Virtual Prototyping and Analysis with Model-Based Engineering

SERC to MITRE to US Government Sponsor

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Systems Engineering Research Center (SERC) Sponsor Research Review (SSRR)
MITRE built on SERC research to develop technology and methodologies at sufficient maturity to transition to a major US Government sponsor program – ready to transition to more sponsor environments.
Graphical Concept of Operations
Initial Research Conducted at SERC

Initial SERC Principal Investigator: Robert Clouthier
Current SERC Principal Investigator: Mark Blackburn
MITRE Champion: Peter Korfiatis (photo on the right)

Abstract from SERC-2011-TR-031

Investigates the current approaches to Concept of Operations (CONOPS) development in use in various DoD and commercial organizations with the goal of understanding why CONOPS creation is such a lengthy process, and how the process can be made more agile. A number of CONOPS are cataloged and analyzed to understand which parts of the current standards are used by the creators of a CONOPS. Traditional CONOPS creation processes are discussed based on literature and face-to-face interviews with those involved with creating CONOPS in both traditional and nontraditional domains. Based on these findings, an agile CONOPS process that emphasizes stakeholder involvement and expedites shared mental models development is put forth. Additionally, current and emerging technologies that might be applicable to creating a graphical CONOPS are discussed. Finally, recommendations for future research to develop a toolbox for creating graphical CONOPS are presented.
The Virtual Prototyping and Analysis with Model Based Engineering research team developed, prototyped and evaluated a way to integrate model-based engineering with video-game technology so that complex systems could be better evaluated in context. This results in gathering knowledge of competing evaluation metrics from various stakeholders earlier in the life cycle, without hindering design freedom or escalating costs. Though leveraging the latest Model-Based Engineering techniques and video-game technology was critical, harmonizing the different modeling perspectives and techniques across various disciplines was necessary to meet the flexibility, adaptability, and scalability needs. A cross-disciplinary MITRE team successfully developed a framework with the necessary technology and methods to address these needs that can be instantiated into a use case specific simulation.
Simulation Environment Project
Transition to US Government Sponsor

US Government Sponsor Transition
MITRE Project Lead: Jen Hebert (photo on the right)
MITRE Products: Live Demos

General description of project goals and objectives

The short-term goal is to bring these technologies to bear on a simulation environment for a specific Government sponsor. The long-term vision is the capability to instantiate any particular assets for varying operational environments. This will require using the modeling and simulation technologies and coupling them with FFRDC’s independent research and development efforts.
Cross-Cutting Across MITRE
Joint Collaboration between Multiple Divisions

Systems Engineering Tech Center
Software Engineering Tech Center
Modeling and Simulation, Experimentation, and Analysis Tech Center
Electrical Systems and Technology Tech Center
Enterprise Integration
Space, Cyber, and Intelligence
OSD Program Division
Air Force Material Command Portfolio

Simulation Environment at MITRE
• Prototypes built at McLean and Bedford as risk reduction efforts, integration test-bed, and concept exploration
• Matured technologies, methods, and frameworks transferred to the US Government

MITRE in pivotal role for enabling our sponsors to stay ahead of the technological curve
 INTERNAL MITRE FUNDING FOR HIGH RISK RESEARCH THAT GOES BEYOND CURRENT SPONSOR FUNDING

MITRE DIFFERENTIATOR

MITRE, as an operator of several FFRDCs, is positioned to incorporate the latest MITRE developed technology, academia research, and commercially available technologies to continually evolve the research.

IDENTIFY SERC RELEVANT ENDEAVORS AND ENABLE ACCESS TO THE SIMULATION FRAMEWORK TO BUILD ON AND BRING TO BEAR THE TECHNOLOGIES THEY ARE DEVELOPING

OTHER INSTITUTIONS:

- Stevens Institute of Technology
- Systems Engineering Research Center
- Massachusetts Institute of Technology
- Georgia Tech