

Conference on Systems Engineering Research

6-9 April 2026 | Arlington, VA



Conference Hosts



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**DEPARTMENT OF
SYSTEMS ENGINEERING
AND OPERATIONS RESEARCH**
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Technical Program – Monday

8:00 - 16:00	Registration	
	Van Metre 113	Fuse 2416
9:00 - 10:00	Systems Engineering & Architecting Research Network (SEANET) 9:00 - 16:00 Lunch (SEANET only) 12:00 - 12:45 Registration required	
10:00 - 12:00		Conducting Research with the Department of War (Hosted by SERC) 10:00 - 12:00 Registration required
12:00 - 14:00		
14:00 - 16:00		Engineering Society of Systems Scholars (ESSyS) Faculty Workshop 14:00 - 16:00 Registration Required
16:00 - 17:00		
17:00 - 17:30		ESSyS Business Meeting 17:00 - 18:00 Van Metre 716
17:30 - 19:00	CSER Welcome Reception Fuse 1311B/1312 17:30 - 19:00	

Technical Program – Tuesday Morning

7:30 - 17:00	Registration				Fuse Exchange
8:30 - 10:00	Plenary Session Introductory remarks: Azad Madni (honorary CSER co-chair), Ali Raz (co-chair), John Shortle (co-chair), Liza Durant (Associate Provost for Strategic Initiatives and Community Engagement, GMU) Keynote Speaker: Dr. Saifur Rahman, Virginia Tech Advanced Research Institute				Fuse 1311A
10:00 - 10:30	Break				Fuse 1311B / 1312
	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
		Agentic AI and Agent-based Simulations	Digital Engineering and SysML	LLMs for Requirements Engineering	Advancing SE Methods and Practice
		Session Chair: Lance Sherry	Session Chair: Matthew Amissah	Session Chair: Shamsnaz Bhada	Session Chair: Paul Grogan
10:30 - 11:00		Agentic Simulacra for Synthetic Construction Management Data Generation Saeideh Shahrokh Esfahani, Nivedha Balakrishnan and Vincil Bishop	Anticipating System Behavior with Intelligent Digital Twins: Lessons and Guidance for Collaborative Systems Engineering Garrett Thurston and Azad Madni	Improving System Engineering Requirements with AI-Based Analysis Walt Melo	BRIDGE: A Context-Aware Framework for Benchmarking Digital Transformation in Systems Engineering Nicole Hutchison
11:00 - 11:30		A quorum sensing algorithm for emergent multi-agent system organization Nathan George, Emel Sen Kilic and Bryan Watson	SysML in Practice: A Case Study on Usability Barriers and Challenges in Train Maintenance Simulation Modeling Bahador Dodge, Abbas K. Zaidi and Sheida Etemadidavan	Exploring Similarity Assessments of LLM-generated Requirements Ramón María García Alarcía, Alessandro Golkar and Alejandro Salado	AI-Assisted Development of Technical Assessments for Systems Engineering Education: A Multi-Agent Approach Emmanuel Gonzalez and Paul Grogan
11:30 - 12:00		Synthetic Flight Track Generation for Collision Risk Analysis: An Iterative Multi-Seed Approach Shahab Aref, John Shortle and Lance Sherry	SysML for Energy Systems Economics Modeling: A Case Study in LCOE Estimation Emmanuel Amo, Matthew Amissah and Elma Kabotsyoe	Using Fine-tuned and context-aware Large Language Models for Requirements Technical Debt Evaluation in Systems Engineering Work Products Krish Patel, Shamsnaz Bhada and Brian Sheehan	Addressing Challenges Related to Systems Engineering Systematic Reviews Susan Ferreira, Duy Thuc Nguyen, Seth Tyler and Gary Reed
12:00 - 13:30	Lunch				Van Metre Multipurpose Room

Technical Program – Tuesday Afternoon

	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
	Panel: Characterizing the Behavior of AI-enabled Socio-Technical Systems: What does a Testbed Need to be? Moderators: Zoe Szajnfarber and Laura Freeman	Swarms and Multi-agent Systems Session Chair: Bryan Watson	Digital Engineering and SysML Session Chair: Matthew Amisshah	AI-Driven MBSE Session Chair: Nicole Hutchison	Transdisciplinary Systems Engineering Session Chair: Paul Wach
13:30 - 14:00		Demonstration of a Novel Biologically Inspired Swarm Consensus Algorithm in a Simulated Search and Rescue Case Study Jack Capuano, Austen Pallen, Grace Gratton, Morgan Kendall and Bryan Watson	CoreMBSE: Capturing the Essential Value of MBSE for Resource Constrained Teams Aapo Hölsä, Emil Kurvinen and Juho Könnö	Using LLMs to automate development of Machine Learning Models for deployment in MBSE Architectures Syed Waqas Ahmed and Abbas K. Zaidi	The INCOSE Symposium Paper Collection: What Does It Tell Us About the Discipline? Caroline Thomas and C. Robert Kenley
14:00 - 14:30		Modeling and Visualization of the Iridium-Cosmos Collision Debris: A Comparison of NASA SBM and ESA-Based Approaches Mustafizur Rahman, Jose Eduardo Rivero, Alfonso Recobos Duque, Gerardo A. Carrasco, Md Fashiar Rahman and Tzu-Liang Bill Tseng	Capacity Enhancement of a Residential Evaporative Cooler Leveraging Model-Based Systems Engineering (MBSE) Approach Saroj Raut, Dr. Niamat Ullah Ibne Hossain, Dr. Sergio A. Luna Fong and Dr. Eric D. Smith	Augment, Don't Automate: Designing LLMs to Support Systems Engineering Teams Nicole Hutchison	Translations of semantic paths through embedding registration Nicholas McKibben, Chris Allport and Alejandro Salado
		Evaluating a Modified Richardson Model for Analysis of the Golden Dome Suvan Kumar	SysML Profile for Adaptable and Adaptive Systems Engineering and Management Haifeng Zhu, Matthew Hause and Ray Barton	A Human-in-the-Loop Framework for Enhancing System-of-Systems Resilience via AI-Driven Anomaly Detection in Digital Twin Environments Cansu Yalim, Rafi Soule, Resit Unal and Holly Handley	Foundations for Systems Engineering: Exploring System Morphisms Paul Wach, Brandt Sandman and Aditya Iyer
15:00 - 15:30		Break			

Technical Program – Tuesday Afternoon

	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
	Workshop: An Introduction to A Categorical Modeling Language Javier Calvo-Amodio and Spencer Breiner	Emergence in Multi-agent Systems		Human-AI Teaming	Tradespace Visualization and Analysis
		Session Chair: Ali Raz		Session Chair: Cansu Yalim	Session Chair: Farid Sahebsara
15:30 - 16:00		Interplay between Physical Design Choices and Emergent Cyber System Consensus: A Case Study with an Underwater Swarm Ava Neubert and Bryan Watson		Sociotechnical digital twins: The tangibility issue Guy Andre Boy	Preliminary results in aggregating multiple value estimates for system optimization Christopher White and Bryan Mesmer
16:00 - 16:30		Implementation and Evaluation of a Snow Observing Strategy Using the NOS-T Distributed Simulation Framework		Human-AI teaming in the development of a high-level systems model	To The Silos: An Investigation into Problem Framing for Tradespace Exploration of Large-Scale Systems
		Divya Ramachandran, Emmanuel Gonzalez, Hadis Banafsheh and Paul Grogan		Benjamin Brink	Meredith Sutton, Edward Louis, Gregory Mocko and Cameron Turner
16:30 - 17:00		Natural Language Processing to Inform Agent-based Modeling: With application to modeling of adoption of medium-duty electric vehicles Fletcher Ouren, Thomas Bradley, Tim Coburn and Erika Gallegos		Human-Centered Mission RAG: A Socio-Technical Framework for Intelligent Team Alignment in Mission Engineering Rafi Soule, Cansu Yalim, Dr. Unal Resit and Dr. Holly Handley	
17:00 - 18:30	Poster Session (17:00 - 18:00) and Reception (17:00 - 18:30)				Fuse 1311B / 1312

Technical Program – Wednesday Morning

7:30 - 17:00	Registration				Fuse Exchange
8:30 - 10:00	Plenary Session Introductory remarks: Ali Raz (co-chair), John Shortle (co-chair) Andre Marshall (VP for Research, Innovation, and Economic Impact, GMU) Michael Watson (INCOSE President) Keynote Speaker: Dr. Sriram D. Ram, National Institute of Standards and Technology				Fuse 1311A
10:00 - 10:30	Break				Fuse 1311B / 1312
	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
	Tutorial: Developing, Integrating, and Evaluating Custom AI Assistants for Systems Engineering Raymond Madachy and Ryan Bell		Digital Twins-1 Session Chair: Julia Bitencourt	Human-AI Architectures Session Chair: Alkim Avsar	
10:30 - 11:00			Enabling the Software-Defined Vehicle: An Approach with Executable Requirements and Generative AI Fernando Sarracini Junior, Arthur Oliveira and Jeremy Rawlings	Beyond time and efficiency: How Human-AI architecture shapes system behavior Bryce Huffman, Sarah Starr, Zoe Szajnarfarber and Caitlin Grady	
11:00 - 11:30			A Capability-Based Verification and Validation Study of an Additive Manufacturing Digital Twin Landon Womack, Ana Wooley and Julia Bitencourt	Collaborative Intelligence: From Alignment to Ethical Co-Agency Jon Wade, Richard Gessner and Alejandro Salado	
11:30 - 12:00			Uncertainty Quantification in Digital Twins: A Metric of Trust to Support Decision Making Julia Bitencourt, Ana Wooley and Gregory Harris	Human-AI Teaming in Kidney Allocation Case Study: Using Fuzzy Logic for Nuanced Clinical Decision-Support Rachel Dzieran, Cihan Dagli and Robert Marley	
12:00 - 13:30	Lunch				Van Metre Multipurpose Room

Technical Program – Wednesday Afternoon

	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
	Urban Systems and Infrastructure Session Chair: Niamat Ullah Ibne	Roundtable Discussion: Advancing Systems Scholarship in Engineering Moderator: Paul Grogan	Digital Twins-2 Session Chair: Casey Eaton	Generative AI and Systems Engineering Session Chair: Jannatul Shefa	SERC Doctoral Student Forum Session Chair: Zoe Szajnfarder
13:30 - 14:00	Bilevel Optimization with Convex User Equilibrium Model: Reformulation and Application to Infrastructure Investment Sainan Zhang		Open-Source Digital Twin Framework for Industrial Automation: Integrating Godot and CODESYS for Real-Time Robotic Arm Co-Simulation Maddlaaj Khan and Imran Khan	Large Language Models for Systems and Ontological Modeling: Fine-tuning and Evaluation Ramón María García Alarcia, Ahmed Alhamadah, Maged Elaasar, Alessandro Golkar and Alejandro Salado	Method for Data-driven AI Airspace Collision Risk Modeling Shahab Aref
14:00 - 14:30	The Mental Models Making Affordable Housing Less Affordable Josh Binder and Shamsnaz Virani Bhada		Lifecycle-Integrated Digital Twin Verification: A Dual-Axis Evaluation Framework Using the Validation Fidelity Ladder (VFL) and Integration Maturity Model (IM ²). Ali Sleiman, Casey Eaton, Bryan Mesmer and Nicholas Loyd	An Ontology-Driven Framework for Continuous Governance in Digital Engineering Environments Mark Teneyck	Managing Critical Supply Chains Under Disruption: The Case of the 2022 Infant Formula Crisis Matthew Beigh
14:30 - 15:00	Applying Systems Engineering Approach to Wildfire Risk Management: A Framework for Mitigating California's Wildfire David Hosterman, Suwetha Muthukumar, Dr. Alexandr Sokolov and Niamat Ullah Ibne Hossain		Digital Twin Technology for Future Military Ships Manuela Nardini, Elisa de Paola and Roberto Avallone	A Personal Generation Process Model for Human-AI Collaboration in Systems Engineering Raymond Madachy	Improving Architectural Design Processes for Complex Systems Supama Mukherjee
15:00 - 15:30	Break				Fuse 1311B / 1312

Technical Program – Wednesday Afternoon

	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
	Trustworthy Autonomous and Space Systems	Advanced Methods in Mission & Systems Engineering	Digital Engineering Processes	Digital Twins-3	SERC Doctoral Student Forum
	Session Chair: Abbas Zaidi	Session Chair: Nil Ergin	Session Chair: Doulotuzzaman Xames	Session Chair: Gregory Mocko	Session Chair: Zoe Szainfarber
15:30 - 16:00	A Systems Engineering Approach for Verification and Validation of AI-Enabled Autonomous Commercial Off-the-Shelf Drone Systems Krish Patel, Max Pabilonia, Shamsnaz Bhada and Ali Raz	Incorporating DevOps Methodologies into the Systems Engineering Lifecycle for Cyber Physical Systems Nicole Klueber and Nil Ergin	Standardization Progresses on Adaptable and Adaptive Entities Haifeng Zhu, Jean-Luc Garnier, Matthew Hause, Ronald Carson, Ray Barton, Rich Hilliard and Wei-Jen Lee	Digital Twins, Not Just Things: Evolving from Shadows to Organizations in the Age of AI Jay Sharritt, John Elshaw and John Colombi	Post Training LLM Alignment, Formal Methods, Natural Language Processing, Knowledge Graphs Balaji Rao
16:00 - 16:30	Defining a Cybersecure Requirements Set for Commercial LEO Satellites and Associated Vulnerabilities Daniel Johnson and Thomas Bradley	Leveraging High-Fidelity Digital Models and Reinforcement Learning for Mission Engineering: A Case Study of Aerial Firefighting Under Perfect Information Ibrahim Cetinkaya, Sajad Khodadadian and Taylan Topcu	Mixed Reality Design Reviews Integrated with a Digital Thread Engineered System: Evidence from Nuclear Engineering at Idaho National Laboratory Kaleb Houck, Logan Browning, Maria Eduarda Montezzo Coelho, Porter Zohner, Peter Suyderhoud and Jack Cavaluzzi	Technical Strategies for Semantic Aggregation of Interoperable Digital Twins John Morris, Duncan Gibbons, Joe Gregory and Gregory Mocko	Operationalizing Do Calculus in Non-stationary Fault Root Cause Diagnosis with Segmented TV DBNs Cansu Yalim
18:00 - 21:00	Conference Banquet National Museum of the United States Army 1775 Liberty Dr, Fort Belvoir, VA 22060 Transport available via Uber code Keynote address: Dr. Tsu-Jae Liu, President, National Academy of Engineering Exhibits open 18:00 - 19:00, Banquet 19:00 - 21:00				

Technical Program, Thursday Morning

7:30 - 17:00	Registration				Fuse Exchange
8:30 - 10:00	Plenary Session Executive Leadership Panel on Intelligent Digital Twin-enabled Systems Engineering for 21st Century Sociotechnical Systems Chair: Marilee Wheaton Panelists: Daniel Hettrema (OUSW R&E), Rosalind Lewis (National Systems Group), Sudarsan Rachuri (Dept. of Energy), Garrett Thurston (Dassault Systèmes)				Fuse 1311A
10:00 - 10:30	Break				Fuse 1311B / 1312
	Fuse 1311A	Global Studio 1324	Van Metre 111	Van Metre 113	Van Metre 121
	Cyber Risk and Resilience	Autonomy in System of Systems	Digital Twins-1	Digital Twins-1	Systems Thinking and Complexity Management
	Session Chair: John Shortle	Session Chair: Meredith Sutton	Session Chair: Julia Bitencourt	Session Chair: Julia Bitencourt	Session Chair: Ben Torkjazi
10:30 - 11:00	Integrating Cyber Risk Management into Digital Threads: An MBSE Framework for CONOP Development Rafi Soule, Ahmed M. Abdelmagid and Dr. Barry C. Ezell	Trade Study on Integrating Levels of Autonomy in System of Systems: A Model-Based Approach Madeline Gray, Trevor Geissler, Mohammadreza Torkjazi and Ali Raz	Digital Twin for Scenario Planning: The Impact Assessment Subsystem of the Coastal Zone Digital Twin Yunzhang Hou and Paul Grogan	A Conceptual Architecture of Socio-Technical Digital Thread Sensing Infrastructure for Continuous Project Monitoring within Digital Engineering Ecosystems Jannatul Shefa and Taylan Topcu	Applying Systems Thinking to Clinical Trials Raymond Madachy
11:00 - 11:30	Quantifying Cybersecurity Countermeasure Efficacy with M3ASURE Ben Breisch and Kristin Voss	Adaptability and Resilience Metrics for Complex Adaptive Systems Ken Cureton, Haifeng Zhu, John Britis, Scott Jackson and Eileen Arnold	How Far Are We in Using MBSE for Digital Twins for Human-in-the-Loop Systems? Insights from a Case Study Md Doulotuzzaman Xames and Taylan Topcu	Engineering the next-generation C2 network for future missions Joseph Kroculick	Analyzing ISRU as an enabler of sustainability for a lunar surface habitat Wilson B Kagabo and Benjamin Kwasa
11:30 - 12:00	Modelling And Assessing Organizational Resilience Leveraging System Dynamics Approach Dr. Shohreh Moradi, Dr. Niamat Ullah Ibne Hossain and Dr. Ivan W. Taylor		Digital Twin-Enabled Human Factors Risk Modeling for AI-Driven Intrapartum Monitoring System Kimberly DeBaise, Lauryn Woodyard, Tracey Brereton, Joe Melnick, Jacqueline Arnold, Denise Foy, Christopher Felton, Kaylah Berndt, William Carey, Leal Segura, Chung Wi, Young Juhn, Mark Lifson and Shauna Overgaard	Unraveling the System Boundary Problem in Systems Utilizing Digital Twins Omar Zeki, Sara Khatouri, Farid Sahebsara, Mohammadreza Torkjazi and Ali Raz	A System Engineering Process for Creating the Lean Start-Up Business Model Canvas (BMC) for Complex Socio-Technical Systems Lance Sherry
12:00 - 13:30	Lunch				Van Metre Multipurpose Room