

Research Task Overview + Motivation

- GTRI has been developing the Framework for Assessing Cost and Technology (FACT) with Marine Corps Systems Command (MARCORSSYSCOM) since 2011.
 - FACT provides tools to support model-based systems engineering practices and processes.
 - FACT offers a suite of tradespace capabilities for conducting Design of Experiments and/or Monte Carlo exploration, sensitivity analysis, solution comparison, and point solution design.
 - FACT has supported the USMC Amphibious Combat Vehicle 2013 Study as well as the HMMWV Sustainment Modification and Improvement effort.
- Naval Air Systems (NAVAIR) has been developing the Architecture Management Integration Environment (AMIE).
 - AMIE provides a standard means to integrate distributed real-time simulations. It allows simulations that speak different distributed simulation protocols (e.g. HLA, TENA, DIS) to participate in the same execution without needing to write a protocol-specific interface for each model.
- Naval Undersea Warfare Center (NUWC) has been developing the Virtual World (VW) to provide a 3D virtual, interactive environment for collaboration, modeling and simulation support, and displaying of virtual test events.
- Recently, NAVAIR and NUWC collaborated to demonstrate a link between VW and AMIE such that VW could display the real-time simulation events occurring in an AMIE-controlled execution.
- The overall goal of this effort is demonstrate proof-of-concept integration between these multiple decision support and model-based systems engineering tools to eventually enable a single comprehensive environment for design analysis and decision support. Furthermore, integration of these capabilities could in the future support the execution of Live Virtual Constructive test events, including the display of the test event within the Virtual World.

Goals and Objectives

- Integrate USMC's FACT with a distributed simulation environment
 - To this end, FACT will integrate with the Next-Generation Threat System (NGTS) simulation. NGTS offers an Application Programming Interface (API) for setting simulation initial conditions and parameters.
 - An existing platform modeled within NGTS will be modeled in FACT with a set of deterministic performance-based models to realize the proof-of-concept integration with AMIE and Virtual World.
 - NAVAIR will support the identifying of other simulations with AMIE interfaces in order complete the distributed simulation federation.
- Display the events of the distributed real-time simulation in Naval Undersea Warfare Center's (NUWC) Virtual World (VW)
- Close the data loop by feeding the distributed simulation data back into FACT to take advantage of the visualization capabilities and allow for design iteration on the system of interest.
 - Additionally, allow cached results to be displayed inline with deterministic fact-running models integrated directly within FACT.

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Methodology

- The general architecture for the integration solution is depicted in the adjacent flowchart.
 - The designer will begin in FACT by designing a system that meets a set of performance characteristics.
 - Once complete, the system will be fed into NGTS which will be integrated into a federation of distributed simulations via AMIE.
 - The simulation data output will be transformed and re-enter FACT for analysis, allowing for design iteration as necessary.
- GTRI is collaborating with NAVAIR in order to select an appropriate platform within NGTS and one or two other simulation models to complete the federation.
- The recently demonstrated link between AMIE and VW will be leveraged to display the simulation events in real-time.

