OneSAF: Next Generation Wargame Model

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Outline

- Status
- Architecture
- Models
- Interoperability
- Standards
One Semi-Automated Forces (OneSAF)

- A composable, next generation simulation architecture supporting both Computer Generated Forces (CGF) and SAF operations
- Provides a full range of operations, systems, and control processes (TTP)
- Supports modeling from entity up to brigade level
- Supports DIS, HLA, MSDL, JC3IEDM and USA ABCS interoperability
- Provides variable levels of composability, fidelity and representation
- Supports multiple Army M&S domain (ACR, RDA, TEMO) applications.

Urban Operations with Contemporary Operating Environment (COE) Focus

- V2.0 Released Feb 2008

Software only
- Platform Independent (Linux / Windows)

Capable of replacing US Army legacy entity-based simulations: BBS, OTB / ModSAF, CCTT / AVCATT SAF, Janus (A&T), JCATS MOUT

Software Distribution to:
- RDECs / Battle Labs / Active Duty Brigades & Battalions
- Service / Joint Organizations
- International Partners
- USG / Academia
OneSAF Making a Difference!

PM FCS Tactical Leader Course (TLC) and Soldier Battle Lab in support of ARCIC, Ft. Bliss, Texas

SE Core program integrated OneSAF Environmental Runtime Component (ERC) into CCTT & AVCATT baselines

PM TRASYS (USMC) fields OneSAF in Combined Arms C2 Training Upgrade System (CACCTUS)

PM Radars uses OneSAF for Operator, School House, Combat Training Center, and Staff Training

Robotic Systems Joint Project Office (RSJPO) uses OneSAF for operator training

TRADOC Experimentation uses OneSAF for the Complex Web Defense (CWD) Experiment

USA Space & Missile Defense Command models new space based systems with OneSAF
OneSAF Community

Engaging with Users and External Developers

- Distributed with source code
- Web-based collaboration
  - Commercial best practices
  - Game community novel practices
- User Conferences
- User and Developer training

Joint & Multi-Service Customers
USMC CACCTUS Training System,
USAF SIMAF (EAAGLES), AFAMS,
JFCOM

• International Project Agreements
  Cooperatively developing the OOS baseline

Foreign Military Sales
Associated with the purchase of hardware, software, training, technical expertise, etc.

Foreign Military Sales
- South Korea
- Australia
- Canada
- Czech Republic
- Denmark
- Slovakia
V2.0 Capabilities
(Released 29 Feb 08)

• Scale up to 30k entities (4x improvement over v1.0)
• Improved data collection tool for analytical use case
• Improved parametric data loading
• Improved terrain representations (SWA terrain with over 30k buildings, 300x300km, 250 Ultra-High Resolution Bldgs)
• Additional/improved COE behaviors (Hijack, sniper, IED emplacement, Unconventional infiltration, etc.)
• C2 stimulation (ABCS) by all entity fidelity types
• SMDC satellite models integrated
Architecture
COMPOSITION TOOLKIT

Battlespace Composition

System Composition

Select only the components needed

Entity Composer

Behavior Composer

Unit Composer

Scenario Composition

Military Scenario Development Environment

Ease of Use in MS Power Point
MANAGEMENT AND CONTROL TOOL
AFTER ACTION REVIEW

Scenario snapshots

3D viewer

Data charts in MS Office format
Models
Multiple Levels of Resolution

- Three levels in OneSAF
  - standard, autonomous, and focused
- Interactions between entities of different levels of resolution are tested
- Allows users to “dial up” the level of resolution where it is needed
FULL RANGE OF OPERATIONS

Complete Simulation Solution
Full range of BFA systems and operations
Semi- or Fully-Automated behaviors
Multi-resolution, validated models
Multi-resolution terrain (Weather/NBC)
Ultra High Resolution Buildings
Two-way connectivity to C4I devices

Humanitarian Assistance
Resupply, Repair, Towing, Medical Treatment,
Casualty move / evacuation
Load/Unload Personnel / Supplies / Equipment

Non-Governmental & Private Volunteer Organizations
Field Mission Delegate Branch
General / Medical / Relief Work Support
Branch
Construction Element
Private Security Team

Ultra-High Resolution Buildings
Advanced features - closet, elevator shaft, hallway, stair, etc.
Apertures - breach hole, door, etc.
Enhanced attribution - lighting characterization, interior wall/floor construction
Enhanced route planning within buildings - routes through apertures, line of sight through apertures
Bullets passing through walls

Urban Operations
Clear a Building
Assault a Building
Urban Sniper
Execute Urban Ambush Air
Conduct Raid
Conduct Ambush
MODELING THE CONTEMPORARY OPERATING ENVIRONMENT

Multiple sides (Up to 25)

Dynamic Asymmetric Relationships
- Friendly
- Hostile
- Suspect
- Neutral

Basic Crowd Modeling

- Improvised Explosive Devices
- Improvised Obstacles in Mouse Holes
- Mouse Hole Creation
- Dynamic Side Changes
- Reduced Profile Shooting
- Detect Vehicle Borne IED
- Indirect Fire Weapons used as Direct fire weapons
- Urban Operations Medevac
- Sniper Tactics
- Penetration of Building Walls
- Conduct Raid
- Controlled Mines
- Ambush
- “Technicals”
- Shielding Tactics
- Expedient Field Fortification
- Decoys
- Rocket & Mortar Attack
**Behavior Modeling Overview**

**Automated Behaviors**
- Typically, does not require user intervention for behavior initiation and execution.
- Commonly developed using Agent-Model pairing.
- Components are assigned to either Entity or Units.
- E.g. Passive Sensing, Direct Fire, Damage Assessment (vulnerability), etc.

- Reactions are automated behaviors which are run as a result of situational conditions within the SAF.
- Reaction behaviors are composite behaviors, developed using the behavior composer.
SYNTHEtIC NATuRAL ENVIRONMENT

- Multi-resolution terrain databases
  - High resolution (1:50k),
  - Very-high resolution (1:12.5k)
- Varying levels of building fidelity
  - Medium, high, and ultra high
- Ray-trace LOS through terrain, features, and UHRB apertures
- Standardization of OTF specification and API
- Multi-resolution NBC & Obscurants
- Degradation of surfaces due to use
- Support for subterranean structures
  - Tunnels, sewers, basements, etc.
- Building damage and rubble of buildings

Ultra-High Resolution Buildings

- Advanced features - balcony, closet, elevator shaft, hallway, fire escape, ramp, stair, etc.
- Apertures - breach hole, door, skylight, trapdoor, etc.
- Enhanced attribution - lighting characterization, interior wall/floor construction
- Enhanced route planning within buildings - routes & LOS through apertures
- Bullets passing through walls
Interoperability
Simulation Services

Interoperability Manager

HLA Interop

HLA Objects
HLA Interactions

RTI

HLA Handler and Converter Classes

System Composition Repository

Published Simulation Objects / Events / Attributes

ODB

HLA RTI Network
C2 SYSTEMS INTEROPERABILITY

- OneSAF models are "C2 Aware"
  - All C2 messages are purposely sent/received by individual models as a result of simulation events
- Two way C2 interface
  - Outbound: OneSAF provides the COP for C2 devices
  - Inbound: C2 Devices affect OneSAF models and provide information to the simulation operator
Standards
**Emerging Standards**

**PLAF - Product Line Architecture Framework**
A modular, composable architecture with well defined APIs and data schemas for all components. Supporting current USA & USMC constructive & virtual simulation development.

**MSDL – Military Scenario Definition Language**
Defines the language between tools & simulations to provide military scenario information to OneSAF. Currently MSDE, C2PC and CAPES interoperate with OTB & OOS using MSDL. Future efforts to include FCS C2 systems and Battlefield Mgmnt Language (BML) integration.

**OTF - Objective Terrain Format**
Defines the OOS Synthetic Natural Environment. Provides a common LVC environmental representation for USA simulations (CATT / AVCATT / CTIA / WARSIM / Combat XXI) and federations (ACTF / BLCSE / MATREX).

**SORD – Simulation Object Runtime Database**
Contains shared battlespace objects, which include platforms, units, dynamic environment objects (smoke clouds, obstacles) missions, orders, and reports. Provides ability for any SORD client to access the data in the OOS database if it has properly expressed interest for those objects.
MSDL Characteristics

- **Separation of Code from Data**
  - XML Schema explicitly defines allowable data types, constraints, enumerations, and hierarchical relationships
- **Use of Industry Standards**
  - World-Wide Web Consortium (WC3) XML
- **Application Independence**
  - Community wide access for military scenario development tools
  - Community wide access to existing military scenarios
- **Separation of Concerns**
  - Focuses on military scenario information not on application specific, exercise control specific, or other simulation initialization areas
Conclusion

OneSAF Provides Unique Opportunities

• US Army SAF / CGF for the future
  – Analysis / Research / Development
  – Live / Virtual / Constructive
• Source Code Distributed
• Extensive Documentation
• Web Site / Technical Support / Help Desk
• User and Developer Training
• A wide range of supportive tools
  – Developer / Data Collection / Interoperability
  – Scenario Development / AAR / Composers
• Leverage other developers code
  – Large Community of Interest (>150 for v1.0)