

# Utility of Conventional Simulations of Combat in the Analysis of Stability and Support Operations

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NOTE: The ideas expressed in this presentation are those of the author, and do not represent the official position of the U.S. government or SAIC.

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## Background

- Frequency and Importance of Stability and Support Operations (SASO) in current military missions.
- Relevant types of military operations in SASO:
  - Humanitarian relief
  - Infrastructure reconstruction and protection
  - Social and Psychological considerations of neutral and opposing factions
  - Freedom of movement and protection from harm of indigenous population
  - Clear-and-hold, cordon-and-search, patrol operations
  - Dismounted operations by small platoon- and company-sized units
  - Threat is organized as small cells of insurgents who attempt to blend in to the population
  - Complex urban terrain is the norm, not the exception
- Focus of current simulations of combat on:
  - Conventional combat missions, e.g., attack, defense, meeting engagement
  - Mechanized warfare
  - Aggregate-level combat, homogeneous campaigns
  - Vehicle-centric instead of dismounted operations in entity-level simulations
  - Two-sided combat
  - Open, rolling terrain

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## What Questions Need to be Addressed in Analysis of SASO?

- Characterizing the SASO domain
- Operations Planning
- Effectiveness of various capabilities in conducting SASO
- Cost-effectiveness of various technologies in equipping SASO forces
- Effectiveness of various tactics, techniques, and procedures in conducting SASO
- ...others

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## What Characteristics are Needed in a SASO Model / Simulation

- The ability to model (not necessarily “simulate”) various aspects of social, civil, and religious structure
- The ability to model infrastructure in order to understand critical dependencies and vulnerabilities
- The ability to model possible effects of social or infrastructure influences on the attitudes and behaviors of the populace.
- The ability to simulate small-unit, dismounted infantry units conducting reconnaissance, patrolling, checkpoints, point protection, cordon-and-search or clear-and-hold operations.
- The ability to simulate construction projects (infrastructure repair and re-establishment)
- The ability to simulate resupply operations (humanitarian relief)
- *NOT* the ability to attempt to predict the insurgent’s specific intent

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## What Characteristics Can Traditional Simulations Provide?

- The ability to model (not necessarily “simulate”) various aspects of social, civil, and religious structure
- The ability to model infrastructure in order to understand critical dependencies and vulnerabilities
- The ability to model possible effects of social or infrastructure influences on the attitudes and behaviors of the populace.
- **The ability to simulate small-unit, dismounted infantry units conducting reconnaissance, patrolling, checkpoints, point protection, cordon-and-search or clear-and-hold operations.**
- **The ability to simulate construction projects (infrastructure repair and re-establishment)**
- **The ability to simulate resupply operations (humanitarian relief)**
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## What Types of Conventional Simulations Are Not As Relevant to SASO?

- Campaign Simulations
  - Aggregate-level
  - Lanchester attrition
  - Long timesteps
- Vehicle-Centric Entity-Based Models
  - Most current entity-level simulations start with a vehicle focus. Dismounted Infantry operations are an afterthought
  - For example, the ACQUIRE target detection algorithm performs poorly at very close ranges, where dismounted infantry often operate
  - Behaviors are more fully developed for mechanized operations in such models as OTB and OneSAF

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## Example Conventional Simulation Useful for Analysis of SASO

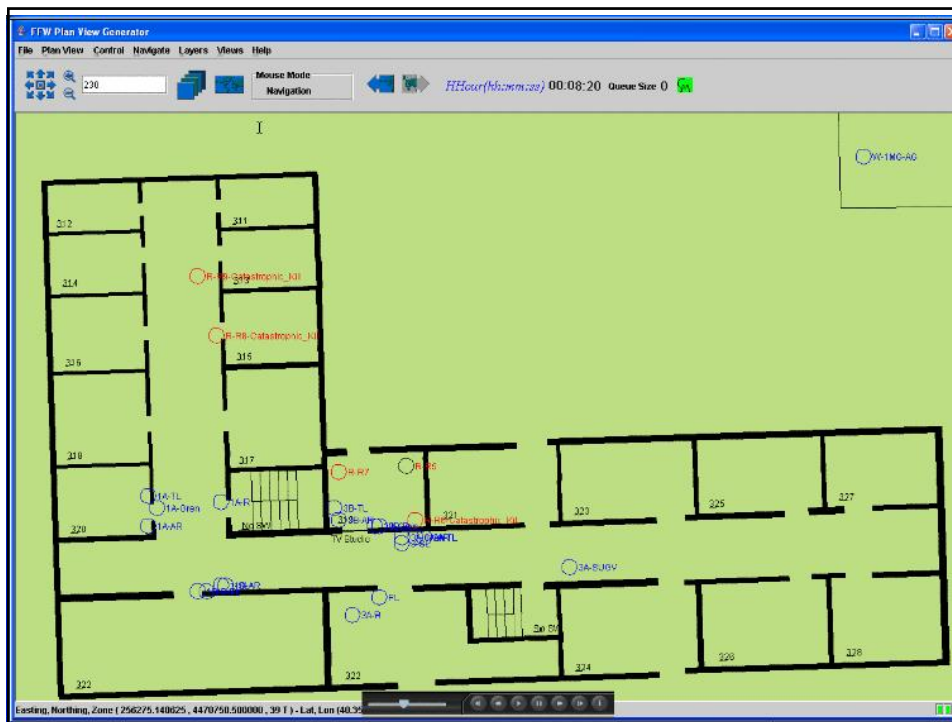
- SUTES (Small-Unit Team Exploratory Simulation)
  - Specifically designed for dismounted infantry operations
  - Uses standard attrition, sensing, communications, terrain and movement algorithms
    - Algorithms model effects, not physics
  - Reactive entity-level behaviors, no aggregate-level behaviors
    - Unit behaviors are scripted
  - Closed, faster-than-real-time, stochastic
  - GUI-based scripting environment, GUI-based or batch-processing run-time environment
  - Developed in-house at SAIC as an interim analysis tool for Future Force Warrior ATD

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## SUTES Simulating a Building-Clearing Mission

- Two FFW Rifle Squads clearing a floor of a large office building
- These runs were used by FFW to assess the combat effectiveness and cost-benefit of various capabilities, for example:
  - Equipping riflemen with Reduced-Exposure Firing
  - Equipping rifle squads with Small Unmanned Ground Vehicles (SUGV)
  - Providing fused Thermal/NIR sensing
  - ... and several other factors.





## What Analysis Issues Might Be Addressed by Agent-Based Models?

- The ability to model attitudes and behaviors of the populace, combined with the ability to model various aspects of social, civil, and religious structure would allow the following issues to be addressed:
  - Would a given tactical operation be more likely to increase or decrease indigenous population's loyalty to the established government?
  - What would be the effect of a given tactical operation on various militias' level of military activity?
  - What is the likelihood that insurgent attacks on civilian members of various religious and civil factions will succeed in causing retaliation, and how will that affect the likelihood of civil war?
- The ability to model critical dependencies and vulnerabilities in infrastructure would allow the following issues to be addressed:
  - What infrastructure nodes' destruction would cause the most widespread effects on the local population's daily routine?
  - What infrastructure nodes' destruction would cause the greatest delay in rebuilding and restarting services to the populace?

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## Summary

- Conventional Simulations *may* have value in analysis of SASO
- Dismounted-Infantry-centric, entity-based simulations are more relevant than vehicle-centric, aggregate-level ones
- But many aspects of SASO are not easily addressed with conventional simulations
- Numerous issues can now be addressed with ABM that were not considered when only conventional simulations were available.