ARCHIMEDES
INITIATIVE

2024 SUMMER WORKSHOP

June 4-6, 2024 | Washington, DC | In Person Only

Register

SYSTEMS ENGINEERING RESEARCH CENTER

ESI Powered by industry, academia and TNO

DLR

TECOSA

Hosted by GW

About the Archimedes Initiative

While many, if not most, engineering organizations practice systems engineering, only a limited number of institutes conduct research into the modernization of systems engineering principles, practices, methods, and methodologies. Four leading centers that conduct such research have joined forces by founding the Archimedes Initiative: the German Space Center (DLR) Institute of Systems Engineering for Future Mobility, the Netherlands Organization for Applied Scientific Research (TNO) Embedded Systems Innovation (ESI) center, the Center for Trustworthy Edge Computing Systems and Applications (TECoSA) at the Royal Institute of Technology in Sweden, and the Systems Engineering Research Center (SERC) of 22 universities operated by Stevens Institute of Technology for the United States Department of Defense.

The complexity of modern systems is exaggerating the limits of classical systems engineering methods and practices. Modern societies depend on such complex systems and system-of-systems for commerce, healthcare, urban living, and transportation – with increasing dependence on developments in computational technologies, AI/ML, and human-machine teaming. Therein lies the focus of the Archimedes research centers – to conduct applied research to evolve the systems engineering and architecting toolkit to help the practicing engineers and scientists address the complexity, dynamic behavior and evolution, and the underlying uncertainty in modern systems and system-of-systems.

The four research centers operate in the context of a diverse ecosystem with nodes in industry, government agencies, and academia. They each target a different application domain. DLR works in the field of automotive and maritime mobility, ESI targets the high-tech equipment industry, TECoSA works with the automotive, truck, and aircraft industries, and the SERC focuses on the defense industry. Each application domain is facing similar challenges, but often in different orders of priority. The aim of the Archimedes Initiative is to accelerate the necessary collaboration and innovation in systems engineering research by learning from each other's best practices across all of these domains.

dlr.de/en esi.nl tecosa.center.kth.se sercuarc.org

Day 1: 4 June 2024 (Tuesday)

Location: City View Room, 1957 E Street NW

Workshop Theme

The theme of this third annual workshop is Trusted AI and Autonomy. AI is changing how people work, communicate, learn and organize. As transformative AI becomes increasingly embedded in complex systems, engineers, policy makers and researchers must determine how to govern and evaluate this emerging technology while balancing its potential to transform society for good against the risks and harms that arise from novel use cases. There is a need to connect choices about data and design to strategies for the governance of AI systems and the data on which they are trained and deployed.

This workshop brings together researchers and practitioners from different disciplines and application areas to discuss fundamental concepts of trust in AI and autonomy, and methods to ensure this trust in deployed systems. Specific topics of interest include:

- Human aspects of trust and explainability
- Systems engineering for AI and autonomy
- Management of trust/risk measures
- Evaluation and certification of autonomous systems
- Testbeds to evaluate socio-technical aspects of trust

Workshop Agenda

Day 1 Agenda	
8:00 AM - 8:30 AM	Registration and Light Breakfast
8:30 AM – 9:00 AM	Kickoff /Opening Remarks: • Zoe Szajnfarber, SERC Chief Scientist, GW Professor • John Lach, Dean of GW Engineering • Dinesh Verma, SERC Executive Director
9:00 AM – 9:45 AM	Archimedes Partner Presentation 1: Axel Hahn, DLR, *Trustworthy Vehicles: Let's Learn from Live*
9:45 AM – 10:30 AM	Archimedes Partner Presentation 2: Freek Bomhof, TNO-ESI, *Trustworthy AI as a Requirement in Applied Research Prototypes*
10:30 AM – 10:45 AM	Networking Break
10:45 AM – 11:30 AM	Archimedes Partner Presentation 3: Martin Törngren, TECoSA, *Trustworthy AI Based Cyber-Physical Systems – the Good, the Bad and the Real Challenge*
11:30 AM – 12:15 PM	Archimedes Partner Presentation 4: Zoe Szajnfarber, SERC, *Opportunities for Systems Engineering in the Trustworthy AI Landscape*
12:15 PM	Lunch (Provided by the SERC)
12:45 PM	Government Keynote: Martin Stanley, Emerging Technology Branch Chief, National Institute of Standards and Technology
2:00 PM – 3:30 PM	Invited Speakers: NIST-NSF Trustworthy AI in Law and Society (TRAILS) Institute, *An Overview and Spotlight of a Research Efforts*
3:15 PM – 3:30 PM	Networking Break
3:30 PM – 4:30 PM	Industry Keynote: Ron Keesing, Senior VP for Technology Integration, Leidos
4:30 PM – 5:00 PM	Closing Remarks – Tom McDermott, SERC CTO
5:00 PM	Adjourn

Day 2-3: Systems Thinking Workshop; 5 and 6 June 2024 (Wednesday and Thursday)

Location: Science and Engineering Hall 1300 and 1400

Workshop Objectives

This workshop is a unique opportunity to further explore the Trusted AI and Autonomy themes of workshop day 1 while learning to apply systems thinking methods and tools. The workshop will be organized around a 2-day "Applied Systems Thinking" professional development course that has been taught to the Federal Aviation Administration (FAA) for the past 10 years. The theme of this workshop will be "Trustworthy Automation of Urban Transportation Systems." The outcome of the workshop will be a strategic plan for Trusted AI and Autonomy research in the near- and long-term by jointly defining the critical research activities necessary to accelerate the deployment of fully automated and trusted urban transportation systems. The first day will focus on defining the problems to be solved by this research, and the second day will model the envisioned systems and the research strategy to achieve fully automated and trusted urban transportation.

Systems Thinking is a holistic problem solving methodology focused on broadly considering whole system structures, patterns, and cycles rather than individual parts. Systems Thinking relies on our **Critical Thinking**: our personal ability to think more clearly and rationally about what to do or what to believe. These come together in support of **Complex Problem Solving**: using a collection of processes and activities related to the cognitive and motivational aspects of ourselves, applied to dynamic situations in complex systems, to achieve ill-defined near- and long-term goals. Complex Problem Solving is a process flow that helps us understand complex situations and then design potential solutions. We seldom are given the time and resources to think our way through a complex problem like urban transportation as a whole, or to collaborate on means to improve these problems holistically. This workshop offers us two days to think through these problems and potential solution pathways, while contributing to the advancement of a collaborative research agenda for the Archimedes partners.

This is an invitation-only Systems Thinking Workshop to derive a global research agenda for Trustworthy AI and Autonomy. If you are interested in participating in this workshop, please indicate your interest on the registration page.

Day 2 (5 June) Agenda	
8:00 AM – 9:00 AM	Light Breakfast and Networking
9:00 AM	The Competences of Systems Thinking: HELIX Employability Skills
10:00 AM	When to Use Systems Thinking
11:00 AM	The Art of Systems Thinking
12:00 PM	Lunch
1:00 PM	Thinking and Systems Thinking
3:00 PM	Problem Definition
5:00 PM	Adjourn for the day

Day 3 (6 June) Agenda	
8:00 AM – 9:00 AM	Light Breakfast and Networking
9:00 AM	Systems Thinking as Modeling
10:00 AM	Model-based Problem Solving (Continue case study)
12:00 PM	Lunch
1:00 PM	Causal Thinking and Modeling
2:00 PM	Systems Thinking as Change Strategy (Continue case study)
4:00 PM	Leadership and Systems Thinking (Review results)
5:00 PM	Adjourn for the day

Day 4: Archimedes Partner Meeting; 7 June (Friday)

Location: Science and Engineering Hall 1300 and 1400
This is an invite-only closed meeting for **Archimedes partners only**.

Day 4 (7 June) Agenda	
8:00 AM – 8:30 AM	Light Breakfast and Networking
8:30 AM	Partner Meeting
11:00 AM	Adjourn