



## Adaptability: Transdisciplinary Strategies and Solutions

*Today's product and services systems are multi-faceted, with distinct levels of implementation that entail complex logic with levels of reasoning in intricate arrangement, organized by webs of connections. These systems increasingly demonstrate self-driven adaptability, autonomy, and emergent behavior. The demand for -- and possibility of -- systems adaptability impacts design, manufacturing, and operations across defense, healthcare, energy, transportation, emergency response, agriculture, and society overall.*

The Complex Adaptive Systems (CAS) Conference was founded and organized by Missouri University of Science and Technology in 2011, pushing research boundaries over the last thirteen years. From 2025 the conference will be expanded to include a larger community of practitioners and researchers worldwide.

CAS will be named *INCOSE Complex Adaptive Systems Conference*, with leadership from the INCOSE Adaptability working group and support from Complex Systems, System of Systems, Artificial Intelligence, Risk Management and Resilience working groups. In 2025 the conference will be held on the MIT Campus. MIT System, Design and Management (SDM) will host the event with support of the MIT Department of Aeronautics and Astronautics and the INCOSE New England Chapter.

This year's theme is **adaptability of complex systems through transdisciplinary systems and solutions**. Engineering requires an increasingly *transdisciplinary* engagement, from systems concept development to solution implementation by multiple technical disciplines along with non-engineering experts and stakeholders. *How we engineer as well as the systems we generate* are adapting sociotechnical systems. To leverage research in CAS and to reveal CAS will enable us to better respond to the complexities we face.

CAS 2025 will balance attention to advanced research on methods with domain applications. Domain application studies are invited across a broad range of sociotechnical systems, including mobility, aerospace, agriculture, urban, medical, health care, mechanical, software, telecommunications, energy, services, acquisition, logistics, and maritime systems. The conference aims to foster innovative approaches for adaptability, autonomy, resilience, AI, complex systems, and system of systems.

## Topics of Interest

### Adaptability in Complex Systems

- System Adaptability
- Adaptive Systems
- Uncertain Requirement Engineering
- Switching Cost Estimation
- Resilient Systems  
System Safety and Reliability
- Complex Systems Modeling
- Adaptable Acquisition
- Supply Chain Adaptability
- Adaptable Software & System Interface
- Adaptability Heuristics
- Adaptable Architectures
- Model-Base Adaptable System Design
- Adaptability in INCOSE SE Vision 2035

### AI and Data Science

- AI for Systems Engineering
- Systems Engineering for AI
- Computational Intelligence
- Machine Learning
- Deep Learning
- Neural Networks
- Quantum technologies
- Explainable AI
- Trusted AI: Robustness, Security, and Testability
- Adaptive Big Data Analytics
- Natural Language Processing
- Clustering and Classification
- Social network and social media analysis
- Bioinformatics and Bio-inspired
- Augmented intelligence
- Ethical aspects of AI
- LLMs and Generative AI
- Human Factors and Adaptability

### Systems Adaptability Domain Case Studies

- Mobility
- Aerospace
- Agriculture
- Urban Planning and Architecture
- Maritime
- Medical Devices
- Health Care
- Mechanical
- Software and Computation
- Telecommunications
- Energy
- Services
- Acquisition
- Logistics

### Cyber Physical Systems

- Cybersecurity
- Distributed Network Security
- Adversarial Attacks
- Authentication and Authorization
- Identity Management and Blockchain
- Smart cities and micro grids
- IoT applications for integration
- Security, Safety and Privacy
- Mobile and Cloud Computing
- Mechanical System Adaptability
- Adaptive Vehicle Make

### Complex Systems / System of Systems

- Meta-X-Complex Systems Architectures
- Rules of engagement and emergent behavior
- Dynamic complex Systems Architectures  
Socio-technical systems
- Systems of Systems Engineering
- Adaptive Control
- Dynamical System Analysis
- Agent Systems  
Modeling and Simulations

## **Organizers**

### **Founding Chair**

Cihan Dagli, Missouri University of Science & Technology

### **General Chairs**

Haifeng Zhu, The Boeing Company

Bryan R. Moser, MIT

### **Organizing Committee**

Brian Sheehan (Hosting Chair – INCOSE New England Chapter)

Ray Barton (Hosting Chair – INCOSE Canada Chapter)

Jack Stein (Hosting Chair – Assistant Director, INCOSE America Sector)

VJ Valkand (Financial Chair)

Nil Ergin (Publication Chair)

Joseph Hemenway (Publicity Chair)

## **Important Dates**

Paper Abstract:	October 5, 2024
Abstract Acceptance Notice:	October 12, 2024
Full Paper for Review:	December 2, 2024
Paper Acceptance Notice:	January 10, 2025
Final Manuscript and Copyright Form:	February 21, 2025
Conference Dates:	March 5-7, 2025
Workshop and Tutorial Proposals:	October 21, 2024

## **Conference Website**

<https://sdm.mit.edu/cas2025>