THE SYSTEMS ENGINEERING RESEARCH CENTER (SERC) is a University-Affiliated Research Center (UARC) of the Department of Defense, leveraging the research and expertise of faculty, staff and student researchers from more than 20 collaborating universities throughout the United States. SERC is unprecedented in the depth and breadth of its reach, leadership, and citizenship in Systems Engineering.

SYSTEMS ENGINEERING RESEARCH CENTER

ENTERPRISES AND SYSTEMS OF SYSTEMS

- Comprehensive Enterprise/ SoS Modeling and Analysis
- Mission Engineering

TRUSTED SYSTEMS

- Systemic Security
- Systemic Assurance

SYSTEMS ENGINEERING AND SYSTEMS MANAGEMENT TRANSFORMATION

- Digital Engineering
- SE Methods for AI and Autonomous Systems
- Systems Engineering for Velocity and Agility

HUMAN CAPITAL DEVELOPMENT

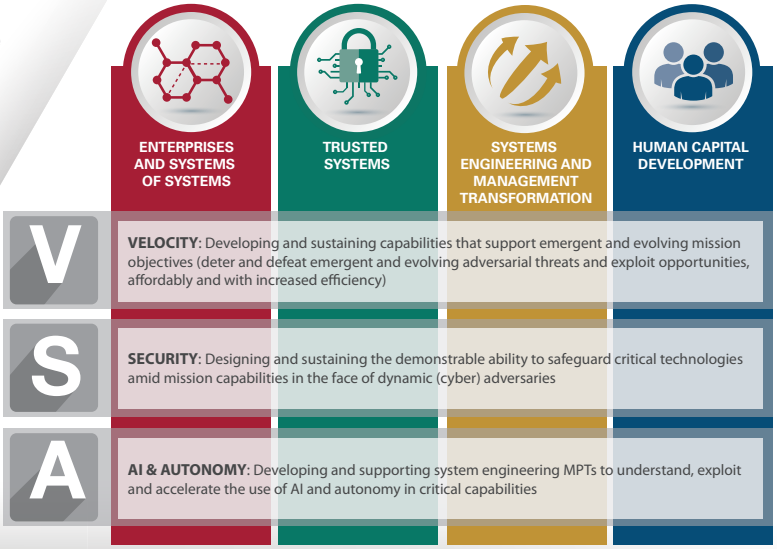
- Evolving Body of Knowledge/Experience Acceleration
- SE and Technical Leadership Education
- Emerging/Critical HCD Areas

The SERC addresses DoD's critical systems challenges across three crosscutting missions:

VELOCITY: Developing and sustaining capabilities that support emergent and evolving mission objectives (deter and defeat emergent and evolving adversarial threats and exploit opportunities, affordably and with increased efficiency)

SECURITY: Designing and sustaining the demonstrable ability to safeguard critical technologies and mission capabilities in the face of dynamic (cyber) adversaries

AI & AUTONOMY: Developing and supporting system engineering MPTs to understand, exploit and accelerate the use of AI and autonomy in critical capabilities



ENTERPRISES AND SYSTEMS OF SYSTEMS (ESoS) **The ESOS Vision is to:** *Create the foundational SE principles and develop the appropriate methods, processes and tool (MPTs) to enable the DoD and its partners to model (architect, design, analyze), acquire, evolve (operate, maintain, monitor) and verify complex enterprises and systems of systems to perform mission engineering in a manner that generates an affordable and overwhelming competitive advantage over its current and future adversaries.*

The goal to achieve this vision is: *Prototype, demonstrate, and provide MPTs, to transform the development and operational management of end-to-end mission capability (composed of services and platforms with variable autonomy) in complex organizational and mission environments, so those capabilities have fewer unintended negative consequences, quickly recognize and exploit unintended positive consequences, adapt well under changing circumstance, and exhibit greater resilience.*

TRUSTED SYSTEMS (TS) **The TS Vision is to:** *Achieve much higher levels of mission trust by applying the systems approach to achieving system assurance and trust for the increasingly complex, dynamic, autonomous, cyber-physical-human net-centric systems and systems of systems.*

The goal to achieve this vision is: *Develop, evaluate, and catalyze the transitioning of integrated concepts, methods, processes, and tools for providing cost-effective, evidence-based, argument-supported assurance that defense systems and projects provide all critical properties on which diverse stakeholders may legitimately rely for mission success with acceptable levels of residual risk.*

SYSTEMS ENGINEERING AND SYSTEMS MANAGEMENT TRANSFORMATION (SEMT) **The SEMT Vision is to:** *Develop methods, processes and tools to enable the transformation from sequential, document-driven, highly constrained practices toward much faster, flexible OODA-loop-supporting mission and enterprise-oriented approaches enabled by advances in modeling, simulation, data-driven analysis and artificial intelligence. These will enable much more rapid, flexible, scalable definition, development and deployment of increasingly complex future weapons systems.*

The goal to achieve this vision is: *Prototype, demonstrate, and provide methods to continuously advance the transformation of systems engineering to dynamic processes that leverage the speed and rigor of rapidly evolving modeling, simulation and analysis computational technologies enabled by computational intelligence. Develop dynamic approaches for iterative procurement cycles that rapidly and concurrently develop cost-effective, flexible, agile systems to respond to evolving threats and mission needs.*

HUMAN CAPITAL DEVELOPMENT (HCD) **The HCD Vision is to:** *Discover how to dramatically accelerate the professional development of highly capable systems engineers and technical leaders in the DoD and the defense industrial base to address the challenges created by the rapidly changing nature of systems, and systems of systems, and the human capabilities necessary to support them, and determine how to sustainably implement those discoveries.*

The goal to achieve this vision is: *Ensure a competitive advantage for the DoD and the defense industrial base through the availability of highly capable systems engineers and technical leaders. Aggressively encourage the investigation and use of emerging digital technologies as both a central competency of the future SE and an evolution of SE education.*

University or Research Organization

1. Stevens Institute of Technology
2. University of Southern California
3. Air Force Institute of Technology
4. Auburn University
5. Carnegie Mellon University
6. Georgetown University
7. Georgia Institute of Technology
8. Massachusetts Institute of Technology
9. Missouri University of Science and Technology
10. Naval Postgraduate School
11. North Carolina Agricultural & Technical State University
12. Old Dominion University
13. Pennsylvania State University
14. Purdue University
15. Texas A&M University
16. University of Alabama in Huntsville
17. University of Maryland
18. University of Massachusetts Amherst
19. University of Virginia
20. University of South Florida
21. Virginia Tech
22. Wayne State University

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