Good Reads About Systems

Recommendations from SERC leadership, researchers and community

Systems Engineering

SERC Executive Director Dinesh Verma co-wrote "Technical debt in the engineering of complex systems" with Ye Yang of Amazon and Phil Antón, Verma's colleague at the Acquisition Innovation Research Center. This paper adapts a metaphor of technical debt (TD) from software engineering – short-term compromises in exchange for speed – to the systems engineering field. It then proposes a TD taxonomy to support the early identification and assessment of TD items in engineering complex systems, especially in the early life cycle phases of engineering complex, distributed systems.

Systems Engineering

SERC researchers Daniel Dunbar, Thomas Hagedorn, Mark Blackburn, John Dzielski, Dinesh Verma, and co-authors discuss semantic web technologies (SWT), which offer data integration and interoperability benefits as well as other opportunities to enhance reasoning across knowledge represented in multiple disparate models. This paper introduces the digital engineering framework for integration and interoperability, which incorporates SWT into engineering design and analysis tasks.

Systems Engineering

Zoe Szajnfarber of the SERC Research Council co-wrote a paper on the importance of developing standard guidelines for representing system architectures. Systems engineers regularly rely on analysis of early design artifacts like system architecture representations to predict system performance, lifecycle costs, and development schedules, and to support design decision-making. Challenges in this type of measurement have led to a heightened focus on developing better metrics. This study demonstrates that choices about how to represent the system can explain variation in measurement, even holding metrics constant.

Systems Engineering

The New Observing Strategies Testbed (NOS-T) is a digital engineering environment for enabling distributed space mission (DSM) technology demonstrations. In this article building on SERC research by Paul Grogan and co-authors, the scalability of NOS-T is demonstrated with a performance assessment of its capabilities under a stress test of high message frequency and payload size, which are both related to the complexity of potential user-generated test cases.

General Good Reads

Adaptive Ethics for Digital Transformation

by Mark Schwartz

Digital transformation doesn't just raise ethical issues, it—in itself—is an ethical shift. Business leaders today are struggling to manage conflicting imperatives: those of the emerging digital world and those of the bureaucratic world of the past. The act of digital transformation requires a deep change in the moral outlook and ethical assumptions of a business. Enterprise strategist Mark Schwartz shows how we need to learn to think differently about relationships with customers and employees. Schwartz

highlights that the ethics of digital transformation is a matter of cultivating and applying virtues rather than applying rules.

The Infinite Game
by Simon Sinek
Author Simon Sinek asks, “How do we win a game that has no end?” In finite games, like football or chess, there are known players, fixed rules, and a clear endpoint. Infinite games, games with no finish line, like business or politics, or life itself, have players who come and go. The rules of an infinite game are changeable while infinite games have no defined endpoint. There are no winners or losers—only ahead and behind. Sinek offers a framework for leading with an infinite mindset to build stronger, more innovative, more inspiring organizations.