



SoSAT

System-of-Systems Analysis Toolset

Highlights

What does SoSAT Enable?

- A unique approach to SoS analysis.
- Multiple user definable performance metrics.
- Modeling system interdependencies and shared functionality.
- Performance measurements of functionally interdependent SoS.
- SoS trade study modeling, analysis, and performance assessment.
- Reliability and functional availability analysis.

Why is SoSAT Important?

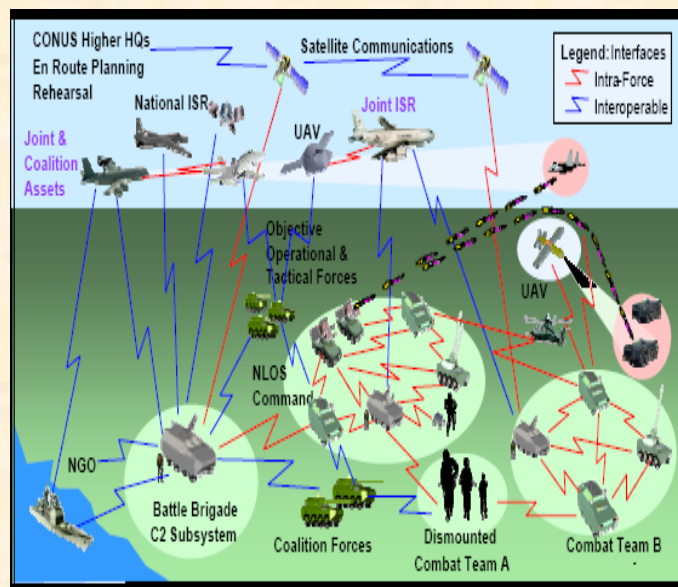
- Characterizes large-scale interdisciplinary problems that involve multiple distributed systems embedded in networks at multiple levels and in multiple domains.
- Allows analysts to evaluate the readiness and sustainment of complex SoS.
- Assists analysts in identifying non-intuitive, interdependent performance and logistics issues.

Example Applications

- Operation and support cost analysis.
- Footprint reduction and impact analysis.
- Evaluation of energy efficiency improvements.
- Modernization upgrade impact analysis.
- Sustainment assessment.
- Acquisition decisions.
- Vulnerability analysis.
- Applicable in industries as diverse as defense, energy, aviation, and healthcare.

SoSAT Overview

SoSAT is a tool designed to model and simulate multi-echelon operations and support activities of a system-of-systems (SoS). It provides logistics analysts with the ability to define operational and support environments of a SoS, ascertain measures of platform and SoS level performance effectiveness, and determine logistics support issues. As a stochastic simulation, SoSAT characterizes sensitivity changes to all platforms, support systems, processes, and decision rules as well as platform reliability and maintainability (R&M) properties. It is designed to be a robust decision support tool for evaluating readiness and sustainment of systems to include consumables and maintenance operations.



SoSAT

Key Features

Provides Analysts the Capability to:

- Simulate any SoS organizational structure.
- Capture multiple system functionalities at any given time.
- Assess multiple performance metrics of multiple systems at multiple levels of an organizational structure over time.
- Support business decisions and trade-offs.

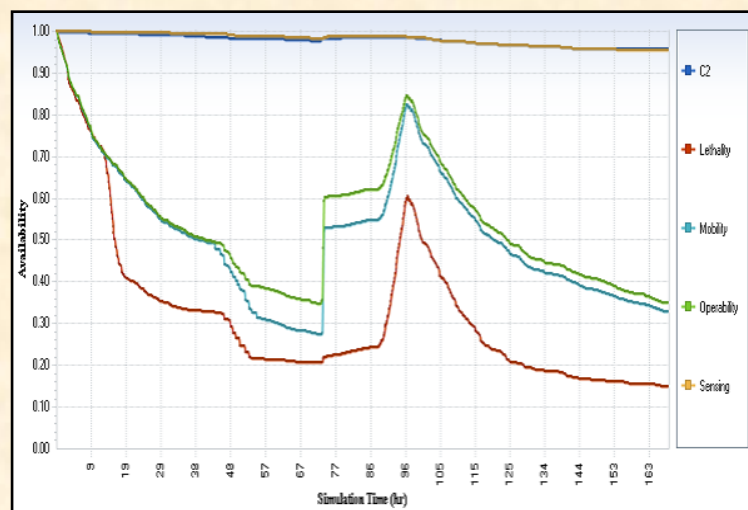
Stochastic Simulation

- Can model variability and uncertainty among various types of systems, individual instances of a system type, and from trial to trial.

Advanced Data Visualization

- Real-time status of individual systems and their components.
- Detailed information for all systems in the model provided at the individual system level, system type level, and organizational structure level.
- Customizable results display with selectable amount and type of data for finer control of the output.

Functional Availability vs. Time



Key Benefits

Basic Modeling Features

- System element reliability failures.
- Consumable usage, depletion, and generation.
- Maintenance activities including required spares or services.
- Supply reorder for consumables and spare inventories.

Advanced Modeling Features

- Combat damage modeling.
- Network modeling.
- Prognostics and health management.
- Time-based changes to model attributes due to external conditions.
- Human performance modeling.

System State Model

- Encapsulates a system, its elements, and its functionality for use in the simulation.
- User definable with multiple functions, components, failure modes, personnel, or functional elements of other system.
- Describes a system's functionality by the states of the system's elements.



Bruce Thompson, CSR Program Lead
Phone: (505) 284-4949, Email: bmthomp@sandia.gov

Website: reliability.sandia.gov

