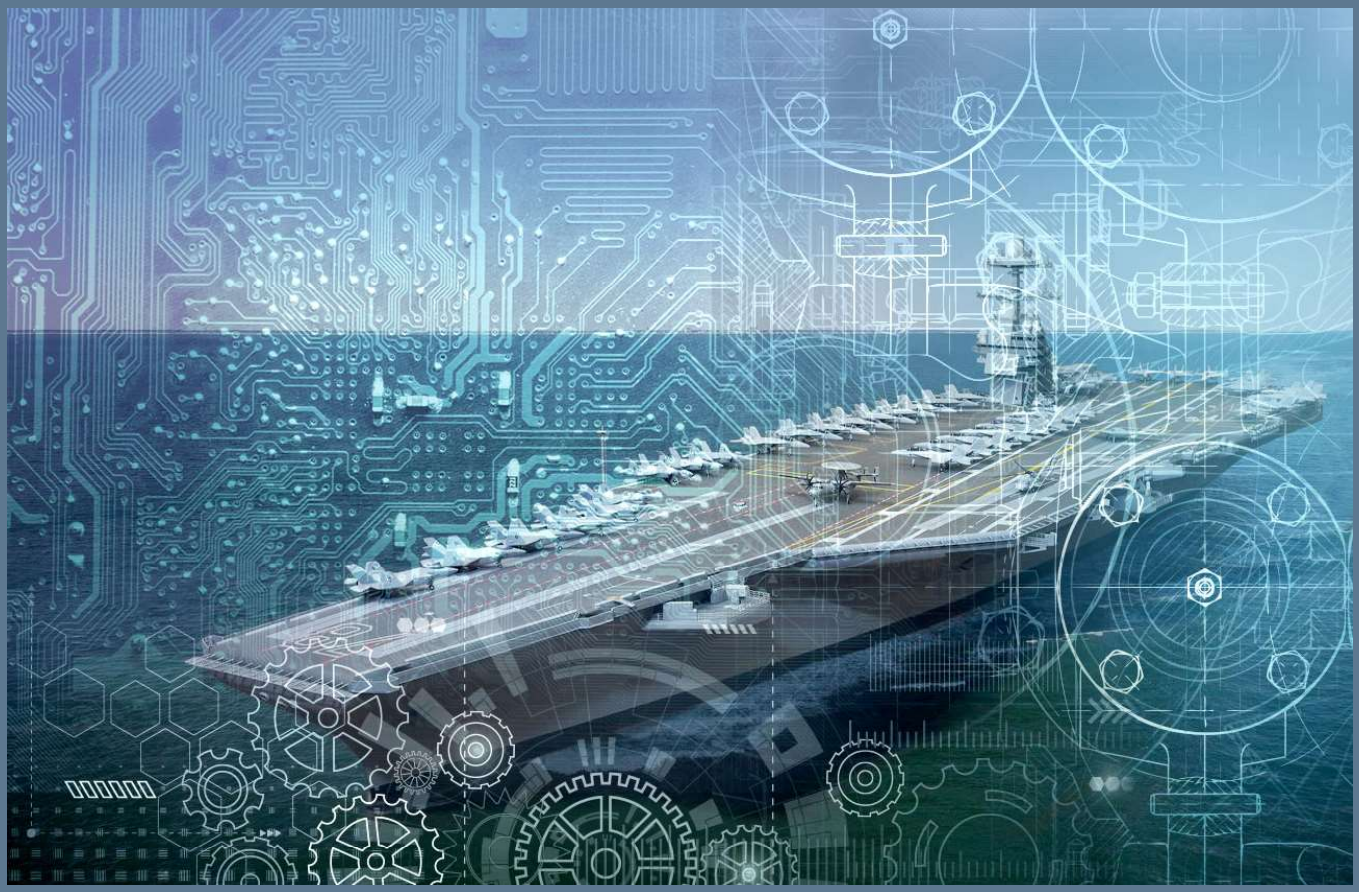
NDIA

21ST ANNUAL SYSTEMS & MISSION ENGINEERING CONFERENCE



October 22 – 25, 2018

Grand Hyatt Tampa Bay

Tampa, FL

NDIA.org/SE18

TABLE OF CONTENTS

NDIA

WHO WE ARE

The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. For more information, visit **NDIA.org**

LEADERSHIP

Bob Rassa
Conference Chair

Frank Serna
Division Chair

Joseph Elm
Vice Chair

SYSTEMS ENGINEERING DIVISION

WHO WE ARE

NDIA's Systems Engineering Division advocates the widespread use of systems engineering in the Defense Department acquisition process to achieve affordable, supportable and interoperable weapon systems that meet the needs of military users; supports the open exchange of ideas and concepts between government and industry; and works for a new understanding of a streamlined systems engineering process.

WELCOME

On behalf of the division and the National Defense Industrial Association, I warmly welcome you to the 21st Annual Systems Engineering Conference. It's hard to believe we in the defense industry have been discussing systems engineering for more than 20 years and still find new issues and aspects to explore. Because technology keeps moving, our military capability continues to increase, the complexity of our systems continues to grow, and the threats we must address continue to rise.

When we began 21 years ago, the term cybersecurity was hardly mentioned in defense circles; same with system of systems, mission engineering, engineered resilient systems, and system security engineering. Today these are some of our hottest issues. The entire defense industrial base seeks to successfully address these as well as affordability, sustainability, and a host of other issues.

New this year are two full tracks on mission engineering as it works with modeling and simulation, digital engineering, and model-based systems engineering. Regarding model-based systems engineering, we have a Tool Vendor track where purveyors of tools supporting digital engineering and a modular open-system approach can demonstrate the products' capabilities to meet the needs of designers and programs.

This conference provides an outstanding opportunity for engineering professionals of the Defense Department, the military, federal agencies, and industry to talk and exchange ideas. Please take maximum advantage of this opportunity.

We are also pleased to have for this conference technical co-sponsors the Institute of Electrical & Electronics Engineers, Aerospace & Electronic Systems Society and Systems Council, and the International Council on Systems Engineering.

Welcome to Tampa!

Bob Rassa
Manager, Engineering Programs
Raytheon Space & Airborne Systems
Conference Chair

SCHEDULE AT A GLANCE

MONDAY, OCT. 22

Registration
Audubon Foyer
12:00 - 5:30 pm

Tutorials
See page 7 for details
1:00 - 5:30 pm

Digital Engineering Summit
Invitation Only
1:00 - 5:00 pm

Networking Break
Audubon Foyer
3:00 - 3:30 pm

TUESDAY, OCT. 23

Registration
Audubon Foyer
7:00 am - 6:30 pm

Networking Breakfast
Audubon Ballroom A
7:00 - 8:00 am

Keynote and General Session
Audubon Ballroom B - F
8:00 am - 5:00 pm

Networking Lunch
Audubon Ballroom A
12:15 - 1:15 pm

Networking Reception
Audubon Promenade/Foyer
5:00 - 6:30 pm

WEDNESDAY, OCT. 24

Registration
Audubon Foyer
7:00 am - 5:00 pm

Networking Breakfast
Audubon Ballroom A
7:00 - 8:00 am

Concurrent Technical Sessions
Various Hotel Room Locations
8:00 am - 5:00 pm

Networking Lunch
Audubon Ballroom A
12:00 - 1:00 pm

THURSDAY, OCT. 25

Registration
Audubon Foyer
7:00 am - 5:00 pm

Networking Breakfast
Audubon Ballroom A
7:00 - 8:00 am

Concurrent Technical Sessions
Various Hotel Room Locations
8:00 am - 5:00 pm

Networking Lunch
Audubon Ballroom A
12:00 - 1:00 pm

EVENT INFORMATION

LOCATION

Grand Hyatt Tampa Bay
2900 Bayport Drive - Tampa, FL

EVENT WEBSITE

NDIA.org/SE18

ATTIRE

Business casual for civilians and uniform of the day for military personnel.

SURVEY AND PARTICIPANT LIST

You'll receive via email a survey and list of attendees (name and organization) after the conference. Please complete the survey, which helps make our event even more successful in the future.

EVENT CONTACT

Meredith Mangas
Associate Director, Meetings
(703) 247-9467
mmangas@ndia.org

Tatiana Jackson
Program Coordinator, Program Development
(703) 247-9479
tjackson@ndia.org

SPEAKER GIFTS

In lieu of speaker gifts, a donation is being made to the Fisher House Foundation.

HARASSMENT STATEMENT

NDIA is committed to providing a professional environment free from physical, psychological and verbal harassment. 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 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 NDIA event.

ANTITRUST STATEMENT

The NDIA has a policy of strict compliance with federal and state antitrust laws. The antitrust laws prohibit competitors from engaging in actions that could result in an unreasonable restraint of trade. Consequently, NDIA members must avoid discussing certain topics when they are together at formal association membership, board, committee, and other meetings and in informal contacts with other industry members: prices, fees, rates, profit margins, or other terms or conditions of sale (including allowances, credit terms, and warranties); allocation of markets or customers or division of territories; or refusals to deal with or boycotts of suppliers, customers or other third parties, or topics that may lead participants not to deal with a particular supplier, customer or third party.

TRACK INFORMATION

AGILE IN SYSTEMS ENGINEERING

John Norton
Raytheon Company

Linda Maness
Northrop Grumman

Agile usage is becoming more prevalent within the government space. Lessons learned and ideas for implementation can be shared with those who are experienced in using Agile concepts. This track brings together practitioners with experience applying agile methods in a variety of disciplines and domains, with the goal of collaboration to expand their effective use in systems engineering and on defense programs.

ARCHITECTURE

Bob Scheuer
The Boeing Company

Ed Moshinsky
Lockheed Martin

Architecture is a key element in systems engineering. This track addresses architecture frameworks, strategies, and applications to improve system design, test, operations, and support.

DEVELOPMENTAL TEST & EVALUATION

Joe Manas
Raytheon Company

Developmental Test and Evaluation is a key aspect of successful systems engineering. This track addresses the entire continuum of test and evaluation from early planning to operational testing.

DIGITAL ENGINEERING/MODEL-BASED SYSTEMS ENGINEERING

All Digital Engineering and Model-based Systems Engineering topics are covered in the generic Modeling & Simulation tracks.

ENGINEERED RESILIENT SYSTEMS

Lois Hollan
Potomac Institute

Engineered Resilient Systems (ERS) is a Department of Defense priority initiative that seeks to transform engineering environments so that warfighting systems are more resilient and affordable across the acquisition lifecycle. The track will present new results across the ERS initiative including anchor technologies and computational representation

EDUCATION & TRAINING

Dr. Don Gelosh
Worcester Polytechnic Institute

The Education and Training track for 2018 is an excellent collection of presentations. The presentations describe a wide range of systems engineering workforce development activities from competency frameworks, cybersecurity skills, MBE and MBSE best practices, System of Systems guide and capstone marketplace to development of technical leaders.

ENTERPRISE HEALTH MANAGEMENT/ PROGNOSTICS/DIAGNOSTICS/RELIABILITY

Chris Resig
The Boeing Company

The health of the system as a whole – the enterprise – is a critical function of systems engineering. This session will touch on some issues relating to the system health, including prognostics, diagnostics and reliability.

ENVIRONMENT, SAFETY, AND OCCUPATIONAL HEALTH

Sherman Forbes
USAF

Lucy Rodriguez
Booz Allen Hamilton

Dave Schulte
SAIC

The ESOH track provides a cross section of topics that reflect the many different Systems Engineering design considerations included under the DoDI 5000.02 acronym ESOH, as defined in MIL-STD-882E, the DoD Standard Practice for System Safety.

HUMAN SYSTEMS INTEGRATION

Dr. Matthew Risser
Pacific Science & Engineering

Tom Hagale
The Boeing Company

The HSI track focuses on the human component in systems development to ensure systems are usable, useful, and support operational needs. The goal is to demonstrate value by aligning HSI processes with acquisition and systems engineering processes, in accordance with DoD HSI policy, standards, and guidance. Topics include HSI methods and best practices, standards and guidance, process innovation, metrics, applications, and approaches to program integration

INTEROPERABILITY AND NETWORK CENTRIC OPERATIONS

Jack Zavin
OUSD(A&S)

John Daly
Booz Allen Hamilton

Interoperability is the ability to operate in synergy in the execution of assigned tasks both within the DoD and its external mission partners. Net Centric Operations supports interoperability by providing the POPIM solution sets that allows the DoD and its mission partners to share information/data/knowledge when needed, where needed, and in a form they can understand and act on with confidence, while protecting it from those who should not have it. Net Centric Operations/ Interoperability includes technologies such as Service Oriented Architecture, Data Center, Cloud Computing, information transport [e.g. internet, web, radios, data links], as well as both hardware and software [aka Information and Communicative Technology] together with people, operating alone or in organizations, as part of the System of Systems Systems Engineering.

MISSION ENGINEERING

Dr. Judith Dahmann
MITRE Corporation

Mission engineering (ME) is the deliberate planning, analyzing, organizing, and integrating of current and emerging operational and system capabilities to achieve desired warfighting mission effects. This track focuses on current directions in Defense ME and approaches to applying SoS and SE approach to ME.

MODELING AND SIMULATION

David Allsop
The Boeing Company

Chris Schreiber
Lockheed Martin

The M&S track highlights the use of models and simulations in the systems engineering process. Included are presentations on integrated environments, tools & technologies, and M&S applications in several SE process phases. Topics focused specifically on Digital Engineering/ Model-based Systems Engineering are contained in a separate track on this topic.

PROGRAM MANAGEMENT

Lisa Manning
AAR Corp

Vaugh Schlegel
Lockheed Martin

Program Managers and chief Systems Engineers should be the “joined-at-the-hip” leads on all programs that wish to be successful. This session will address some of the issues that our program managers face in the execution of programs.

SOFTWARE ENGINEERING

Ken Nidiffer
Software Engineering Institute

Software is often overlooked when talking systems engineering yet software is a key element of most designs today and must always be part of the systems engineer’s portfolio of responsibility. This session will highlight a few significant software development issues.

SYSTEMS ENGINEERING EFFECTIVENESS

Tim White
Raytheon Company

Joe Elm
L-3 Technologies

Systems Engineering Effectiveness is obvious to some and quite esoteric to others. The goal though, improving the value obtained for each SE dollar spent, is shared by each who joins the discussion. Please attend the SE Effectiveness track to learn how your peers are implementing practical measures to better quantify the benefits of Systems Engineering and its value to Product Users and Developers alike. Early and effective Systems Engineering has been shown to return excellent value to all project stakeholders. This Track will highlight the latest DoD policy and guidance, define new approaches, and provide some practical experiences to assist the DoD and defense industry SE community in achieving a quantifiable and persistent improvement in program outcomes through appropriate application of systems engineering principles and best practices.

SYSTEM OF SYSTEMS

Dr. Judith Dahmann
MITRE Corporation

Jennie Horn
Raytheon Company

Rick Poel
The Boeing Company

The System of Systems track will feature papers highlighting development SoS engineering approaches, particular SoS SE application areas, and SoS tools and modeling, including SoS SE applied to defense missions in mission engineering. See directly related track in Mission Engineering above.

SYSTEM SECURITY ENGINEERING

Holly Dunlap
Raytheon Company

Melinda Reed
OUSD(R&E)

Systems Security Engineering has become one of the most important aspects in the design of DoD systems. This track will focus on system security engineering and a holistic approach to program protection.

AGENDA

MONDAY, OCTOBER 22

12:00 – 5:30 pm

REGISTRATION
AUDUBON FOYER

TUTORIAL SESSIONS
1:00 – 3:00 PM

Modeling and Simulation in the SE Process
SANDHILL CRANE

Dr. James Coolahan
Coolahan Associates, LLC.

Integrating SE with EVM and PM
SNOWY EGRET

Paul Solomon
Performance-Based Earned Value Management

NDIA Workshop on Mission Engineering
WHITE IBIS

William Miller
Stevens Institute of Technology

CMDR Kirk Michealson, USN (Ret)
Tackle Solutions, LLC.

Multicore, Virtualization, and Containerization
HERRING GULL

Donald Firesmith
Software Engineering Institute

1:00 – 5:00 pm

DIGITAL ENGINEERING SUMMIT (INVITATION ONLY)

3:00 – 3:30 pm

NETWORKING BREAK
AUDUBON FOYER

TUTORIAL SESSIONS CONTINUED
3:30 – 5:30 PM

Modeling and Simulation in the SE Process
SANDHILL CRANE

Integrating SE with EVM and PM
SNOWY EGRET

NDIA Workshop on Mission Engineering
WHITE IBIS

Multicore, Virtualization, and Containerization
HERRING GULL

TUESDAY, OCTOBER 23

7:00 am – 6:30 pm

REGISTRATION
AUDUBON FOYER

7:00 – 8:00 am

NETWORKING BREAKFAST
AUDUBON BALLROOM A

8:00 – 8:15 am

OPENING REMARKS
AUDUBON BALLROM B-F

Bob Rassa
Director, Engineering Programs, Raytheon Space & Airborne Systems
Conference Chair, Systems Engineering Division, NDIA

Frank Serna
Principal Director Strategic Initiatives, Draper Labs
Division Chair, Systems Engineering Division, NDIA

MG James Boozer Sr., USA (Ret)
Chief of Staff, NDIA

TUESDAY, OCTOBER 23

8:15 – 9:15 am

KEYNOTE ADDRESS

AUDUBON BALLROOM B-F

James "Jim" Faist
Director, Defense Research and Engineering for Advanced Capabilities,
Office of the Under Secretary of Defense for Research and Engineering

9:15 – 9:45 am

NETWORKING BREAK

AUDUBON FOYER

9:45 – 11:00 am

DOD EXECUTIVE PANEL: SERVICE SYSTEMS ENGINEERING LEADS DISCUSS SE ISSUES

AUDUBON BALLROOM B-F

Kristen Baldwin
Deputy Director, Strategic Technology Protection and Exploitation,
Office of the Under Secretary of Defense for Research and Engineering
Moderator

William Bray
Deputy Assistant Secretary of the Navy Research, Development, Test and Evaluation

Leo Smith
Deputy Director, Office of the Chief Systems Engineer,
Office of the Secretary of the Army for Acquisition, Logistics and Technology

Jeffrey Stanley
Deputy Assistant Secretary of the Air Force for Science, Technology, and Engineering,
Office of the Assistant Secretary of the Air Force for Acquisition and Logistics

11:00 am – 12:15 pm

DOD EXECUTIVE PANEL: INTERAGENCY SYSTEMS ENGINEERING ACTIVITY

AUDUBON BALLROOM B-F

Kristen Baldwin
Deputy Director, Strategic Technology Protection and Exploitation,
Office of the Under Secretary of Defense for Research and Engineering
Moderator

Glenn Bell
Chief System Engineer for Defense Programs, National Nuclear Security Administration

Steven Hirshorn
Chief Engineer, Aeronautics Research Mission Directorate, Office of the Chief Engineer,
National Aeronautics and Space Administration

Joseph Post
Director (Acting), National Airspace System (NAS) Systems Engineering & Integration, Federal Aviation Administration

Albert "Benjie" Spencer
Chief Engineer, National Weather Service, National Oceanic and Atmospheric Administration

Kerry Wilson
Deputy Director, Office of Systems Engineering, Department of Homeland Security

12:15 – 1:15 pm

NETWORKING LUNCH

AUDUBON BALLROOM A

1:15 – 2:30 pm

INDUSTRY EXECUTIVE PANEL: INDUSTRY LEADERS DISCUSS DRIVING REVOLUTIONARY CHANGE IN DEFENSE SOFTWARE ACQUISITION

AUDUBON BALLROOM B-F

Joe Elm
Principal Engineer, L-3 Technologies
Moderator

Milo Medin
Vice President, Wireless Services, Google

Dr. Ross Niebergall
Vice President and CTO, Harris Corporation

Maj Gen Paul Nielsen, USAF (Ret)
Director, Software Engineering Institute

Dr. John Zolper
Vice President Research and Innovation, Raytheon Company

2:30 – 2:45 pm

PRESENTATION OF THE FERGUSON AWARD FOR SYSTEMS ENGINEERING EXCELLENCE

AUDUBON BALLROOM B-F

2:45 – 3:15 pm

NETWORKING BREAK

AUDUBON FOYER

3:15 – 5:00 pm

DOD EXECUTIVE PANEL: SERVICE AND AGENCY PROGRAM MANAGERS DISCUSS SYSTEMS ENGINEERING ISSUES

AUDUBON BALLROOM B-F

James Thompson
Director, Major Program Support,
Office of the Under Secretary of Defense for Research and Engineering
Moderator

Paul Russo
CVN 78 Ship Design Manager, NAVSEA 05V3

Bob Sheibley
Program Manager, Improved Turbine Engine/FVL

5:00 – 6:30 pm

NETWORKING RECEPTION

AUDUBON PROMENADE/FOYER

WEDNESDAY, OCTOBER 24

	Modeling & Simulation 1 Audubon B	Modeling & Simulation 2 Audubon C	System Security Engineering Audubon D	Systems Engineering Effectiveness Audubon E	Software Engineering Audubon F
8:00 am	21494 DoD Digital Engineering Implementation Challenges and Recommendations **Philomena Zimmerman** OUSD(R&E)	21322 Analyzing System Alternatives Through Architecture Simulation **Dennis Chapman** U.S. Army RDECOM ARDEC	21527 Welcome and System Security Engineering Council Highlights **Holly Dunlap** Raytheon Company	21407 Panel: Methods for Accelerated Delivery of Capability – What Does It Take to Go Fast? **D. Scott Lucero** OUSD(R&E) *Moderator* **Thomas McDermott** Stevens Institute of Technology **Troy Peterson** INCOSE **Laura Freeman** Institute for Defense Analyses **Bess Dopkeen** DoD Cost Assessment and Program Evaluation	21747 Software Acquisition: Facing the Challenge, Valuing Velocity! **James Thompson** OUSD(R&E)
8:30 am	21367 Uncovering Cascading Vulnerabilities in Model-Centric Acquisition Programs **Donna Rhodes** Massachusetts Institute of Technology	21404 Iterative Analysis Between MBSE Software and External Tools **MAJ Stephen Gillespie** U.S. Military Academy	21405 DoD Approach for Engineering Cyber-Resilient Weapon Systems and Program Protection **Melinda Reed** OUSD(R&E)		21735 Driving Revolutionary Change in DoD Software Design and Acquisition **Joseph Elm** L-3 Technologies
9:00 am	21398 Is There a Simple Ontology We Can Use for Digital Engineering? **Warren Vaneman** Naval Postgraduate School	21438 Affordable Resilient Architectural Trades in Next Generation Defense Systems **Marilee Wheaton** The Aerospace Corporation	21474 Cyber Resiliency for AF Weapon Systems **Daniel Holtzman** U.S. Air Force		
9:30 am	**NETWORKING BREAK – AUDUBON FOYER**				
10:00 am	21390 Modeling Digital Engineering Transformation: The Program Authoritative Source of Truth **Thomas McDermott** Stevens Institute of Technology	21509 How Model-Based Systems Engineering with SysML Helps in Complex Systems Design **Saulius Pavalkis** No Magic, Inc.	21561 Systems Engineering Resiliency and Security Engineering Lead **Dawn Williamson** Northrop Grumman Corporation	21555 Developmental System Requirements for Mobility in **Doris Turnage** U.S. Army Corps of Engineers	21740 A Path Toward Consensus Measures for Iterative Software Development **Geoff Draper** Harris Corporation
10:30 am	21401 Modeling Digital Engineering Transformation: Workforce and Culture **Thomas McDermott** Stevens Institute of Technology	21426 De-Mystifying Model-Based Systems Engineering **Warren Vaneman** Naval Postgraduate School	21535 The Value of Using Systems Engineering to Sharpen the Spear Against the Cyber Threat **Richard Massey** The Boeing Company	21422 Streamline Defense Industry Performance with CMMI V2.0 **Ron Lear** CMMI Institute **Kevin Schaaff** CMMI Institute	21741 Integrating Systems Engineering with a Software Factory **Sarah Sheard** Software Engineering Institute

Mission Engineering	Engineered Resilient Systems	Program Management	Interoperability and Network Centric Operations
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
21289 Closing the Loop Between Missions and Acquisition **Ronald Kratzke** Vitech Corporation	21553 The Role of High-Performance Computing, High-Fidelity Physics, and Large-Data Analytics in DoD Acquisition **David Richards** U.S. Army Engineer Research and Development Center	21449 PM and SE Career Path Similarities **Michael Williamson** Lockheed Martin Missiles and Fire Control	21391 Overview & Track Context **John Daly** Booz Allen Hamilton
21339 Digital Engineering Support to Mission Engineering **Judith Dahmann** MITRE Corporation **Philomena Zimmerman** OUSD(R&E)	21559 Changes within the DoD High Performance Computing Modernization Program in Response to DoD Demand Signals and to Support Engineered Resilient Systems **Robert Wallace** Department of Defense HPCMP	21368 Program Risk/Opportunity Management, It's Not Just Technical Anymore **Vaughn Schlegel** Lockheed Martin	21293 Acquisition Agility: Reciprocity and Efficiencies in Approved Products List Testing **Danielle Mackenzie** DISA JITC
21388 Mission Assurance Through Energy Assurance – Measuring Mission Effectiveness and Resilience Through Disruption **John Collins** Idaho National Laboratory	21605 The CREATE Element of the U.S. DoD HPC Modernization Program – Past, Present, and Future **Robert Meakin** CREATE, HPCMP	21516 Collaboration Between Systems Engineers and Program Managers **Lisa Hoffman** AAR Mobility Systems	21417 Lessons Learned from Tactical Radio Interface Standardization **Don Stephens** Joint Tactical Networking Center
NETWORKING BREAK – AUDUBON FOYER			
21540 Role of Industry in Mission Engineering **William Miller** Stevens Institute of Technology	21586 ERS Recent Developments and Plans **Owen Eslinger** U.S. Army Engineer Research and Development Center		21515 Architecture Nomograph a Visual Validation Tool for DODAF Products **Mark Gibson** Engility Corporation
			Human Systems Integration Sandhill Crane
21392 Considerations in Modeling Defense Capabilities at the Mission Level of Performance **John Daly** Booz Allen Hamilton	21492 Leveraging ERS to Enable Digital Engineering for Rotorcraft Acquisition **Marvin Moulton** U.S. Army RDECOM	21441 Cost-Based Risk Management for Mission Critical Microgrids **Robert Baker** Colorado State University	21333 Department of Defense Human Systems Integration Initiatives **Andrew Monje** OUSD(R&E)

WEDNESDAY, OCTOBER 24

	Modeling & Simulation 1 Audubon B	Modeling & Simulation 2 Audubon C	System Security Engineering Audubon D	Systems Engineering Effectiveness Audubon E	Agile in Systems Engineering Audubon F
11:00 am	21337 Exchanging Digital Artifacts for the Engineering Life Cycle **Philomena Zimmerman** OUSD(R&E)	21556 Frenemies: OPM and SysML Together in an MBSE Model **Matthew Hause** PTC	21381 Leveraging Systems Modeling to Assess and Mitigate Cyber-Based Mission Risk: A Cybersecurity Architecture Framework **Everett Oliver** George Washington University	21749 SERC Capstone Marketplace: A Platform to Engage Engineering Undergraduates in Systems Engineering While Working on Real Problems and Operational Needs **Capt William Shepherd, USN (Ret)** Systems Engineering Research Center	21742 Managing Complexity with Agility and Openness **Larri Rosser** Raytheon Intelligence Information and Services
11:30 am	21428 Critical MBE Themes that Enable a Collaborative Government-Industry Digital Engineering Process Throughout the DoD Acquisitions Lifecycle **Zhigang Pan** Northrop Grumman Corporation	21304 Architecture-Drive Assurance for Avionic Systems **Dan Bliek** Rockwell Collins	21341 Hardware Assurance (HwA) Through the Lifecycle **Raymond Shanahan** OUSD(R&E)	21564 Helix: Developing an Understanding of Organizational Systems Engineering Effectiveness **Nicole Hutchison** Stevens Institute of Technology	
12:00 pm	**NETWORKING LUNCH – AUDUBON A**				
1:00 pm	21331 Maximizing the Utility of Data and Emerging Technology with System of Systems and Big Data Analytics **Claudia Rose** BBII Enterprises	21374 MBSE for SOCOM JATF-TALOS **Bjorn Cole** Georgia Tech Research Institute	21507 Mission Thread Analysis Methods for Identification of Critical Components **Suzanne Hassell** Raytheon Company	21423 Estimate to Complete Development & Analysis **Michael Campbell** SPEC Innovations	21361 Semantic Versioning and Automated System Build Assembly **Duane Spence** Raytheon Company IIS
1:30 pm	21435 Accomplishing Complex NAVSEA Frigate Systems with Digital End-to-End MBSE Development in Enterprise Architecture and Systems of Systems Architectures and Engineering **John Sahlin** Engility Corporation	21451 MBSE Design Pattern for Non-Standard Interfaces **David Wood** Harris Corporation	21335 Long-Term Strategy for DoD Assured Microelectronics Needs and Innovation for National Economic Competitiveness **Raymond Shanahan** OUSD(R&E)	21557 Integrating Descriptive and Analytical System Models **Ronald Kratzke** Vitech Corporation	21362 Transforming Systems Engineering for DevOps **Brian Davenport** Raytheon Company

Mission Engineering	Engineered Resilient Systems	Program Management	Human Systems Integration
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
21432 Experiences in Experimentation Supporting Mission Engineering of Multi-Domain Capability **Gene Bergmeier** Lockheed Martin Corporation	21536 Flexible Web Based Workflow Automation **Dharhas Pothina** U.S. Army Engineer Research and Development Center	21242 Integrated Baseline Review **Andrea Nibert** Leidos	21378 User-Centric Systems Engineering; Integrating User Experience Design with Traditional Systems Engineering **Radhika Patel** U.S. Army ARDEC
21389 Mission Engineering Update **James Thompson** OUSD(R&E)	21552 Deep Data Analytics for Engineered Resilient Systems (ERS) **David Stuart** U.S. Army Engineer Research and Development Center	21352 PARCA: IBR's in DoD – Joint Situational Awareness **John McGregor** OUSD(A&S) PARCA	21562 Meeting User Needs: Tailoring Human Systems Integration (HSI) for DoD Agile & DevOps **Ariana Kiken** Pacific Science & Engineering Group
NETWORKING LUNCH – AUDUBON A			
21510 Mission Engineering Competencies **Nicole Hutchinson** Stevens Institute of Technology	21532 LM Overview of the AFRL/ERS EXPEDITE Program **Clifton Davies** Lockheed Martin Aeronautics	21243 Estimate to Complete Development & Analysis **Andrea Nibert** Leidos	21489 Human Systems Integration Risk Management Tool **Bill Kosnik** Air Force Space Command
Architecture			
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
21413 MOSA – Key Points for Implementation from the NDIA Architecture Committee **Edward Moshinsky** Lockheed Martin	21297 ERS Ontology-Assisted Simulation Environments **Randy Ramsey** Raytheon Company	21377 Use of Other Technology Agreements for Department of Defense Research and Development **Andrea Belz** University of Southern California	21427 Simpath?: A Computational Model to Facilitate Human Systems Integration Evaluations **Elizabeth Weldon** Georgia Tech Research Institute **C.J. Hutto** Georgia Tech Research Institute

WEDNESDAY, OCTOBER 24

	Modeling & Simulation 1 Audubon B	Modeling & Simulation 2 Audubon C	System Security Engineering Audubon D	Systems Engineering Effectiveness Audubon E	Agile in Systems Engineering Audubon F
2:00 pm	21523 Interdiction: The Application of SysML State Machines to Cybersecurity **Michael Vinarcik** Booz Allen Hamilton	21309 Formal and Probabilistic Modeling in the Engineering of Resilient Multi-UAV Swarms **Azad Madni** University of Southern California SSI	20591 Systems Engineering Challenges for Integrating Software Assurance into Defense Systems Throughout the System Acquisition Lifecycle **Kenneth Nidiffer** Software Engineering Institute	21554 Benchmarking Systems Engineering Measure **Geoff Draper** Harris Corporation	21363 Going DevOps in GovCloud – Trials and Travails of Standing Up a DevOps Pipeline in AWS **John Mallinger** Raytheon Company
2:30 pm	**NETWORKING BREAK – AUDUBON FOYER**				
3:00 pm	21279 Phoenix: The Rebirth of RFESS **Quintina Jones** Raytheon Company Missile Systems	21579 Pattern Based Systems Engineering and the Smart Enterprise **Troy Peterson** INCOSE	21400 Joint Federated Assurance Center (JFAC) Update 2018 **Thomas Hurt** OUSD(R&E)	20812 Affordable Rocks (and Batteries) – A Lighthearted Dialogue About Value **Mike Yokell** Lockheed Martin	21364 Infrastructure as Code – Moving to Hardware Defined Infrastructure **Brian Davenport** Raytheon Company
3:30 pm	21305 Key Support Analysis Data used for Modeling a Global Spares Pool **Camille Lewis** Lockheed Martin	21466 Collaboration in an Authoritative Source of Truth Environment using Open MBEE **Benjamin Kruse** Stevens Institute of Technology	21570 Considering Cyber-Resilience and Sustainment Supply Chain within a Blockchain (Shared Ledger) Paradigm **Charles Miller** Raytheon Company	20813 Complications with Using Affordability Efficiency Measures **Mike Yokell** Lockheed Martin	21375 Systems Engineering for Highly Rapid Development: The Parallel Agile Process **Doug Rosenberg** Parallel Agile, Inc. **Barry Boehm** University of Southern California
4:00 pm	21320 CREATE as an Early Example of a DoD "Software Factory" **Richard Kendall** High Performance Computing Modernization Office	21338 An MBE Manifesto **Edward Carroll** Sandia National Laboratories **Chris Schrieber** Lockheed Martin Corporation **Frank Salvatore** Engility Corporation **Bill Schindel** ICTT **Sharon Trauth** Sandia National Laboratories **Dana Grisham** Sandia National Laboratories **Nancy Hayden** Sandia National Laboratories	21402 Advancing DoD Software Assurance (SwA) **Thomas Hurt** OUSD(R&E)		21469 Principled Design vs. Designing for Principles **Erin Ryan** The Aerospace Corporation
4:30 pm	21538 On the Topic of Navy Antiship Missile Threat Modeling and Simulation Requirements **Warren Boord** NSWC/DD		21311 Industry Thoughts on a Market of Assured and Trustworthy Complex Cyber/Physical Systems **Robert Martin** MITRE Corporation		

Architecture	Engineered Resilient Systems	Program Management	Human Systems Integration
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
21366 Your Father's Architecture: Does it Matter Anymore – Is it the Critical Piece or a Waste of Money? **Michael Coughenour** Lockheed Martin	21425 Securing the ERS Digital Workflow **Greg Eakman** BAE Systems	21346 Acquisition Agility Act of FY 2017 NDAA **Robert Gold** OUSD(R&E)	21440 Combat Operations Center Hazardous Noise Root Cause Analysis **Rachael Lund** NSWC Dahlgren Division
NETWORKING BREAK – AUDUBON FOYER			
21439 Leveraging MOSA Practices to Educate the Acquisition Workforce **Yvette Rodriguez** Defense Acquisition University	21529 ERS is the Catalyst for Collaboration between Industry and Government in Aviation System Modeling **David Quinn** U.S. Army RDECOM	21528 Integration of Parametric Cost Estimation with System Architecture – It's a Dirty Job but Someone Has To Do It! **Barry Papke** No Magic, Inc. **Gan Wang** BAE Systems	21323 Embedding Human Systems Integration Within Systems Engineering Processes – A Peek into the Draft HSI MIL Handbook **Sarah Orr** AF 711th Human Performance Wing HSI Directorate **Jessica Shihady** AF 711th Human Performance Wing HSI Directorate
21357 Comprehensive Architecture Strategy **Marcell Padilla** CRL Technologies, Inc.	21519 Engineered Resilient Systems – Enabling Analysis of Large-Scale Maintenance Data through Innovative Techniques **Maria Seale** USACE Engineer Research and Development Center	21376 Technology Advancement in NASA's Small Business Innovation Research Program **Andrea Belz** University of Southern California	21308 Toward Next Generation Adaptive Cyber-Physical-Human Systems **Azad Madni** University of Southern California
21565 Actionable Architecture through Aspect Modeling **Laura Hart** MITRE Corporation	21687 Computational Analyses in Support of the World's Best Hypersonics Systems **Col K. Colin Tucker, USAF** SAF/AQR	21298 Readiness Level Assessment Tool for Nuclear Weapons Programs **Glenn Bell** National Nuclear Security Administration	21395 Engineering the Complete System: Hardware, Software, AND People **Michael Pietryga** Air Force 711th Human Performance Wing HSI Directorate
21345 Modeling with Standards Based Requirements **Col Steve MacLaird, USAF (Ret)** Object Management Group	21424 Challenges and Opportunities for High-Fidelity Computational Modeling to Support Future Vertical Lift **Andrew Wissink** U.S. Army Aviation Development Directorate, AMRDEC	21287 The Excellent 3-in-1 Systems Engineering Tool (SET)! **Denise Shealey** AFLCMC/EZSI	

THURSDAY, OCTOBER 25

	Modeling & Simulation 1 Audubon B	Modeling & Simulation 2 Audubon C	System Security Engineering Audubon D	Environment, Safety & Occupational Health Audubon E	Tool Vendor Demonstrations for MBSE/Digital Engineering Audubon F
8:00 am	21415 What's the Difference Between Digital Engineering and Product Lifecycle Management (PLM)? **Steven Dam** SPEC Innovations	21328 A Model-Based Requirements Engineering Framework for Developing Military Healthcare Delivery Requirements **Steven Biemer** Johns Hopkins University	21410 Software Assurance Concept of Operation – Advancing Software Assurance in the Modern Age **Kenneth Nidiffer** CMU Software Engineering Institute **Bradley Lanford** Engility Corporation	21343 Operationalizing the Munitions Risk Management Assessment Process **Mark Peterson** Booz Allen Hamilton, Carderock Division	21351 Discovering Tool Capabilities to Support Engineering Activities **Ronald Kratze** Vitech Corporation
8:30 am	21522 Semantic Web Technology Architecture to Enable Digital Thread **Mark Blackburn** Stevens Institute of Technology	21370 Understanding Discontinuous Technologies Using Model-Based Systems Engineering (MBSE) Behavior Models **Wendy Golden** Aerospace	21416 Systems Engineering Considerations for Achieving System Resilience **Michael McEvilley** MITRE Corporation	21748 Impact Assessment and Technology Road Map for Chromium **Drew Rak** Noblis	21351 Discovering Tool Capabilities to Support Engineering Activities **Steven Dam** Spec Innovations
9:00 am	21568 A Systems Engineering Tools Ecosystem **Matthew Hause** PTC	21385 A Model-Based Systems Engineering Approach to Communicating and Verifying Dynamic Requirements in Contracted System Development **Donald Barrett** George Washington University	21447 Cybersecurity the Systems Engineering Way **David Olmstead** Lockheed Martin	21420 Use of Draft MIL-STD-882E, Task 108, to Prohibit & Eliminate Cr6+ **Gene McKinley** U.S. Air Force	21351 Discovering Tool Capabilities to Support Engineering Activities **Dirk Zwemer** Intercax
9:30 am	**NETWORKING BREAK – AUDUBON FOYER**				
10:00 am	21353 Model-based Systems Engineering (MBSE): Using Semantic Web Technology to Enable Integration **Roshan Patel** U.S. Army RDECOM ARDEC	21443 A Model-Based Systems Engineering Approach to Communicating and Verifying Dynamic Requirements in Contracted System Development **Donald Barrett** George Washington University	21342 Enhancing DoD Technological Advantage **Brian Hughes** OUSD(R&E)	21412 Leveraging System Safety to Improve System Security **Michael McEvilley** MITRE Corporation	21351 Discovering Tool Capabilities to Support Engineering Activities **Jason Wilson** No Magic, Inc.
10:30 am	21495 Model-Based Enterprise Maturity Model that Captures Both Digital Capability and Organizational Effectiveness **Jason Hatakeyama** The Boeing Company	21541 Requirements Partitioning, the RMF, and MBSE **Ronda Henning** Harris Corporation	21406 Systems Engineering Perspectives for Cybersecurity Requirements Derivation **Michael McEvilley** MITRE Corporation	21313 MIL-STD-882E Revised Level of Rigor **Doug Peterson** AFMC/SES	21351 Discovering Tool Capabilities to Support Engineering Activities **Gavin Arthurs** IBM

Architecture	Engineered Resilient Systems	Development Test & Evaluation	System of Systems
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
21354 MOSA Standards Showcase **Michael Heaphy** Defense Standardization Program Office **John Bowling** Air Force Life Cycle Management Center **Ken O'Driscoll** FACE **Benjamin Peddicord** CMOSS	21548 A Digital Exploration of System Trade-Offs **Greg Eakman** BAE Systems	21472 MBSE for Developmental Test & Evaluation **Gary Honea** Raytheon Company	20627 Status of the Development of International Standards for Systems of Systems **Mike Yokell** Lockheed Martin
	21433 Architecting Resilient Systems with Design Structure Matrices and Network Topology Analysis **Robert Hill** George Washington University	21396 A Model-Based Framework to Evaluate and Optimize Unmanned Surface Vessels (USV) **Daniel Veit** George Washington University	20628 Overview of System of Systems (SoS) Managerial and Operational Affinity – Assessing and Improving Relationships Within Systems of Systems **Mike Yokell** Lockheed Martin
		21517 Network Analysis of SysML Data to Inform Test and Evaluation **MAJ Stephen Gillespie** U.S. Military Academy	21280 Mission Engineering and Prototype Warfare: Operationalizing Technology Faster to Stay Ahead of the Threat **Matthew Horning** U.S. Army TARDEC
NETWORKING BREAK – AUDUBON FOYER			
21359 Modular Open Systems Approaches (MOSA) Panel: Discussion of MOSA Frameworks **Philomena Zimmerman** OUSD (R&E) *Moderator* **John Bowling** Air Force Life Cycle Management Center **Kenneth O'Driscoll** NAVAIR 4.1.2.1 **John Stough** PEO Aviation **Daniel Torres** U.S. Army TARDEC	21240 Preparing Chief Engineers for the Digital Engineering Transformation **Lt Col Karl Schwenn** Credence Management Solutions	21293 Acquisition Agility: Reciprocity and Efficiencies in Approved Products List Testing **Danielle Mackenzie** DISA JITC	21284 Cyber-Physical Systems and System of Systems Architecting Tool **Cihan Dagli** University of Missouri Science and Technology
	21321 The Steps to Success: A Career Development Model Based on the New INCOSE SE Competency Framework **Don Gelosh** Worcester Polytechnic Institute		21411 Lead Systems Integration: An Engineering and Management Strategy for System of Systems **Warren Vaneman** Naval Postgraduate School

THURSDAY, OCTOBER 25

	Modeling & Simulation 1 Audubon B	Modeling & Simulation 2 Audubon C	System Security Engineering Audubon D	Environment, Safety & Occupational Health Audubon E	Tool Vendor Demonstrations for MBSE/Digital Engineering Audubon F
11:00 am	21330 Integrated Model Based Engineering **Nidal Eid** ARDEC	21360 INCOSE Systems Engineering Transformation **Troy Peterson** INCOSE	21403 Engineering Cyber-Resilient Weapon Systems (CRWS) Workforce Development Workshop **Melinda Reed** OUSD(R&E)	21310 Verifying Software Control Categories (SCCs) Using Quantitative Fault Tree Analyses (FTAs) **Robert Smith** Booz Allen Hamilton	21351 Discovering Tool Capabilities to Support Engineering Activities **Steven Goldner** Cadence
11:30 am	21521 Model-Based Engineering (MBE) Structures Viewed Through Axiomatic Investigation in Abstract Algebra & Application Implications **Jeffrey Havlicek** U.S. Air Force	21348 Transforming Large Scale DoD Organizations Into an MBSE Powerhouse **Cory Henry** Booz Allen Hamilton		21549 Unmanned System (UxS) IPT and Engineering Precepts for Safe Autonomy **Michael Demmick** NOSSA	21351 Discovering Tool Capabilities to Support Engineering Activities **Scott Ragon** Phoenix Integration
12:00 pm	**NETWORKING LUNCH – AUDUBON A**				
1:00 pm	21286 Connecting the MBE Gap: Linking Systems and Hardware Designs through OSLC **Julie DeMeester** Raytheon Company	21468 Systems Engineering Transformation Surrogate Pilot Use Cases Enabling a New Operational Paradigm for Acquisition **Mark Blackburn** Stevens Institute of Technology	21310 Verifying Software Control Categories (SCCs) Using Quantitative Fault Tree Analyses (FTAs) **Robert Smith** Booz Allen Hamilton	21537 Digital Engineering **Philomena Zimmerman** OUSD(R&E)	21351 Discovering Tool Capabilities to Support Engineering Activities **Garrett Thurston** Dassault
1:30 pm	21327 Transforming Systems Engineering to Take Advantage of the Digital Revolution **Edward Kraft** University of Tennessee Space Institute	21498 Lesson Learned from Boeing's MBSE Implementation: Different Roles and Skill Sets Needed in a Successful MBSE Deployment **Glendora Ferguson** The Boeing Company	21412 Leveraging System Safety to Improve System Security **Michael McEvilley** MITRE Corporation	21355 Streamlining ESOH in Acquisition: What's on the Horizon? **David Asiello** OASD(EI&E)	21351 Discovering Tool Capabilities to Support Engineering Activities **Joe Colloca** PTC
2:00 pm	21421 Turning the Digital Thread Into Reality **Steven Dam** SPEC Innovations	21409 Organizational Considerations for Effective Model-Based Systems Engineering Implementation **Warren Vaneman** Naval Postgraduate School	21313 MIL-STD-882E Revised Level of Rigor **Doug Peterson** AFMC/SES	21380 Adapting ESOH Risk Management for Rapid Prototyping and Rapid Fielding Programs **Lori Hales** Booz Allen Hamilton	21351 Discovering Tool Capabilities to Support Engineering Activities **Robert Bailargeon** Sodius

Architecture	Education & Training	Enterprise Health Management/Prognostics/ Diagnostics/Reliability	System of Systems
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
21359 Modular Open Systems Approaches (MOSA) Panel: Discussion of MOSA Frameworks **Philomena Zimmerman** OUSD(R&E) *Moderator* **John Bowling** Air Force Life Cycle Management Center **Kenneth O'Driscoll** NAVAIR 4.1.2.1 **John Stough** PEO Aviation **Daniel Torres** U.S. Army TARDEC	21334 Manufacturing and Quality (M&Q) Body of Knowledge (BoK) **Andrew Monje** OUSD(R&E)		21487 System of Systems Model Building and Acausal Simulation Environment **Peter Menegay** SynaptiCAD
	21344 Competency-Based Assessment of Systems Engineers: Results and Recommendations from a United Kingdom Pilot Program for INCOSE Certified Systems Engineering Professionals (CSEP) **Courtney Wright** INCOSE		21430 An Attack Graph-Based Vulnerabilities Framework for Systems of Systems **Thomas Horan** U.S. Air Force
NETWORKING LUNCH – AUDUBON A			
21419 Implementing DoDAF and UAF **Steven Dam** SPEC Innovations	21347 Empowering the Department of Defense Engineer **Robert Gold** OUSD(R&E)	21350 DMSMS/Obsolescence Panel **Robin Brown** Defense Standardization Program Office **Ethan Plotkin** GDCA **KiHo Kang** KIHOMAC **Lance Magnusson** Obsolescence Branch Manager at NUWC Division, Keyport	**Modeling & Simulation 3** Sandhill Crane 21300 Model-Based Enterprise Capabilities Matrix Workshop **Joe Hale** NASA/MSFC **Al Hoheb** The Aerospace Corporation
21371 The Sensor Open Systems Architecture (SOSA) Initiative in a Nutshell **Steve Davidson** Raytheon Company	21365 Modular Online Open SoSE Education and Training (MOOSE) **Judith Dahman** MITRE Corporation		
	21418 What is the Future of Systems Engineering? **Steven Dam** SPEC Innovations		

THURSDAY, OCTOBER 25

	Modeling & Simulation 1	Modeling & Simulation 2	System Security Engineering	Environment, Safety & Occupational Health	Tool Vendor Demonstrations for MBSE/Digital Engineering
	Audubon B	Audubon C	Audubon D	Audubon E	Audubon F
2:30 pm	**BREAK – AUDUBON FOYER**				
3:00 pm	21545 The Digital Twin Throughout the SE Lifecycle **Matthew Hause** PTC	21437 Model Based System Operations: Enabling Rapid Adaptability and Operational Resiliency in the Digital Era **T.J. Mathieson** Northrop Grumman Innovation Systems	21431 Leveraging Vulnerability Prediction Models to Aid Cyber Security Planning **Raymond Chow** Lockheed Martin	21312 Leveraging Industry Standards and Tools in ESOH Risk Management **Yvonne Pierce** The Boeing Company **Timothy Sheehan** Raytheon Company	21351 Discovering Tool Capabilities to Support Engineering Activities **David Green** Ansys
3:30 pm	21508 Integrating System Modeling With PLM Platform to Enable Enterprise MBSE Capabilities-to Develop the Right Systems Right on Time and on Budget **Gan Wang** BAE Systems **Saulius Pavalkis** No Magic, Inc.	21531 Application of MBSE in AGILE Development **Tamara Hambrick** Northrop Grumman Enterprise Services **Jason Forth** NAVAIR	21534 Risk, Issue, and Opportunity Management Guidance for Cybersecurity **Cory Ocker** Raytheon Company	21414 Naval Sea Systems Command's (NAVSEA) Approach for Managing the Risk of Hazardous Material Usage in New Acquisition **Jessica Klotz** NSWC, Carderock Division	21351 Discovering Tool Capabilities to Support Engineering Activities **Pieter Dermont** Modelon
4:00 pm	21563 Interoperate and Collaborate on Heterogeneous MBSE Models to Support Acquisition Process **Sanjay Khurana** Dassault Systems	21324 Continuous Virtual Integration **Rand Whillock** Adventium Labs	21308 Toward Next Generation Adaptive Cyber-Physical-Human Systems **Azad Madni** University of Southern California	21285 Environmental Life Cycle Assessment of Commercial Transportation Activities in the United States **Shelia Neumann** University of Texas at Arlington	21351 Discovering Tool Capabilities to Support Engineering Activities **Carlton Francis** Transmagic, Inc.
4:30 pm		21539 Use of Model- Based Systems Engineering (MBSE) to Improve Program Metrics **Howard Gans** Harris Corporation	21488 Integrating Systems Engineering, Cyber Security and Cyber T&E through MBSE **Barry Papke** No Magic, Inc.	21326 ESOH Risk Management in Middle Tier Acquisition **Sherman Forbes** AF/AQRE	21351 Discovering Tool Capabilities to Support Engineering Activities **Alan Mendel** Aras
5:00 pm	**CONFERENCE ADJOURNS**				

Architecture	Education & Training	Enterprise Health Management/Prognostics/ Diagnostics/Reliability	Environment, Safety & Occupational Health
White Ibis	Snowy Egret	Wilson's Plover	Sandhill Crane
BREAK – AUDUBON FOYER			
21369 Organizing, Acquiring, and Architecting for Strategically Proactive Obsolescence Management of Mission Critical Avionics and Electronic Control Systems **Markeeva Morgan** George Washington University	21403 Training the Cybersecurity Workforce **Melinda Reed** OUSD(R&E)	21307 Applying Science and Technology to Sustainment of Legacy Systems **Marilyn Gaska** Lockheed Martin	21429 The Supporting Acquisitions Strategic Objective: APHC Initiatives **Timothy Kluchinsky** U.S. Army Public Health Center
21560 Mission Engineering, Digital Engineering, MBSE, and the Like: The One Underlying Essential Attribute **Robert Scheurer** The Boeing Company	21542 The Role and Challenges of Systems Engineering Professional Continuing Education **Ronald Phipps** Air Force Institute of Technology	21332 Update on R&M Engineering Activities: Rebuilding Military Readiness **Andrew Monje** OUSD(R&E)	21434 Assessment of Acoustic Energy and Hearing Protection Strategies in Support of Army Modernization **Olivia Webster** U.S. Army Public Health Center
	21566 The Systems Engineering Research Center (SERC): 10 Years of Progress **Nicole Hutchinson** Stevens Institute of Technology		21394 APHC support to the ALU CDC and JCIDS Processes **Robert Booze** U.S. Army Public Health Center
	21567 Outside-In Workshop: An Interactive SE Training Approach for High-Tech Organizations **Asmae Mhassni** Intel Corporation		21358 Revolutionizing Environment, Safety, and Occupational Health (ESOH) in Systems Engineering to Meet Rapid Prototyping/Fielding Under the Middle Tier of Acquisition **Corey Pressley Plakos** Naval Air Systems Command
CONFERENCE ADJOURNS			

BIOGRAPHY

JAMES A. FAIST

Director, Defense Research and Engineering for Advanced Capabilities

Mr. James "Jim" A. Faist is the Director of Defense Research and Engineering for Advanced Capabilities, reporting directly to the Under Secretary of Defense Research and Engineering within the Office of the Secretary of Defense. Jim directs an organization whose mission is to recognize, explore, and force the development and integration of new technology to maintain U.S. technological superiority. He is responsible for establishing a Department of Defense joint mission engineering capability, oversight of developmental testing and test facilities as well as demonstration and validation of technology prototype and rapid fielding activities. Jim serves as the mission area advisor for warfighter portfolios in hypersonics, space, autonomy, and networked command, control, and communication architectures. He also provides independent technical risk assessments of major acquisition programs. Jim has an extensive career in industry and government in national defense, including progressive responsibilities and experience in military operations, advanced technologies, system development, engineering leadership, and program management. He is a recognized expert in advanced sensors, weapons, and electronic warfare for space, air, and ground capabilities.

Faist was a chief engineer for the Northrop Grumman and Harris Corporations. He held senior executive positions at Schafer Corporation, Trident Systems Incorporated, and System Planning Corporation. Prior to his work in the industry, he served in the United States Air Force as a Weapons Systems Officer and an Electronic Warfare Officer in the F-4D/E Phantom II fighter aircraft.

Jim earned a Bachelor of Science in Electrical Engineering from Virginia Military Institute in Lexington, Virginia, and a Master of Science in Electrical Engineering from Cornell University in Ithaca, New York, with emphasis on microwave and power systems. During his career he received numerous performance awards and honors from the U.S. Air Force, academia, and industry.

TECHNICAL SESSION SUMMARIES

Systems Engineering Challenges for Integrating Software Assurance into Defense Systems Throughout the System Acquisition Lifecycle

20591 | Nidiffer, K.

This presentation presents systems engineering challenges for integrating software assurance into defense systems throughout the system acquisition lifecycle. It focuses on current government and industry efforts to provide program managers with a guidebook for system engineering-In software assurance.

Status of the Development of International Standards for Systems of Systems

20627 | Yokell, M.

As systems of systems engineering (SoSE) matures, there is a growing interest in SoSE standardization. Three new international standards are being developed to address systems of systems concerns. This presentation provides a status on their development.

Overview of System of Systems (SoS) Managerial and Operational Affinity – Assessing and Improving Relationships Within Systems of Systems

20628 | Yokell, M.

Two key characteristics of systems of systems are operational and managerial independence. But what do these terms really mean, and what am I supposed to do about them?

Affordable Rocks (and Batteries) – A Lighthearted Dialogue About Value

20812 | Yokell, M.

Explore what affordability is (and isn't) plus some of the tools in the systems engineer's toolbox. Join us for a lighthearted, interactive dialogue about affordability and value. Learn why affordability tells us nothing about what we get for our money and why we should focus on value instead.

Complications with Using Affordability Efficiency Measures

20813 | Yokell, M.

Affordability efficiency measures help us to make informed buying decisions. We can compare unit acquisition costs, annualized sustainment costs or even miles per gallon. This presentation uses publicly available data about cars to explore some complications in using these kinds of measures.

Preparing Chief Engineers for the Digital Engineering Transformation

21240 | Bearden, K. • Schwenn, K.

We will present the problem of a comprehensive Chief Engineer continuing education. We will discuss the overall structure of the course followed by a detailed discussion on the digital engineering transformation and what is required to bring it about.

Integrated Baseline Review

21242 | Nibert, A. • Humphreys, G. • Tague, S. • Deacon, P. • Brock, R.

This presentation will be a shortened version of our popular Integrated Baseline Review class. We will cover how an organization's engineers should play a critical role in both the preparation and execution of a successful IBR.

Estimate to Complete Development & Analysis

21243 | Nibert, A. • Humphreys, G. • Tague, S. • Deacon, P. • Brock, R.

This session will be based on H&A's EAC class where the engineer's role in the EAC process is discussed. From development, review, and reporting - EAC data will be covered with attendees and how its use can facilitate management decision making.

Phoenix: The Rebirth of RFESS

21279 | Jones, Q. • Morrill, T.

Using Model Based Systems Engineering to optimize the RF Environment Simulation Software to make it more scalable and extensible

Mission Engineering and Prototype Warfare: Operationalizing Technology Faster to Stay Ahead of the Threat

21280 | Horning, M. • Shidfar, S. • Smith, R.

Prototype Warfare shifts focus from large fleets of common one-size-fits-all exquisite systems to small quantities of rapidly fielded, highly tailored systems that are focused on specific capabilities within a specific theater to address a specific requirement.

Cyber-Physical Systems and System of Systems Architecting Tool

21284 | Dagli, C.

The challenge in Complex Adaptive Systems design is to create an organized complexity that will allow a system to achieve its goals through a meta-architecture. In this paper SoS Explorer tool is presented that provides a framework for defining and modeling meta-architectures.

Environmental Life Cycle Assessment of Commercial Transportation Activities in the United States

21285 | Neumann, S.

Life Cycle Assessment, ISO 14040, applied to the U.S. commercial space transportation activities to determine environmental impacts generated from launch operations. Space Transportation Environmental Profile for Launch (STEP-L) was created using the SimaPro results.

Connecting the MBE Gap: Linking Systems and Hardware Designs through OSLC

21286 | DeMeester, J. • Finlay, C.

The ability to create traceability between design models and product data is a well-known gap. This gap impedes the creation of a comprehensive digital thread. This presentation will discuss our digital thread proof of concept including use cases, technical approach, and lessons learned.

The Excellent 3-in-1 Systems Engineering Tool (SET)!

21287 | Shealey, D.

AFLCMC Engineering, in collaboration with SAF/AQRE, is developing a 3-in-1 Systems Engineering Tool under the Rapid Innovation Fund Initiative. The 3-in-1 SET will help the government stop rebuying technical data it already owns, which will be a significant cost savings to the warfighter and taxpayers.

Closing the Loop Between Missions and Acquisition

21289 | Kratzke, R. • McCafferty, F.

Apply model based systems engineering to close the loop between project missions and acquired system. Present the concepts used to capture mission/acquisition ideas, interrelationships, and consistency.

Acquisition Agility: Reciprocity and Efficiencies in Approved Products List Testing

21293 | Mackenzie, D.

The DoD Information Network Approved Products List (DoDIN APL) is the sole list of products that have completed required Interoperability and Cybersecurity testing/certification and may connect to the DoDIN. JITC has implemented testing efficiencies that reduce test costs and schedules by 69%.

ERS Ontology-Assisted Simulation Environments

21297 | Ramsey, R. • Ball, G. • Runge, K. • Schneider, T.

Domain vocabularies, shorthand notation, and discipline biases all create ambiguity when describing complex systems. This presentation shows how ontologies can disambiguate language and assure sufficient and consistent system descriptions in support of analysis of alternative design choices (AoA).

Readiness Level Assessment Tool for Nuclear Weapons Programs

21298 | Venkatesh, S. • Bruns, C. • Bell, G.

This presentation describes the approach and focuses on the specific tool used within the nuclear weapons programs for assessing the readiness levels for technologies for insertion into the nation's nuclear stockpile modernization programs.

Model-Based Enterprise Capabilities Matrix Workshop

21300 | Hoheb, A. • Hale, J.

The Model-Based Enterprise Capabilities Matrix is being developed for INCOSE with high interest across the DoD, the Intelligence community and civil space. It's a tool to determine the current and desired levels of MBE application for any enterprise, program, or project.

Architecture-Drive Assurance for Avionic Systems

21304 | Bliek, D.

Introduce architecture-driven assurance approach and the fundamental precepts that must be met to achieve overarching objectives. Describe MBSE tools and techniques to meet architecture-driven assurance precepts, and a discussion of the expected benefits from using architecture-driven assurance.

Key Support Analysis Data used for Modeling a Global Spares Pool

21305 | Lewis, C.

Our customers mandate affordability over all aspects and phases of the life cycle of a new system resulting in comprehensive decision support through optimization of spares solutions, maintenance resources, and support organizations for sustainment of the product.

Applying Science and Technology to Sustainment of Legacy Systems

21307 | Gaska, M.

This presentation will highlight trends in science and technology applications to sustainment to include sustainment as a science, Industry 4.0, and additive manufacturing/business models. Focus topics from the sustainment conferences also include automation, corrosion/materials, and capability management.

Toward Next Generation Adaptive Cyber-Physical-Human Systems

21308 | Madni, A.

This paper presents research on next generation adaptive Cyber-Physical-Human Systems sponsored by DoD Systems Engineering Research Center. It discusses the challenges posed by adaptive CPHS along with the highlights of a model-based methodology for engineering such systems.

Formal and Probabilistic Modeling in the Engineering of Resilient Multi-UAV Swarms

21309 | Madni, A. • Sievers, M. • Erwin, D. • Lucero, S.

This paper presents DoD-Systems Engineering Research Center-sponsored research on formal and probabilistic methods in engineering resilient multi-UAV swarms. An innovative approach based on resilience contract is presented.

Verifying Software Control Categories (SCCs) Using Quantitative Fault Tree Analyses (FTAs)

21310 | Smith, R.

This presentation explores performing FTAs "sensitivity analyses" of software failures and impact to top event failure probability and cut sets; and proposes an approach to use this information to determine and/or verify the Software Control Category assignments in accordance with Table IV from MIL-STD-882E.

Industry Thoughts on a Market of Assured and Trustworthy Complex Cyber/Physical Systems

21311 | Martin, R.

This talk addresses the myriad of issues that underlie unsafe, insecure, and unreliable software and provides industry insights on how to conquer them and pave the way to a trustworthy marketplace of complex cyber/physical systems like, industrial Iot systems and their related services.

Leveraging Industry Standards and Tools in ESOH Risk Management

21312 | Pierce, Y. • Sheehan, T.

Provides an overview of aerospace and defense industry chemical reporting including how collaborative industry efforts support ESOH risk management under MIL-STD-882E and NAS411 Hazardous Materials Management Program and provide an opportunity to improve reporting quality and efficiency.

MIL-STD-882E Revised Level of Rigor

21313 | Peterson, D.

The Level of Rigor (LOR) as defined MIL-STD-882E paragraph 4.4 is not well understood. This paper explores the underlying philosophy behind the LOR and provides revised guidance to better develop the LOR.

CREATE as an Early Example of a DoD "Software Factory"

21320 | Kendall, R. • Post, D.

This presentation will focus on illustrating the DoD "software factory" concept through CREATE. It is based on the "disciplined agile" software development approach that attempts to balance risk with value to provide accelerated development of innovative software for the nation's defense.

The Steps to Success: A Career Development Model Based on the New INCOSE SE Competency Framework

21321 | Gelosh, D.

This presentation describes how the Worcester Polytechnic Institute (WPI) Systems Engineering program used the new INCOSE Competency Framework to develop a career development model for systems engineers called "The Steps to Success".

Analyzing System Alternatives through Architecture Simulation

21322 | Chapman, D.

Lecture/demonstrating showing methods on how to simulate a systems architecture. It will go through the methods and applications for using simulated models via MBSE.

Embedding Human Systems Integration Within Systems Engineering Processes – A Peek into the Draft HSI MIL Handbook

21323 | Orr, S. • Shihady, J.

The presentation will address how and why Human Systems Integration (HSI) is embedded within the systems engineering processes, within the SEP, and what activities are conducted early on in the systems engineering process, based upon sections of the draft HSI MIL-HDBK.

Continuous Virtual Integration

21324 | Smith, T. • Whillock, R. • Boydston, A. • Edman, R.

This paper describes our experience and lessons learned using agile software engineering practices in model-based systems engineering for embedded computing systems.

ESOH Risk Management in Middle Tier Acquisition

21326 | Forbes, S.

This presentation will discuss how procedures and techniques used for management of Environment, Safety, and Occupational Health (ESOH) as a design consideration will have to adapt to address ESOH considerations in the Middle Tier (Rapid Prototyping and Rapid Fielding programs) Acquisition programs.

Transforming Systems Engineering to Take Advantage of the Digital Revolution

21327 | Kraft, E.

Essential elements of systems engineering are examined through the lens of model-based digital engineering leading to the transformation of each lifecycle phase to an event-based, digital approach to supplying quantified decision analytics bringing systems engineering into the digital revolution.

A Model-Based Requirements Engineering Framework for Developing Military Healthcare Delivery Requirements

21328 | Biemer, S.

A model-based requirements engineering framework that considers the heterogeneous military healthcare stakeholder community is presented. The framework incorporates the attributes of complex adaptive systems by incorporating flow and influence within a healthcare delivery system of systems.

Integrated Model-Based Engineering

21330 | Patel, M.

ARDEC is evaluating vendors for implementation of a model based engineering framework and multidisciplinary software platform to integrate system development activities.

Maximizing the Utility of Data and Emerging Technology with System of Systems and Big Data Analytics

21331 | Rose, C.

Discussion about new transitional phase in terms of MBSE and Big Data analysis and utilization. Models on which we base engineering architectures are now driving data collection analysis and design in innovative ways revealing dynamic properties that essentially now allow us to see our models come to life.

Update on R&M Engineering Activities: Rebuilding Military Readiness

21332 | Monje, A.

This presentation will discuss reliability and maintainability engineering activities in light of the Department of Defense reorganization of the Under Secretary of Defense (USD) for Acquisition, Technology, and Logistics into USD for Acquisition and Sustainment and USD for Research and Engineering.

Department of Defense Human Systems Integration Initiatives

21333 | Monje, A.

The Department of Defense (DoD) Office of the Under Secretary of Defense for Research and Engineering manages the discipline of human systems integration (HSI) as a critical element of systems engineering. This presentation will provide an overview and update of DoD HSI activities and initiatives.

Manufacturing and Quality (M&Q) Body of Knowledge (BoK)

21334 | Monje, A.

With typically 28 percent of a program's total life cycle costs consumed during the production phase, manufacturing can represent a significant risk to program management teams. This presentation will update the community on the development of a Manufacturing and Quality Body of Knowledge.

Long-Term Strategy for DoD Assured Microelectronics Needs and Innovation for National Economic Competitiveness

21335 | Shanahan, R.

The DoDs Microelectronics Innovation for National Security and Economic Competitiveness (MINSEC) initiative will ensure U.S. leadership in microelectronics technology through development and capture of disruptive technology and promotion of strong government and industry partnerships in a domestic ecosystem.

Exchanging Digital Artifacts for the Engineering Life Cycle

21337 | Zimmerman, P. • Coleman, J.

This presentation discusses a conceptual construct, the Digital Engineering Information Exchange Model (DEIXM), which OUSD (R&E) is proposing to provide a foundation for exchanging graphical and non-graphical digital artifacts in a digital engineering environment.

An MBE Manifesto

21338 | Carroll, E. • Schreiber, C. • Schindel, W. • Salvatore, F. • Schindel, B. • Trauth, S. • Grisham, D. • Hayden, N.

Systems Engineering is based on assumptions from supporting disciplines such as systems analysis, systems science, and systems thinking. Therefore, it should be natural to think of Systems Engineering as being data driven. To that, we are proposing a Model-based Engineering (MBE) Manifesto.

Digital Engineering Support to Mission Engineering

21339 | Dahmann, J. • Zimmerman, P.

This presentation outlines key mission engineering activities and describes opportunities for application of digital engineering to support mission engineering.

Hardware Assurance (HwA) Through the Lifecycle

21341 | Shanahan, R.

Microelectronics are subject to potential attack in all phases of their lifecycle, including design, fabrication, assembly, deployment, and retirement. This presentation surveys potential attacks and mitigations at each lifecycle phase.

Enhancing DoD Technological Advantage

21342 | Hughes, B.

This presentation will discuss techniques to prioritize controlled technical information for protection efforts.

Operationalizing the Munitions Risk Management Assessment Process

21343 | Peterson, M. • Lenox, J. • Darnell, M. • Darby, S.

This paper will examine the DoD policy on deviations, look at methodologies for conducting risk assessments, and discuss process for conducting munitions risk assessments in support of munitions operations using both U.S. and NATO explosives safety criteria.

Competency-Based Assessment of Systems Engineers: Results and Recommendations from a United Kingdom Pilot Program for INCOSE Certified Systems Engineering Professionals (CSEP)

21344 | Wright, C. • Presland, I.

The International Council on Systems Engineering has completed a pilot program to evaluate the competency of systems engineers through personal narratives, references, and interviews. Based on INCOSE's competency framework, this approach was developed at the request of the UK Ministry of Defence.

Modeling with Standards Based Requirements

21345 | MacLaird, S.

Why Standards?

Autonomy Strategy Timelines | Rapid Development & Testing | Complexity Management | Cost Reduction | Rapid Integration | Reliability | Cybersecurity | Cybersecurity in the Age of Autonomous Systems | Cybersecurity Transformation Opportunities

Acquisition Agility Act of FY 2017 NDAA

21346 | Gold, R. • Harrington, B.

This presentation will discuss the content of the Acquisition Agility Act (AAA) of the FY 2017 National Defense Authorization Act and Department of Defense actions to date in response to the AAA.

Empowering the Department of Defense Engineer

21347 | Gold, R.

This presentation will highlight initiatives under way to empower engineering workforce members to enhance their knowledge, skills, and abilities to meet current and emerging defense needs. The discussion will include initiatives to recruit technical professionals with the requisite expertise.

Transforming Large Scale DoD Organizations Into an MBSE Powerhouse

21348 | Henry, C.

Transforming a large scale organization is never a simple prospect. This presentation will review how the Navy SPAWAR organization is approaching the problem and lesson learned so far.

DMSMS/Obsolescence Panel

21350 | Brown, R. • Plotkin, E. • Kang, K. • Magnusson, L.

This panel will provide practical insight into how programs can mitigate issues of diminishing manufacturing sources and materiel shortages (DMSMS)/obsolescence. Topics will include minimizing budget and schedule risk while enhancing future readiness.

Discovering Tool Capabilities to Support Engineering Activities

21351 | Zimmerman, P. • Alexander, T.

Vendors will provide systems engineering tool demonstrations: Each vendor will present a tool demonstration within a 30-minute block. Participants will have the opportunity to learn about the tools and ask questions of the vendors.

PARCA: IBR's in DoD – Joint Situational Awareness

21352 | McGregor, J.

Performance Assessments and Root Cause Analyses is the DoD focal point for all policy, guidance, and competency for Earned Value Management. During this interactive session PARCA will present the results of the IBR Guide update and will facilitate discussions with the audience to discuss IBR best practices.

Model-Based Systems Engineering (MBSE), Using Semantic Web Technology to Enable Integration

21353 | Patel, R. • Jauregui, C.

As with many of the concepts that enable good systems engineering, MBSE has taken on diverging definitions. This presentation will explore an MBSE solution that allows systems engineers to create a digital model by establishing an information model.

MOSA Standards Showcase

21354 | Heaphy, M. • Lipkin, I. • O'Driscoll, K. • Peddicord, B.

Practitioners in modular and open systems approach (MOSA) standardization will provide a cross-section of government and industry perspectives on development, management, and conformance with standards enabling MOSA.

Streamlining ESOH in Acquisition: What's on the Horizon?

21355 | Asiello, D.

This presentation will address the current priorities and initiatives which OASD (EI&E) is undertaking to support the department's goals to streamline the traditional acquisition process, develop a culture of rapid and meaningful innovation, and strengthen industry partnerships.

Comprehensive Architecture Strategy

21357 | Padilla, M. • Davis, J. • Jacobs, W.

The Comprehensive Architecture Strategy integrates business and technical aspects to support the efficient development and sustainment of mission systems that meet business needs along with functional and performance needs.

Revolutionizing Environment, Safety, and Occupational Health (ESOH) in Systems Engineering to Meet Rapid Prototyping/Fielding Under the Middle Tier of Acquisition

21358 | Pressley Plakos, C. • Essex, L.

Traditional Environment, Safety, and Occupational Health (ESOH) compliance must evolve to meet the modern rapid acquisition environment. Recruitment strategies, training, and retention of the new workforce will be essential to Department of Defense mission and success of ESOH in Systems Engineering.

Modular Open Systems Approaches (MOSA) Panel: Discussion of MOSA Frameworks

21359 | Zimmerman, P. • Bowling, J. • O'Driscoll, K. • Stough, J. • Torres, D.

This panel will discuss suggested elements needed to consistently implement modular open systems approaches (MOSA). Panel members will include representatives from programs that have implemented MOSA and those who have developed relevant policy and guidance.

INCOSE Systems Engineering Transformation

21360 | Peterson, T.

The Systems Engineering discipline is transforming to model-based discipline and one of INCOSE's key strategic objectives is to accelerate this transformation. This presentation will provide updates on several leading INCOSE activities directed at accelerating this important transformation.

Semantic Versioning and Automated System Build Assembly

21361 | Spence, D. • Mallinger, J. • Davenport, B.

Now that we've achieved DevOps at a component level, we're drowning in software builds. How do we track compatibility and turn a pile of components into a working system?

Transforming Systems Engineering for DevOps

21362 | Davenport, B. • Mallinger, J.

Transforming traditional Systems Engineering and Systems Architecture to enable DevOps and DevSecOps.

Going DevOps in GovCloud – Trials and Travails of Standing Up a DevOps Pipeline in AWS

21363 | Mallinger, J. • Davenport, B.

Lessons Learned moving from traditional data centers to cloud deployments: An SE Perspective.

Infrastructure as Code – Moving to Hardware Defined Infrastructure

21364 | Davenport, B. • Mallinger, J.

Infrastructure convergence with software, and moving towards software defined automated infrastructure.

Modular Online Open SoSE Education and Training (MOOSE)

21365 | Dahman, J.

As interest in systems of systems (SoS) and SoS engineering (SoSE) has grown so has the need for more broadly available SoS educational material to support the SE community. The MOOSE concept is to offer an on-demand, self-paced learning experience based on sets of short course video modules.

Your Father's Architecture: Does it Matter Anymore – Is it the Critical Piece or a Waste of Money?

21366 | Coughenour, M. • Moshinsky, E. • Hart, L.

This presentation will examine many of the places where architecture has a role & discuss the role & value proposition of architecture/ architecting in each, including: MBSE, Agile at scale, Capability evolution, mission-critical complex development, COTS integration, Mission Engineering & MOSA/OTTB.

Uncovering Cascading Vulnerabilities in Model-Centric Acquisition Programs

21367 | Rhodes, D.

Digital engineering changes how systems are acquired and developed through model-based engineering practices and tools, leading to potential new programmatic vulnerabilities. A new method enables identifying and mitigating vulnerabilities within the enterprise itself.

Program Risk/Opportunity Management, It's Not Just Technical Anymore

21368 | Schlegel, V. • Leonard, E.

Risk and Opportunity (R/O) Management has traditionally been executed within Systems Engineering with a strong technical focus. It is critical that programs evolve to inclusive R/O management beyond technical to fully address and manage all elements of a program.

Organizing, Acquiring, and Architecting for Strategically Proactive Obsolescence Management of Mission Critical Avionics and Electronic Control Systems

21369 | Morgan, M. • Sarkani, S. • Mazzuchi, T.

This presentation will describe a generic organizational structure approach, an abstracted acquisition strategy, and a set of design architecture characteristics that can minimize fiscal and schedular impacts of obsolescence while providing other benefits such as controlled technology insertion.

Understanding Discontinuous Technologies Using Model-Based Systems Engineering (MBSE) Behavior Models

21370 | Golden, W. • Mazzuchi, T. • Sarkani, S.

This presentation recommends a methodology to develop several behavior models in MBSE for discontinuous technologies, specifically batteries such as those in Electric Cars, building upon the existing body of knowledge and data mining from financial and technology reports.

The Sensor Open Systems Architecture (SOSA) Initiative in a Nutshell

21371 | Davidson, S.

Overview of the Sensor Open System Architecture (SOSA) technical architecture for radar, EO/IR, SIGINT, EW, and Communications — and the associated business model — that is being developed by the government/ industry consensus-based SOSA Consortium.

Driving System Architecture Decisions Using Model-Based Failure Analysis in System Design

21373 | Van Bossuyt, D.

Presentation of ongoing efforts to develop methods to decrease risk of system failure during conceptual system design. Discussion of automated design tools to develop safer, more effective systems that are more robust to malicious attacks.

MBSE for SOCOM JATF-TALOS

21374 | Cole, B. • Gillespie, S. • Nguyen, L. • Wise, R.

The presentation will discuss the past year of model-based systems engineering as applied to the JATF-TALOS. An abbreviated MBSE method has been used to accommodate the rapid development approach to delivering the TALOS prototype. Tailoring of the method and focused products will be discussed.

Systems Engineering for Highly Rapid Development: The Parallel Agile Process

21375 | Rosenberg, D. • Boehm, B.

The parallel agile process uses a common architecture for each of its components, enabling many developers to work in parallel and have their modules consistently interact within the architecture. It has been successfully applied in several domains. The presentation will elaborate on the process.

Technology Advancement in NASA's Small Business Innovation Research Program

21376 | Belz, A. • Zapatero, F. • Terrile, R. • Giga, A.

We study NASA SBIR TRLs and find that technologies advance from TRL 2 to 4 (3 to 5) in Phase I (II); selection is TRL-independent, with "microfirms" (1-5 employees) selected less frequently initially. The PI and NASA disagree on TRL 20% of the time, but this does not impact funding likelihood.

Use of Other Technology Agreements for Department of Defense Research and Development

21377 | Belz, A. • Khashe, Y. • Doumitt, A.

Other Transaction Agreements (OTAs) have grown in use at DOD. We find that the Army leads in using R&D funds this way, followed by DARPA. Funds are used in the engineering development stage, bridging the "valley of death"; in fact, basic research was unsupported through this pathway until 2015.

User-Centric Systems Engineering; Integrating User Experience Design with Traditional Systems Engineering

21378 | Patel, R.

This presentation explores the integration of user experience (UX) design principles with the traditional systems engineering 'vee' approach to enhance human-centric design and development practices within the Department of Defense's (DoD) research, development and engineering centers. In the absence of frequent user interaction, UX design tools can help prompt the appropriate questions and design considerations needed to develop a system that is readily accepted by the user and also eases his/her burden.

Adapting ESOH Risk Management for Rapid Prototyping and Rapid Fielding Programs

21380 | Gill, K. • Hales, L.

This presentation looks at how to adapt traditional procedures and techniques for ESOH risk, compliance, and requirements management to support Middle Tier Acquisition Programs and suggests a path forward to refine a streamlined approach to ESOH risk and requirements management.

Leveraging Systems Modeling to Assess and Mitigate Cyber-Based Mission Risk: A Cybersecurity Architecture Framework

21381 | Oliver, E. • Mazzuchi, T. • Sarkani, S.

Modern organizations depend on information technology for mission success. Using stochastic modeling of cyber vulnerability and incident data, and the methods of reliability and risk assessment, we can assess mission impact and prioritize candidate cyber defense strategies.

A Model-Based Systems Engineering Approach to Communicating and Verifying Dynamic Requirements in Contracted System Development

21385 | Barrett, D. • Sarkani, S. • Mazzuchi, T.

While Model-Based Systems Engineering has become widely utilized, programs continue to use documents to communicate and verify requirements in contracted system development. The use of an MBSE approach will improve the accuracy and increase the speed of contractual performance verification.

The Systems Integratore – Who Has the Monkey?

21386 | Jones, S.

DoD pushed the Role of the Systems Integrator out to Industry in the 1990's. Recently DoD has encouraged retaining that responsibility within the government and systems integration has frequently not been performed in a timely manner. This presentation provides recommendations for improving that track record.

Mission Assurance Through Energy Assurance – Measuring Mission Effectiveness and Resilience Through Disruption

21388 | Collins, J.

Current mission assurance methods assess installation readiness during disruption. The DEEPR approach develops full mission threads and measures mission effectiveness and resilience throughout prolonged and widespread outage.

Mission Engineering Update

21389 | Thompson, J.

This presentation will provide a review of ongoing activities and updates on mission engineering implementation and plans.

Modeling Digital Engineering Transformation: The Program Authoritative Source of Truth

21390 | McDermott, T. • Paredis, C. • Collopy, P. • Nadolski, M.

The presentation describes collected interview data and systemigram mapping created a conceptual descriptive model of the architecture behind the DoD digital engineering strategic goal to move programs to an authoritative source of truth - a move from document centric processes to digital models and data.

Overview & Track Context

21391 | Daly, J. • Zavin, J.

Operations must be planned and executed in an uncertain, changing, and essentially unknowable world environment. To do this users (human or non-person entities) whether known or unanticipated can easily discover, access, trust, and use information to support their mission objectives.

Considerations in Modeling Defense Capabilities at the Mission Level of Performance

21392 | Daly, J.

Defense capabilities are typically 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, MBSE and mission-level simulation are a potential path forward to achieve this.

APHC Support to the ALU CDC and JCIDS Processes

21394 | Booze, R.

The Army OTSG established the Army Health Hazard Assessment Program in 1981 to evaluate the potential occupational health effects of operating military weapon systems and in 1995 designated APHC as the Lead Agent for this effort. This program is governed by Army Regulation 40-10.

Engineering the Complete System: Hardware, Software, AND People

21395 | Pietryga, M.

Human Systems Integration (HSI) is the systems engineering process that provides integrated analysis and design for the human component of any engineered system. Systems Engineers must understand the role of people in the system to at least the same degree of rigor as the other system components.

A Model-Based Framework to Evaluate and Optimize Unmanned Surface Vessels (USV)

21396 | Veit, D. • Sarkani, S. • Mazzuchi, T.

There is no comprehensive evaluation method for total system performance of Unmanned Surface Vessels (USVs) that has been validated and adopted by the DoD community. The proposed framework is a better method to comprehensively evaluate a USV's total system performance and mission effectiveness.

Is There a Simple Ontology We Can Use for Digital Engineering?

21398 | Vaneman, W. • Dam, S.

This paper explores a relatively new ontology, the Lifecycle Modeling Language (LML), how it can be used to visualize this information to enhance understanding, and to make more informed decisions about the architecture or system.

Joint Federated Assurance Center (JFAC) Update 2018

21400 | Hurt, T.

This presentation will describe recent accomplishments of the Joint Federated Assurance Center (JFAC) such as development of a draft JFAC Full Operational Capability (FOC) Plan and a Defense Acquisition University continuous learning module, and other ongoing efforts and collaborations.

Modeling Digital Engineering Transformation: Workforce and Culture

21401 | McDermott, T. • Nadolski, M. • Collopy, P. • Paredis, C.

While MBSE is broadly adopted in the defense industry, Digital Thread is still in the early stages of development and adoption. Often overlooked is the human role and associated changes, how workforce will shift and might change over time, as the broader system seeks to become more agile.

Advancing DoD Software Assurance (SwA)

21402 | Hurt, T.

This brief will highlight Department of Defense software assurance (SwA)-related activities and progress in areas including contract language, metrics, use of SwA tools by acquisition phase and type of software, coding standards, training, and more.

Engineering Cyber-Resilient Weapon Systems (CRWS) Workforce Development Workshop

21403 | Reed, M.

The Department of Defense is developing workforce competencies in software assurance and cybersecurity. Working with Defense Acquisition University and academia, the community will develop appropriate knowledge-based competencies to identify curriculum to enhance the cybersecurity body of knowledge.

Iterative Analysis Between MBSE Software and External Tools

21404 | Gillespie, S. • MacCalman, A. • Cole, B.

DoD Approach for Engineering Cyber-Resilient Weapon Systems and Program Protection

21405 | Reed, M.

DoDI 5000.02 Enclosure 14, Cybersecurity in the Defense Acquisition System, establishes acquisition responsibilities for cybersecurity for weapon systems to achieve. This presentation will discuss ongoing initiatives to establish or strengthen key acquisition best practices.

Systems Engineering Perspectives for Cybersecurity Requirements Derivation

21406 | McEvilley, M. • Reed, M.

This presentation will provide an engineering perspective of the challenges and response to DoDI 5000.02 Enclosure 14 requiring cybersecurity requirements to be derived and captured in system performance specs and product support needs.

Methods for Accelerated Delivery of Capability – What Does It Take to Go Fast?

21407 | Lucero, D. S.

PANEL: This panel will discuss the opportunities and challenges in getting defense and aerospace engineers to go fast.

Organizational Considerations for Effective Model-Based Systems Engineering Implementation

21409 | Vaneman, W.

This paper discusses the organizational and cultural challenges associated with MBSE implementation. These challenges are as important to MBSE implementation as are the technical considerations, but are often not sufficiently addressed during MBSE implementation planning.

Software Assurance Concept of Operation – Advancing Software Assurance in the Modern Age

21410 | Nidiffer, K. • Lanford, B.

An overview of the Software Assurance (SwA) CONOPS and an introduction to the DoD SwA guidebook, presenting systems engineering challenges for engineering-in software assurance into defense systems throughout the system acquisition lifecycle.

Lead Systems Integration: An Engineering and Management Strategy for System of Systems

21411 | Vaneman, W. • Carlson, R.

This presentation defines Lead Systems Integration, introduces the LSI Enterprise Framework, illustrates how it could be used as a framework for the engineering management of SoS, and begins to shape the problem to satisfy a set of mission capabilities.

Leveraging System Safety to Improve System Security

21412 | Reed, M. • McEvilley, M.

Present strong parallel objectives for system safety and system security, and opportunities that system safety presents to inform development and maturation of security engineering mindset and methods in response to engineering weapon systems challenges for contested cyberspace environment operation.

MOSA – Key Points for Implementation from the NDIA Architecture Committee

21413 | Moshinsky, E.

MOSA is a new requirement for large DoD acquisitions. Implementation guidelines are being developed. The DoD and the contractor community need to understand the implications of MOSA acquisitions and the impact of its tenets on their business practices and priorities.

Naval Sea Systems Command's (NAVSEA) Approach for Managing the Risk of Hazardous Material Usage in New Acquisition

21414 | Klotz, J.

The use of Hazardous Materials (HM) over the lifecycle of an asset poses a hazard that must be addressed through proper management strategies. NAVSEA has implemented a standard process to properly assess and minimize HM in delivered systems.

What's the Difference Between Digital Engineering and Product Lifecycle Management (PLM)?

21415 | Dam, S.

This paper will discuss how the PLM and Digital Engineering are similar and different. The presentation will also discuss the elements of information needed in each area, including the places where that information overlaps, as well as the necessary features of the tools involved.

Systems Engineering Considerations for System Resilience

21416 | McEvilley, M. • Reed, M.

This presentation outlines the computer science and software engineering methods, practices, and considerations that underlie development of software for high-confidence application, such as the software employed in weapon systems that operate in contested cyberspace environments.

Lessons Learned from Tactical Radio Interface Standardization

21417 | Stephens, D.

The DoD developed a software defined radio (SDR) architecture that has been deployed within the Department and foreign ministries of defense. Lessons learned from this standardization are applicable to new open systems architecture projects.

What is the Future of Systems Engineering?

21418 | Dam, S. • Vaneman, W.

This paper addresses the question, "What is the future of systems engineering." This paper discusses previous methodologies from the 1960s to the present and outline potential needs for education and training of the future systems engineering workforce.

Implementing DoDAF and UAF

21419 | Dam, S.

The DoD Architecture Framework (DoDAF) is evolving into the Unified Architecture Framework (UAF) under the guidance and control of the Object Management Group. This paper is an "outsider's" view of the strengths and weaknesses in implementing these frameworks on DoD architecture programs.

Use of Draft MIL-STD-882E, Task 108, to Prohibit & Eliminate Cr6+

21420 | McKinley, G.

The USAF Combat Rescue Helicopter Program implemented a novel approach to HAZMAT management through the use of NAS 411 and MIL-STD-882 to reduce the use of Cr6+ by >90% over the Legacy HH-60G Platform. This effort significantly reduces the risk to USAF operators and maintainers for decades to come.

Turning the Digital Thread Into Reality

21421 | Dam, S. • Rygaard, C.

For digital engineering to become a reality, it requires that these systems and design engineering tools to interoperate efficiently and effectively. This paper will discuss an approach to providing an integrated, seamless environment that will form the basis for establishing a digital thread.

Streamline Defense Industry Performance with CMMI V2.0

21422 | Lear, R. • Schaaf, K.

Reliable and innovative suppliers are critical to success at the DoD. CMMI Development V2.0 focuses on driving business performance through building and benchmarking capabilities, ensuring the DoD is evaluating and selecting the right suppliers with proven capabilities focused on continuous performance.

Estimate to Complete Development & Analysis

21423 | Campbell, M. • Dam, S.

Using the capability of NLP, a branch of Artificial Intelligence, algorithms we can read statements within the project to connect and trace to other statements. This paper will show an interactive traceability matrix with the NLP-based traceability assist technology.

Challenges and Opportunities for High-Fidelity Computational Modeling to Support Future Vertical Lift

21424 | Strawn, R. • Wissink, A.

This presentation will describe how current and future new ERS workflows and computational modeling tools will reduce cost, improve mission performance, and speed up the development of the Army's Future Vertical Lift (FVL) aircraft.

Securing the ERS Digital Workflow

21425 | Eakman, G.

The ERS Cloud Computing Architecture (ECCA) creates a secure modeling and simulation collaboration platform to perform analysis of alternatives. ECCA leverages industry developed tools while protecting intellectual property.

De-Mystifying Model-Based Systems Engineering

21426 | Vaneman, W. • Vaneman, N.

This paper defines MBSE as the formalized application of modeling (static and dynamic) to support system design and analysis, throughout all phases of the system lifecycle, and through the collection of modeling languages, structures, model-based processes, and presentation frameworks.

Simpath?: A Computational Model to Facilitate Human Systems Integration Evaluations

21427 | Weldon, E. • Hutto, C.J. • Fausset, C. • Price, C.

Manpower, personnel, and training (MPT) analyses are essential for DoD programs as technologies and systems evolve. Researchers at GTRI have developed a computational model called simpath? that facilitates MPT analyses by allowing stakeholders to visualize trade-offs and make data-driven decisions.

Critical MBE Themes that Enable a Collaborative Government-Industry Digital Engineering Process Throughout the DOD Acquisitions Lifecycle

21428 | Pan, Z.

In this presentation, we will highlight some of the key issues and themes that the AIA MBSE team has identified that will help both industry and government take the next steps in realizing a much more dynamic, efficient, and flexible Digital Engineering process through use of models.

The Supporting Acquisitions Strategic Objective: APHC Initiatives

21429 | Kluchinsky, T.

This session will discuss the Army Public Health Center's initiatives that have been developed to assist in meeting the FY16 Strategic Goals for Modernization.

An Attack Graph-Based Vulnerabilities Framework for Systems of Systems

21430 | Horan, T. • Mazzuchi, T. • Sarkani, S.

Modeling system of systems vulnerabilities using Bayesian Attack Graphs. Utilizing results to conduct a risk analysis and identify means of failure within the overall system.

Leveraging Vulnerability Prediction Models to Aid Cyber Security Planning

21431 | Chow, R. • Sarkani, S. • Mazzuchi, T.

Current NIST standards provide a framework for addressing cyber security but lacks prescriptive guidance. Stochastic modeling combined with preventive maintenance principles can be used to offset this deficiency, providing required minimum frequencies for cyber security audits and assessments.

Experiences in Experimentation Supporting Mission Engineering of Multi-Domain Capability

21432 | Bergmeier, G. • Hinchman, G. • Coughenour, M. • Brake, J.

A key challenge of leveraging multi-domain capabilities is finding practical ways to begin to realize such a complex task. This presentation will discuss lessons learned from a series of exercises that are exploring approaches to synchronize ops / effects across multiple domains.

Architecting Resilient Systems with Design Structure Matrices and Network Topology Analysis

21433 | Hill, R. • Mazzuchi, T. • Sarkani, S.

Addresses the intersection of Design Structure Matrices and resilience engineering, with a view to building Engineered Resilient Systems. Proposes a method to better build in resilience, earlier in the lifecycle, using a comparatively simple, computationally inexpensive tool.

Assessment of Acoustic Energy and Hearing Protection Strategies in Support of Army Modernization

21434 | Webster, O.

The goal of the Health Hazard Assessment Program is to prevent injuries and protect the health of Soldiers so that they can accomplish their mission. This presentation focuses on the hazard of Acoustic energy and health hazard intervention strategies to protect the hearing of Soldiers.

Accomplishing Complex NAVSEA Frigate Systems with Digital End-to-End MBSE Development in Enterprise Architecture and Systems of Systems Architectures and Engineering

21435 | Sahlin, J. • Tsui, R. • Davis, D. • Moore, C.

NAVSEA Frigate program for modernizing with Cyber, Combat, Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C6ISR). We accomplish the complex systems with MBSE approach from end-to-end of the total Systems Engineering development life cycle.

Model-Based System Operations: Moving MBSE into the Operational Lifecycle Phase

21437 | Mathieson, T.J. • Mazzuchi, T. • Sarkani, S.

MBSE has proven transformational for the development of complex systems yet is not well suited for the operational phase of a lifecycle. Model Based System Operations (MBSO) is proposed as an extension to the MBSE methodology adapted specifically for support to system utilization and sustainment.

Affordable Resilient Architectural Trades in Next Generation Defense Systems

21438 | Wheaton, M. • Madni, A.

Affordability and resilience are non-functional requirements that are increasingly needed in next generation defense systems. There is a pressing need for a tradespace definition and evaluation framework to balance these requirements in the design of complex systems.

Leveraging MOSA Practices to Educate the Acquisition Workforce

21439 | Rodriguez, Y. • Ofori, M.

The Defense Acquisition University and Office of the Under Secretary of Defense for Research and Engineering are partnering to leverage Modular Open Systems Approach methods, processes, and tools to increase acquisition workforce expertise. This session addresses the development of the MOSA course.

Combat Operations Center Hazardous Noise Root Cause Analysis

21440 | Lund, R. • Gross, D.

Engineers from NAVSEA and NAVAIR conducted a root cause analysis of the Marine Corps' Combat Operations Center when feedback was discovered in the intercommunications system. This presentation will provide an overview of the problem statement, analysis approach, findings and recommendations.

Cost-Based Risk Management for Mission Critical Microgrids

21441 | Baker, R.

Risk decisions for a remote based mission critical microgrid consider operational metrics in a value model unique to the mission owner. Incorporating a grid model with the mission model set can generate cost metrics over varying time horizons and inform a mission owners tailored risk management process.

A Model-Based Systems Engineering Approach to Communicating and Verifying Dynamic Requirements in Contracted System Development

21443 | Barrett, D. • Sarkani, S. • Mazzuchi, T.

While Model Based Systems Engineering has become widely utilized, programs continue to use documents to communicate and verify requirements in contracted system development. The use of an MBSE approach will improve the accuracy and increase the speed of contractual performance verification.

Cybersecurity the Systems Engineering Way

21447 | Olmstead, D.

Systems Security Engineering has atrophied ever since DoD relegated it to MIL-HDBK status from MIL-STD status on 19950801. This briefing will review history and herald a possible bright future for the specialty discipline of Systems Security Systems Engineering (3SE).

PM and SE Career Path Similarities

21449 | Williamson, M. • Grant, R.

The career paths for systems engineers and program managers run parallel to each other and quite often cross. The commonality of building a broad base with a focus on integrating elements and balancing trade-offs drives similarity in the career paths of PM and SE.

MBSE Design Pattern for Non-Standard Interfaces

21451 | Wood, D. • Peters, A.

SysML design pattern for physical/logical interfaces using COTS connectors.

Collaboration in an Authoritative Source of Truth Environment using Open MBEE

21466 | Kruse, B. • Bone, M. • Blackburn, M.

Lessons learned from an application of OpenMBEE as an authoritative source of truth for a Systems Engineering Transformation UAV surrogate pilot study. OpenMBEE is used to support the collaboration through online and live documents, directly derived from views in SysML models.

Systems Engineering Transformation Surrogate Pilot Use Cases Enabling a New Operational Paradigm for Acquisition

21468 | Blackburn, M. • Bone, M. • Kruse, B.

NAVAIR characterized the Systems Engineering Transformation (SET) Framework for a Digital Engineering (DE)-enabled acquisition. This presentation discusses the Surrogate Pilot use cases, models and lessons learned in assessing the SET Framework for collaboration between government and industry.

Principled Design vs. Designing for Principles

21469 | Ryan, E.

Space is critical to U.S. national security, but designing a truly resilient space architecture may be beyond the capabilities of traditional systems engineering methodologies. An approach that prioritizes "design principles" ahead of "principled design" may be the key to achieving our objectives.

MBSE for Developmental Test & Evaluation

21472 | Honea, G. • Manas, J.

This paper will focus on the MBSE Test & Evaluation (T&E) portion of the Digital Thread. It will discuss the methodology and framework for developing a program test strategy and the architecture to implement the test strategy through the use of modeling tools.

Cyber Resiliency for AF Weapon Systems

21474 | Holtzman, D.

USAF Cyber Campaign Plan - An integrated, holistic approach to addressing Cyber Resiliency for Weapon Systems.

Integrating Systems Engineering, Cyber Security and Cyber T&E through MBSE

21488 | Papke, B. • Hambrick, T. • Lilienthal, M.

This presentation describes recent advancements in enterprise architecture frameworks, security engineering analysis and cyber test and evaluation processes that can be united through the model based systems engineering to extend the digital thread into security engineering and cyber test and evaluation.

Human Systems Integration Risk Management Tool

21489 | Kosnik, B. • Zimmerlin, Z. • O'Neill, P.

The Human Systems Integration Risk Management Tool is a software-based interactive application designed to track, analyze, and mitigate human performance risk associated with the development of systems. Tool content was developed by HSI government and industry subject matter experts.

Leveraging ERS to Enable Digital Engineering for Rotorcraft Acquisition

21492 | Moulton, M. • Williams, C. • Quinn, D.

Leveraging the ERS program has enabled the AED to address two of the foundational elements of a Digital Engineering Ecosystem. The AED has established a Digital Engineering process with application to PEO Aviation. Examples of acquisition support at various stages of the lifecycle will be presented.

DoD Digital Engineering Implementation Challenges and Recommendations

21494 | Zimmerman, P.

This presentation provides the results of the Digital Engineering Implementation Workshop convened to foster collaboration among Service Digital Engineering Implementation Plans. Presenters will discuss challenges and recommendations.

Model-Based Enterprise Maturity Model that Captures Both Digital Capability and Organizational Effectiveness

21495 | Hatakeyama, J. • Plant, J. • Seal, D. • Huang, T.

A modified version of the NIST Model Based Enterprise Capability Index Assessment Tool will be presented that includes the effectiveness of deployed capabilities, rather than relying solely on the increased fidelity and connectivity of digital capabilities.

Lesson Learned from Boeing's MBSE Implementation: Different Roles and Skill Sets Needed in a Successful MBSE Deployment

21498 | Ferguson, G. • Gau Pagnanelli, C. • Friedland, B.

Examine lessons learned for use of defined user roles, such as MBSE architects, detailed modelers, and model reviewers, when implementing MBSE on programs.

Mission Thread Analysis Methods for Identification of Critical Components

21507 | Hassell, S. • Munro, B. • Thomas, J. • Bates, L.

Results of evaluation of mission thread analysis methods which can be used to identify critical components, providing a focus for secure supply chain risk management.

Integrating System Modeling With PLM Platform to Enable Enterprise MBSE Capabilities- to Develop the Right Systems Right on Time and on Budget

21508 | Pavalkis, S. • Wang, G.

Overview of two MBSE implementation use cases that connect the digital thread from stakeholder requirements to logical and physical representations of a system in SysML, as well as validation and verification testing to demonstrate RFLP traceability across multiple engineering domains to PLM.

How Model-Based Systems Engineering with SysML Helps in Complex Systems Design

21509 | Pavalkis, S.

In this presentation, we will show modern, straightforward, and industry adopted MBSE method and framework. We will show that requirements are no longer loosely traceable abstract text paragraphs. Now they are formalized with models which allow efficient traceability and optimization.

Mission Engineering Competencies

21510 | Miller, W. • Hutchison, N. • See Tao, H. • Vesonder, G.

Supported by a literature review of mission engineering and related areas such as systems of systems and capability engineering, the research team interviewed 32 individuals who are or have been mission engineers. We will present the findings including the current mission engineering competency model.

Architecture Nomograph – A Visual Validation Tool for DODAF Products

21515 | Gibson, M.

DoDAF products are used by JITC for Interoperability test planning. JITC developed a tool to address the large number of errors being found with these artifacts including viewpoint traceability, and consistency. Products of this tool will be presented as well as statistics for its application.

Collaboration Between Systems Engineers and Program Managers

21516 | Hoffman, L.

Learn how Program Managers and Systems Engineers can better work together to meet program goals. Understanding the strengths of each role is the key.

Network Analysis of SysML Data to Inform Test and Evaluation

21517 | Gillespie, S. • MacCalman, A. • Cole, B.

Engineered Resilient Systems – Enabling Analysis of Large-Scale Maintenance Data through Innovative Techniques

21519 | Seale, M. • Strelzoff, A. • Ruvinsky, A. • Walker, L.

The need to handle massive data sets for analytical purposes is central to the mission of the Engineered Resilient Systems program. In support of this, the ERS Data Analytics team is developing the first comprehensive Army rotorcraft maintenance database with corresponding analysis capabilities.

Model-Based Engineering (MBE) Structures Viewed Through Axiomatic Investigation in Abstract Algebra & Application Implications

21521 | Havlicek, J.

While investigating Model-Based Engineering (MBE), group theory axioms are addressed. Relaxed algebras are presented within group-like category theory. Concepts including directed graphs, morphisms, inheritance, and network theory are introduced. Descriptive analytic opportunities are included.

Semantic Web Technology Architecture to Enable Digital Thread

21522 | Blackburn, M.

A key enabler identified for digital thread is the ability to manage data throughout the entire digital engineering environment. In this presentation an architecture based on semantic web technology is presented along with demonstrated use cases of the architecture managing data between digital artifacts.

Interdiction: The Application of SysML State Machines to Cybersecurity

21523 | Vinarcik, M. • Colwander, J.

This presentation explores the use of SysML state machines to describe threats and controls in a cybersecurity context. It presents a method to integrate cybersecurity analysis into a system's conceptual design and architecture to ensure fidelity and rigor throughout the development process.

Welcome and System Security Engineering Council Highlights

21527 | Dunlap, H.

System Security Engineering takes a holistic approach to ensuring system survivability in a cyber contested environment by integrating the security specialties. Please join our track to share your expertise, needs, and find opportunities to network with highly regarded experts.

Integration of Parametric Cost Estimation with System Architecture – It's a Dirty Job but Someone Has to Do It!

21528 | Papke, B. • Wang, G.

This presentation expands on previous work for implementation of the COSYSMO parametric cost model sizing drivers in SysML and presents a new CONOPS for parametric cost estimation as an integrated part of system architecture definition.

ERS is the Catalyst for Collaboration between Industry and Government in Aviation System Modeling

21529 | Quinn, D.

Collaborative interactions between the General Atomics Aeronautical Systems, INC. (GA-ASI) and the U.S. Army Aviation Engineering Directorate involving aerodynamic modeling of the Gray Eagle Unmanned Aircraft System (UAS) yield high fidelity models and V&V process efficiencies.

Application of MBSE in AGILE Development

21531 | Hambrick, T. • Forth, J.

Northrop Grumman's latest program goal is to deploy, integrate, and sustain significant interoperable technology upgrades to increase the mission profile of the aircraft system in the coming years. The team has used models to integrate each technical discipline into the program's technical baseline.

LM Overview of the AFRL/ERS EXPEDITE Program

21532 | Davies, C.

EXPEDITE is the latest AFRL MSTC program advancing the SOA of Multi-disciplinary Analysis and Design Optimization. This presentation provides an overview to the LM approach to meeting the EXPEDITE objectives discipline fidelity increases, ERS HPC integration, and Effectiveness Based Design.

Risk, Issue, and Opportunity Management Guidance for Cybersecurity

21534 | Ocker, C. • Farmsworth, B. • McEvilley, M.

Presentation of the NDIA project on Cybersecurity Risk, Issue, and Opportunity Management to provide additional guidance to programs on accurately and holistically assessing cybersecurity risks for presentation to decision makers.

The Value of Using Systems Engineering to Sharpen the Spear Against the Cyber Threat

21535 | Massey, R.

A cost/benefit value based approach to applying cybersecurity to a weapon systems integrates with systems engineering processes. Effective means to measure a cyber-threat and risk from which performance objectives are derived leads towards more clearly stating the problem which can be addressed with engineering principles.

Flexible Web Based Workflow Automation

21536 | Pothina, D. • Christensen, S. • Winters, K. • Bednar, J.

One of the primary efforts within Engineered Resilient Systems is workflow automation. Typically, these workflows take significant effort to setup and reconfigure. In this work, we demonstrate a new set of open tools that allow for building flexible workflows built entirely inside Jupyter Notebooks.

Digital Engineering

21537 | Zimmerman, P

This presentation will provide an overview of the DoD digital engineering strategy that sets the vision for encouraging innovation in the way we conceive, build, test, field, and sustain our national defense systems.

On the Topic of Navy Antiship Missile Threat Modeling and Simulation Requirements

21538 | Boord, W. • Miller, G.

This paper addresses Modeling and Simulation (M&S) requirements pertaining specifically to the surface navy antiship missile (ASM) threat problem.

Use of Model-Based Systems Engineering (MBSE) to Improve Program Metrics

21539 | Gans, H. • Draper, G.

This presentation will expand upon the concept of requirements volatility through the combined use of an MBSE tool and the IBM Dynamic Object Oriented Requirements System (DOORS). The approach can be used iteratively with DOORS to close the gap between the requirements and the architecture.

Role of Industry in Mission Engineering

21540 | Miller, W. • Moshinsky, E.

The NDIA industry team reports its findings on the role of industry in Mission Engineering to support the Department of Defense, its services, and agencies.

Requirements Partitioning, the RMF, and MBSE

21541 | Henning, R. • Hansen, D.

The RMF provides the ability to categorize security controls on a system, enterprise, or hybrid applicability basis. However, complex system modeling for availability and reliability requires further decomposition. We present a technique to support system performance modeling and RMF security controls.

The Role and Challenges of Systems Engineering Professional Continuing Education

21542 | Phipps, R.

This session will explore current systems engineering professional continuing education approaches, identify weaknesses and propose opportunities that might be exploited to improve the education effectiveness not only for the engineering workforce but other stakeholders as well.

The Digital Twin Throughout the SE Lifecycle

21545 | Hause, M.

This presentation will look at the systems engineering lifecycle and demonstrate how the definition, development and deployment of digital assets with MB SE contributes to a digital twin that will provide innovation, value, and capabilities for the armed forces.

A Digital Exploration of System Trade-Offs

21548 | Eakman, G.

Bringing together new system specifications requires expertise across several domains, including system of systems and mission planning. This presentation describes an approach to defining and searching the tradespace of system capabilities using shared modeling and simulation tools.

Unmanned System (UxS) IPT and Engineering Precepts for Safe Autonomy

21549 | Demmick, M.

Covers the rewrite of the OSD Unmanned System (UxS) Safety Guide, which can be applied to weapon and non-weapon UxS and is agnostic of domain. The guide's precepts consider the possibility that mobile systems can be used as weapons; and that non-weapon systems can be used to control weapon systems.

Deep Data Analytics for Engineered Resilient Systems (ERS)

21552 | Stuart, D.

In order to fully understand a proposed system design early in the acquisition process, a huge amount of manufacturing, lifecycle cost, and performance data is needed. This presentation outlines how ERS is tackling the challenge of deep data analytics to improve the development of DoD weapon systems.

The Role of High-Performance Computing, High-Fidelity Physics, and Large-Data Analytics in DoD Acquisition

21553 | Richards, D.

To face challenges from adversaries, the DoD must condense acquisition timelines while also producing resilient weapons. This presentation will address how investments in high-performance computing have birthed research and development programs, such as ERS, that are addressing these needs.

Small Business Process Manager

21554 | Draper, G.

Objective SE measures are fundamental to ensuring effective program execution within plan. Which measures work best, and which do not? This panel discussion with live interactive benchmarking audience participation will evaluate common SE measures and the extent to which they are used effectively.

Developmental System Requirements for Mobility in

21555 | Turnage, D.

Reasearch to develop a prototype real-time mobility warning system for ground vehicles that extends route situational awareness by deploying sensors on unmanned aerial vehicles.

Frenemies: OPM and SysML Together in an MBSE Model

21556 | Hause, M.

This presentation will discuss the benefits and issues with OPM and SysML, the tools supporting both, the OPM profile in SysML and demonstrate using example models how the two can work together in an integrated fashion.

Integrating Descriptive and Analytical System Models

21557 | Kratzke, R.

Typical design methods require the team to manually coordinate and manage differences between descriptive and detailed analytic models for components. This presentation examines methods used to integrate descriptive models with detailed component analytical models during system design.

Changes within the DoD High Performance Computing Modernization Program in Response to DoD Demand Signals and to Support Engineered Resilient Systems

21559 | Wallace, R.

Dramatic shifts within the DoD HPCMP in response to changes from within the DoD community as well as from industry and the global R&D community.

Mission Engineering, Digital Engineering, MBSE, and the Like: The One Underlying Essential Attribute

21560 | Scheurer, R.

Today's systems challenges involve a desire to apply new approaches to produce and use innovative systems much faster and more affordably than ever before. This presentation addresses the enduring role and new thinking that systems architectures play now in the midst of system developments.

Systems Engineering Resiliency and Security Engineering Lead

21561 | Williamson, D.

Recommendations to Achieve Cyber Resiliency: Requires integration of system security engineering throughout the system lifecycle. We must Establish definitions, requirements, and metrics related to cyber resiliency; Information Sharing; Beyond Risk Management Framework (RMF); Rapid & Agile Acquisition.

Meeting User Needs: Tailoring Human Systems Integration (HSI) for DoD Agile & DevOps

21562 | Kiken, A. • Risser, M.

As DoD increases use of Agile and DevOps, HSI must adapt processes and products to support cross-functional teams, ensuring user needs and capabilities are met throughout development. HSI approaches are compared on two Navy software programs to inform best practices for HSI in cross-functional teams.

Interoperate and Collaborate on Heterogeneous MBSE Models to Support Acquisition Process

21563 | Khurana, S. • Beadling, R.

A methodology to interoperate existing heterogeneous MBSE models enabled by an adaptable interoperable holistic navigation capability that introspects various sets of models (Requirements models, Architectures, Behaviors models, Engineering & 3D models, Source code, Test cases and results, etc.).

Helix: Developing an Understanding of Organizational Systems Engineering Effectiveness

21564 | Hutchison, N. • Burke, P. • Giffin, R. • Luna, S.

This presentation will provide initial research findings on the investigation and analysis of organizational systems engineering capability, building on previous work on the effectiveness of systems engineers. Attendees will be provided the opportunity to participate in the research study if desired.

Actionable Architecture Through Aspect Modeling

21565 | Hart, L.

This presentation will discuss how to annotate an architecture description in an MBSE environment to support actionable architecture through Aspect Modeling. The aspects are identified, codified and then applied to either new or existing architecture models for evaluation or auditing.

The Systems Engineering Research Center (SERC): 10 Years of Progress

21566 | Hutchison, N. • Verma, D.

This presentation will provide a brief overview, highlight key accomplishments, examples of how the research is being used, and provide an overview of the planned future directions for the SERC.

Outside-In Workshop: An Interactive SE Training Approach for High-Tech Organizations

21567 | Mhassni, A. • Waln, M. • Hammond, K.

How can we apply an Outside-in approach to grow and win in new and evolving markets? The Outside-in workshop is an interactive session to teach systems engineering techniques which can be adapted and applied to a range of products, from smart connected devices to supercomputers.

A Systems Engineering Tools Ecosystem

21568 | Hause, M.

The DEWG envisions a systems engineering ecosystem where the different tools interoperate and work together. This presentation will examine the tools and technologies in this ecosystem and examine use cases from different stakeholder perspectives to show how each would benefit from this environment.

Considering Cyber-Resilience and Sustainment Supply Chain within a Blockchain (Shared Ledger) Paradigm

21570 | Miller, C.

During this talk the presenter will share observations and opinions. The discussion contains a foundational Blockchain and Distributed Ledger technology overview. There are two main takeaways intended from this talk.

Takeaway: Basic understanding of Blockchain which will also serve as the stepping stone for continuing this discussion with a focus on Cyber Security and Supply Chain.

Takeaway: To engage the audience and suggest possible ways for leveraging Blockchain tech with a focus on Supply Chains. Leveraging these technologies are intended to address Cyber Security related challenges evolving within challenges of Supply Chain today.

Pattern Based Systems Engineering and the Smart Enterprise

21579 | Peterson, T.

This briefing will provide an introduction to Pattern-Based Systems Engineering (PBSE) and its implications for the Smart Enterprise. PBSE provides a “learning curve jumpstart” from an existing Pattern, gaining the advantages of its content, and improve that pattern with what they learn, for future users.

ERS Recent Developments and Plans

21586 | Eslinger, O.

ERS combines high-performance computing with weapon systems modeling to enable better-informed decisions and ensure Warfighter and mission success. As the DoD adapts and prepares for future challenges, ERS is also evolving. This presentation details recent developments and upcoming plans.

The CREATE Element of the U.S. DoD HPC Modernization Program – Past, Present, and Future

21605 | Meakin, R.

In 2008, the High Performance Computing Modernization Program (HPCMP) initiated a program known as CREATE to address major national priorities. This presentation will detail those priorities and how CREATE is delivering capabilities in support of weapon systems analysis and DoD acquisition efforts.

Computational Analyses in Support of the World’s Best Hypersonics Systems

21687 | Tucker, C.

There is a critical need for advancing U.S. hypersonics systems to the best in the world. Scientists and Engineers must conduct conceptual design in a highly computational space and be able to rapidly analyze, understand and visualize the design elements in an environment executed in a vast sea of data.

Driving Revolutionary Change in DoD Software Design and Acquisition

21735 | Elm, J. • Thompson, J.

A DSB Task Force recommended adoption of continuous iterative development methods, commercial best practices, and software factories into DoD acquisition. DoD and an NDIA industry working group are collaborating to help enable their effective deployment on defense programs.

Industry Best Practices for Iterative Software

21736 | Yeman, R. • Verga, S. • Rosser, L. • Marbach, P.

Industry Best Practices for Iterative Software Development, Agile, and DevOps

A Path Toward Consensus Measures for Iterative Software Development

21740 | Draper, G.

Traditional measures for managing software development are not keeping pace with industry trends toward iterative development, agile, and DevOps. Modernization of measurement frameworks has been recommended by independent DoD studies and reports. NDIA, INCOSE, and PSM are collaborating on potential solutions.

Computational Analyses in Support of the World's Best Hypersonics Systems

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There is a critical need for advancing U.S. hypersonics systems to the best in the world. Scientists and Engineers must conduct conceptual design in a highly computational space and be able to rapidly analyze, understand and visualize the design elements in an environment executed in a vast sea of data.

Integrating Systems Engineering with a Software Factory

21741 | Sheard, S.

The defense industry is moving toward iterative SW development/acquisition methods and SW factories with continuous builds and rapid deployment. How does this integrate with SE, DT&E, and cyber in an integrated engineering approach to ensure the integrity and security of these systems?

Managing Complexity With Agility and Openness

21742 | Rosser, L.

Review of literature, best practices and lessons learned on the application of techniques of agility and openness to manage complexity in system design, implementation, integration, testing deployment and sustainment.

Software Acquisition: Facing the Challenge, Valuing Velocity!

21747 | Thompson, J.

This presentation discusses the challenges and potential solutions to improve the speed and effectiveness of defense software acquisition.

Impact Assessment and Technology Road Map for Chromium

21748 | Rak, D.

The potential impacts from recent changes in the ACGIH's TLV-TWA for chromium and a technology roadmap for replacement technologies will be discussed.

SERC Capstone Marketplace: A Platform to engage Engineering Undergraduates in Systems Engineering while working on Real Problems and Operational Needs

21749 | Shepherd, W. • Verna, D.

An innovative program to introduce undergraduate engineering students to systems concepts while working on problems of relevance to the Department of Defense as part of their Senior Design Projects.

TABLE TOP HOURS

MONDAY, OCT. 22
12:00 – 5:30 pm

TUESDAY, OCT. 23
7:00 am – 6:30 pm

WEDNESDAY, OCT. 24
7:00 am – 3:30 pm

THURSDAY, OCT. 25
7:00 am – 3:00 pm

TABLE TOP BY COMPANY

CMMI Institute

DoD High Performance Computing Modernization Program (HPCMP)

DS Government Solutions Corp

Esteco

FAMU-FSU Engineering

Georgia Tech Research Institute

Harris Corporation

International Council on Systems Engineering

MITRE Corporation

No Magic, Inc.

Skayl

Sparx Systems PTY LTD

SPEC Innovations

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Raytheon Company, with 2017 sales of $25 billion and 64,000 employees, is a technology and innovation leader specializing in defense, civil government and cybersecurity solutions. With a history of innovation spanning 96 years, Raytheon provides state-of-the-art electronics, mission systems integration, C5ITM products and services, sensing, effects, and mission support for customers in more than 80 countries. Raytheon is headquartered in Waltham, Massachusetts.

DS GOVERNMENT SOLUTIONS CORP

TUESDAY LUNCH SPONSOR

Dassault Systèmes, the 3DEXPERIENCE Company, provides businesses and people with virtual universes to imagine sustainable innovations. This purpose has given birth to a unique portfolio of products and Industry Solution Experiences whose key strengths are in their scientific content and deep understanding of industrial processes.

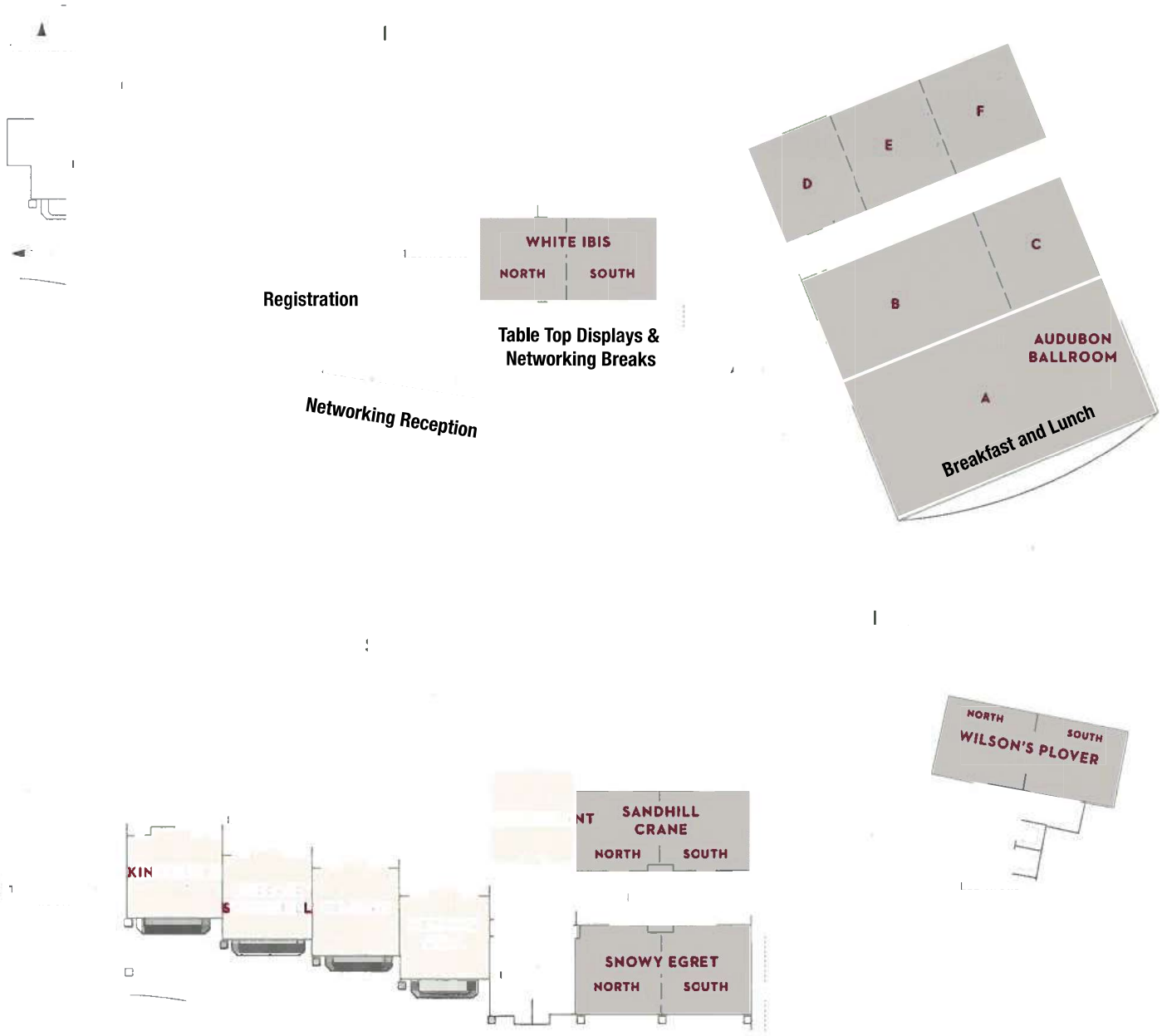
The Company's software portfolio spans a wide spectrum of domains from modelling and scientific simulation to production and logistics optimization, and is applicable from Natural Resources to Defense-systems, Cities, Transportation, Smart Products, all the way to biological systems and chemistry.

Dassault Systèmes 3DEXPERIENCE platform leverages the Company's world-leading 3D software applications to transform how complex mechatronic systems are designed, produced, and supported, enabling the warfighter to accomplish their mission.

A model-based approach is the core of the 3DEXPERIENCE platform and is valuable to ensure mission effectiveness. Our offers leverage multi-discipline solution capabilities in design, engineering, simulation, testing, manufacturing, and support, enabling an end to end, data-driven digital thread and model-based enterprise capability.

With its online architecture, the 3DEXPERIENCE environment helps businesses to test and evaluate complex systems anywhere in the development lifecycle - hardware, software, in-field performance and support to ensure mission success. In short, 3DEXPERIENCE platform powers the next-generation capabilities to support the warfighter.

VENUE MAP


WHITE IBIS
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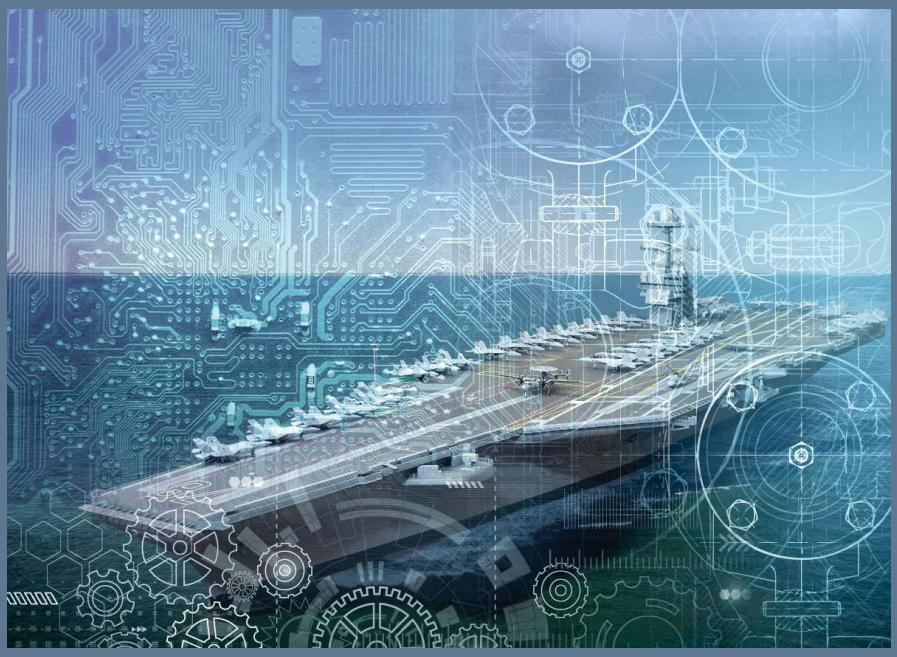
SAVE THE DATE



22ND ANNUAL SYSTEMS & MISSION ENGINEERING CONFERENCE

This conference will focus on improving acquisition and performance of Defense programs and systems, including system - of - systems engineering, systems security, net-centric operations and data/information interoperability, and all aspects of system sustainment.

October 2019

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