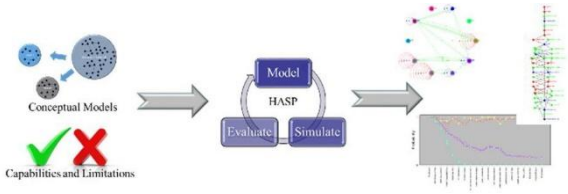
Steps 3 – 5 use:

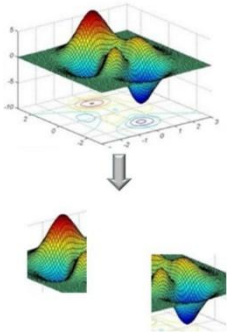
Hyper Agent-based Simulation Programs (HASP)™

Causal, Stochastic M&S System

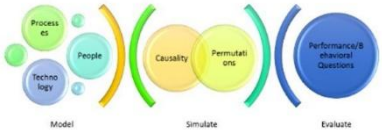
Problem: With the ever growing complexity and scale of today's systems and Systems of Systems, how can we effectively interrogate all of the possible states and parameter interactions in a meaningful way, during concept exploration and design, which allows us to determine sensitivities in the system before they manifest into catastrophic failures resulting in significant monetary and human losses?



Solution: Current approaches to this problem focus on modeling component performance through discrete event or agent-based techniques, typically leveraging Monte Carlo approaches for parameter reduction. The HASP™ approaches the problem from an abstract perspective modeling the cause and effect processes (including business processes and human decisions/actions) and their resultant behaviors using Credal Networks and embedding them with multi-dimensional PDF's that describe the processes of each of the behaviors/performance.



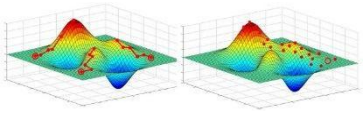
In each agent, the HASP™ provides a concise model of the entire system or SoS and possible employment strategies and decision logics that may be utilized in the real system. Through simulation, the HASP™ computes millions of parameter permutations in minutes and determines possible failure conditions, bifurcations of state, optimal architecture and employment strategies (TTP and CONOP).



Key Technologies: The HASP™ is built on many accepted mathematical and modeling and simulation paradigms which are fused into novel processes and tools:

- Bayesian and Credal Networks
- Multi-dimensional PDF's
- Decision Science
- Graph Modeling
- Deep Analytics
- Stochastic Simulation
- Uncertainty Quantification
- Optimization

ISSAC fuses these technologies and capabilities into a single environment that produces actionable information to be used throughout the engineering lifecycle of a system or SoS.



Extensions and Applications: The HASP™ is being used for parameter reduction, concept exploration, test case planning and design, trades, analyses of alternatives and process and architectural optimization. The HASP™ forms a base for analytics and inference in the Elicitor™ Evolutionary Learning Algorithms (ELA™).