Systems Security Engineering: A Loss-Driven Focus

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Abstract.

Systems security engineering (SSE), as an integral part of systems engineering, applies scientific, mathematical, engineering, and measurement principles, concepts, and methods to coordinate, orchestrate, and direct the activities of security and other contributing engineering specialties (e.g. reliability, safety and human factors) to deliver sufficiently secure systems. This tutorial provides an overview of SSE, its concepts, and the increasingly critical role of SSE as part of systems engineering. Loss-driven systems engineering provides a means to focus the tutorial; relating to loss driven concepts will be a key element.

Systems engineering is about meeting stakeholder needs within constraints of cost, schedule, and performance; integrating system security into systems engineering is about meeting the security protection needs derived from those stakeholder needs. SSE activities address system-of-interest loss concerns associated with the system throughout its life cycle, in consideration of adverse conditions resulting from threats, disruptions and hazards. The tutorial will offer a system-oriented framing of the security perspective with connections to the technical engineering and technical engineering management methods and activities employed as part of a systems engineering project to address stakeholder security concerns.

This tutorial targets the experienced systems engineer who is a novice in SSE as a specialty discipline of systems engineering

Biography

Mark Winstead (The MITRE Corporation)
The MITRE Corporation's Systems Security Engineering Department Chief Engineer, had over twenty-five years' STEM experience before joining MITRE in 2014, including stints as a crypto-mathematician, software engineer, systems engineer, systems architect and systems engineer as well as systems security engineer. He has worked for several defense contractors, an Environmental Protection Agency contractor, a Facebook-like start up, a fabless semi-conductor manufacturer of commercial security protocol acceleration solutions, and a network performance management solutions company.Additional to serving as a chief engineer, Mark works with various MITRE sponsors, helping programs with security engineering as well as teaming with others on integrating SSE into the acquisition systems engineering process. He has also worked with the MITRE Institute on developing materials for training in SSE.Additionally, Mark is co-author of NIST SP 800-160 Volume 1, Revision 1 Engineering Trustworthy Secure Systems.Mark is a graduate of the University of Virginia (PhD, Mathematics) and Florida State University (BS & MS, Mathematics). He resides in Colorado Springs, CO.

Michael Mcevilley (The MITRE Corporation)
Michael has over 35 years' experience in high confidence software-intensive systems and requirements engineering. He has been employed at The MITRE Corporation for over 20 years where he has supported several DoD programs with focus on requirements analysis, and system design assurance for safety- and security critical ground, surface, subsurface, and air weapons platforms. Michael is currently a System Assurance Lead in the MITRE Systems Engineering Innovation Center and supports DoD systems engineering efforts for program protection planning and for achieving confidence in weapon systems engineered to operate in contested cyberspace environments.Prior to joining MITRE he served as an officer in the USAF, worked in industry developing software for the Aegis Weapons System and for Command and Control (C2) of worldwide military airlift operations.Michael is a co-author of NIST SP 800-160 Volume 1 Systems Security Engineering: Considerations for a Multidisciplinary Approach in the Engineering of Trustworthy Secure Systems and the forthcoming Revision 1.

Daryl Hild (The MITRE Corporation)
Daryl's career spans 3 decades consulting on systems engineering solutions that span US Army tactical

communications networks, IT networks and systems management solutions; NORAD / NORTHCOM air warning and missile warning systems, the US Air Force global positioning system, space systems, and cyberspace security. He is currently the Department Head for the Systems Security Engineering department within the MITRE Labs. Prior to MITRE, Daryl was an Army Signal Officer. He received his BS in Electrical Engineering from Washington University, St. Louis, MO; and his MS and PhD in Electrical and Computer Engineering from the University of Arizona, Tucson.