Test-Driven Systems Engineering: Creating Things That Work

Don Greenlee

Science Applications International Corporation
and
University of California
San Diego

Abstract:
The fundamental basis of all systems engineering (SE) activity in system development is a comprehensive articulation of requirements for the system. Regrettably, real-world requirements documentation is usually incomplete, out-of-date, asynchronous with current technology capabilities, in dispute among stakeholders and otherwise less than ideal as a driver of the SE function. Exploiting a domain understanding of test and evaluation (T&E), the systems engineer can utilize processes and tools enabling SE to create systems which will "automatically" meet their intended goals and thresholds, i.e., the systems will "work". The basic concept is to drive the SE function "backward" from the T&E Master Plan (TEMP) to a System Engineering Plan (SEP) and System Engineering Management Plan (SEMP) consistent with system success against the TEMP criteria. In practice, the inherent "Test-Analyze-Fix" nature of complex system development guarantees that much program activity after DoD acquisition Milestone A, including SE, is actually driven by T&E events. The described processes and tools will allow this to take place in a disciplined, organized manner, rather than as a series of reactions to emergencies. Users will comprehend the valuable ROI, since success in verification and validation testing is "baked in". As with all SE efforts, this approach can be viewed as a risk reduction enabler (cost, schedule, technical performance, safety, etc.).

Author Bio:
Don Greenlee is a Chief Scientist for Systems Engineering, Test and Training with Science Applications International Corporation and a member of the instruction faculty in Systems Engineering at the University of California, San Diego. He is a former deputy assistant Secretary of Defense (Operational Test and Evaluation) and a Past President of the International Test and Evaluation Association. Don established the INCOSE Test and Evaluation Working Group, which later became the Verification and Validation WG, and is currently Co-Chairman of the Autonomous System Test and Evaluation WG. He is a former President of the San Diego Chapter of INCOSE.