NDIA
AT THE HEART OF THE MISSION

2020 VIRTUAL
SYSTEMS & MISSION ENGINEERING CONFERENCE

November 10, 12 – 13 | NDIA.org/VirtualSME

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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 than 100 years, NDIA and its predecessor organizations have been at the heart of the mission by dedicating their time, expertise, and energy to ensuring our warfighters have the best training, equipment, and support. For more information, visit **NDIA.org**

SCHEDULE AT A GLANCE

TUESDAY, NOVEMBER 10

Opening Remarks & Keynote
9:00 – 10:15 am EST

Networking Lounge & Exhibit Hall Break
10:15 – 10:30 am EST

General Session & Awards Presentation
10:30 am – 12:30 pm EST

Exhibit Hall & Lunch Break
12:30 – 1:00 pm EST

Concurrent Technical Sessions
1:00 – 3:15 pm EST

Networking Lounge & Exhibit Hall Break
3:15 – 3:30 pm EST

Concurrent Technical Sessions
3:35 – 5:50 pm EST

THURSDAY, NOVEMBER 12

Concurrent Technical Sessions
9:00 – 10:40 am EST

Networking Lounge & Exhibit Hall Break
10:40 – 11:00 am EST

Concurrent Technical Sessions
11:00 am – 12:40 pm EST

Exhibit Hall & Lunch Break
12:40 – 1:10 pm EST

Concurrent Technical Sessions
1:10 – 3:25 pm EST

Networking Lounge & Exhibit Hall Break
3:25 – 3:45 pm EST

Concurrent Technical Sessions
3:45 – 6:00 pm EST

FRIDAY, NOVEMBER 13

Concurrent Technical Sessions
9:00 – 10:40 am EST

Networking Lounge & Exhibit Hall Break
10:40 – 11:00 am EST

Concurrent Technical Sessions
11:00 am – 12:40 pm EST

Exhibit Hall & Lunch Break
12:40 – 1:10 pm EST

Concurrent Technical Sessions
1:10 – 3:25 pm EST

Networking Lounge & Exhibit Hall Break
3:25 – 3:45 pm EST

Concurrent Technical Sessions
3:45 – 6:00 pm EST

WELCOME TO THE 2020 VIRTUAL SYSTEMS & MISSION ENGINEERING CONFERENCE

On behalf of the National Defense Industrial Association's Systems Engineering Division, I would like to extend a very warm welcome to the 2020 Virtual Systems & Mission Engineering Conference. It is not hard to understand that we in the defense industry have been dialoguing on systems engineering topics for over 20 years and are still finding new issues and aspects to explore. After all, because the technology keeps advancing, our military capability continues to increase, the complexity of our systems continues to grow at an alarming rate, and the threats we have to address continue to multiply. Accordingly, we need to continue to do the right systems and mission engineering work to continue to build adaptive, competent, and cost-effective military systems. This conference provides the forum to do just that.

Two years ago, we added the word "Mission" to our name to recognize the new focus of engineering within the Pentagon circles, namely Mission Engineering and Integration, that are the critical elements that we want to achieve with our military and defense systems. Everything we do is oriented towards meeting and satisfying the specific mission, and so we are focused now on the end goal rather than the means to achieve the end goal, which we know to be effective systems engineering.

This year, we add the complexity of doing a virtual conference instead of the traditional in-person event—and that has been truly a "systems engineering" challenge all in itself. However, with the help of the NDIA staff, we have made it work well. We believe the content to be exemplary as it gets to the very heart of all the topics that we as systems and mission engineers need to address.

This conference is the primary one in the United States that brings together the engineering arms of the Office of the Secretary of Defense, the Services, many of the Federal Agencies, and the defense industrial complex to address and seek solutions to the issues we all face. Executives, managers, and engineers from all of the major U.S. defense contractors, as well as the principal engineering executives, managers, and engineers from the Department of Defense and the Services and Federal Agencies are here and dialogue among us, which is critical to achieving a mutual understanding of the issues we collectively face and desperately need to solve. This conference provides an outstanding opportunity to have that dialogue and exchange ideas, so please take maximum advantage of this opportunity.

Bob Rassa
Director, Engineering Programs
Raytheon Intelligence and Space

GET INVOLVED
Learn more about NDIA's Technical Divisions and how to join one at **NDIA.org/Divisions**

LEADERSHIP

Bob Rassa
Conference Chair

Joe Elm
Division Chair

Geoff Draper
Vice Chair

Garry Roedler
Vice Chair

SYSTEMS ENGINEERING DIVISION

WHO WE ARE

The Systems Engineering Division advocates for 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. In addition to supporting the open exchange of ideas and concepts between government and industry, the Division works for a new understanding of a streamlined systems engineering process.

TRACK INFORMATION

Agile

Geoff Draper
L3Harris Technologies

Robin Yeman
Lockheed Martin Corporation

Suzette Johnson
Northrup Grumman

Andrea Nibert
Leidos

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 & MOSA

Bob Scheurer
The Boeing Company

Ed Moshinsky
Lockheed Martin Corporation

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

Capability Maturity Model Integration

Dr. Ken Nidiffer
George Mason University

CMMI, or Capability Maturity Model Integration, will address topics in process improvement for systems and software engineering and the overall development process that have improved product development within the defense and commercial industry.

Digital Engineering

Judith Dahmann
The MITRE Corporation

John Daly
Booz Allen Hamilton

Digital Engineering is an emerging set of practices for Systems Engineering and other engineering disciplines, which has—at its core—the use of models (data, algorithms, and/or processes) as a technical means of communication. When used properly, models can provide a cohesion across engineering activities and cohesion with acquisition activities. When coupled with computational capabilities, resultant data from simulations can be used in decision-making at all echelons and an increased level of insight. Moreover, risk reduction in the end item can be achieved.

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

Robert Raygan
Defense Acquisition University

The Education & Training track for 2020 is an excellent collection of presentations from government, industry, and academia. The presentations describe a wide range of systems engineering (SE) workforce development activities covering the core of SE, agile approaches, an MBSE learning environment, modular online open education, and the future of SE.

Environment, Safety, & Occupational Health

Sherman Forbes
U.S. Air Force

Gabrielle Gonzalez
Booz Allen Hamilton

Engineering design considerations included under the DoD acronym "ESOH," as defined in MIL-STD-882E, the DoD Standard Practice for System Safety. Mr. David Asiello, the Acquisition ESOH lead in the Office of the Assistant Secretary of Defense for Sustainment will make the ESOH Track's keynote presentation. He will provide an overview of the Office of the Secretary of Defense's (OSD) reorganization that has separated Systems Engineering from Acquisition & Sustainment and has separated Safety & Health Management from Environmental Management. Also, he will emphasize the importance of incorporating ESOH risks and requirements management into Acquisition & Sustainment as a way to promote readiness and summarize the new Defense Acquisition System (DAS) Adaptive Acquisition Framework and its challenges to Systems Engineering and ESOH policy. The remainder of the ESOH track presentations will address specific acquisition ESOH issues, to include integrating ESOH risks and requirements management into Digital Engineering and the new Middle Tier Acquisition framework, specifically ESOH system design issues, hazardous materials management, and acquisition and sustainment programs' lessons learned.

Human Systems Integration

Dr. Matthew Risser
Pacific Science & Engineering

Randi Rohrer
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.

Mission Engineering & Assurance

Dr. Judith Dahmann
The MITRE Corporation

John Daly
Booz Allen Hamilton

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 approaches to ME.

Model-Based Systems Engineering/ Modeling & Simulation

Dave Allsop
The Boeing Company

Chris Schreiber
Lockheed Martin Corporation

The Modeling & Simulation (M&S) Track highlights the use of models and simulations in the Systems Engineering process. Included are presentations on integrated environments, tools and technologies, and M&S applications in several Systems Engineering process phases. Topics focused specifically on Digital Engineering/Digital Thread/Model-Based Systems Engineering are also covered in this track.

Program Management/Risk Management

Dave Ingalls
Augur Consulting

Stewart Tague
Lockheed Martin Corporation

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

Dr. Ken Nidiffer
George Mason University

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 track will highlight a few significant software development issues.

Systems Engineering Effectiveness

Joe Elm
Chair, Systems Engineering Division, NDIA

Systems Engineering (SE) Effectiveness is obvious to some and quite esoteric to others. However, the goal—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 the appropriate application of SE principles and best practices.

System of Systems

Dr. Judith Dahmann
The MITRE Corporation

John Daly
Booz Allen Hamilton

The System of Systems (SoS) Track will feature papers highlighting the development of SoS engineering approaches, particularly SoS SE application areas, as well as SoS tools and modeling, including SoS SE applied to defense missions in mission engineering. See directly related track in Mission Engineering & Assurance, above.

System Security Engineering & Assurance

Cory Ocker
Raytheon Technologies

Holly Dunlap
Raytheon Technologies

System 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. It includes the integration and risk management of all the security specialties to include: system security engineering, cybersecurity, anti-tamper, software assurance, hardware assurance, cyber supply chain risk management, and general program security throughout the system development lifecycle. This holistic approach will ensure battlefield system survivability for system mission success.

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AGENDA

TUESDAY, NOVEMBER 10

9:00 – 9:15 am EST

OPENING REMARKS

Joe Elm
Chair, Systems Engineering Division, National Defense Industrial Association (NDIA)

Bob Rassa
Director, Engineering Programs, Raytheon Intelligence and Space
Conference Chair, Systems Engineering Division, NDIA

Gen Herbert "Hawk" Carlisle, USAF (Ret)
President and Chief Executive Officer, NDIA

9:15 – 10:15 am EST

KEYNOTE ADDRESS

Dr. Sandra Magnus
Deputy Director for Engineering, Office of the Under Secretary of Defense for Research & Engineering (OUSD(R&E))

10:15 – 10:30 am EST

NETWORKING LOUNGE & EXHIBIT HALL BREAK

Sponsored by IBM

10:30 am – 12:15 pm EST

EXECUTIVE PLENARY PANEL: SERVICE & AGENCY SYSTEMS ENGINEERING LEADS

Dr. Sandra Magnus
Deputy Director for Engineering, OUSD(R&E)
Moderator

Kristen Baldwin
Deputy Assistant Secretary of the Air Force for Science, Technology, & Engineering,
Office of the Assistant Secretary of the Air Force (Acquisition, Technology, & Logistics)

Jeannette Evans-Morgis
Chief Systems Engineer, Office of the Assistant Secretary of the Army (Acquisition, Logistics, & Technology)

David McNeill
Chief Engineer, Missile Defense Agency

John Fiore
Chief Engineer, Office of the Assistant Secretary of the Navy (Research, Development, & Acquisition)

12:15 – 12:30 pm EST

AWARDS PRESENTATION

INDIVIDUAL AWARD

Dr. Azad Madni
Professor, Astronautical Engineering; Executive Director, System Architecting & Engineering Program;
and Director, Distributed Autonomy and Intelligent Systems Laboratory, University of Southern California

GROUP AWARD

Systems Engineering Division
Air Force Life Cycle Management Center, Wright Patterson Air Force Base

12:30 – 1:00 pm EST

EXHIBIT HALL & LUNCH BREAK

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CONCURRENT TECHNICAL SESSIONS

	2C1 – Digital Engineering	2C2 – Engineered Resilient Systems	2C3 – Agile Systems Engineering	2C4 – System of Systems
MODERATORS	**Jennie Horne**	**Lois Hollan**	**Suzette Johnson & Geoff Draper**	**Judith Dahmann**
1:00 – 1:30 pm EST	23064 INCOSE Model-Based Enterprise Capabilities Matrix for Organizational Assessments **Al Hoheb** Senior Systems Engineer, The Aerospace Corporation	23427 DARPA CRANE Program Philosophy **Dr. Xander Walan** Program Manager, Tactical Technology Office, DARPA	23990 Introduction to the DoD Software Acquisition Pathway **Sean Brady** Software Acquisition Pathway Lead, Office of the Under Secretary of Defense for Acquisition & Sustainment	23255 Leveraging Set-Based Practices to Enable Efficient Concurrency in Large Systems and Systems-of-Systems Engineering **Brian Kennedy** Chief Technical Officer, Targeted Convergence Corporation
1:35 – 2:05 pm EST	23206 I Want it Now! ... Mature Digital Engineering Capabilities Deployable Today **Christopher Finlay** Director, Digital Engineering, SAIC	23402 Hypersonic Design Engineering **Dr. Justin Foster** Research Mechanical Engineer, Information Technology Lab, Engineer Research and Development Center, U.S. Army	23470 Enabling the Future for Agile in Defense Systems: ADAPT Strategic Plan **Dr. Suzette Johnson** Enterprise Lean-Agile Strategic Lead, Northrop Grumman **Robin Yeman** Senior Fellow, Lockheed Martin Corporation	23058 A Pattern-Based Approach to the Development of Systems of Systems Using the Unified Architecture Framework 1.1 **Dr. Graham Bleakley** Technical Director, Systems Engineering, IBM United Kingdom Ltd.
2:10 – 2:40 pm EST		23401 Data Architecture and Strategy to Support Engineering Design **David Stuart** Associate Technical Director, Engineered Resilient Systems	23062 Adopting DevSecOps in Defense Systems: Systems Engineering Considerations **Dr. Richard Turner** Senior Software Engineer, Software Engineering Institute, Carnegie Mellon University	23395 Applying Systems Engineering for Threat-Based Planning **Dennis Chapman** Strategic Planner, U.S. Army Futures Command
2:45 – 3:15 pm EST		23390 Industry/Government Simulation Collaboration Framework **Dr. George Ball** Principle IT Fellow, Raytheon Technologies	22989 DevSecOps – Software Development in the Next-Generation DoD **Joseph McKairnes** Senior Architect, Federal Solutions, GitLab	
3:15 – 3:30 pm EST	**NETWORKING LOUNGE & EXHIBIT HALL BREAK**			Sponsored by IBM

	2D1 – Digital Engineering	2D2 – Systems Engineering Effectiveness	2D3 – Agile Systems Engineering	2D4 – System Security Engineering & Assurance
MODERATORS	**Jennie Horne**	**Joe Elm**	**Suzette Johnson**	**Holly Dunlap**
3:35 – 4:05 pm EST	23367 Promoting a Distributed Model-Based Market/Exchange **Mark Petrotta** Principal Systems Engineer, Systems Strategy, Inc.	23272 Integrated Product Line Engineering and the Digital Thread **Matthew Hause** Principle Systems Engineer, Systems Strategy, Inc.	23091 Provisioning Pipelines: A Managed DevSecOps Approach to Software Pipeline Creation **Shane Ficorilli** Software Engineer, Software Engineering Institute	23458 Welcome and System Security Engineering Committee Highlights **Cory Ocker** Secure Systems Manager, Raytheon Technologies
4:10 – 4:40 pm EST	23119 Leveraging the Digital Engineering Transition to Revolutionize the IP Marketplace **Curtis Sisson** Manager, Model-Based Systems Engineering, Boeing Defense, Space & Security (BDS), The Boeing Company	23282 Answering the Challenges of AI with Systems Engineering **Dr. Barclay Brown** Engineering Fellow, Raytheon Technologies	23097 A Holistic DevSecOps Perspective for Big System Builders **Dr. Harry Koehnemann** SAFe® Fellow and Principle Consultant, Scaled Agile	23203 OUSD(R&E) Resilient Systems Overview **Melinda Reed** Director, Resilient Systems, Office of the Under Secretary of Defense for Research & Engineering
4:45 – 5:15 pm EST	23218 Extending a Digital Engineering Framework Through Operations **Christopher Ritter** Director, Digital Innovation Center of Excellence, Idaho National Laboratory	23176 Not All Data is Created Equal: Solving the Problem of Traceability and Repeatability with Analysis Workflows **Dr. Andy Ko** Director, Engineering Services, Phoenix Integration, Inc.	23222 The Systems Engineer as an Agile Product Owner **Paul Zajac** Principle Subject Matter Expert, Software Factory, Lockheed Martin Corporation	23171 Agile Authorizations for Cyber Resiliency **Daniel Holtzman** Technical Director, Cyber, U.S. Air Force
5:20 – 5:50 pm EST	23354 Digital Engineering Information Exchange Challenge **Sean McGervey** Systems Engineer, Johns Hopkins University Applied Physics Laboratory		23333 The GAP Model for Agility and Excellence **Noah Carpenter** Chief Scrum Master/ Software Developer, Northrop Grumman	23186 The Missing Link: The Operational Level of Weapon Systems Cybersecurity **Dr. William Bryant** Technical Fellow, Modern Technology Systems, Inc.
5:50 pm EST	**CLOSING REMARKS** Session Moderators			

THURSDAY, NOVEMBER 12

	3A1 – Digital Engineering	3A2 – Model-Based Systems Engineering	3A3 – Agile Model-Based Engineering	3A4 – System Security Engineering & Assurance
MODERATORS	**John Daly**	**Chris Schreiber**	**Geoff Draper**	**Cory Ocker**
9:00 – 9:30 am EST	23357 Modeling Case Studies for Dynamic Exploration of Acquisition Decisions **Marilee Wheaton** Systems Engineering Fellow, The Aerospace Corporation	23364 INCOSE and the Future of Systems Engineering **Troy Peterson** Vice President, System Strategy, Inc.	23102 Model-Centric Systems Engineering in an Agile Environment **Natasha Shevchenko** Technical Staff Member, Software Engineering Institute, Carnegie Mellon University	23224 Protecting the DevSecOps Application Through Software Assurance **Bradley Lanford** SAIC Software Assurance Lead, STP&E Contractor Support Team, Office of the Under Secretary of Defense for Research & Engineering
9:35 – 10:05 am EST	23283 Digital Engineering Modeling Methods for Digital Signoffs **Dr. Mark Blackburn** Senior Research Scientist, Stevens Institute of Technology	23381 Agile for All – Integrating Agile Practices Across Functions **Robin Yeman** Senior Fellow, Lockheed Martin Corporation	23177 A Framework for Agile MBSE Development **Dave Wood** Scientist, Systems Engineer, CSEP, OCSMP, L3Harris Technologies	23321 Accelerating Modernization of Software Acquisition to Better Serve the Warfighter with a Special Emphasis on Software Assurance and Near-Term Technology Drivers **Dr. Kenneth Nidiffer** George Mason University
10:10 – 10:40 am EST	23319 Digital Engineering Strategy to Enable Enterprise Systems Engineering **Ryan Noguchi** Director, Space Architecture Department, The Aerospace Corporation	23100 Model of Models Methodology **Aleczander Jackson** Chief Engineer, Digital Engineering, Modern Technology Solutions, Inc.	23085 Agile Robots from Jupiter **Todd Shayler** Associate Branch Head, Applied Decision Systems, Georgia Tech Research Institute	23172 Threat and Attack Modeling: System Centric versus Attack Centric **Randall Brooks** Engineering Fellow, Raytheon Technologies
10:40 – 11:00 am EST	**NETWORKING LOUNGE & EXHIBIT HALL BREAK**			

	3B1 – Digital Engineering	3B2 – Model-Based Systems Engineering	3B3 – Agile Acquisition	3B4 – System Security Engineering & Assurance
MODERATORS	**John Daly**	**Chris Schreiber**	**Geoff Draper**	**Holly Dunlap**
11:00 – 11:30 am EST	23063 Accelerating the Change: MBE Deployment Mechanisms **Karla Beas** Systems Engineer, Raytheon Technologies	23065 Leading Model-Based Systems Engineering Adoption – Top 6 Things Leaders Can Do to Drive MBSE **Al Hoheb** Senior Systems Engineer, The Aerospace Corporation	23098 DOs and DON'Ts in Capacity-Based Agile Procurements – A Case Study **Dr. Mahdieh Gholampoor** Director, Service Delivery, Abaco Strategy, LLC	23308 The Expansive Use of NIST SP 800-53r4 as a Common Requirements Lexicon **David Olmstead, PE, ESEP, CISSP-ISSEP** Cyber Systems Security Engineer/ Senior Staff, Lockheed Martin Corporation
11:35 am – 12:05 pm EST	23268 Digital Engineering: From Toolchain to Platform **Dr. Aleksandra Markina-Khusid** Department Manager, Systems & Mission Analysis Department, MITRE	23201 Workflows in Multi-Repository Model Management **Veejay Gorospe** Solutions Consultant, Dassault Systems CATIA | No Magic		23271 Continuous, Agile, Cyber Assured? **Ronda Henning** Senior Fellow, L3Harris Technologies
12:10 – 12:40 pm EST	23299 Cloud Infrastructure for Digital Engineering Tools **Nancy Gomez Dominguez** Lead Cloud Infrastructure and Software Engineer, Idaho National Laboratory	23284 The Lifecycle Modeling Framework: Organizing and Simplifying the Application of Model-Based Systems Engineering **Dr. Jerry Sellers** President, Teaching Science and Technology, Inc.		23326 Incorporating Cybersecurity into SAFe® **Flavius Galiber** Digital Engineering Coach, Northrop Grumman
12:40 – 1:10 pm EST	**EXHIBIT HALL & LUNCH BREAK**			

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	3C1 – Digital Engineering	3C2 – Model-Based Systems Engineering	3C3 – Agile Program Management	3C4 – System Security Engineering & Assurance
MODERATORS	**John Daly**	**Chris Schreiber**	**Andrea Nibert**	**Cory Ocker**
1:10 – 1:40 pm EST	23191 DE Metrics: Categorizing the Benefits and Value of Digital Engineering **Tom McDermott** Deputy Director and Chief Technology Officer, Stevens Institute of Technology	23340 Digital Tread – Integrating MBSE and Product Lifecycle Management **David Segal** Senior Director, Business Development, PTC, Inc.	23096 PSM Continuous Iterative Development (CID) Measurement Framework **Cheryl Jones** System Engineer, Combat Capabilities Development Armaments Center, U.S. Army	23204 Design Principles for Weapon Systems Engineering **Michael McEvilley** Principle Scientist, MITRE
1:45 – 2:15 pm EST	23199 Digital Engineering Measures Correlated to Digital Engineering Lessons Learned from Systems Engineering Transformation Pilot **Dr. Mark Blackburn** Senior Research Scientist, Stevens Institute of Technology	23229 6 Vs and 3 Ts of Systems Engineering **David Long** Founder and President, Vitech	23086 Managing an Agile Project in an EVM World **Colt Stout** Deputy Project Manager, Sandia National Laboratories	23202 Cyber Resilient Weapon Systems Workforce Competency **Melinda Reed** Director, Resilient Systems, Office of the Under Secretary of Defense for Research & Engineering
2:20 – 2:50 pm EST	23179 A Digital Engineering Demonstration for a Small Unmanned Underwater Vehicle **Dr. Ronald Giachetti** Chair and Professor, Department of Systems Engineering, Naval Postgraduate School	23231 Schema and Metamodels and Ontologies, Oh My! **David Long** Founder and President, Vitech	23109 Performance Measurement in an Agile Contract – DO's and DON'Ts from a Success Story **Kishore Nakka** Enterprise Lean/Agile & SAFe® Transformation Leader, OST, Inc.	23332 Trusted Traceability: What the Semiconductor and Electronics Can Learn from the Food and Beverage Supply Chain **Alastair Orchard** Vice President, Digital Enterprise, Mentor, A Siemens Business
2:55 – 3:25 pm EST	23279 Lessons Learned in the Creation of a Digital Thread **Kayla Corey** Systems Engineer, SPEC Innovations	23234 Model-Based Requirements: Writing Requirements without Writing **Dr. Alejandro Salado** Assistant Professor, Virginia Tech University		
3:25 – 3:45 pm EST	**NETWORKING LOUNGE & EXHIBIT HALL BREAK**			

	3D1 – Mission Engineering & Assurance	3D2 – Model-Based Systems Engineering	3D3 – Agile Program Management	3D4 – System Security Engineering & Assurance
MODERATORS	**Judith Dahmann**	**Chris Schreiber**	**Andrea Nibert**	**Holly Dunlap**
3:45 – 4:15 pm EST	23230 R&E Mission Engineering State of Practice **Elmer Roman** Director, Mission Integration, Office of the Under Secretary of Defense for Research & Engineering	23263 Transitioning Legacy Systems to Model-Based Systems Engineering **Paul White** Lead, ICBM GBSD Digital Engineering Branch, BAE Systems	23092 Mission Based Alternative to WSJF **Keith Korzec** Senior Member, Technical Staff, Software Engineering Institute	23205 Concepts for an Approach to Weapon Systems Engineering **Michael McEvilley** Principle Scientist, Office of the Under Secretary of Defense for Research & Engineering
4:20 – 4:50 pm EST	23246 Approach to Digital Engineering for Large Systems of Systems Mission **Dr. Judith Dahmann** Technical Fellow, MITRE	23129 Format Independence for SysML Models **Robin Mikola** Principle Solutions Architect, SodiusWillert	23469 Measuring Product Value **Bill Golaz** Project Engineering Principle and Fellow Emeritus, Lockheed Martin Corporation	23192 Can We Assure Resilience of Cyber-Physical Systems Using Model-Based Systems Engineering? **Tom McDermott** Deputy Director and Chief Technology Officer, Stevens Institute of Technology
4:55 – 5:25 pm EST	23346 Application of Probabilistic Graph Models to Kill Chain and Multi-Domain Kill Web Analysis Problems **Dr. Valerie Sitterle** Principal Research Engineer and Chief Scientist, Systems Engineering Research Division, Georgia Tech Research Institute	23371 MBSE: From Abstraction to Implementation **Javier Villafane** Principle Systems Engineer, Raytheon Technologies	23307 Building Quality by Engineering People and Values: Improve the Person, and You Improve Everything! **Dr. Barclay Brown** Engineering Fellow, Raytheon Technologies	23361 Model-Based Cyber Threat Analysis Approach **Leqi Zhang** Cyber Solution Architect, L3Harris Technologies
5:30 – 6:00 pm EST	23347 Implementing Digital Engineering Environment for Mission Engineering **Dr. Jeff Boulware** Technical Director, The MITRE Corporation **Jason Anderson** Strategic Multi-Disciplinary Systems Analyst, The MITRE Corporation		23104 Integrating DevOps into Navy Combat Systems Development **LT Andrew Miller, USN** Engineering Duty Officer, Naval Postgraduate School	23343 On-Demand Integrity Measurement at the Circuit-Board Level **Random Gwinn** Cybersecurity Researcher and Engineer, Johns Hopkins University Applied Physics Laboratory
6:00 pm EST	**CLOSING REMARKS** **Session Moderators**			

FRIDAY, NOVEMBER 13

	4A1 – Mission Engineering & Assurance	4A2 – Modeling & Simulation	4A3 – Agile Systems Engineering	4A4 – Environment, Safety, & Occupational Health
MODERATORS	**John Daly**	**Joe Manas**	**Geoff Draper & Suzette Johnson**	**Sherman Forbes**
9:00 – 9:30 am EST	23254 Leveraging Set-Based Practices for Ongoing Optimization of Your Mission Engineering Designs, Even as the Mission Unfolds **Brian Kennedy** Co-Founder and Chief Technical Officer, Targeted Convergence Corporation	23213 Relationship between Traditional Modeling & Simulation and Digital Engineering **Brian Miller** U.S. Army Futures Command, Office of the Under Secretary of Defense for Research & Engineering	23394 Industrial DevOps: From Value Streams to Agile Teams **Dr. Suzette Johnson** Enterprise Lean-Agile Strategic Lead, Northrop Grumman **Robin Yeman** Senior Fellow, Lockheed Martin Corporation	23197 Environment, Safety, and Occupational Health in the Adaptive Acquisition Framework **David Asiello** Program Manager, Office of the Deputy Assistant Secretary of Defense for Environment
9:35 – 10:05 am EST	23348 Advancements Towards a Digital Approach for Mission Engineering **Todd Shayler** Associate Branch Head, Applied Decision Systems, Georgia Tech Research Institute	23257 Every Mission-Level or System-Level Trade Study Should Have an Associated Trade Space Map to Facilitate Multi-Discipline Review **Brian Kennedy** Chief Technical Officer, Targeted Convergence Corporation	23082 CyberAgility Deliver Security Faster: Agile Case Studies in Cybersecurity **Tim LaPorta** Director, Agile Coaching & Staffing, Lithespeed, LLC	23351 F-35 Joint Program Office and Support Team – Environmental Excellence in Weapons System Acquisition **John Casana** Senior Lead Engineer, Booz Allen Hamilton
10:10 – 10:40 am EST		23296 Improved Delivered Capability: Isolating and Predicting New Technologies, Technology Uses, and Emerging Threat Sources **Dr. Carlo Lipizzi** Associate Professor at the Stevens Institute of Technology and Principle Investigator at the System Engineering Research Center	23093 Agile: Beyond IT and System Development **Dr. Martha Hennen** Personnel Psychologist, Office of Equal Employment Opportunity, U.S. Securities and Exchange Commission	23184 Integrating ESOH Engineering And Product Support Activities **Erin Beck** Environmental Engineer, Naval Air Systems Command
10:40 – 11:00 am EST	**NETWORKING LOUNGE & EXHIBIT HALL BREAK**			

	4B1 – Software	4B2 – Model-Based Systems Engineering	4B3 – Architecture & MOSA	4B4 – Environment, Safety, & Occupational Health
MODERATORS	**Joe Manas**	**Chris Schreiber**	**Bob Scheurer**	**Megan Clampitt**
11:00 – 11:30 am EST	23352 Building Safety into Autonomous Robot Software **David Hetherington** Principle Systems Engineer, System Strategy, Inc.	23251 Using Effective MBSE to move up the Data-Information-Knowledge-Understanding-Wisdom Chain and Providing Long Term Strategic Value to the Enterprise **Brian Selvy** Principle Systems Engineer, Vitech Corporation	23377 Purpose of Architecture **Michael Stokes** Senior Principle Systems Engineer and Certified Architect, Raytheon Technologies Corporation	23194 Unmanned System (UxS) Safety IPT and Engineering Precepts for Safe Autonomy **Michael Demmick** Navy Weapon System Explosives Safety Review Board Secretariat, Executive Secretary, Joint Weapons Safety Working Group & OSD UxS Safety IPT Chair, Naval Ordnance Safety & Security Activity
11:35 am – 12:05 pm EST	23358 A Pattern Language for Integrating Software Cost Estimation into a SysML System Model **Dr. Thomas Ford** Principle Systems Engineer, Centauri, LLC		23363 The Who, What, When, Where, Why & How of Architecture with the UAF **Matthew Hause** Principle Systems Engineer, System Strategy, Inc.	23391 Weapon System-Related Impulse Noise Assessment **LTC Andy Merkley, USA** Army Hearing Program Manager, Army Public Health Center
12:10 – 12:40 pm EST			23327 System Operational Architectures with Agent Modeling for Ground Vehicle Autonomous and Smart Systems **David Hetherington** Principle Systems Engineer, System Strategy, Inc.	23399 Strategizing Solutions for Protecting Warfighter Brain Health **Olivia Webster** Biomedical Engineer, Army Public Health Center
12:40 – 1:10 pm EST	**EXHIBIT HALL & LUNCH BREAK**			

	4C1 – Program Management/Risk Management	4C2 – Model-Based Systems Engineering	4C3 – Architecture & MOSA	4C4 – Environment, Safety, & Occupational Health
MODERATORS	**Dave Ingalls**	**Chris Schreiber**	**Ed Moshinsky**	**Megan Clampitt**
1:10 – 1:40 pm EST	23209 Risk Management within Nuclear Weapons Programs: Where We Were, and Where We're Heading **R. Glenn Bell** Chief System Engineer, Defense Programs, National Nuclear Security Administration	23285 A System Dynamics Model to Measure and Quantitatively Improve Digital Transformation and MBSE Adoption Within a Large-Scale Organization or Enterprise **Robert Iannuzzi** Mission and Systems Engineer, U.S. Navy	23374 MOSA Strategy **Steve Thelin** Engineering Fellow and MOSA Pillar Lead, Raytheon Missiles and Defense, Raytheon Technologies	23226 Answering the Ask through Imagination: NEPA Process Streamlining Innovations **Brian Boose** Vice President, Technical Practice Director, Impact Assessment and Permitting, AECOM
1:45 – 2:15 pm EST	23233 Formal Inconsistencies in Risk Assessment Processes **Dr. Alejandro Salado** Assistant Professor, Virginia Tech	23360 MBSE Research Testbed for Rapid and Flexible Modeling and Experimentation **Dr. Azad Madni** Professor, Astronautical Engineering, Executive Director, Systems Architecting and Engineering Program, and Chief Executive Officer, Intelligent Systems Technology, Inc., University of Southern California	23457 Integrating MOSA **Nadine Geier** Director, Systems Engineering, Office of the Under Secretary of Defense for Research & Engineering	23372 Ground Based Strategic Deterrent Program Office National Environmental Policy Act Compliance Perspective – High Risk Management **Sharon Dore** Chief, Product Support, Ground Based Strategic Deterrent Program, U.S. Air Force
2:20 – 2:50 pm EST	23328 Risk & Opportunity Management Transfer – Systems Engineering & the PMO **Liz Garypie** Director, Enterprise Configuration Control, Lockheed Martin Corporation	23365 Graph Exploration of System Models **Troy Peterson** Vice President, System Strategy, Inc.	23252 Identifying Security Patterns for Modular Open Systems **Giselle Bonilla-Ortiz** Senior Systems Engineer, Raytheon Technologies	23200 Department of the Navy Initiatives to Expedite NEPA Reviews **Barbie Prine** Senior Environmental Planner, Chief of Naval Operations, Marine Corps Headquarters
2:55 – 3:25 pm EST			23373 Measuring MOSA **Steve Thelin** Engineering Fellow and MOSA Pillar Lead, Raytheon Missiles and Defense, Raytheon Technologies	
3:25 – 3:45 pm EST	**NETWORKING LOUNGE & EXHIBIT HALL BREAK**			

	4D1 – Program Management	4D2 – Model-Based Systems Engineering	4D3 – Architecture & MOSA	4D4 – Environment, Safety, & Occupational Health
MODERATORS	**Stewart Tague**	**Chris Schreiber**	**Bob Schuerer**	**Megan Clampitt**
3:45 – 4:15 pm EST	23190 Early Science and Technology Protections Translate to Uncompromised Transition of Advanced Capabilities into Acquisition **Kristopher Gardner** Director, Science & Technology Protection, Office of the Under Secretary of Defense for Research & Engineering	23195 A Model-Based Systems Engineering Approach to Assessing Modularity in System Architectures **Benjamin Stirgwolt** PhD Student, The George Washington University	23449 Assessing MOSA – Refining the Practice **Nadine Geier** Director, Systems Engineering, Office of the Under Secretary of Defense for Research & Engineering	23212 Lockheed Martin's Chemical Stewardship Program: Reducing Risk through the Sustainable Management of Chemical Substances and Materials **Margaret Proul** Manager, Enterprise Risk and Sustainability Program, Lockheed Martin Corporation
4:20 – 4:50 pm EST	23344 Achieving Airborne System Airworthiness in a Landscape of Disruptive Technologies and Diverse Regulatory Objectives **Todd Stempel** Chief Technologist and Certification Manager, ENSCO Avionics, Inc.	23228 Applying an MBSE Approach for Evaluating Shipyard Operations **David Jurkiewicz** Specialist Master Consultant, Deloitte	23317 Method for Consistent Evaluation of Applicability of Open Standards **Tara Trumbull** Principle Systems Engineer with Honors and Section Head, Raytheon Technologies	23331 Model-Based Systems Engineering Library – The National Aerospace Standard 411-1 Hazardous Materials Target List **Jack Gallagher** Staff Engineer, Booz Allen Hamilton
4:55 – 5:25 pm EST	23219 Deep Digital Thread from Project Controls Through Engineering Design **Jeren Browning** Full Stack Developer, Idaho National Laboratory	23382 Using SysML State Machines to Automatically Conduct Failure Modes and Effects Analysis **Michael Vinarcik** Chief Systems Engineer, SAIC	23339 Developing Meta Systems Architectures for Leading Innovation with Complex Societal and Technical Challenges **Dr. Cihan Dagli** Professor, Systems Engineering & Engineering Management and Computer & Electrical Engineering, Missouri University of Science & Technology	23178 Evaluating Potential Impacts to the DoD Mission and the Defense Industrial Base from Emerging National and International Chemical Regulations **Emma Williams** Junior Environmental Engineer, Noblis
5:30 – 6:00 pm EST	23294 Addressing Capability Gaps in the A&D Industry: Strategic Frameworks & Best Practices **David Gross** Founder and Managing Director, Strategic Value Partners		23375 Architecture in the Design Process **Michael Stokes** Senior Principle Systems Engineer and Certified Architect, Raytheon Technologies	23313 Addressing Environment, Safety, and Occupational Health in the Adaptive Acquisition Framework **Sherman Forbes** Team Lead, Engineering Policy & Standards and Specialty Engineering, Secretary of the Air Force for Acquisition
6:00 pm EST	**CLOSING REMARKS** Session Moderators			

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SESSION DESCRIPTIONS

DevSecOps – Software Development in the Next-Generation DoD

22989 | McKairnes, J.

This session will explore Software Development methodologies from the early beginnings, with the advent of methodologies, to today's DevSecOps and how it is enabling the USAF Software Factories such as Kessel Run, Bespin, and others.

A Pattern-Based Approach to the Development of Systems of Systems Using the Unified Architecture Framework (UAF) 1.1

23058 | Bleakley, G. • Gery, E.

This presentation gives an overview of the Unified Architecture Framework and describes how it can be used to support the through lifecycle development of Systems and Systems of Systems using model-based techniques in support of the DoD's digital engineering vision.

Adopting DevSecOps in Defense Systems: Systems Engineering Considerations

23062 | Turner, R. • Morales, J.

We have observed conflicts between the SE and DevSecOps processes that may elevate overall project risk and could prove a barrier to CI/CD adoption. We believe that the reconciliation of DevSecOps and Systems Engineering offers significant value. As such, we are researching means by which the two disciplines can adapt to each other.

Accelerating the Change – MBE Deployment Mechanisms

23063 | Beas, K. • Sayan, C.

To achieve the benefits of Model Based Engineering (MBE)/Digital Engineering, a scalable and sustainable mechanism for developing the supportive infrastructure, processes, skills, and expertise is needed.

INCOSE Model-Based Enterprise Capabilities Matrix for Organizational Assessments

23064 | Hoheb, A.

The INCOSE Model-Based Enterprise Capabilities Matrix 2-hour workshop provides an overview of its use and content as well as how it helps implement the OSD Digital Engineering Strategy. Participants will apply the matrix against an acquisition scenario to define needed modeling capabilities.

Leading Model-Based Systems Engineering Adoption – Top 6 Things Leaders Can Do to Drive MBSE

23065 | Hoheb, A.

These top six things leaders can do to adopt MBSE was extracted, derived, and synthesized from my experiences of cross-community involvement with government (DoD, Intelligence Community, civil and commercial space) and industry. This talk is most suitable to those who are new to MBSE and are in a leadership role.

CyberAgility Deliver Security Faster: Agile Case Studies in Cybersecurity

23082 | LaPorta, T. • Cuellar, R.

The current business transformation model revolves around Business Agility, defined as the customer-focused, holistic organizational embrace of Lean-Agile from individual teams and programs to the portfolio level, and across the entire enterprise. Making a shift toward Business Agility enables the whole organization to become adaptable and responsive to change. Whether or not business units use Agile methods themselves, the Agile organization is one where all components align around value streams to allow for rapid experimentation, continuous learning, and low-risk, iterative creation.

Evaluating, Selecting, and Succeeding with Agile Suppliers

23084 | Dalton, J.

The Federal Government uses measurable, verifiable frameworks for evaluating organizational performance of suppliers like CMMI, ISO, NIST, and (soon) the CMMC. None of them address Agile Performance. Evaluating Agile organizational performance has been impossible—until now.

Agile Robots from Jupiter

23085 | Shayler, T. • Mark, T.

This talk discusses Robot Framework and JupyterLab as open source tools that enable agile and model-based software design, development, testing, and documentation. Including process automation in the model increases the availability of project artifacts like acceptance test logs, screenshots, and reports, and software documentation. The increased availability of artifacts allows project managers to better mitigate risks and ensure that users have the software tools they need to complete their workflows and solve real problems.

Managing an Agile Project in an EVM World

23086 | Stout, C. • Lorber, A.

Is your Agile project required to produce a project baseline, a work breakdown structure, and track against it? Can this be done without destroying the agility of teams doing the work? The answer is yes; we are currently doing it on a $40M per year satellite ground system software project for the U.S. Government that is a multi-year effort of approximately 120 people in 13 teams.

Provisioning Pipelines: A Managed DevSecOps Approach to Software Pipeline Creation

23091 | Ficorilli, S. • Morales, J.

The process of building software pipelines is complex and nontrivial. A managed approach to their creation, testing, management, and maintenance is required. In this presentation, we introduce the concept of provisioning pipelines to address this need across the government.

Mission-Based Alternative to WSJF

23092 | Korzec, K.

DoD programs have struggled with prioritizing requirements using WSJF. By assessing each requirement's value towards the mission, we can prioritize a backlog quickly and without complicated financial calculations.

Agile: Beyond IT and System Development

23093 | Hennen, M.

This presentation will provide an overview of how Agile can be applied in business program management above and beyond information technology and system development.

PSM Continuous Iterative Development (CID) Measurement Framework

23096 | Jones, C. • Draper, G.

The Practical Software and Systems Measurement (PSM) Continuous Iterative Development (CID) measurement framework details common information needs and measures that are effective for evaluating CID approaches. The most critical information needs and measures have been prioritized, based on a series of surveys with members of relevant PSM, NDIA, and INCOSE working groups. The information needs address the team, product, and enterprise perspectives to provide insight and drive decision-making.

A Holistic DevSecOps Perspective for Big System Builders

23097 | Koehnemann, H.

Many DevOps and DevSecOps discussions focus on software-only technical practices – containerization, CI/CD, PaaS/IaaS, etc. While those are certainly key aspects to connecting the many functions of development, compliance, and operations, end-to-end value delivery is much broader and may include also hardware elements. This talk presents a holistic view of DevSecOps that spans the complete value delivery pipeline and includes guidance for those building large, cyber-physical systems.

DOs and DON'Ts in Capacity-Based Agile Procurements – A Case Study

23098 | Gholampoor, M.

Capacity-Based Agile procurements have proven to bring the value to federal agencies, yet its implementation has its own challenges. In this session, we share tips and lessons learned from a Capacity-Based Agile case study that struggled to deliver MVPs at the originally intended cadence. The case study describes the challenges with contract structure, process, people, and organizational culture at a federal agency that hindered the successful execution of Agile Scrum and identifies the root cause of these challenges and describes the lessons learned.

Model of Models Methodology

23100 | Jackson, A.

MTSI proposes the Model of Models methodology in order to enable traceability while facilitating reusability and modularity. The key to this process is a library system where reusable elements are placed within libraries dedicated to reusable elements with the goal of elimination of rework.

Model-Centric Systems Engineering (MCSE) in an Agile Environment

23102 | Shevchenko, N. • Popeck, M.

Many projects struggle when applying agile practices to more complex systems with custom architectural patterns and five or more agile teams. MCSE provides the structure for multiple agile teams to synchronize their efforts by extracting different views of the model to communicate, track, and perform their individual developments. Our results show that integration of MCSE with agile practices enhances a project's ability to implement complex systems.

Integrating DevOps Into Navy Combat Systems Development

23104 | Miller, A. • Giachetti, R.

What does DevOps within the context of the acquisitions and development of the Navy's combat systems look like? This report looks at the unique challenges and needs facing the Navy as it implements DevOps into its acquisitions processes.

Performance Measurement in an Agile Contract – DOs and DON'Ts from a Success Story

23109 | Nakka, K. • Hinton, V.

It's always a challenge to measure performance in an Agile contract, but we did measure performance. We would like share with the audience how to do more with less in a government environment.

Leveraging the Digital Engineering Transition to Revolutionize the IP Marketplace

23119 | Sisson, C.

The goal of this presentation is to open up the discussion on challenges to both the government and industry in adapting the way IP is handled during the digital transformation. This presentation also aims to share recommendations and strategies by which the business models for IP may change as well as share risks if no changes are made.

Format Independence for SysML Models

23129 | Mikola, R.

Extract, Transform and Load SysML Models from Rhapsody(R) to MagicDraw(R).

Agile Authorizations for Cyber Resiliency

23171 | Holtzman, D.

USAF Fast Track ATO – Evolving the RMF process toward Risk Management and Agile Authorizations.

Threat and Attack Modeling: System Centric versus Attack Centric

23172 | Brooks, R.

Threat and Attack Modeling can be done in many ways. System Centric focuses on the defense of attacks. Attacker Centric focuses on attack goals. This session will compare and contrast the two methods.

Not All Data Is Created Equal: Solving the Problem of Traceability and Repeatability with Analysis Workflows

23176 | Ko, A.

Phoenix Integration will present research that addresses the challenge of analysis repeatability and traceability. This is done by identifying the data types within an engineering process, archiving them in repositories that suits its purpose and use, and connecting them with metadata.

A Framework for Agile MBSE Development

23177 | Wood, D. • Chapman, K. • Basso, M. • Peters, A.

This presentation proposes both an approach for Agile, Incremental Systems Engineering, and the early validation of system CONOPS and architecture by auto-generating and using the same interfaces for assembly APIs and for simulation.

Evaluating Potential Impacts to the DoD Mission and the Defense Industrial Base from Emerging National and International Chemical Regulations

23178 | Williams, E. • Rak, D. • Underwood, P. • Vogel, C.

National and international chemical ESOH regulations have the potential to disrupt the use and availability of chemicals and materials needed for national defense. This briefing describes the collaborative risk evaluation approach, summarizes supporting data, and presents key assessment results.

A Digital Engineering Demonstration for a Small Unmanned Underwater Vehicle

23179 | Giachetti, R. • Giammarco, K. • Wolfgeher, C. • Eldred, R.

The presentation demonstrates digital engineering concepts, methods, and tools through the design, development, and analysis of a small unmanned underwater vehicle with a mission to explore undersea wrecks. The paper describes what did and did not work as well as implementation challenges.

Integrating ESOH Engineering & Product Support Activities

23184 | Beck, E. • Hammerer, M.

This presentation describes several tangible methods used to integrate ESOH risk management functions into a system's product support (sustainment) products and processes during the acquisition process.

The Missing Link: The Operational Level of Weapon Systems Cybersecurity

23186 | Bryant, W.

Weapon systems cybersecurity efforts are hampered by a gap between policy strategy and engineering tactics. What is needed is a systems engineering construct to link them. This presentation will offer such a construct in the Combined Systems Security Engineering Process or CSSEP.

Early Science & Technology Protections Translate to Uncompromised Transition of Advanced Capabilities into Acquisition

23190 | Gardner, K. • Schwaninger, M.

To maintain technological advantage, DoD must establish a risk management approach, applying tailored protections to technology areas impacting national security. This discussion will describe a new DoD Instruction (DoDI), Technology, and Program Protection to Maintain Technological Advantage.

DE Metrics: Categorizing the Benefits and Value of Digital Engineering

23191 | Blackburn, M. • Van Aken, E.

This presentation discusses the results of a recently completed study to define metrics that represent value, benefits, and change progress in enterprise DE transformation.

Can We Assure Resilience of Cyber-Physical Systems Using Model-Based Systems Engineering?

23192 | McDermott, T. • Beling, P.

We provide a history of SERC Mission Aware research, current work to standardize assurance design in MBSE tools, and current work to integrate Mission Aware with DoD mission engineering and operational simulation activities.

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

23194 | Demmick, M.

The Unmanned System (UxS) Safety IPT collaborates on issues impacting the role or use of unmanned systems in Military operations. The IPT developed UxS safety policy to augment existing system safety engineering practices to support safe implementation of UxS autonomous capabilities.

A Model-Based Systems Engineering Approach to Assessing Modularity in System Architectures

23195 | Stirgwolt, B.

With current approaches, the modularity of a system cannot be evaluated in an integrated and efficient manner. This presentation describes a model-based systems engineering approach to integrating the systems architecture and the modularity assessment of the architecture.

Environment, Safety, and Occupational Health (ESOH) in the Adaptive Acquisition Framework

23197 | Asiello, D.

ODASD(ENV) will highlight policy aimed at managing Environment, Safety, and Occupational Health (ESOH) risks and strengthening readiness in the Adaptive Acquisition Framework. It will cover efforts with key stakeholders to improve the integration of ESOH in a culture of rapid and meaningful innovation.

Digital Engineering Measures Correlated to Digital Engineering Lessons Learn from Systems Engineering Transformation Pilot

23199 | Blackburn, M. • Kruse, B. • Bone, M.

The presentation summarizes correlated analysis of 22 DE Success Measure Categories with 17 lessons learned observed during the NAVAIR Surrogate Pilot that applied DE methods and tools using an Authoritative Source of Truth that modeled everything to demonstrate the art-of-the-possible.

Department of the Navy Initiatives to Expedite NEPA Reviews

23200 | Prine, B. • Lamb, R. • Cecchini, J. • Schroeder, D.

Panel discussion of Department of the Navy (DON) initiatives to strengthen and expedite NEPA reviews.

Workflows in Multi-Repository Model Management

23201 | Gorospe, V.

There are situations in the defense industry where models need to be cooperatively developed across multiple repositories (e.g. government with contractor, security classification, etc.). This presentation discusses these cases and some workflow examples with SysML models and Teamwork Cloud.

Cyber Resilient Weapon Systems (CRWS) Workforce Competency

23202 | Reed, M.

This presentation provides an overview of the ongoing effort conducted by the Resilient Systems directorate within the Strategic Technology Protection and Exploitation office to advance the competency of the CRWS engineering workforce.

OUSD(R&E) Resilient Systems Overview

23203 | Reed, M.

This presentation provides an overview of the ongoing efforts conducted by the Resilient Systems (RS) directorate within the Strategic Technology Protection and Exploitation office.

Design Principles for Weapon Systems Engineering

23204 | McEvilley, M. • Reed, M.

This presentation discusses ongoing efforts and results to establish the objectives and tenets of the design basis for DoD standardization of weapon systems engineering practice to effectively address the adversity associated with contested cyberspace.

Concepts for an Approach to Weapon Systems Engineering

23205 | McEvilley, M. • Reed, M.

This presentation explains and relates the elements of a comprehensive and balanced approach for systems engineering to address the resilience, security, and survivability concerns associated with contested cyberspace in the absence of quality and timely threat information.

I Want It Now! ... Mature Digital Engineering Capabilities Deployable Today

23206 | Finlay, C.

Many still struggle with how to implement Digital Engineering (DE) capabilities for their programs. Even worse, they use new DE technologies to do business the old way. It doesn't have to be this way. There are many mature DE capabilities ready for deployment today for teams to exploit to the greatest extent.

Risk Management within Nuclear Weapons Programs: Where We Were, and Where We're Heading

23209 | Bell, G. • Buford, T. • Jackson, W.

The NNSA is committed to ensuring the surety and reliability of our nuclear weapons and deterrence by being responsive and resilient. This requires risk management within system and digital engineering to be improved to become better risk-informed in operations and decision-making.

Lockheed Martin's Chemical Stewardship Program: Reducing Risk through the Sustainable Management of Chemical Substances and Materials

23212 | Proul, M.

Lockheed Martin is undertaking efforts to reduce risks related to the use of hazardous substances and to deliver more sustainable products, including assessing the chemical substances and materials that are incorporated in products and implementing less hazardous alternatives.

Relationship between Traditional Modeling & Simulation and Digital Engineering

23213 | Miller, B.

This presentation will provide the common elements and relationship between traditional modeling and simulation and digital engineering.

Extending a Digital Engineering Framework through Operations

23218 | Ritter, C. • Browning, J. • Hays, R. • Nelson, L.

Digital engineering represents a breakthrough to improve change, process, risk, schedule, and documents management. Extension of a digital engineering framework to holistically include both design and operations represents unique challenges. This presentation discusses methods to connect these domains.

Deep Digital Thread from Project Controls through Engineering Design

23219 | Browning, J. • Ritter, C.

Engineering design systems are not typically connected to the project controls systems, leaving teams and projects siloed. To overcome this factor, INL is developing the deep lynx database architecture for seamless integration of these systems.

The Systems Engineer as a Agile Product Owner

23222 | Zajac, P.

Explore the idea of using systems engineers to be product owners for development teams. There are several natural synergies that make this a good fit. There are also some hurdles that will need to be tackled in order for a Systems Engineer to function well as an Agile Product Owner.

Protecting the DevSecOps Application through Software Assurance

23224 | Lanford, B.

This presentation will delve into a layered approach to DevSecOps security and focus on the software assurance techniques to protect the application software being developed and deployed, also the ability to utilize DoD DevSecOps enterprise services creates unique security tradeoffs for DoD programs.

Answering the Ask through Imagination: NEPA Process Streamlining Innovations

23226 | Boose, B. • Warf, J.

DoD's NEPA process typically takes too long, costs too much, and produces long, cumbersome documents. We will discuss AECOM's tested methods and software tools to overcome these challenges and truly streamline the process, and AECOM's "Digital NEPA" platform, the next evolution in NEPA streamlining.

Applying an MBSE Approach for Evaluating Shipyard Operations

23228 | Jurkiewicz, D.

Using a Model-Based Systems Engineering (MBSE) approach, this presentation will describe the overall operational model of a notional public shipyard by creating an example as-is state model of an unplanned maintenance cycle and how inserting new technology can alter steps in the process.

6 Vs and 3 Ts of Systems Engineering

23229 | Long, D.

In transforming our practices through MBSE and seeking to transform the greater enterprise through digital engineering, the letters V and T become even more important. Model-based practices and digital engineering seek to transform the V. And, doing so is reliant upon the T.

R&E Mission Engineering State of Practice

23230 | Roman, E.

Mission Engineering (ME) is a key element of the Department's modernization strategy—applying engineering discipline to help identify and prioritize investment decisions to close capability gaps.

Schema and Metamodels and Ontologies, Oh My!

23231 | Long, D.

Over the last five years, there has been a growing fascination with conceptual data models, metamodels, and ontologies in systems engineering. So, what are these concepts? What differentiates them and, more importantly, why should I care?

Formal Inconsistencies in Risk Assessment Processes

23233 | Salado, A. • Stephen, C., • Kannan, H.

In this study, the consistency of the safety processes of the FAA and the U.S. Navy with decision theory was assessed. Three key formal inconsistencies that lead to irrational safety decisions—related to assessment process, safety metric definition, and expertise aggregation—were found.

Model-Based Requirements: Writing Requirements without Writing

23234 | Salado, A.

We present a True-Model Based Requirements (TMBR) approach that captures the problem space without using shall statements and without imposing specific solutions. The resulting model-based requirements can then be automatically converted to textual requirements to support contracting.

Approach to Digital Engineering for Large Systems of Systems Mission

23246 | Dahmann, J. • Khaw, A. • Biloiu, I. • Dailey, M.

This presentation provides an approach to applying Digital Engineering (DE) to a large systems of systems mission. One of the challenges faced when working with a large systems of systems mission is the scale and scope. This presentation outlines an approach to addressing this challenge.

Implementing Digital Engineering Environment for Mission Engineering

23247 | Boulware, J. • Anderson, J.

This presentation provides an implementation perspective on the development of a digital engineering environment (DEE) for Integrated Air and Missile Defense (IAMD) initiated as a pilot and now transitioning to implementation.

Using Effective MBSE to Move Up the Data-Information-Knowledge-Understanding-Wisdom Chain and Providing Long-Term Strategic Value to the Enterprise

23251 | Selvy, B.

This presentation will assess the problem that MBSE is trying to solve and then use the DIKW model as an assessment mechanism to evaluate where we are in our current state of practice. The presentation will conclude with recommendations for the evolution of MBSE tools and discipline moving forward.

Identifying Security Patterns for Modular Open Systems

23252 | Bonilla-Ortiz, G. • Verma, D.

The convergence of security and Modular Open Systems Approach (MOSA) is not readily discussed in available literature. The research presented in this paper aims to determine attack vectors and vulnerabilities to modular open systems and attempts to explore security patterns to mitigate these threats.

Leveraging Set-Based Practices for Ongoing Optimization of Your Mission Engineering Designs, Even as the Mission Unfolds

23254 | Kennedy, B.

Mission Engineering must continue incorporating a wide variety of expertise and to evolve their Mission Design as the mission nears and even after the mission is underway. Set-based practices are particularly effective in evolving the design as uncertainty is reduced or more expertise is available.

Leveraging Set-Based Practices to Enable Efficient Concurrency in Large Systems and Systems-of-Systems Engineering

23255 | Kennedy, B.

This presentation will introduce three key enablers that allow you to leverage Set-Based practices to coordinate concurrent system-of-systems, systems, and subsystem engineering efforts so that they jointly prioritize their learning and converge their decision-making efficiently.

Every Mission-Level or System-Level Trade Study Should Have an Associated Trade Space Map to Facilitate Multi-Discipline Review

23257 | Kennedy, B.

Trade Studies that require knowledge from multiple experts from different disciplines are notoriously error-prone. Simply reviewing the trade space will rarely find mistakes. Coupling with that a Decision Map that shows the structure of the trade space is far more effective at finding holes.

Transitioning Legacy Systems to Model-Based Systems Engineering

23263 | White, P. • Swanson, E.

The U.S. Department of Defense defined a Digital Engineering Strategy (DES), in 2018, to modernize its capability to meet current and future demands. We invite you to attend this presentation and learn how a legacy program can transition to MBSE.

Digital Engineering: From Toolchain to Platform

23268 | Markina-Khusid, A. • Quinn, G. • Kamenetsky, J.

This presentation documents MITRE's Digital Engineering (DE) Platform, an effort to build a set of reusable digital engineering assets that connects people, processes, tools, and data across an end-to-end digital enterprise.

Continuous, Agile, Cyber Assured?

23271 | Henning, R.

In the quest to deliver capability more quickly, new development methodologies for continuous capability delivery have been attempted. Even the best of these methodologies are nearly silent on cyber assurance. This presentation discusses the foundation prerequisites for an assured agile environment.

Integrated Product Line Engineering and the Digital Thread

23272 | Hause, M. • Momoh, T.

System lifecycle development tools must support Product Line Engineering (PLE) throughout the development process. Integrated PLE (IPLE) supports the entire development lifecycle from stakeholder needs, requirements, to assembly of bill of materials in PLM and manufacture in a true digital thread.

Lessons Learned in the Creation of a Digital Thread

23279 | Corey, K. • Dam, S.

For Digital Engineering to become a reality, many people envision that this requires systems and design engineering tools be fully integrated. This paper will discuss some of the lesson learned so far in developing a digital thread for a DoD customer.

Answering the Challenges of AI with Systems Engineering

23282 | Brown, B.

Surveying some of the main challenges in the development of intelligent systems, including reliability, safety, dependability, and resistance to hacking; case studies of recent AI failures will highlight how systems engineering methods and techniques could be used or adapted to solve AI challenges.

Digital Engineering Modeling Methods for Digital Signoffs

23283 | Blackburn, M.

The presentation summarizes Digital Engineering modeling methods that produce artifacts for mission and system engineering models. We discuss the use of OpenMBEE View and Viewpoints to provide Digital Signoffs for the artifacts of the modeling method.

The Lifecycle Modeling Framework: Organizing and Simplifying the Application of Model-Based Systems Engineering

23284 | Sellers, J.

The research described in this presentation offers the Lifecycle Modeling Framework (LMF) as a methodology for organizing and managing the process of building and evolving systems engineering models.

A System Dynamics Model to Measure and Quantitatively Improve Digital Transformation and MBSE Adoption within a Large-Scale Organization or Enterprise.

23285 | Iannuzzi, R. • Isaacs, A. • Praizner, S.

This presentation explores the numerous variables associated with digital transformation and adoption of model-based engineering via Systems Dynamics. The various reinforcing and balancing loops that force an S-type curve normally associated with epidemiology and technology adoption are discussed.

Addressing Capability Gaps in the A&D Industry: Strategic Frameworks & Best Practices

23294 | Gross, D.

From the earliest stages of ground-breaking programs, Program Managers face significant choices as they approach and address capability gaps. What are the best practices? One consultant with 20 years of top-tier consulting and real-world operating experience shares his insights.

Improved Delivered Capability: Isolating and Predicting New Technologies, Technology Uses, and Emerging Threat Sources

23296 | Lipizzi, C. • Clifford, M.

Systems can no longer simply satisfy requirements but need to cultivate experimentation and innovation in an evolving operational environment. This proposed framework identifies emergent behaviors and the sources to enable competent decision-making to protect and advance mission objectives for a system.

Cloud Infrastructure for Digital Engineering Tools

23299 | Gomez Dominguez, N. • Deschamps, B. • Ritter, C.

Managing to move digital engineering tools to the cloud can be a tedious process. Using cloud offerings and available technology on premises allows applications such as Jazz Doors Next Generation and AVEVANET to be accessed by partners outside of the organization via SSO federated services.

Building Quality by Engineering People and Values: Improve the Person, and You Improve Everything!

23307 | Brown, B.

Effective and successful systems development is a function of optimally employing people, process, and tools. We'll show how a values-based quality management approach enables both short- and long-term success through the application of personal and leadership values.

The Expansive Use of NIST SP 800-53r4 as a Common Requirements Lexicon

23308 | Olmstead, D.

A review of how various source documents (e.g., SCRM, JSIG, CNSSI 1253, etc.) leverage the NIST catalogue of security Controls | Control Enhancements (NIST SP 800-53r4) and the associated Verification/Validation methods in NIST SP 800-53Ar4.

Addressing Environment, Safety, and Occupational Health in the Adaptive Acquisition Framework

23313 | Forbes, S.

A case will be made for developing an overarching DoDI 5000 policy focused on System Safety/ESOH functional execution and requirements for each acquisition pathway to address the challenge of inconsistent or missing content in rapidly developed Adaptive Acquisition Framework policies.

Method for Consistent Evaluation of Applicability of Open Standards

23317 | Trumbull, T.

We propose a new methodology for consistently evaluating applicability of open standards; this methodology enables quick identification of what specific system aspects any open standard is intended to define.

Digital Engineering Strategy to Enable Enterprise Systems Engineering

23319 | Noguchi, R.

This presentation extends the DoD Digital Engineering Strategy for organizations who seek to apply Digital Engineering not only to improve program and project outcomes but also to achieve a more efficient and effective implementation of Enterprise Systems Engineering (ESE) to improve enterprise outcomes.

Accelerating Modernization of Software Acquisition to Better Serve the Warfighter with a Special Emphasis on Software Assurance and Near-Term Technology Drivers

23321 | Nidiffer, K.

This presentation addresses the role of software as a force multiplier in satisfying Department of Defense (DoD) needs to accelerate modernization of acquisition. A special emphasis is placed on near-term technology drivers and their impact on software assurance.

Incorporating Cybersecurity into SAFe®

23326 | Galiber, F.

This presentation discusses how the Scaled Agile Framework (SAFe) shifts cybersecurity compliance from an isolated "waterfall" event to an integrated, continuous, and lean activity on DoD programs.

System Operational Architectures with Agent Modeling for Ground Vehicle Autonomous and Smart Systems

23327 | Hetherington, D. • Adams, C. • Cheung, C. • Mikulski, C.

Generating operational architecture SysML models at and within the system level using agents within a reference architecture approach. Project application discussion included.

Risk & Opportunity Management Transfer – Systems Engineering & the PMO

23328 | Garypie, L. • Tague, S.

This session will discuss roles and responsibilities for R&O management between SE and Project Management Office resources on programs.

Model-Based Systems Engineering Library – The National Aerospace Standard 411-1 Hazardous Materials Target List

23331 | Gallagher, J. • Downey, K. • Hales, L.

The National Aerospace Standard NAS411-1 was created as a MBSE library to advance environmental, safety, and occupational health into a digital environment. The approach is discussed and a small demonstration may be offered. Material identification is critical in management of hazards and risks.

Trusted Traceability: What the Semiconductor and Electronics Can Learn from the Food and Beverage Supply Chain.

23332 | Orchard, A.

Discover how Siemens/Mentor and an AFRL program are using blockchain technologies, advanced analytics, and PLM concepts to enable complete traceability in the semiconductor & electronics industry to meet challenges such as chip assurance, counterfeiting, authenticity validation, and DoD requirements.

The GAP Model for Agility and Excellence

23333 | Carpenter, N.

We will focus on two areas: the program and team level changes made to enable as well as lead excellence in Agility. This will be more than an "Experience Report"; it will focus on the improvements that individuals and teams can make to enable Agility and change.

Developing Meta Systems Architectures for Leading Innovation with Complex Societal and Technical Challenges

23339 | Dagli, C.

In this talk, possible mission engineering approaches for developing meta systems architectures for leading innovation in complex adaptive societal systems will be discussed. The impact of AI in development of these systems will be highlighted.

Digital Tread – Integrating MBSE and Product Lifecycle Management

23340 | Segal, D.

This presentation will examine the integration between the MBSE and PLM domains, using OSLC connectivity; it will also examine the benefits, initiatives taking place at the OMG and OASIS, and the future of integrated MBE in a wider scope.

On-Demand Integrity Measurement at the Circuit-Board Level

23343 | Gwinn, R. • Matties, M. • Rubin, A.

Critical systems face many threats, with supply chain counterfeiting and the introduction of trojans being particularly challenging due to the limited response options. Several existing hardware-focused methods along with a new experimental method will be discussed.

Achieving Airborne System Airworthiness in a Landscape of Disruptive Technologies and Diverse Regulatory Objectives

23344 | Stempel, T.

This discussion addresses key airworthiness requirements that have to be considered when planning and managing key systems development programs.

Application of Probabilistic Graph Models to Kill Chain and Multi-Domain Kill Web Analysis Problems

23346 | Sitterle, V. • Baker, J. • Fullmer, D. • Brown, D.

This work describes both the initial application of a Bayesian network model-based approach to a more traditional view of kill chain analysis and its evolution toward a more dynamic assessment of high-level effectiveness of a multi-domain web.

Advancements Towards a Digital Approach for Mission Engineering

23348 | Shayler, T. • Browne, D.

This presentation discusses advancements on a digital approach to mission engineering developed by GTRI to support investment tradespace analysis across the DoD. The approach includes Bayesian networks and visualizations for tradespace analysis and decision support.

F-35 Joint Program Office and Support Team – Environmental Excellence in Weapons System Acquisition

23351 | Casana, J.

This presentation showcases the F-35 Environment, Safety, and Occupational Health Team's efforts that led to winning the 2020 Secretary of Defense Environmental Award. Successes include removal of hexavalent chromium exterior primer and using low volatile organic compounds for aircraft coatings.

Building Safety into Autonomous Robot Software

23352 | Hetherington, D.

Getting software for autonomous robots to work at all can be hard. Figuring out how to engineer such software for functional safety is even harder. This presentation will provide a brief overview of the functional safety landscape for managers and engineers just starting to grapple with the issues.

Digital Engineering Information Exchange Challenge

23354 | McGervey, S. • Hambrick, T. • Tseng, C.

This panel will discuss the Digital Engineering Information Exchange (DEIX) Challenge proposed to the community in July 2020, introduce the Challenge submissions received, and look at next steps.

Model-Centric Systems Engineering (MCSE) in an Agile Environment

23356 | Shevchenko, N. • Popeck, M.

We propose an MCSE approach that uses a digital system model as a single authoritative source of truth that allows for the system and its components to be designed at different levels of abstraction while permitting the creation of views to maintain current agile practices.

Modeling Case Studies for Dynamic Exploration of Acquisition Decisions

23357 | Wheaton, M. • Madni, A.

Case Studies have historically been static narratives about experiences and lessons learned on a major acquisition program. This paper is concerned with transforming case studies into dynamic simulations to explore the impact of changes in assumptions, technologies, regulations, and tradeoffs.

A Pattern Language for Integrating Software Cost Estimation into a SysML System Model

23358 | Ford, T.

A pattern language for integrating software cost estimation within a SysML system model is described. The pattern language is implemented as a SysML profile and contains important patterns that aid the systems modeler in capturing software elements of the system and their individual and aggregate costs.

MBSE Research Testbed for Rapid and Flexible Modeling and Experimentation

23360 | Madni, A. • Madni, C. • Purohit, S. • Siever, M.

Advances in systems modeling, digital engineering, and machine learning have produced new challenges for MBSE. No longer can the use of isolated MBSE tools suffice. This paper presents a MBSE testbed for researchers engaged in modeling and managing the interactions of disparate models and tools.

Model-Based Cyber Threat Analysis Approach

23361 | Zhang, L.

Cybersecurity design and analysis is the most effective when it is an integral part of the upfront system model development process. A model-based cyber threat analysis approach is proposed to facilitate and standardize the process in incorporating cybersecurity analysis into system models.

The Who, What, When, Where, Why, & How of Architecture with the UAF

23363 | Hause, M.

Systems engineers often ask what the Unified Architecture Framework (UAF) is for. The UAF addresses the Who, What, When, Where, Why, and How (WWWWW&H) of your System of Systems (SoS) architecture. This presentation will look at the WWWWW&H questions and show how the UAF supports the WWWWW&H.

INCOSE and the Future of Systems Engineering

23364 | Peterson, T.

INCOSE has many initiatives and efforts targeted to accelerate the transformation of Systems Engineering to a model based discipline. This briefing will cover several efforts INCOSE either leads or is participating in to help deliver the envisioned future state.

Graph Exploration of System Models

23365 | Peterson, T.

Graph Analytics and visualization of systems models is a significant enabler to building shared understanding across the systems development community. This presentation will share the current challenge, propose a solution, provide an example, and share the benefits of the approach.

Promoting a Distributed Model-Based Market/Exchange

23367 | Petrotta, M.

Model repositories often exist in silos associated with organizational structure, functional discipline, tool type, etc. This briefing will outline a distributed model-based approach that provides a signed blockchain change record and open value exchange between stakeholders.

MBSE: From Abstraction to Implementation

23371 | Villafane, J.

A practitioners story exploring the implementation of Model-Based Systems Engineering (MBSE) within an existing organization.

Ground Based Strategic Deterrent (GBSD) Program Office National Environmental Policy Act (NEPA) Compliance Perspective - High Risk Management

23372 | Dore, S.

This presentation describes the Ground Based Strategic Deterrent (GBSD) Program Office's management of National Environmental Policy Act (NEPA) Compliance and mitigation of its High Schedule risk to the GBSD Program.

Measuring MOSA

23373 | Thelin, S. • Trumbell, T.

This paper presents one possible way to measure Modularity and Openness of a MOSA architecture and how it relates back to customer objectives.

MOSA Strategy

23374 | Thelin, S. • Head, J.

Short overview on elements of a MOSA strategy and how that can be used to guide development of MOSA architectures.

Architecture in the Design Process

23375 | Stokes, M. • Kelly, J.

Architecture has always been a part of the design process but historically an unacknowledged component to design. In recent years, architecture has taken a front seat to requirements and design. This has created a question in the defense industry of what it means to perform an architecture.

Purpose of Architecture

23377 | Stokes, M. • Head, J. • Kelly, J.

This presentation will discuss the purpose of doing architecture and the why. It addresses how that purpose influences the artifacts that we produce and the methodologies we use.

Agile for All – Integrating Agile Practices Across Functions

23381 | Yeman, R.

Agile principles and practices can be applied effectively beyond software development in a variety of applications and functions. Can we get much more done, and better, if we learn to collaborate using agile practices across disciplines?

Using SysML State Machines to Automatically Conduct Failure Modes and Effects Analysis

23382 | Vinarcik, M.

Failure Modes and Effects Analysis is current supported with various plugins and methodologies; some SysML modeling tools include plugins to facilitate analysis. This paper showcases using state machines and well-crafted models to minimize the effort and maximize the rigor of FMEA analysis.

Industry/Government Simulation Collaboration Framework

23390 | Ball, G. • Bane, S. • Wernz, S. • Wu, A.

Raytheon Missiles & Defense and the Government have been collaborating on the implementation of a simulation framework that promotes bi-directional sharing of models and simulation results. This approach reduces the reliance on written communication and accelerates product development and accuracy.

Weapon System-Related Impulse Noise Assessment

23391 | Merkley, J.

Presentation and panel discussion regarding how the Department of the Army assesses Impulse Noise associated with operating weapon systems.

Industrial DevOps: From Value Streams to Agile Teams

23394 | Johnson, S. • Yeman, R.

In this presentation, we will walk through the importance of Industrial DevOps, systems thinking, and value stream identification to understand flow. Using a scenario, we will discuss the similarities, challenges, and considerations for improving dynamic learning and feedback loops for both culture and technical architectures.

Applying Systems Engineering for Threat-Based Planning

23395 | Chapman, D.

The program will be a 30-minute presentation briefing the methodology for threat-based planning as used by the Combat Capabilities Development Center (CCDC) Armaments Center. There will be a demonstration and an explanation of the tools.

Strategizing Solutions for Protecting Warfighter Brain Health

23399 | Webster, O.

Congress mandated a longitudinal medical study to determine the effects of blast overpressure (BOP) exposure to heavy weapons and breaching charges on warfighter brain health. This will improve the monitoring and assessment of BOP, and inform policy for risk mitigation, unit readiness, and healthcare decisions.

Data Architecture and Strategy to Support Engineering Design

23401 | Stuart, D.

As AI/ML is increasingly employed in engineering design, proper architecture and strategies must support data needs. ERS has made great strides in understanding storage, access, schemas, aggregation, and scaling to make architectural decisions that enable AI/ML workflows for engineering design.

Hypersonics Design Engineering

23402 | Foster, J.

The Defense Department has identified hypersonic capabilities as a highest technical priority for National Security. Our computational scientists and engineers have collaborated with industry partners to introduce “Fail Fast – Fix Fast” hypersonics design engineering.

DARPA CRANE Program Philosophy

23427 | Walan A.

CRANE leverages a Multi-Disciplinary Analysis & Optimization approach for aircraft configuration exploration and refinement while incorporating Active Flow Control modeling, component maturation, and testing into an innovative aircraft conceptual design to enable a full-scale flight demonstration.

Assessing MOSA – Refining the Practice

23449 | Geier, N. • Tindle, J.

Employing a modular open systems approach (MOSA) is now mandated by law. In the past, the Department of Defense has used qualitative means to assess MOSA. This presentation describes efforts to develop consistent, quantitative methods to assess the extent to which programs employ MOSA.

Integrating MOSA

23457 | Geier, N. • Mckeeby, D.

Integrating a modular open systems approach involves considering what parts of a system or platform may change over time and how to package those parts so they can be removed and replaced without reengineering other parts of the system. This presentation discusses items for programs to consider.

Welcome and System Security Engineering Council Highlights

23458 | Ocker, C. • Dunlap, H. • Reed, M.

System 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.

Greatly Improved Safety at Lower Cost

23468 | Leveson, N.

System complexity is reaching a new level (tipping point), and traditional safety approaches are proving less effective as a result. DoD and its partners need a paradigm shift to a "systems approach" and a change from a hazard identification process focused on trying to increase component reliability to prevent failures to one that uses constraints to enforce safe behavior of systems.

Measuring Product Value

23469 | Golaz, B.

How does one measure value of systems or products? Value can have different meanings depending on objectives—capability, performance, timeliness, life cycle cost, Return on Investment (ROI), profitability, market share, or many other attributes.

Enabling the Future for Agile in Defense Systems: ADAPT Strategic Plan

23470 | Johnson, S. • Yeman, R.

The Defense industry is adapting agile methods to software development. The NDIA ADAPT team has established a strategic vision and plan to help enable an agile future—which is coming sooner than we may have once thought.

Introduction to the DoD Software Acquisition Pathway

23990 | Brady, S.

The DoD Senior Lead for Software Acquisition introduces the newest addition to the Adaptive Acquisition Framework, the DoD's Software Acquisition Pathway. DoD Instruction 5000.87 was published on October 2 and is a substantial departure from status-quo business that postures DoD to win in an era of Great Power Competition. The DoD's preferred pathway for software acquisition, it is built to unleash modern commercial development practices such as Agile, Lean, DevSecOps, and human-centered design to deliver digital capability at the speed of relevance. The pathway codified the top recommendation of the Defense Innovation Board Software Acquisition and Practices Study and direction from Congress in the FY2020 national defense act. Motivated by tremendous interest from the services, the policy team took just nine months to move from interim to final policy—three months earlier than promised and one year earlier than Congressional expectation.

ON-DEMAND SESSIONS

EDUCATION & TRAINING

23267

Growing an Organic Systems Engineering/Systems Thinking Culture within a Legacy Program

Patrick McMillan
Systems Integration Manager, Lockheed Martin Corporation

Not only changing the wheels of the bus while its moving, but aligning the steering at the same time.

23370

A Scalable Agile Mechanism for Developing Model-Based Engineering Practitioners and Expertise

Dr. Carla Sayan
Radar Systems of Systems Architect, Raytheon Technologies

We introduce our agile-based approach to address existing MBE/Digital Engineering challenges and accelerating MBE practitioners' expertise.

23314

The Future of Defense Training Starts with an Immersive Toolset

Hamza Ayaz
Business Development Executive, Modest Tree

Immersive technologies are transforming the training landscape. This presentation will cover both the innovations that are currently being incorporated to modernize defense training and the potential changes that these innovations are bringing to the shape of the industry at large.

23349

Resiliency Across Spectrums

Claudia Rose
President, BBII Enterprises

How to train workforce resiliency so that individuals and teams can create more flexible designs in systems engineering. This presentation introduces these new systems engineering possibilities, discusses the problems, and suggests the new paradigms that can help further these goals.

23217

With a Little Help From Our Friends: The Family of Systems Disciplines and What We Can Learn from One Another

Zane Scott
Vice President, Professional Services, Vitech

There are a variety of systems disciplines, all of which employ the same fundamental concept of systems. These disciplines offer each other their unique perspectives and approaches. This presentation explores ways in which the disciplines can open new solutions and new market spaces for each other.

ENGINEERED RESILIENT SYSTEMS (ERS)

23407

Design Engineering Advancements through Lockheed Martin's EXPEDITE Program

Juan Montoro
Conceptual Design Manager and ADP Program Manager, Lockheed Martin Corporation

Lockheed Martin is achieving significant advances in Design Engineering capabilities by employing a Multi-disciplinary Design Optimization (MDO) framework to enable Effectiveness Based Design (EBD).

23403

Python Technologies for the Rapid, Agile Development of Novel Simulation & Analysis Workflows

Dr. James A. Bednar
Senior Manager, Technical Services, Anaconda, Inc.

New tools developed in the HoloViz.org project make it feasible to specify, configure, visualize, and share results from high-performance-computing simulations and analyses as needed for emerging requirements, using Python in a web browser with very little code or training.

23415

HPCMP CREATE: A Vision for Physics-Informed Digital Engineering

Dr. Robert Meakin
Associate Director, Computational Research and Engineering Acquisition Tools and Environments (CREATE), High Performing Computing Modernization Program, U.S. Department of Defense

A vision for physics-informed digital engineering is presented. The approach is to synthesize digital surrogates using physics-based and data-driven analytics, providing decision-makers actionable information, intuitively understood, at the speed of relevance.

23993

Empowering Program Offices to Incorporate Computational Engineering Development and Insertion (CEDI) with Acquisition Projects to Significantly Reduce Processing Time and Technical Risk

Dr. Robert Wallace
Technical Director, Information Technology Laboratory, Engineer Research and Development Center, U.S. Army

ERS-Industry Partnerships, under Program Office sponsorships, have proven highly successful in significantly reducing processing time and risk in platform development, and have introduced a radically new dynamic in Government-Industry collaboration. This talk introduces the structure and value of the CEDI Fail-Fast/Fix-Fast approach.

HUMAN SYSTEMS INTEGRATION

23423

Joint Human Systems Integration Capabilities-Based Assessment Initiative Updates

Dr. Larry Shattuck
Human Systems Integration Program Director and
Institutional Review Board Chair, Information Technology Laboratory,
Engineer Research and Development Center, U.S. Army

This presentation will provide an overview and update of Joint HSI activities and initiatives with a focus on the recent updates to Defense System Acquisition policy for HSI.

23304

Maturation of a Human Readiness Levels Scale

Dr. Judi See
Systems Analyst, Sandia National Laboratories

Maturation of a human readiness levels (HRL) scale to complement and supplement the existing technology readiness levels (TRL) scale is described. The HRL scale has demonstrated utility for a range of scenarios and missions.

LIFE CYCLE SUPPORT

23329

NanoFlowX Electronic Waterproofing Solutions

Dr. Evan Vickers
Lead Chemist, NanoFlowX

NanoFlowX Nano Coating solution is the world's fastest IP68-rated electronic waterproofing solution that protects against liquids, humidity, dust, corrosion, and bacteria in just two minutes without special equipment or training. This is a Commercial Off-the-Shelf Technology Readiness Level-9 product.

MODEL-BASED SYSTEMS ENGINEERING

23318

Think Globally, Act Locally: Adapting MBSE for the Enterprise Context

Ryan Noguchi
Director, Space Architecture Department, The Aerospace Corporation

MTSI proposes the Model of Models methodology in order to enable traceability while facilitating reusability and modularity. The key to this process is a library system where reusable elements are placed within libraries dedicated to reusable elements with the goal of elimination of rework.

23117

The Future of Performance Design with MBSE: Electric Powertrain Example

Dr. Sulius Pavalkis
Industry Business Senior Consultant and Model-Based Systems Engineering Transformation Leader, Dassault Systems, Catia, No Magic

Using an electric vehicle powertrain example, we will illustrate how to achieve performance design in the context of a system architecture utilizing a MBSE methodology called Cyber MagicGrid©. Through this framework, we will cover all phases of systems engineering life.

23180

Inconceivable: Those Requirements Don't Mean What You Think They Mean

Michael Vinarcik
Chief Systems Engineer, SAIC

Using modeling to identify inconsistencies and gaps in text-based requirements.

SYSTEMS ENGINEERING EFFECTIVENESS

23253

Using Graph Analysis to Support the Digital Thread for Mission Engineering

Dr. Dirk Zwemer
President, Intercax, LLC

An extensible graph analysis framework encompassing mission models (UAF), systems models (SysML), and other domain models provides an approach for formulating executable tests to verify and validate the Digital Thread. Application to a sample mission/system is illustrated.

23324

Model-Based Automated Design Exploration for Wargaming

Jonathan Kidner
Marine Corps Warfighting Laboratory Liaison,
Naval Surface Warfare Center (NSWC) Crane

A system model-driven approach to mission engineering. Using SysML to inform modeling and simulation in order to enable quantitative wargaming outputs.

BIOGRAPHIES

KRISTEN BALDWIN

Deputy Assistant Secretary of the Air Force for Science, Technology, & Engineering
Office of the Assistant Secretary of the Air Force (Acquisition, Technology, & Logistics)

Kristen J. Baldwin, a member of the Senior Executive Service, is Deputy Assistant Secretary of the Air Force for Science, Technology and Engineering, Office of the Assistant Secretary of the Air Force (Acquisition, Technology and Logistics), the Pentagon, Washington, D.C. Ms. Baldwin provides guidance, advocacy, and policy for the Air Force's annual $2.6 billion science and technology program and $1 billion developmental prototyping and experimentation program, conducted at 40 research sites worldwide. She provides engineering and technical management direction on digital engineering, cyber resilient weapons, corrosion control, capability development planning, and the functional management of more than 14,000 military and civilian scientists and engineers. In addition, she is responsible for providing technical advice and counsel to the Air Force Acquisition Executive on a broad range of engineering and technical management areas. As part of this role, she oversees the Air Force's international science and technology outreach via various bi-lateral and multi-lateral engagement fora, including the NATO Science and Technology Organization and the NATO Air Force Armaments Group.

Before this appointment, Ms. Baldwin served as the Deputy Director for Strategic Technology Protection and Exploitation within the Office of the Under Secretary of Defense for Research and Engineering. She was the Department of Defense (DoD) lead for maintaining technology advantage by mitigating exploitation and vulnerabilities of critical missions, programs, technologies, and the industrial base. Ms. Baldwin oversaw program protection policy and related hardware and software assurance, anti-tamper, and critical technical information protection practices.

A member of the Senior Executive Service since 2007, Ms. Baldwin has also served as Acting Deputy Assistant Secretary of Defense for Systems Engineering; and Deputy Director, Software Engineering and System Assurance. Before joining the Office of the Secretary of Defense, Ms. Baldwin served as a science and technology advisor in the Army's Office of the Deputy Chief of Staff for Operations and Plans. She began her career at the U.S. Army's Armament Research, Development, and Engineering Center, Picatinny Arsenal.

Ms. Baldwin is a recipient of the Meritorious Presidential Rank award in recognition of exemplary service, and the National Defense Industrial Association Lt Gen Thomas R. Ferguson, Jr., Systems Engineering Excellence Award. She holds a Bachelor of Science in Mechanical Engineering from Virginia Tech and a Master of Systems Management from the Florida Institute of Technology.

JEANNETTE EVANS-MORGIS

Chief Systems Engineer
Office of the Assistant Secretary of the Army (Acquisition, Logistics, & Technology)

Ms. Jeannette Evans-Morgis was appointed to the Senior Executive Service in December 2015 and currently serves as the Chief Systems Engineer for the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)). In this position, she serves with a vision of integrating systems engineering to modernize the Army, along with systems engineering for ASA(ALT) in support of the Army Materiel Enterprise to ensure delivered equipment meets the mission needs of the force against any potential adversaries.

JOHN FIORE

Chief Engineer

Office of the Assistant Secretary of the Navy (Research, Development, & Acquisition)

Mr. John G. Fiore is the technical director for the Naval Surface Warfare Center, Dahlgren Division (NSWCDD), Dahlgren, VA. He was appointed to the position in July 2016 and has been in the Senior Executive Service since September 2014. In his current role, he is responsible for Dahlgren's technical excellence in executing research, development, test and evaluation, analysis, systems engineering, integration, and certification of complex naval combat, sensor, weapon, and strategic systems associated with surface warfare as well as homeland defense and force protection.

Fiore is also serving as the Assistant Secretary of the Navy for Research Development and Acquisition Chief Engineer, he was appointed in November 2019. In this role, he leads the Navy's engineering enterprise-wide efforts as a national expert in systems engineering, including development, integration, and testing of complex Navy warfare systems.

Fiore was previously the director for Above Water Sensors in the Program Executive Office for Integrated Warfare Systems (PEO IWS). In this capacity, he oversaw the planning, development, acquisition, testing, and sustainment of cost-effective warfare systems for U.S. Navy surface ships and submarines. Additionally, he was the chief technology officer for PEO IWS. He spearheaded the constantly evolving transition of new naval capabilities and technologies into more than 150 programs of record.

Fiore began his career at Naval Surface Warfare Center Philadelphia Division (NSWCPD) in Philadelphia, PA, where he held a series of progressively challenging positions culminating in his assignment as the first deputy program manager for Smartship in 1998. After leaving NSWCPD, he held key leadership positions at the National Geospatial Intelligence Agency as deputy program manager for Imagery Continuity of Operations; the U.S. Navy's Office of Technology Development Support as the chief engineer for an advanced airborne intelligence, surveillance, reconnaissance, and targeting sensor; and as the acting deputy program executive at the Aegis Ballistic Missile Defense (BMD) organization where he shared responsibility with the program executive for oversight of all Aegis BMD programs.

Fiore graduated from Drexel University in Philadelphia, PA, with Bachelor and Master of Science degrees in Electrical Engineering. He attended the Program for Management Development at Harvard Business School and graduated with a Master of Science degree in Science and Technology studies from Virginia Polytechnic Institute and State University. He is also a graduate of the Defense Systems Management College where he received level III certification in Program Management and Systems Engineering.

DR. SANDRA MAGNUS

Deputy Director for Engineering

Office of the Under Secretary of Defense for Research & Engineering

Dr. Sandra H. "Sandy" Magnus is the Deputy Director for Engineering within the Office of the Under Secretary of Defense for Research and Engineering. She serves as the DoD's Chief Engineer for Advanced Capabilities. In this role, she is the lead for engineering policy, practice, and the DoD engineering workforce, as well as digital engineering and systems of systems engineering initiatives. She leads mission integration management, independent technical risk assessments, and program planning and execution.

Formerly the Principal of AstroPlanetview, LLC, Dr. Magnus is also the former Executive Director of the American Institute of Aeronautics and Astronautics (AIAA), the world's largest technical society dedicated to the global aerospace profession.

Selected to the NASA Astronaut Corps in April 1996, Dr. Magnus flew on the STS-112 shuttle mission in 2002 and on the final shuttle flight, STS-135, in 2011. She flew to the International Space Station on STS-126 in November 2008 and served 4 months on board as flight engineer and science officer. Following her assignment on Station, she served at NASA Headquarters in the Exploration Systems Mission Directorate and as the deputy chief of the Astronaut Office.

While at NASA, Dr. Magnus worked with the international community, including the European Space Agency (ESA) and the Japan Aerospace Exploration Agency (JAXA), as well as with Brazil on facility-type payloads. She spent time in Russia developing and integrating operational products and procedures for the International Space Station.

DAVID MCNEILL

Chief Engineer
Missile Defense Agency

Mr. David McNeill is the Chief Engineer for the Missile Defense Agency. As Chief Engineer, Mr. McNeill is responsible to the Director for Engineering for providing sound and integrated engineering and manufacturing processes and products; thorough element engineering controls and management and verification through audit; independent test, analysis, and assessment of failed and high risk events and engineering efforts; industrial and manufacturing readiness; integrated, reliable and sustainable ballistic missile defense elements; and competent next generation of project engineer leaders. Serving as the Chief Engineer, Mr. McNeill's objective is to bring the Ballistic Missile Defense System into being by providing authoritative and technically sound direction over a broad spectrum of technical and programmatic issues.

Prior to his Senior Executive Service appointment, Mr. McNeill served as the Chief Engineer for Targets and Countermeasures, serving as the single technical authority for 32 target launches. He was also responsible for verifying System Requirements were executable, specification documents were accurate, and systems met final requirements. Mr. McNeill also implemented and maintained responsibility of a rigorous Risk Program in support of MDA's overall risk process.

Previous assignment with the Missile Defense Agency include Chief Engineer for United States Israeli Cooperative Program Office where Mr. McNeill served as the technical authority for the Arrow 2, Arrow 3, David Sling, and Iron Dome weapon systems. He was responsible for establishing opportunities to further expand the layered Ballistic Missile Defense by exploiting existing technologies to improve Israeli Cooperative programs and improving Phased Adaptive Approach early warning of existing or upgraded Israeli Cooperative systems.

Mr. McNeill served for 25 years with the Aviation and Missile Command in the positions of Senior Design Engineer for the Research and Development Engineering Center; Senior Engineer for Terminal High Altitude Area Defense Project Office Live Fire Test and Evaluation; and Division Chief, Flight Test Planning and Analysis. Mr. McNeill also served 3 years with the Space and Missile Defense Command as the Parametric Edno/Exo Lethality Simulation Program Manager.

Mr. McNeill has over 39 years of engineering experience. He earned a Bachelor's of Science degree in Mechanical Engineering from The University of Alabama in Huntsville and obtained Level III Acquisition Professional Certification in Systems, Planning, Research Development, and Engineering.

Mr. McNeill possesses extensive leadership and hands-on technical expertise gained through increasingly demanding engineer positions involving major weapon systems. He is level III certified in System Engineering and a member of the Acquisition Professional Community.

Mr. McNeill was awarded the Missile Defense Agency Technical Star Award for exceptional achievements.

SPONSOR DESCRIPTIONS

CONTRIBUTING SPONSOR

AMERICAN SYSTEMS is at the forefront of Research and Engineering modernization priorities to further our National Defense Strategy.

We work with a broad portfolio of Science & Technology programs, liaise with Academia and Federally Funded Research Centers, and assist in the development of investment strategy through mission analysis in areas such as 5G, Microelectronics, Hypersonics, Directed Energy, and C4ISR. We develop and assess future joint warfighting concepts through digital engineering, modeling & simulation, data analytics, and wargaming. We support the services and Joint missions by modernizing legacy architectures through mission engineering of new capabilities and operations.

NETWORKING LOUNGE SPONSOR

IBM is a globally-integrated technology and consulting company with operations in more than 170 countries. Our Engineering Management solutions provide an integrated management environment for systems and software development. Our portfolio of products help companies developing increasing complex products optimize their management so they can deliver on time, deliver on budget, successfully manage compliance and regulatory requirements, while improving the quality of the products delivered. The Engineering Management portfolio includes requirements, test, and workflow management as well as systems design modeling. The portfolio is underpinned with solutions for publishing, method composition, and data analysis that further enhance your business's development processes. www.ibm.com

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Raytheon is a technology and innovation leader specializing in defense, civil government and cybersecurity markets throughout the world. With a history of innovation spanning nearly a century, Raytheon provides state-of-the-art electronics, mission systems integration and other capabilities in the areas of sensing; effects; and command, control, communications and intelligence systems, as well as cybersecurity and a broad range of mission support services. Featured areas are missile defense, command and control, sensors and imaging, cyber, electronic warfare, precision weapons, training, and mission support.

Raytheon is headquartered in Waltham, Massachusetts.

EXHIBITOR DESCRIPTIONS

AGI mission-level software helps engineers, operators, and analysts working on complex land, sea, air, and space systems. Our modeling, analysis, and visualization tools, coupled with legendary customer support, help those in aerospace and defense organizations make critical decisions faster and more accurately in an operational context. Learn more at **agi.com**.

BigLever Software™ is the long-standing leader in the Product Line Engineering (PLE) field. BigLever's holistic onePLE™ solution delivers the leading-edge technology, proven methodology, business strategy, and organizational change expertise needed to efficiently transition to and operate a game-changing PLE practice. The company's state-of-the-art PLE methods and tools provide one unified, automated approach for feature-based variant management. This approach extends across the full lifecycle including engineering and operations disciplines; software, electrical, and mechanical domains; and tool ecosystem. Some of the world's largest forward-thinking organizations across a spectrum of industries are leveraging BigLever's PLE solution to engineer their competitive advantage through order-of-magnitude improvements in productivity, time-to-market, portfolio scalability, and product quality.

DTIC collects, disseminates, and analyzes scientific and technical information to rapidly and reliably deliver knowledge that propels development of the next generation of warfighter capabilities. DTIC is the central repository for DoD's body of 4.6M scientific and technical records. For more information, visit **https://discover.dtic.mil/**.

Sodius Corp., based in the United States, provides software solutions for Enterprise Interoperability, Data Transformation, and Model-Based Code Generation to improve traceability, exchange, and sharing of engineering data in highly regulated industries.

With offices around the world, the two companies Sodius deploy their solutions worldwide in Aerospace, Defense, Automotive, Transportation, and Medical industries.

Today, Sodius is the global leader in integration technology and code generation for embedded systems leveraging the power of connected data to enable the products of tomorrow.

SPEC Innovations (Systems and Proposal Engineering Company) has been a leader in systems engineering, since 1993. Our goal is to move the systems engineering discipline into the future.

We developed and released the first collaborative cloud-native MBSE tool, Innoslate, in 2012. Since then, we have evolved Innoslate into a full lifecycle solution through requirements management to verification and validation. Innoslate was developed to support the entire system or product lifecycle. This cloud or on-premise application simplifies system or product development while reducing time-to-market, cost, and risk. Innoslate was made for systems engineers by systems engineers.

EXHIBIT HALL HOURS

TUESDAY, NOVEMBER 10
10:15 am – 3:30 pm EST

THURSDAY, NOVEMBER 12
10:40 am – 3:45 pm EST

FRIDAY, NOVEMBER 13
10:40 am – 3:45 pm EST