meet regularly by teleconference for technical discussions and the PSG meets by teleconference to conduct business as needed.

The primary purpose of this meeting is to continue activities toward the development of Gen3 of the DIS Standard (Version 8) by reviewing the current status and approving such PCRs or concepts that are ready for PSG approval. Additional PCRs will be discussed during the meeting, and there will be two proposals for new capability.

0830-1000 **Mark McCall**
1030-1200 *Chair*
1530-1700
1900-2100

VERIFICATION, VALIDATION & ACCREDITATION/ACCEPTANCE PRODUCTS (VV&A PRODUCTS) PSG

BOARDROOM 3

The PSG supports these products:

- IEEE Std 1516.4™-2007, IEEE Recommended Practice for VV&A of a Federation — An Overlay to the High Level Architecture Federation Development and Execution Process
- SISO-GUIDE-001.1-2012, Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 1: Introduction and Overview
- SISO-GUIDE-001.2-2013, Guide for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Volume 2: Implementation Guide
- SISO-REF-2013, Reference for Generic Methodology for Verification and Validation (GM-VV) to Support Acceptance of Models, Simulations, and Data, GM-VV Vol. 3: Reference Manual

0830-1000 **Simone Youngblood**
1030-1200 *Chair*

1000-1030 **BREAK**

WORKING SESSIONS

EXPLORATION OF NEXT GENERATION TECHNOLOGY APPLICATIONS TO MODELING AND SIMULATION (ENGTAM) SSG

SALON 3

This group is executing these group-specific tasks:

- Capture and decompose common M&S program goals including accounting for non-functional requirements such as security, performance, risk, cost, and long-term sustainability.
- Explore the latest industry technology trends and available solutions, specifically focused on their applicability to the M&S domain. Examples include wearable technology, streaming, advanced hardware, cloud services, and data sharing applications.
- Account for security requirements and what the application each technology will need to consider.
- Consider other architecture quality requirements and management requirements such as risk, cost, and long-term sustainability, among others.
- Assist the M&S domain in staying informed of recent technology advancements and to understand their impacts to our current and future implementations.

1030-1200 **Chris McGroarty**
Lead

GATEWAY DESCRIPTION AND CONFIGURATION LANGUAGES (GDACL) PDG

BOARDROOM 4

The GDACL PDG conducted product ballots in 2015 for these products:

- SISO-STD-014-00-DRAFT, Standard for Gateway Description Language
- SISO-STD-014-01-DRAFT, Standard for Gateway Filtering Language

The product ballots were both valid and successful. The PDG is in the process of resolving comments with the balloters and documenting final comment resolutions. The next step is the preparation and processing of the Product Approval Package. Watch for new SISO Standards to be published in 2016. The family of products are used by both developers and users of Live, Virtual, and Constructive (LVC) environments during gateway selection and configuration. Each product reflects a different aspect of the overarching process of gateway selection and configuration.

1030-1200 **Bob Lutz**
Chair

1200-1330 **LUNCH**

1330-1500

GENERAL SESSION
TAKEAWAYS & BEST PAPERS AND/OR PRESENTATIONS

SALON 2

Call to Order

Randy Saunders
SISO Conference Committee Chair

Track Discussions and Best Papers and/or Presentations

Scott Johnston
System Lifecycle & Technologies (SLT)

Sara Meyer
Modeling & Simulation Specialty Topics (SPEC)

Randy Sanders
Services, Processes, Tools, and Data (SVCS)

WORKING SESSIONS

SPACE REFERENCE FEDERATION OBJECT MODEL (SRFOM) PDG

BOARDROOM 4

The PDG is developing (1) a natural language, human readable overview, description and specification of the Space Reference FOM Federation Agreement; and (2) a set of computer-interpretable HLA 2010 FOM modules (XML) intended for consumption by HLA run-time infrastructure and other software tools.

1330-1500 **Björn Möller**
1530-1700 *Chair*

1500-1530 **BREAK**

CYBER MODELING AND SIMULATION (CYBERMS) SG

LEGACY NORTH 2

The purpose of this study group is to identify key cyber M&S activities, document best practices, highlight lessons learned, and identify areas for potential standardization in order to facilitate adoption by the cyber M&S community.

1530-1700 **Katherine L. Morse**
Lead

1715-1745

HOT WASH

FORUM EAST 4

The Hot Wash provides participants the opportunity to discuss the SIW and suggest ideas for improving future SIW events. This session is open to all..

Randy Sanders
CC Chair

SISO SPONSORS

STRATEGIC ORGANIZATIONAL MEMBER

The Department of Defense (DoD) Modeling and Simulation Coordination Office (DMSCO) is the focal point for coordinating all matters regarding modeling and simulation across the DoD for the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)). Modeling and simulation (M&S) is an enabler of warfighting capabilities. It helps to save lives, to save taxpayer dollars, and to improve operational readiness. DMSCO assists the DoD to use M&S in a cost-effective manner through tools, policies, standards, guidance, and collaborative forums.

The use of simulations and simulators to provide training procedures improves individual and collective capabilities. Military forces train with a wide range of simulated weapons, ships, aircraft, and other vehicles in conjunction with live training on actual equipment. Within the military, and in other professions, M&S helps provide a safer and lower resource-intensive rehearsal capability for a wide variety of training.

Training is one of the most employed of the M&S applications, but there are many other ways that M&S enables Department's functions. In particular, M&S is used to analyze and inform the Department decisions in acquiring new capabilities, adopting new tactics, processing intelligence, and testing systems before they are put into the hands of our fighting forces.

Established in 2006, with a heritage back to 1991, DMSCO fosters M&S interoperability and reuse to improve value and mission effectiveness for the Department's M&S Enterprise. The Department's M&S Enterprise consists of the military services (the Army, Marines, Navy, and Air Force); the Joint Staff; and seven communities (Acquisition, Analysis, Intelligence, Experimentation, Planning, Test/Evaluation, and Training). All parts of the whole help ensure DoD's readiness to provide for national security. The M&S Enterprise also includes other US Government agencies and international military partners. As a pivotal organization, DMSCO recommends policies, plans, and programs to the USD(AT&L) that supports the M&S Strategic Vision and DoD priorities. DMSCO can be viewed as having three distinct arenas: Operations, Governance and Technology.

Operations: DMSCO manages the sustainment and operation of enterprise level M&S capabilities - tools, data, and services - in support of USD(AT&L). DMSCO also serves as the Department's lead for M&S standards and is the point of contact for International M&S activities.

Governance: DMSCO develops strategic policy, guidance, standards, and practices, with the advice and assistance of the M&S Steering Committee (M&S SC). DMSCO also provides the Secretariat (administrative) functions for the M&S SC. As a result, the policies and standards help educate the Department's workforce, promote interoperability and reuse, and enable the DoD M&S Enterprise.

Technology: DMSCO provides technical expertise to the USD(AT&L) and provides technical coordination to M&S Enterprise and the M&S SC on DoD M&S architectures, software, computing, data, and other related enabling technologies.

NATO Modelling and Simulation Group (NMSG) is part of the NATO Science and Technology Organization (STO). The mission of the NMSG is to promote co-operation among Alliance bodies, NATO member nations and partner nations to maximise the effective utilisation of M&S.

The NMSG has been designated by the North Atlantic Council (NAC) to supervise the implementation of the NATO Modelling and Simulation Master Plan (NMSMP) and also to propose regular updates to the NMSMP. The NMSG is the delegated tasking authority on M&S interoperability standards within NATO. The NMSG M&S Standards Subgroup (MS3), consisting of NATO and national M&S experts, created and maintains the M&S Standards Profile document (published under the NATO reference AMSP-01). The second release, AMSP-01(B), was promulgated in Jan 2012 and includes more than 40 M&S related standards. The identified standards/products were included in AMSP-01 following a formal selection and classification process by the MS3 experts and is therefore considered as relevant for the NATO M&S domain. The standards and products included in AMSP-01 are formally mandated by NATO when supported by a specific STANAG. The NMSG and SISO have signed a formal technical cooperation agreement in 2007 which underpins the importance of M&S standards to the NMSG. For more information visit us at www.sto.nato.int

SUPPORTING ORGANIZATIONAL MEMBER

AEgis Technologies creates innovative solutions to challenges requiring specialized modeling and simulation knowledge; expertise in simulation and software development, integration, and analysis; training simulator development; HLA/DIS technologies; C4I-to-Simulation interoperability; object-oriented analysis/design; and VV&A programs for software/ simulations. AEgis provides specialized Photonics/MEMS, electro-optic, infrared/LADAR services/products. Commercial software offerings include HLA LabWorks dramatically reduces HLA simulation/ federation development costs, acslXtreme provides outstanding capabilities to model real world systems using continuous simulation, and BattleStorm provides a low-cost, flexible simulation framework on which multiple simulators are built. AEgis has offices in Huntsville, Orlando, Albuquerque, Rhode Island, Washington D.C., Canada and Europe. Visit their web site at www.aegistg.com.

Aptima's mission is to engineer tools and systems that increase human capabilities. Our scientists study how humans think and learn in today's technology-rich networked environments, and we use that knowledge to solve problems and provide solutions in defense, homeland security, healthcare, aviation and cyber security. Aptima's solutions span the human continuum from the micro to the macro – from the neural and individual level, to teams and large groups, and even to complete societies. To learn more, visit www.aptima.com.

SUPPORTING ORGANIZATIONAL MEMBER

CAE is a global leader in the provision of simulation and control technologies and training solutions for aerospace, defense and marine markets. CAE employs more than 6,000 people around the world and generates revenues in excess of C$1 billion. CAE offers HLA compliant simulation development, control, and visualization tools under the STRIVE(tm) product line; a simulation-based eLearning/ ADL (seLearning) development and deployment environment under the Simfinity(tm) product line; plus modeling & simulation training, support and professional services. Visit their web site at www.cae.com.

Pitch Technologies is a leading provider of innovative state-of-the-art interoperability products, services and solutions for development of distributed systems. Our products and solutions are being used by some of the largest and most complex simulation programs in government and industry around the world.

Our experts provide the management, guidance and technical support you need to successfully integrate distributed simulation systems into an interoperable solution that meets your needs and reduces cost, risk and time-to-market.

Pitch Technologies expanding product family consists of infrastructure products, development tools and runtime tools allowing the design, integration and execution of the most complex LVC environments and supports the latest IEEE 1516 HLA Evolved standard. Pitch products have been designed to meet our customer's highest demands in terms of performance, robustness and ease-of-use.

Pitch Technologies also offers a complete range of HLA training courses targeted at general management, technical executives, project managers, developers and system integrators. Visit www.pitch.se for more information.

SUPPORTING ORGANIZATIONAL MEMBER

SimPhonics is a leader in high fidelity simulation audio and networked radio systems. Well ahead of it's time, V+, a fifth generation visual programming system, forms the heart of SimPhonics software products providing extensible standards based solutions. From FAA Level D audio simulation to realistic radio modeling for DIS/HLA, SimPhonics is committed to evolving technology in order to bring unmatched quality to our customers around the world. For nearly two decades, SimPhonics has fielded thousands of systems and has made significant contributions to establishing standards to improve interoperability. Visit www.simphonics.com for COTS pricing and technical data.

SISO SPONSORS

SimVentions is a privately held business, incorporated in the state of Virginia in 2000. Our corporate headquarters is located in Fredericksburg, Virginia with additional offices in Virginia Beach, Quantico, Dahlgren, and Washington D.C. At SimVentions, expressing what we do is quite simple: We develop innovative solutions that strengthen and sustain U.S. Military personnel and technology. This is true whether it be for modeling and simulation, software engineering, systems engineering, or cybersecurity. A few of our key solutions include InformeDB Enterprise, which is a digital engineering tool, EMBR Portal, which is a tool for cataloging digital artifacts within the system engineering and simulation community, numerous tactical software components for the Navy and Marine Corps, object-oriented components for software applications, interactive courseware modules for training, and program management and process tools in support of the rapid insertion of technology and components to warfighters.

Specific to M&S, SimVentions' expertise lies in the development and use of DIS, HLA and other distributed technologies such as web services, service-oriented architectures (SOA), and, within the tactical community, Object Management Group's (OMG) Data Distribution Service (DDS), and The Open Group's Future Airborne Capability Environment (FACE). SimVentions has been an integral part in the research, standardization and development of various processes and concepts including Base Object Models (BOMs), Simulation Reference Markup Language (SRML), HLA Evolved, Federation Development and Execution Process (FEDEP),Coalition Battle Management Language (C-BML), Military Scenario Definition Language (MSDL), use and application of Metadata within the M&S community, and all with an eye for supporting composability and reuse within the greater SISO and M&S community. Additional experience includes the development of a suite of tools to facilitate the development of HLA federations and analysis of DIS simulations. SimVentions also has significant experience and background supporting various DoD related activities including the surface Navy in Dahlgren, VA. SimVention's most recent achievement was as lead developer of the Tactical Simulator (TACSIM) supporting the Navy's Surface Electronic Warfare Improvement Program (SEWIP). TACSIM incorporates the SLQ-32's tactical code and interfaces to emulate a real shipboard environment for system and subsystem test and validation. TACSIM is also deployed at Navy training commands to assist instructors in training students with scenario driven exercises. By design, development of TACSIM has removed the requirement for availability and expensive procurement of target hardware, resulting in significant cost and schedule savings.

SUPPORTING ORGANIZATIONAL MEMBER

Thales is a global technology leader for the Defence & Security and the Aerospace & Transport markets. In 2010, the company generated revenues of €13.1 billion with 68,000 employees in 50 countries. With its 22,500 engineers and researchers, Thales has a unique capability to design, develop and deploy equipment, systems and services that meet the most complex security requirements. Thales has an exceptional international footprint, with operations around the world working with customers as local partners.

Thales recognizes the importance of modelling and simulation in support of the systems engineering lifecycle, from concept development and experimentation through to testing and evaluation. Thales is also a world-leader in providing simulation-based training systems. SISO is considered an important forum within which to share advanced methods and technologies and to draw upon complementary capabilities to meet the specific requirements of our customers.

Trideum Corporation is a privately owned and operated small business, founded in 2005, headquartered in Huntsville, Alabama. Trideum specializes in providing solutions and services in the area of Modeling & Simulation (M&S), Test & Evaluation (T&E), Capabilities Analysis and Management, and Training/Training Development.

In addition to our Huntsville headquarters, Trideum operates a Program Office in Leavenworth, Kansas, as well as Field Offices in the Northern and Tidewater regions of Virginia; Orlando, Florida; Washington; Arizona; Ohio; and Texas.

Trideum has a broad range of expertise gained through hands-on program execution. Our offering ranges from strategic to operational, technical, and analytical requirements planning to engineering analysis, design, development and integration. We are involved in the development, design, building and operation of synthetic environments for testing, training and experimentation.

Our Quality Management System (QMS) is certified in accordance with ISO 9001:2008. Trideum was named to INC5000 in 2015, as one of America's fastest growing companies.#

MÄK Technologies develops software to link, simulate and visualize the virtual world. We create tools and toolkits for distributed simulations, develop PC-based military tactical trainers, craft custom solutions, and research and develop the latest simulation technologies. We build commercial off the shelf simulation tools that are flexible, portable and supported. Whether you choose our best-selling networking toolkit VR-Link or the high performance MÄK RTI, you have purchased a product backed by the industry's leading distributed simulation experts. Please visit www.mak.com for more information.

ABSTRACTS

2019-SIW-001

DIS Packet Efficiency Using Bundling

Tuesday, 0830-0850, Salon 3, SVCS Track

William Oliver / william.oliver@dst.defence.gov.au

IEEE 1278.1 Distributed Interactive Simulation (DIS) Protocol Data Units (PDUs) are typically transmitted within UDP packets over Ethernet on the Local Area Network (LAN). The proposals for DIS version 8 include implementing simpler smaller PDUs which will result in more PDUs being sent on the network. Bundling of PDUs, introduced in IEEE 1278.2 Communication Services and Profiles, has been proposed as a way of increasing the efficiency of transmitting a larger number of smaller PDUs. Bundling concatenates several PDUs into a single datagram that can be transmitted and relayed through the network in one operation. The effect of bundling has been conducted using PDUs logged from large scale international training exercises. This logged PDU data was used as the input to some models to quantify the effect of bundling on current DIS exercises. Results show that bundling would have provided considerable network efficiencies for these exercises with far smaller bandwidth required for the same PDU throughput. These findings provide some background data that can inform the DIS v8 discussions on PDU bundling.

2019-SIW-002

Developing Standards and Tools for Including the Cyber Domain in Tactical Training and Exercises

Tuesday, 1550-1610, Salon 2, SLT Track

Bert Boltjes / bert.boltjes@tno.nl

As cyber operations are evolving to become a major military enabler, cyber activities and their resulting effects should also be represented in simulation environments. Currently much effort is being put into creating simulation environments to enable the simulation of cyber operations at the technical (network) level. At this level the focus is on detection and exploitation of vulnerabilities on the offensive side and on prevention, detection and mitigation of malicious intrusions on the defensive side. Simulations at this level facilitate training of and competition between cyber technicians. Typical examples are so-called "Capture-the-flag" events. However, Cyber operations also have an important impact at the tactical, operational and strategical level, but so far little effort has been put into integration of cyber operations and their effects at these levels. What there is, is mainly limited to degrading some of the tactical data communication or switching off C2 systems or simulators. A standard approach is required to integrate offensive and defensive cyber activities and their resulting effects in simulation environments in a timely, efficient, interoperable, and cost-effective manner.

A first requirement for a standard approach is to describe the elements of systems that can be affected by cyber operations, their characteristics, the way they interact, offensive and defensive cyber activities and the effects they can have on operational capabilities. For this purpose, taxonomies and ontologies for cyber operations have been described in the literature, but they only cover elements of cyber operations (tailored to specific attacks, threats, vulnerabilities et cetera). All these attempts serve a specific research purpose and there is limited or no coherence between them. With only one exception that we know of, the research results have, beside papers, not been available for further development. Open sources and standards are lacking which hinders further development of interoperable products for introducing cyber operations in modelling and simulation for training and experimentation as they do exist for Land, Sea, Air, and Space. An ontology for the cyber domain is – however – important to the development of (re-usable) simulation conceptual models, simulation scenarios and simulation data exchange models. An ontology provides amongst others consistent naming, meaning, relations and interactions of the various elements used in the different models.

TNO Defence Research is strongly involved in many standardisation activities for modelling and simulation in the military domain. In addition, as part of a doctoral research project (Technical University Delft, TNO Defence Research, and Netherlands Defence Academy (NLDA)) aimed at assessing the effects of cyber operations in support of targeting decision making that avoids collateral damage. In this context computational ontologies have been developed to describe cyber operations and to represent and reason around the necessary knowledge to assess the effects of cyber operations. These ontologies can be regarded as a (knowledge-based) simulation environment resulting from empirical research and design studies in the military cyber domain.

This paper describes a development method, focused on the construction of a cyber operations ontology for training and exercises, and the initial steps toward a cyber simulation data exchange model.

2019-SIW-003

Multi Protocol Time Management Using DIS Version 7

Tuesday, 0910-0930, Salon 3, SVCS Track

David Taylor / david.taylor@lmco.com

The increasing need for higher fidelity in distributed simulation presents many challenges to the engineering and simulation communities. One such example is the need for detailed Software Virtual Network (SVN) to emulate the communications within an increasingly connected world. In the case of designing swarming systems, the SVN tool often is the primary hub for networked collaborative systems and the cost for these tools can be prohibitive. The US Naval Research Lab (NRL) has funded the development of a Free and Open Source (FOSS) software tool to address this and other issues. The Extensible Mobile Ad Hoc Network Emulator (EMANE) is rapidly becoming the preferred tool for emulating communications systems but its rapid growth in popularity has stressed its original emulation design. This paper describes the work of an industry-government-academia team to implement time management protocols as defined in IEEE1278.1-2012 and to extend this implementation to a industry standard protocol gateway to enable a common time managed environment across a DIS and TENA federation.

ABSTRACTS

2019-SIW-004

Considerations in Modeling Defense Capabilities at the Mission Level of Performance

Monday, 1530-1550, Salon 2, SLT Track

John Daly / daly_john@bah.com

Defense capabilities are typically described, designed, built, modeled and tested as discrete capabilities that contribute to an overall military mission and missions. This “one to many” relationship has made actual performance modeling at the mission level difficult - as there are many different missions for a given capability; and it may be a dominant or marginal contributor to those missions. Further, a mission area is a System of Systems (SoS) aggregate of various discrete capabilities. Much progress has been made in the digital engineering field for systems engineering of defense capabilities, and Model Based Systems Engineering (MBSE) in particular is a development that offers promise as the data and modeling digital backbone that can be leveraged at the mission/enterprise level by mission simulations. These enterprise level mission simulations have often relied on individual capability performance models that are very simplistic, and often approximate. The opportunity now exists to link those simulations directly to definitive performance models based on MBSE use - in the individual systems that compose the SoS of that mission capability. This could lead to an opportunity to more accurately determine the Performance “P” (Cost, Schedule, and Performance) at the mission level of delivered capability – which directly corresponds to warfighter need. This presentation will cover the linkage from an individual defense capability and its notional MBSE systems engineering construct, to that capability’s contribution to a defense mission and its mission level performance. Determining mission level performance is also critical to implementation of Mission Integration Management as required in the NDAA-17; as well as supporting Modular Open Systems Approach considerations in the MDAA-17 Acquisition Agility Act. Utilizing enterprise-level mission simulation tied to an MBSE construct in the individual capability systems is a potential path forward to achieve this.

2019-SIW-005

Taming the Terminator

Tuesday, 0910-0930, Salon 2, SLT Track

Robert Lutz / robert.lutz@jhuapl.edu

Innovations in machine learning, artificial intelligence, and other supporting technologies have significantly advanced the state-of-the-art in terms of the capabilities provided by autonomous unmanned aircraft systems. However, autonomous systems pose special challenges for live tests on DoD test ranges, in that the methods and infrastructure used to verify requirements for traditional military systems are inadequate to accurately measure the performance and behavioral characteristics of aircraft controlled by an on-board autonomy engine. The Safe Testing of Autonomy in Complex Interactive Environments (TACE) system provides an on-board “Watchdog” processor that automatically detects unsafe behaviors stemming from an autonomy-generated instruction or from user-defined platform/test range limitations during live tests. If unsafe behavior occurs, then the Watchdog unilaterally assumes control of the autopilot as needed to mitigate or remediate the sensed hazard. TACE also provides a ground station for test monitoring and control and a sophisticated live-virtual-constructive (LVC) infrastructure for stimulating autonomous system behaviors of interest.

This paper focuses on Test Resource Management Center (TRMC)-sponsored improvements of TACE capabilities and transition of TACE to “early adopter” test ranges. More specifically, this paper will 1) discuss the integration of TACE with the NAVAIR GUARDIAN system (resulting in a TRL 6 ground-based sense-and-avoid system for collision avoidance and airspace de-confliction), 2) discuss the integration of TACE with AFRL’s Unmanned Systems Autonomy Services (UxAS) (resulting in a hardware agnostic test tool for ranges to safely evaluate a wide variety of autonomous systems from across the DoD on low-cost platforms), and 3) discuss ongoing efforts to transition TACE to the Edwards Air Force Base (EAFB) test range.

2019-SIW-006

On the Role of Simulation and Simulation Standards in Industry 4.0

Tuesday, 0830-0850, Legacy North 2, SPEC Track

Steffen Strassburger / steffen.strassburger@tu-ilmenau.de

This article introduces the concepts and ideas behind Industry 4.0 and discusses the role of simulation and simulation standards for implementing it. We argue that the success of Industry 4.0 highly depends on the success of interconnected cyber-physical systems (CPS) which can only be implemented with up-front simulation. This up-front simulation and development of CPS is often associated with the term of building the “digital twin” for the respective CPS. Digital twins are typically defined as digital representations which represent the real system and its current state in a digital model. For investigating their dynamic behavior, digital twins must have properties typically associated with simulation models. In this article, we will discuss requirements and potential solutions for the successful implementation of digital twins as well as the implications that this has on simulation standards. As an example, digital twins as representations of a CPS will have the need to communicate with other digital twins; hence a modular approach for building federations of digital twins is needed. Beyond that, also a need for standardized communication between the digital twin and the real CPS arises. The article will therefore discuss currently available interoperability standards, like the High Level Architecture (HLA) on the simulation side, and Open Platform Communications (OPC) Unified Architecture (OPC UA) on the control hardware side and how well they match the requirements that Industry 4.0 with its CPS and digital twins imposes. The article will also include our opinion on the need for the future evolvement of existing standards.

2019-SIW-007

Using the Opus Codec for Simulated Radio Communications

***Paper will be discussed during DIS / RPRFOM PSG meeting, Thursday, 7:00 PM, Forum West 1

Peter Ross / peter.ross@dsto.defence.gov.au

Since 1995 μ-law has served as the minimum required audio encoding scheme in DIS and RPR-FOM-based distributed simulation standards. Despite huge advances in audio compression technology, its status as the lowest common denominator, means μ-law continues to be used today in distributed simulation exercises. The introduction of DIS version 8 presents an opportunity to update the minimum required encoding scheme to a more efficient and capable system.

We propose Opus Codec as the new minimum required encoding scheme for DIS version 8. Opus is a high performance, royalty free, open standards audio codec that supports both interactive voice and music applications. At 12 kbit/s it can reproduce better-than telephone quality audio, in comparison to the 64 kbit/s bitrate required by μ-law. Opus is used in many internet services, including Skype and YouTube. This paper describes how to use the Opus Codec in DIS and RPR based simulations. We provide theoretical and synthesised bandwidth comparisons, and estimate the real-world benefits by applying Opus to historical exercise data.

2019-SIW-008

Model Based System Engineering Applied to Tradespace Exploration and Assessment

Tuesday, 0830-0850, Salon 2, SLT Track

William “Bud” Robey / bud.robey@theperducogroup.com

The Air Force Strategic Development Planning & Experimentation (SDPE) Office is responsible for supporting Air Force Development Planning efforts and conducting experimentation campaigns that will result in planning choices for senior Air Force-level resource decisions. While the SDPE office is established within Air Force Material Command (AFMC) for organize, train, & equip considerations, it receives its operational taskings through the Capability Development Council from the CSAF and SECAF. The SDPE was created as the 10th AFRL Directorate due to the Lab’s flexibilities and multi-domain perspectives of air, space, and cyber. The office is responsible for tracking the execution of approximately 120 action items from the Air Superiority 2030 Enterprise Capability Collaboration Team (ECCT) as well as facilitating the new Multidomain Command and Control ECCT. There are also four experimentation campaigns in development: Data to Decisions (D2D), Defeat of Agile Intelligent Targets (DAIT), Future Attack Capabilities Experimentation (FACE), and Directed Energy (DE).

Over the past year, one tool, the Advanced Framework for Simulation, Integration and Modeling (AFSIM), paired with complementary tools, is enabling game changing analytical methodology for translating military utility at the campaign level into COCOM, MAJCOM, AF and AFRL investment strategies. This short presentation will provide background for application of Model-Based Systems Engineering tools to Early Systems Engineering (ESE) activities.

2019-SIW-009

A discrete event simulation-based multi-objective reinforcement learning reward function for optimizing manufacturing material handling

Tuesday, 0850-0910, Legacy North 2, SPEC Track

Mikel Petty / pettym@uah.edu

Material handling is the activity of transporting materials from place to place within a manufacturing facility. The cost of material is significant and non-value-added for manufacturers, thus managers strive to plan material handling so as to enable efficient production while minimizing cost. However, material handling is a very complex process, and consequently any algorithm or procedure to optimize material handling must consider multiple performance variables, including labor and equipment costs, time and distance, and the effects of possible material shortages. However, most conventional optimization procedures assume a single variable to be optimized. Therefore, combining or integrating multiple optimization variables into a single cost function is an active research area. In this paper we show how an abstract discrete event simulation can serve as the basis of an integrated cost function for a complex manufacturing material handling planning process. A weighted sum objective function applied to the simulation’s results is the cost function. That cost function is used to calculate the reward in a larger implementation that applies reinforcement learning to improve material handling plans. The larger project is briefly described in this paper to set the integrated cost function in context. This may be the first work that shows how multiple material handling performance variables can be integrated into a single cost function suitable for optimization or machine learning.

2019-SIW-010

Cross Domain Security for Mission Training through Distributed Simulation

Tuesday, 1610-1630, Salon 2, SLT Track

Arjan Lemmers / arjan.lemmers@nlr.nl

NATO needs a MTDS (Mission Training through Distributed Simulation) capability to provide mission training and operational assessment of air and C2 systems in all core roles related to air operations. In order to maximize training effectiveness, it’s essential that the MTDS capability provides scalable, immersive, realistic, seamless and secure training environments. The NATO task group MSG-165 will incrementally build, exploit and maintain an initial MTDS capability in coordination with relevant MTDS exercises.

While a lot of technical concepts, standards and tools are already available to support the interoperability of classified systems, security still puts limitations on their usage in a multinational distributed network. Information security is therefore key to deliver realistic training and is increasingly important as a necessity for future MTDS exercises. It is likely that some or all the simulation data to be exchanged between the training systems may be classified at a specific (national) classification level and need to be protected. The most important task is to prevent information leakage between security domains (confidentiality) and to protect system integrity. Therefore, access to sensitive data should be regulated with proper privileges. This implies that adequate security measures are needed to deal with different security domains.

In the MSG-165 task group a subgroup is working towards Cross Domain Security (CDS) solutions for MTDS. The group sets the principles for CDS, drafts a CDS reference model and gathers CDS requirement specifications for MTDS. In this presentation the authors will give an overview of the current status and will present some of their first ideas and concepts for CDS Solution Architectures and Network Solutions for MTDS.

2019-SIW-011

A Robotics and Autonomous System Use Case to Guide Specification of the Command and Control System to Simulation System Interoperation (C2SIM) Standard

Tuesday, 1110-1130, Legacy North 2, SPEC Track

Curtis Blais / clblais@nps.edu

A Simulation Interoperability Standards Organization (SISO) Product Development Group (PDG) is developing a standard for Command and Control System to Simulation System Interoperation (C2SIM). The C2SIM standard will improve upon and replace the currently existing Military Scenario Definition Language (MSDL; SISO-STD-007-2008) and Coalition Battle Management Language (C-BML; SISO-STD-011-2014) SISO standards. Current work in the PDG is specifying a core logical data model addressing key areas of C2-to-Simulation interoperation such as initialization and tasking/reporting. In addition, the PDG has defined an initial Land Operations extension to the core data model suitable for implementation, demonstration, and evaluation of the standard in a distributed environment. Due to the rapid introduction of robotic and autonomous systems (RAS) into military operations, there is interest in examining what is needed in C2SIM to address its broader objective of enabling information interchange across C2 systems, simulation systems, and RAS. This paper proposes a use case for such an information interchange and investigates how such capabilities may be addressed in C2SIM through changes or additions to the various levels of data models currently under development.

ABSTRACTS

2019-SIW-012

Command and Control System to Simulation System Interoperation: Technical Approach in Development of the C2SIM Standard

Tuesday, 0910-0930, Legacy North 2, SPEC Track

J. Mark Pullen / mpullen@c4i.gmu.edu

A Simulation Interoperability Standards Organization (SISO) Product Development Group (PDG) is developing a standard for Command and Control System to Simulation System Interoperation (C2SIM). The C2SIM standard will improve upon and replace the currently existing Military Scenario Definition Language (MSDL; SISO-STD-007-2008) and Coalition Battle Management Language (C-BML; SISO-STD-011-2014) SISO standards. Current work in the PDG is specifying a core logical data model ontology addressing key areas of C2-to-Simulation interoperation such as initialization and tasking/reporting as well as transformation of the ontology data model to an Extensible Markup Language (XML) schema for implementation. In addition, the PDG has defined an initial Land Operations extension to the core data model suitable for implementation, demonstration, and evaluation of the standard in a distributed environment. NATO has a Modeling and Simulation Group actively participating in these activities. This paper describes the technical approach and status of development of the C2SIM standard, describing pre-ballot products, a reference implementation, and planned evaluation activities.

2019-SIW-013

From Information Description to Information Understanding: The Role of Ontology in Emerging SISO Standards

Tuesday, 1050-1110, Legacy North 2, SPEC Track

Curtis Blais / clblais@nps.edu

A primary challenge in computing is making human information intelligible to automated systems. The long-standing domain of Knowledge Representation in the field of artificial intelligence addresses this challenge through both representation schemes (how information is encoded) and computational algorithms (how information is processed). For distributed systems on the scale of the World Wide Web, numerous researchers and organizations have laid out a technical approach and road-map, often referred to as the Semantic Web and Semantic Web Stack, aimed at improving the encoding of semantics to enable automated systems to perform reasoning to assist human users more effectively. Formalization of information into an ontology using a standard encoding language such as the Web Ontology Language (OWL) creates opportunities for advanced capabilities. Just as we have seen adoption of XML in the Simulation Interoperability Standards Organization (SISO) as a means for specifying standards for interoperability over the past 15 years, it appears likely that a similar transition will occur in the coming years as the community becomes more aware of the opportunities and benefits of the use of stronger semantic representations in specification of its interoperability standards.

A Simulation Interoperability Standards Organization (SISO) Product Development Group (PDG) is developing a standard for Command and Control System to Simulation System Interoperation (C2SIM). The C2SIM standard will improve upon and replace the currently existing Military Scenario Definition Language (MSDL; SISO-STD-007-2008) and Coalition Battle Management Language (C-BML; SISO-STD-011-2014) SISO standards. Current work in the PDG is specifying a core logical data model ontology addressing key areas of C2-to-Simulation interoperation such as initialization and tasking/reporting. This paper discusses motivation of using ontology as the specification language for the C2SIM standard and explores some of the capabilities that will be obtained from this approach in the short-term and over time as the approach gains more widespread adoption.

2019-SIW-014

Applying the M&S COI Discovery Metadata Specification to System Repositories for Digital Engineering

Monday, 1610-1630, Salon 2, SLT Track

James Coolahan / jim.coolahan@comcast.net

During the last several years, the U.S. Office of the Secretary of Defense (OSD) has promoted several concepts related to what is now being called Digital Engineering. In mid-2018, the Under Secretary of Defense for Research and Engineering [USD(R&E)] released a Digital Engineering Strategy, to which the Services are responding. A key construct of the Digital Engineering of a system, originally referred to as the Digital System Model (DSM), has evolved to become known more recently as the "Authoritative Source of Truth" about a system. Irrespective of the name, in practice, this construct will, no doubt, be implemented as a repository of authoritative data and information about a system as it evolves through the U.S. Department of Defense (DoD) acquisition process. This repository, perhaps physically distributed but definitely logically unified, will serve as a key resource in a digital collaborative environment consisting of system stakeholders; systems engineering processes; and modeling, simulation, engineering and analysis tools.

In order to serve as the "Authoritative Source of Truth," the system data and information repository must have metadata for each element of its contents that provides an unambiguous definition of the element, sources of its technical credibility, and organizational sources of authority. Additionally, data elements will require units of measure, may be parts of data aggregates from which they may inherit metadata, and may be associated with other data elements in other ways. It would be useful if there were an accepted standard for metadata for the elements of a system data and information repository, so that common tools could be developed that could operate on metadata from multiple repositories, thus providing both consistency and sufficiently broad use to encourage the development of such tools. Rather than starting from scratch to develop a specification for the metadata, it would be useful to reuse existing metadata specifications. One such specification, the Modeling and Simulation Community of Interest Discovery Metadata Specification (MSC-DMS), in its latest version 1.5, appears to provide an excellent starting point for specifying a significant fraction of the metadata that will be needed for a system data and information repository. This presentation will show how much of the MSC-DMS can be applied directly to this new use, and will indicate some extensions that are likely to be needed

2019-SIW-016

The Persistent Cyber Training Environment--Cyber Mission Force Training for the 21st Century.

Tuesday, 1550-1610, Legacy North 2, SPEC Track

Jake Borah / jborah@sprynet.com

The Persistent Cyber Training Environment (PCTE) will provide the DoD cyberspace workforce the capability to conduct cyberspace training, exercises, mission rehearsals, experimentation, certifications, as well, as the ability to assess and develop cyber tactics, techniques, and procedures for missions that cross boundaries and networks. PCTE will provide the cyberspace workforce with a training environment that emulates a realistic operational environment that provides scope (types of nodes), scalability (number of nodes), and fidelity (level of representation of nodes) driven by training objectives and user defined specifications. The PCTE Objectives are: a) decrease the time to produce and present training scenarios, b) increase the training throughput, c) increase the quality of training, and d) increase the reuse of existing training scenarios and emulate environments. PCTE will be a hybrid cloud simulation environment composed of five regional compute and storage sites. These sites will be deployed from the fourth quarter of fiscal year 2018 until the fourth quarter of fiscal year 2019. PCTE will initially be accredited at the Secret level. PCTE will eventually be accredited a multiple classifications levels from Unclassified to Top Secret SCI. This paper will explain what PCTE is, how it is being developed, what has been accomplished, and where the program is going.

2019-SIW-017

A Conceptual Modeling Approach for Threat Analysis and Threat Capability Assessment

Tuesday, 0850-0910, Salon 2, SLT Track

John Daly / daly_john@bah.com

This presentation describes research on the application of conceptual modeling methodologies to defining the key components of strategic threats and the corresponding threat capabilities; as well as identifying the required counter-capabilities required to counter the threat. By using a conceptual modeling and systems engineering approach (including Model-Based Systems Engineering (MBSE)), we can define the generic components of a threat; and then link that threat model to capabilities used in countering the threat. In this presentation we show how we can reverse-engineer the threat into model-based components and then link those threat component capabilities ("Red Capabilities"), with the appropriate counter-capabilities ("Blue Capabilities") - to exploit their vulnerabilities and defeat the threat. This conceptual model-based methodology helps us objectively identify the key counter-capability areas required at the system of systems level, and with further analysis to individual system capabilities; all in a systematic, objective, repeatable methodology. By including threat model components in a conceptual modeling framework, we can compose process models that characterize key threat scenarios. A model-based methodology makes analysis of a large number of threats, asynchronous and simultaneous multiple threats scenarios, and highly complex threats a tractable problem. Our methodology describes a threat as a process subject to modeling and leveraging systems engineering insight. This enables analysis that identifies linkages between threats and the capabilities that can be used to defeat or protect against them. These threat process models can be further linked to counter-capabilities of organizations or nations, helping identify those which are not being addressed or met effectively. A key advantage of the approach is to use modeling throughout, so that the analysis can scope to performance of capabilities more easily, as the fundamental modeling data and relationships are in place. Additionally, complex systems, and systems of systems interactions in threat execution and protection are accommodated more readily. By utilizing conceptual modeling and system engineering tools and processes to analyze threats, we are able to gain critical insight on threat and counter-threat capabilities; as well as manage complexity in ways impossible using conventional analysis.

2019-SIW-018

A Transformation Process for Generating an Extensible Markup Language (XML) Schema from a Formal Ontology for Practical Application in C2SIM Implementations

Tuesday, 1030-1050, Legacy North 2, SPEC Track

Curtis Blais / clblais@nps.edu

A Simulation Interoperability Standards Organization (SISO) Product Development Group (PDG) is developing a standard for Command and Control System to Simulation System Interoperation (C2SIM). The C2SIM standard will improve upon and replace the currently existing Military Scenario Definition Language (MSDL; SISO-STD-007-2008) and Coalition Battle Management Language (C-BML; SISO-STD-011-2014) SISO standards. Current work in the PDG is specifying a core logical data model ontology addressing key areas of C2-to-Simulation interoperation such as initialization and tasking/reporting as well as transformation of the ontology data model to an Extensible Markup Language (XML) schema for implementation. This paper describes the transformation process of interpreting the ontology structures and generating associated XML Schema language constructs to support practical application of the standard. Certain restrictions are imposed on the XML Schema language constructs generated in order to make implementation of software for reading and writing XML documents conforming to the generated schema as simple as possible. The transformation relies on particular patterns found in a specific representation of the ontology; namely, the Resource Description Framework (RDF) XML (rdf/xml) format produced by the open-source Protégé ontology editing tool developed by Stanford University.

2019-SIW-019

Cloud Based Modeling and Simulation Case Study: Soldier Systems Engineering

Monday, 1550-1610, Salon 3, SVCS Track

Rob Kewley / rob@simlytics.cloud

The Simulation Interoperability Standards Organization's (SISO) Cloud Based Modeling and Simulation (CBMS) Study Group was established to identify and study existing M&S in the cloud activities, document best practices, highlight lessons learned and identify areas for potential standardization in order to facilitate adoption by other practitioners. One of the group's goals is to catalog, describe, and analyze current efforts using M&S in the cloud, identifying the advantages and disadvantages of each approach. The group has adopted the case study approach for this effort, and this paper is the first cloud-based modeling and simulation case study analyzed. It breaks down the case into several categories of analysis and documents the approach and lessons learned within those categories. The soldier systems engineering M&S case study documents an effort led by the Army's Sergeant 1st Class Paul Ray Smith Simulation and Training Technology Center with additional support from the Natick Soldier Research Development and Engineering Center to model the complex tradespace between equipment performance and human performance in the context of mission related tasks.

2019-SIW-020

Modeling, Simulation, and the Hard Problems of Wargaming: Complexity, Cognition, and Computers

Monday, 1550-1610, Legacy North 2, SPEC Track

O. Thomas Holland / thomas.holland@gtri.gatech.edu

Wargaming as a method for understanding difficult problems has a long tradition in military science. For a variety of different, but valid reasons, wargaming remains a problematic undertaking. As the increased interest in wargaming has taken hold in the United States, NATO and beyond, the temptation to apply M&S solutions, which are so valuable in the training domain, is often a lure for many organizations who then run the risk of applying M&S to the wargaming domain with unrealistic expectations. The art and science of wargaming, if taken as a cognitive process, is a domain that is necessarily complex and the possibilities of applying such solutions must come with caveats and constraints. The authors present here some of the considerations of where wargaming remains a challenging pursuit that can benefit from M&S solutions. The authors present some examples, and also issue a call to beginning an M&S community conversation to address wargaming. Although M&S can certainly help address the hard problems of wargaming, our experience has shown that it is important to be constrained and to carefully introduce M&S to the wargaming community.

ABSTRACTS

2019-SIW-021

Lessons Learned from a French system acquisition experimentation mixing military ground vehicles and simulations

Tuesday, 1110-1130, Salon 3, SVCS Track

Jose Ruiz / ruiz__jose@hotmail.com

Inside the French Ministry of armed forces, the Armament Procurement Agency (DGA) conducts studies and evaluations of new systems before delivering it to military forces. For ground vehicles, a technical center provides a wide terrain for mobility and detonation assessments. During the trial periods, the evaluated vehicles are equipped with measuring assets to collect data (GPS location, azimuth of turret, elevation of gun …) and to broadcast it to an analysis team located in a central building. This center also provides to the analysis team various virtual and constructive simulations, in static and dynamics platforms. Previous experimentations were conducted to insert the collected data from vehicles inside a simulation but this application was too specific (lack of flexibility for structures of data and simulation systems). The purpose of the recent experimentation is to display the collected data inside a synthetic world by applying the HLA (High Level Architecture) standard and the RPR-FOM (Real time Platform Reference Federation Object Model) as data exchange model. The two main challenges are the translation of collected data to standardized simulated objects, and the control and monitoring of all deployed systems including vehicle assets and simulations. The presentation describes how DGA has adapted its national interoperability system for simulation called ELLIPSE to support the experimentation, and provides lessons learned about using data translation and remote control.

2019-SIW-022

Simulating the future Megacity: Approaches and standards for representing Pattern of Life modelling

Monday, 1610-1630, Legacy North 2, SPEC Track

Jonathan Lloyd / jplloyd1@dstl.gov.uk

Dstl, on behalf of the UK MOD, is leading research into approaches for simulating the Future Operating Environment. This work in particular covers both representation of future worlds (e.g. Megacity operating environments and the interconnected nature of those environments) alongside the representation of future force structures; Tactics, Techniques and Procedures (TTPs); and Pattern of life. Alongside the challenge of representing such future operating environments is the challenge of how the UK MOD protects its investment in development of computer generated forces and pattern of life behaviours through development of common approaches that can be re-used across the defence enterprise in accordance with simulation policy (Joint Service Publication 939) that directs that such coherent and re-usable approaches are developed.

This paper will provide an overview of the problem space that the research is looking to address, and describes how recentDstl funded research has developed an approach for standardizing Pattern of Life through a proposed Pattern-of-Life Definition Language (PLDL). PLDL is a potential industry standard to provide standardized, portable and re-useable POL definitions. The PLDL schema allows a simulation planner to design Patterns of Life which are independent of simulation scenarios, platforms and geographic locations. This will aim to promote discussion at SIW on the appetite for standardization of such an approach within SISO, and relevance to other standards such as the Military Scenario Definition Language (MSDL) and C2Sim standards. The paper will conclude on how this work could provide a grounding for representing other aspects of the interconnected nature of future Megacity type environments.

2019-SIW-023

New Object Modelling opportunities in HLA 4

Tuesday, 1030-1050, Salon 3, SVCS Track

Bjorn Moller / bjorn.moller@pitch.se

One of the main success factors of HLA is that it makes it easy to create, maintain and share federation object models (FOM) for distributed simulations. Such models can be developed and extended for almost any domain, for example defense and security, space, engineering, medicine and transportation. Particular success stories include the Real-time Platform Reference FOM (RPR FOM), NATO Education and Training Network (NETN) FOM and the upcoming Space Reference FOM.

As experience from developing FOMs have been gathered, HLA has been extended and matured over time. HLA IEEE 1516-2000 introduced well-defined data types and the use of XML syntax. HLA IEEE 1516-2010 introduced modular FOMs. Still, some challenges exist, in particular for making flexible extensions to reference FOMs.

The HLA standard is now open for revision for a new version, nick-named HLA 4. This paper explains some of the proposed new features for object modelling. Several of them are based on requirements from the RPR FOM community but are useful for most FOMs.

One important requirement is to be able to make a more fine-grained extension of an already existing object model using additional FOM modules. There are four cases for this:

It should be possible to add more attributes to an existing object class, using a new FOM module. The same applies to interaction classes where new parameters needs to be added. A typical RPR FOM use case is to add more attributes to the standard Aircraft class.

It should be possible to add more Dimensions for DDM filtering to an existing object class or interaction class. A typical RPR FOM use case is to be able to add Lat/Long based filtering of platforms in a battlefield.

It should be possible to add more enumerators to an existing enumeration. A typical RPR FOM use case is to be able to add new or experimental types of platforms, that don't exist in the standard SISO-REF-010 enumerations.

It should be possible to add more variants to an existing variant record data type. A typical RPR FOM use case is to be able to add records that describe new data links to the Signal interaction.

Other proposed features include the ability to specify the minimum set of attribute values that is required for an entity to be useful in a federation. As an example, it may be difficult for most simulations to properly handle an aircraft instance, unless the type, force affiliation and position is known. It has also been proposed to be able to clearly specify references, for example that the firing entity of a fire interaction refers to a platform.

Among the more advanced proposed features is the ability to specify that an interaction is targeted at a particular object instance, somewhat similar to a method invocation in object-oriented programming.

This paper explains how these new features can be integrated into existing simulations as well as how they can be used to simplify FOM development and enhance interoperability while maintaining backwards compatibility.

2019-SIW-024

Developing Space FOM Federation Agreements

Tuesday, 1050-1110, Salon 3, SVCS Track

Bjorn Moller / bjorn.moller@pitch.se

The SISO Space Reference FOM provides a framework for developing interoperable simulations for the Space domain. The first version focuses on time, reference frames and execution management. It is expected to be a starting point to build specific federation agreements upon. To facilitate this, two types of templates are provided in the standard: the Federation Execution Specific Agreement (FESFA) and Federate Compliance Declaration (FCD).

This presentation describes how these can be used across the federation development, from a DSEEP (Distributed Simulation Engineering and Execution Process standard) perspective, and how additional federation agreements and FOM extensions can be added. The FEAT (Federation Agreement Template standard) is touched upon from this perspective. Some experiences from early use cases, like SEE (Simulation Exploration Experience) are also given.

The presentation finally summarizes on how SISO standards can build upon each other and synergize. Some ideas for the road ahead are also given.

2019-SIW-025

The Wargaming Process and M&S

Monday, 1530-1550, Legacy North 2, SPEC Track

Charles Turnitsa / cturnitsa@gmail.com

In a pattern similar to (but distinct from) the processes developed as standards for distributed simulation events (examples include FEDEP and DSEEP), there is also an identifiable process for wargaming events, as typically executed by the US Department of Defense, and other organizations. Within this process, there are a number of different aspects of the wargame, aside from the actual game execution mechanism, that are suitable candidates for introducing a number of methods, tools and techniques from modeling and simulation. Even in cases where traditional analog execution of the wargame are preserved, this is the case, although the benefits of such wargaming can also be augmented by digital tools, without losing the flexibility and expressiveness of analog gaming. A review of the identifiable wargaming process, and discussion of it's usefulness to the community of practice, as well as identification of the introduction of modeling and simulation are both presented here. Several experiences and lessons learned are enumerated.

2019-SIW-026

Development and instrumentation of low cost accessible platforms for virtual driving cockpit experience.

Tuesday, 1530-1550, Legacy North 2, SPEC Track

Jonathan Diemunsch / jonathan.diemunsch.1@us.af.mil

The data standards that are used within the VR environment allow for many integrations that can be done at a rapid pace with minimal infrastructure. The development of a low cost go kart implementation allows the go kart to be fully immersed within a simulation of an indoor go kart track. The go kart was instrumented to allow for the game engine to take the inputs from the go kart in a way that utilizes the standards of controller inputs within the Unreal Game Engine. The tools utilized to create the high fidelity virtual experience are commercially available and through the standard interfaces of the tools this experience was created by the Gaming Research Integration Learning Lab through our STEM outreach efforts. This proof of concept shows the potential of low cost modeling of platforms for virtual integration in the future while providing a clear way forward on the implementation of the game engine standards.

2019-SIW-028

Advancing M&S as The "Tool" for Digital Engineering

Monday, 1550-1610, Salon 2, SLT Track

Paul Gustavson / pgustavson@simventions.com

There continues to be a growing interest and intrigue in Digital Engineering as means to support system engineering artifacts. But Digital Engineering is more than PowerPoint and PDFs. Digital Engineering demands something more. It begs to be the playground for which thoughts and ideas can be seeded, tested, explored, and revisited. And the principle tool Digital Engineering needs in the creation and exploration of new ideas and supporting visioneering is Modeling and Simulation (M&S).

This paper and presentation explores how M&S can support the five goals of the Digital Engineering strategy, which center on the following elements:

(1) Models,

(2) Authoritative data sources,

(3) Innovation,

(4) Infrastructure and environment, and

(5) Culture / Work Force

We'll examine how the overall goal of Digital Engineering truly can't work without M&S enablers. These enablers include standards that support data asset catalogs, composable models, interoperability exchange, and game engine viewpoints to create rich user experiences. The path of taking Digital Engineering to the next level is through M&S -- it is the tool. And for those of us that have been involved in M&S -- especially standards -- Digital Engineering is our Why -- it always has been. While we didn't know what to call it early on, the idea of digital engineering -- at least pieces of it -- was envisioned at the start when we pioneered Simnet, DIS and later HLA. It's why we have built standards. It's time to seize the opportunity and discuss the standards, technologies and methods that will make digital engineering even more common place. Some of the topics we explore include Base Object Models (BOMs), Game Engines, Mixed Reality (VR/AR), and AI/ML.

ABSTRACTS

2019-SIW-029

Secure Data Exchange In Dynamic Mesh Networks

Tuesday, 1610-1630, Salon 3, SVCS Track

Deryck Arnold / deryck.arnold@uk.thalesgroup.com

Theme: "Information Exchange, Today's Challenges, Tomorrow's Requirements, Emerging a new Exchange Standard"

This paper discusses how a distributed structured database can be used to provide secure information exchange in near real time ad-hoc environments. We introduce the concept of a structured database which follows a global schema, but where branches are distributed across participating processing nodes and kept in sync by the transmission of atomic transactions between them. The processing nodes form a mesh network that can be used to propagate information with built in security.

The capability this provides to applications is analogous to the World Wide Web, but designed for near-real-time systems rather than humans, and for peer-to-peer networks rather than centralized client-server networks.

This concept can also meet the requirements for multi-level security in training solutions involving multiple distributed entities, real and simulated, amongst many other use cases.

To achieve this goal requires a new standard to make it interoperable between multiple parties, and is the purpose of this application. We shall call this the Global Schema Standard (GSS).

Requirements for a new standard

Future systems will increasingly be represented by multiple autonomous, yet cooperating, systems and this need has to be addressed. The distributed database can support these requirements and because it is extensible future and as yet unknown ones. It can provide interoperable capability between organizations, components, real assets, simulated devices and training environments.

This approach, if standardized, could become a fundamental component in many loosely coupled distributed systems and be of great benefit to many parties developing cooperating heterogeneous systems. The secondary benefit being that all compliant systems become interoperable by default and mean a reduction in cost and time to support new exercises.

2019-SIW-030

End User Autonomy in the Generation of Automated Performance Measures

Tuesday, 1530-1550, Salon 3, SVCS Track

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Simulation-based training continues to evolve with the introduction of novel and deployable technologies such as virtual reality, augmented reality, and mixed reality. As these environments mature, organizations will continue to pursue opportunities to provide relevant training at the time needed. For example, the U.S. Navy's Sailor 2025 initiative has a pillar dedicated to the development of "modern training at the point of need." While these technologies focus on providing training content within these emerging technology media, they may result in an increase of practice and instructorless training tools. Ensuring that these systems yield the learning desired will require integration of human performance assessment via automated, system-based measures or self-assessment technology.

The Human Performance Markup Language (HPML) under development via the SISO Product Development Group provides a first step in ensuring that performance assessment technologies can be integrated in a manner that ensures interoperability across training systems and with instructional systems such as learning management systems. While the HPML is intended to increase visibility into measures through a human and machine-readable format, providing end users with an opportunity to develop and tailor performance measures will be critical to minimizing lifecycle sustainment costs and ensuring systems remain relevant. As such, the Navy is pursuing a technology aimed to provide an interface that would assist with the development and revision of performance measures - the Performance Measurement (PM) Workbench.

Early iterations of the tool provide software engineers with a technology that facilitates the generation of HPML to expedite the development of measures for new domains and customers. The goal of current effort is to provide this technology with an interface that allows end users to interact with a visual interface that provides building blocks to modify and create measures. This technology development will provide considerable benefits for the modeling and simulation training community. For example, leveraging the HPML as the output will ensure standardization of generated measures thereby mitigating interoperability issues. Additionally, through end user involvement, training system validation and increased proficiency monitoring will become more accessible. Finally, as more simulation training environments use HPML for performance measures, integration of HPML with Learning Management Systems will increase the opportunity for lifelong learning trend analysis. However, transition of such a technology will require careful consideration to avoid challenges. Specifically, an intuitive user interface to increase system use, policy or processes to validate measures, and how data changes in performance measures will impact desired trend analysis.

This paper will provide an overview of the PM Workbench technology, as well as a short discussion on the benefits of the technology. Finally, the paper will provide a preliminary look at the challenges that should be considered as the technology matures and transitions to use in the future.

2019-SIW-031

Research on Cloud-Based Simulation: A Literature Review

Monday, 1530-1550, Salon 3, SVCS Track

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With increasing interest in cloud computing and uncertainty over the potential impact on the M&S community, a Cloud-Based Simulation Study Group was assembled to identify and document existing M&S in the cloud activities to facilitate adoption by other practitioners and better understand how simulations should ideally be compiled in the future. One of the Study Group tasks includes a literature review of research in this area. The main object of this paper is to provide a summary of research reported in the last few years on any aspect of running simulation through or from the cloud. This review is intended to provide a better understanding of cloud computing from a distributed simulation perspective and inspire additional research to better answer the underlying research question.

2019-SIW-032

The UFOS Framework Enabling Formalized Execution of Physics-integrated Descriptive Architecture Languages

Monday, 1610-1630, Salon 3, SVCS Track
Gregory Haun / ghaun@agi.com

A core goal for an efficient and scalable simulation and analysis framework is the separation of the models, from the simulation execution, from the chosen methods for orchestration and/or analysis. In doing so, the analysis concepts, simulation architecture, and simulation execution can be abstracted and constructed in such a way to support inherent interoperability with diverse and best-of-breed models and tools assuming that the underlying context is well described and semantically grounded during data interchange. This alleviates inherent challenges found in monolithic simulation environments where the models are deeply interwoven within the simulation framework making changes difficult to perform without costly code reviews and/or access to the original developers, thus becoming outdated.

Consistent simulation context and semantic agreement of data objects produced and consumed during transaction is crucial in the design and construction of a model agnostic simulation infrastructure and orchestration framework. These concepts necessitate a formal knowledge construct, which describes the overall physics phenomenology, operational domain concepts, systemic functions, and methods for process interaction. This formal descriptor captures the ontological relationships of objects, concepts, and actions thus becoming the basis for integration, as well as the very language for simulation represented through ontologically adorned behavioral definitions. Ultimately, these behavioral ontologies not only serve knowledge mapping and relational reasoning, but also provide a mechanism for formal execution and thus deeper reasoning extended through physics-integrated simulation. Additionally, this common vernacular also ensures consistency during object and data interchange and additionally subordinate meta-models guaranteeing unit transformation for efficient orchestrated execution and simulation.

This presentation will describe the development and utility of an orchestration and simulation framework, UFOS (Unifying Framework for Orchestration and Simulation), founded on an executable architecture methodology, leveraging behavior-rich ontologies, allowing for the orchestration, execution, and examination of formalized process interactions. A constituent agent framework, the AMoEBA (Agent Modeling of Event-based Architectures) framework allows for the interpretation and direct execution of semantically-formalized agent interactions representing doctrinal/policy motivations, systemic modes of operation, and human behaviors; constrained by integrated models, tools, and data imposing limitations, such as those realized through a holistic and multi-dimensional physics-based environment. Concept, system, and actor architectures constructed through these semantically formalized behaviors and physics constrained events allow for non-developers and experts in the field to easily and graphically capture, vet, and adapt these models for analysis and simulation needs without being burdened with additional development translation and explanation.

2019-SIW-033

Natural Language Processing and Web Tools for Mapping Units from ClinicalTrials.Gov

Tuesday, 1550-1610, Salon 3, SVCS Track
Jacob Barhak / jacob.barhak@gmail.com

Summary data from some clinical trials is now becoming available in electronic format due to US public law through the NIH NLM database ClinicalTrials.Gov . The database currently holds over a quarter of a million trials with about 30K trials with result records. However, despite the great work of the team that developed this fast growing database, the data held in it is far from standardized and using it requires effort, especially for machines. The difficulty arises from the fact that data entry to this database is manual from multiple external sources, mostly textual, and somewhat permissive. Although entered data goes through a review process, the review is human and therefore sometimes forgiving. For machine comprehension, definition of units is essentials so numbers held in the database will make sense. There are currently over 20K units for 30K clinical trials with results and many of the units are synonyms and some are even errors. Even CDISC units that are in a good level of standardization need normalization and enhancement. This presentation will discuss recent advances in the effort to standardize the medical units. Specifically Natural Language Processing (NLP) techniques are used alongside other Machine Learning methods to cluster similar units together. This allows a human to inspect and standardize the units more efficiently. In this presentation the NLP techniques used will be discussed in details as well as the clustering techniques. Similar techniques merged with web tools will be helpful for future analysis of other textual fields within the fast growing database. To move the standardization effort forward a web tool was created to allow humans to classify the units. Multiple users can see the units in each cluster and the machine suggestions and classify those. The web portal is accessible through: ClinicalUnitMapping.com.

2019-SIW-034

A Simpler Dead Reckoning Algorithm with Better Performance

Tuesday, 0850-0910, Salon 3, SVCS Track

Robert Murray / bobmurray222@gmail.com

“The nice thing about standards is that you have so many to choose from.” - Grace Murray Hopper or Andrew S. Tanenbaum, take your pick. We even have a choice of epigrammatists.

Sarcasm aside, it is a well-known fact that too many choices in simulation standards leads to less interoperability. This is the case with the current state of dead reckoning. There are eight Dead Reckoning Algorithms (DRAs) for moving entities and not much guidance for implementers to choose between them. After 25 years of experience with dead reckoning, it is time to improve both its ease of use and performance.

Practical use has shown that algorithms 2 through 5, the so-called World formulas, are used almost exclusively. Algorithms 6-9, the so-called Body formulas, are rarely seen in practice. This is unfortunate because the Body formulas perform much better in certain conditions. In the simplest terms, the Body formulas are able to predict circular motion while the World algorithms are limited to parabolic motion. Most entities turn in circles, not parabolas. We’ve been missing out on better performance because the Body formulas are not widely understood.

The proposal in this paper is to combine the math formulas used by the eight algorithms into a single algorithm called Dead Reckoning Algorithm 10. Being an algorithm, DRA 10 can choose the best formula by following a series of standardized rules. This improves performance for everyone and removes the problem of implementors making the wrong decision. DRA 1 remains unchanged for use with static entities.

No new formulas are being proposed, only a new algorithm that incorporates the existing formulas. There are actually only two formulas, one general World formula and one general Body formula. The other six formulas are subsets of those two. DRA 10 will implement both formulas and choose the best one based on the current dynamics of the vehicle.

The change to a single algorithm has some issues. For simplicity, there can be only one set of coordinates, so DRA 10 will specify the use of World coordinates and internally convert to Body coordinates when necessary. Other issues include differences in centripetal acceleration, the necessity of angular velocity, translation between DRA 10 and older simulations using dead reckoning algorithms 2-9, and entities with atypical dynamics. This paper describes solutions to these issues.

DRA 10 has a software implementation that is available as open source software. The results of initial testing of DRA 10 are presented in this paper.

2019-SIW-035

Cyber Battlefield Operating System Simulation (CyberBOSS)

Tuesday, 1610-1630, Legacy North 2, SPEC Track

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Today’s cyber threats faced by the Department of Defense (DoD) and the Army are sophisticated and real. There are nation states, rogue organizations, and individuals devising ways to make the next cyber security breach more damaging and costlier than the last. In DoD mission environments, cyber adversaries threaten networks and systems that are directly linked to national security. The DoD and Army are making significant strides against these threats with the standup of the Cyber Command and the Cyber Mission Forces. Cyber Command is working to rapidly train and equip these cyber warriors while the rest of the forces are beginning to incorporate the new cyber domain into their training regimen. Combatant Commanders are most effective in warfighting when directing the employment of forces within a combined theater of operations, including land, maritime, air, space and now the cyber domains. Since offensive and defensive cyberspace operations are critical to protecting forces, the Army must ensure that its warfighters are equipped with the cyber knowledge needed to make operational decisions. To address this need, we are performing the Cyber Battlefield Operating System Simulation (CyberBOSS) research effort through the U.S. Army Simulation and Training Technology Center (STTC). CyberBOSS research consists of developing a cyber ecosystem with the goal of providing interoperable cyber effects and actions between and within live, virtual, constructive, and gaming (LVC&G) training systems. In addition, this cyber ecosystem facilitates interoperation between LVC&G synthetic battlespaces and accurate cyber terrain provided by cyber range training tools. To accomplish this, we are developing a common data model referred to as the Cyber Data Model (CDM) to allow for the exchange of cyber related information related to cyber capabilities, cyber susceptibilities, cyber effects, and cyber terrain ground truth. For the 2019 Simulation Innovation Workshop (SIW), we will present our progress to date and illustrate our approach for the CDM, the data model contents, our messaging approach over ActiveMQ between services, our architecture for connecting LVC&G systems with cyber ranges, and lessons learned in interoperating cyber range tools and synthetic battlespace simulations.

2019-SIW-036

The Secure LVC Advanced Training Environment Technology Demonstration: Implications for Modeling and Simulation LVC infrastructure and Standards

Tuesday, 1030-1130, Salon 2, SLT Track

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The Secure LVC Advanced Training Environment (SLATE) is an Air Force Advanced Technology Demonstration accomplished in partnership with the US Navy. The Special Event will focus on outcomes from the recently completed demonstration that occurred in three phases over the summer and early fall of 2018. The SLATE effort was composed of six major areas of work, called “pillars”. The first area involves the creation and validation of an enhanced range infrastructure, data specifications and systems interfaces. The second area involves the creation and evaluation of methods and technology to ensure that multiple, independent channels of secure data representing different classification levels can pass securely and cleanly in real time. The third area involves evaluating large data throughput amongst the multiple security levels, a frequency friendly, pod form factor radio and a high capacity waveform created for the effort. The fourth area involves creating and flying a “pod form factor” to facilitate seamless L, V and C data to move between the aircraft and the ground in real time. The fifth area involves modification to aircraft operational code and a specialized sensor processor that enable on- board sensors and other systems to recognize and manipulate V and C data in real time. The sixth area involves assessing the impact of the integration and flight testing of the other five areas and technologies on readiness training and assessments of the operational value of the SLATE as a training capability. Each of the presentations will describe the critical aspects of their pillar work towards the successful integration and completion of the effort. The descriptions will detail advances and outcomes from both engineering and modeling and simulation perspectives. Lessons learned will be highlighted in each presentation. Finally, we’ll describe continued gaps in technology and policy to fully realize secure and interoperable LVC in the tactical air communities of interest.

2019-SIW-037

Artificial Intelligence, Standards, and the Next Generation of Analytic Simulations

Tuesday, 1530-1550, Salon 2, SLT Track

Tim Cooley & Ivar Oswalt / tcooley@dynamx.org

Whether it is new technology and algorithms, existing technology re-applied to a new problem, or well-known techniques reborn due to technology advancement, innovation moves simulation forward. With innovation comes the challenge to determine if existing standards are sufficient or if new standards are necessary. We have previously scratched the surface of Artificial Intelligence (AI) and standards where we discussed standards for AI in general. This presentation dives deeper and examines analytic simulations with embedded AI. In particular, it focuses on developing an essential understanding of the simulation results generated. After all, simulations that include AI may, and in fact are likely to, generate outputs that are unforeseen. Analytic output standards provide decision makers consistent measurement scales and informative descriptive labels to help them discern robust and well-founded results from those that are not. Traditional simulation output analysis includes replication design, estimation of performance metrics, and system analysis and experimentation; for both terminating and steady-state simulations. These need to be adapted to analytic simulations that include AI and different standards may need to be applied on a case-by-case basis depending upon the machine learning algorithm(s) utilized in the AI. This presentation discusses modifications to existing standards, potential new standards required, and the implications of both. It also provides a simple case study that shows traditional standards and then those that are needed when AI is introduced.

SISO Simulation Interoperability Standards Organization

"Simulation Interoperability & Reuse through Standards"

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