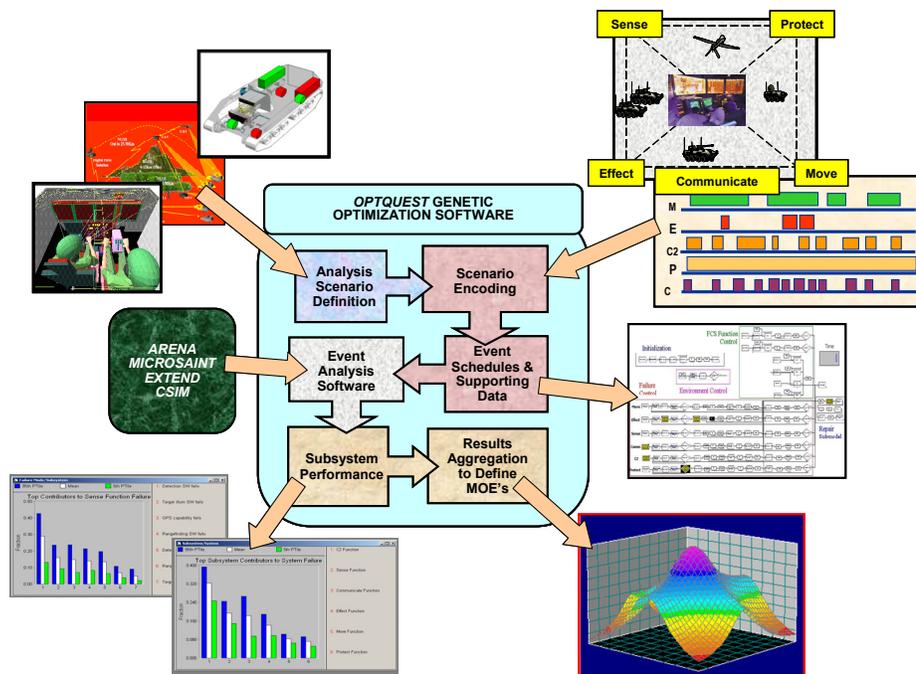


Scientific Computing Within the ORNL Modeling and Simulation Group: **System-of-Systems Simulation - Comprehensive Assessment Software Suite**

The ORNL Modeling and Simulation Group (MSG) develops sophisticated numerical solutions for a wide range of scientific, engineering, and operational applications. MSG's core competency is computational physics and engineering, and within this context we have extensive experience simulating complex highly integrated system-of-systems. To support this activity, MSG has developed the Comprehensive Assessment Software Suite (*COMPASS*) to conduct functional evaluations of highly coupled system-of-systems (SoS) whose optimal effectiveness depends on complex and uncertain technology-human-operational-cost interactions. *COMPASS* is a general-purpose tightly-integrated analysis framework for small to medium-sized problems. It is comprised of commercial discrete-event-simulation (DES), evolutionary-optimization, and 2D visualization software; scientific-computing subject matter experts; and cost-efficient problem solving procedures. *COMPASS* achieves its versatility, in part, through its design philosophy and modular structure.

- *COMPASS* is designed to determine transient cause and effect between any set of coupled objects of varying granularity. Thus, it can be applied to any SoS that can be represented as objects and it can calculate any measure-of-effectiveness that results from object characteristics and their time-dependent interactions.
- Structurally, *COMPASS* consists of a DES numerical engine that can be intelligently executed across massive trade spaces using evolutionary-optimization techniques. This ability to control the degree of automated execution permits *COMPASS* to be applied to a wide variety of analysis; from R&D where minimal automated execution is needed to maximize the acquisition of physical insight, to Program Management where highly automated studies are required to define macroscopic issues such as life-cycle costs.

This unique combination of state-of-the-art software and experienced analysis staff make *COMPASS* the ideal systems analysis tool for an extremely broad range of R&D, industrial, homeland defense, and military applications. We welcome the opportunity to discuss your potential application and ways *COMPASS* can contribute to a solution.



Schematic representation of the MSG-developed COMPASS software suite functionality shown within the context of a generic numerical-problem-solving process & the DARPA-funded effort to define ultrareliability for the US Army's Future Combat System