Executable Architecture Systems Engineering (EASE)
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Outline

- What’s the problem?
- What’s our vision?
- How do we see it?
- EASE Components
- System Design Document
- Some Components
- Summary
I want to simulate the operations being executed in the field.
Sure, great! What exactly are your requirements?
You need to use my model, it has to scale and be ready soon.
But, what actually needs to be modeled? And when is soon?
Warfare needs to be modeled dummy. Such a geek!
Ignorance! We need details on terrain, force structure, fidelity, etc.
Can’t you plug together the latest versions of the best models?
No, they don’t work together yet! That is why you need me!

We’re behind schedule and we have limited funding! We need a tool to ease and expedite distributed simulation.
M&S Integration for Interoperability

Challenges:
• Reduce time and money for M&S environments through reuse
• Integrating cross-Service and cross-domain models
• Reducing engineering costs per event with better information and more automation

Interoperability:
• Communicating with the same understanding (Subject)
• Speaking the same language (English)
• Using a common medium (Middleware)
EASE Vision

- Provide an easy to use interface to allow users to execute M&S supported events and experiments on a cloud-based set of computing resources
  - Reduce the barrier of entry for distributed M & S
  - Provide an easy to use interface for designing and executing simulation
  - Ensure traceable execution based on functional and technical requirements
  - Enable more consistent execution through data-driven approach
  - Foster interoperability and identify gaps and duplication
  - Monitoring and data collection provided to user for After Action Review
Integrated M&S Environment

M&S Users

M&S System Engineers

EASE User Interface / Coordination

M&S Developers

Deploy Asset Management

Models & Simulations

Surrogates

AAR / Data
## Interview Stage

### Find an Execution
- **CAPABILITIES**
  - Blue SA Request / Response
  - Communications Effects
  - Ground Platforms
  - Information Topology Management
  - Area of Operation and Intelligence
  - Centralized Damage Calculations
  - Chemical, Biological, Radiological
  - Fire Mission Execution
  - High Fidelity Ballistic Project

### Matching Executions
- **Individually Selected/Unit Engagement**
  - **Individual Combatants Unit Engagement**
    - Blue individual combatants dispersed within wooded area.
    - Movement of unmanned sensor will detect enemy forces to engage.

- **Large Scale Engagement**
  - 30,000+ entities interacting across the battle space.
  - Brigade sized blue force operating against modern red forces across a wide variety of terrain features. This scenario can serve as the basis for large scale scenario needs. Segments of the force are operating across portions of the terrain in a configurable way.

- **Large Unit Civil Operations**
  - Units of blue forces operating within a heavy civilian population against insurgent forces.

- **McKenna Small Arms Engagement**
  - Basic scenario with no blue individual combatants, entities dispersed within wooded area, thus few or no initial detections. Movement of the single blue Raven will generate many enemy detections.

- **Medium Civilian Population Scenario**
  - Force laydown is compact with considerably more enemy

### Modeling
- **Communications Effects**
- **Ground Platforms**
- **Information Topology Management**

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Execution

**Schedule Execution**

**Scenario**

**Individual Combatants Unit Engagement**
Blue individual combatants dispersed within wooded area. Movement of unmanned sensor will detect enemy forces to engage.

**Capabilities**
- **Capabilities:**
  - Communications Effects
  - Ground Platforms
  - Information Topology Management

**Communications Effects**
- Advanced

**AAR**

**Data Collection Plan:**
- All
- Critical
- None

**Execution**

- **Name:** Individual Combatants Unit Engagement
- **Description:** Purpose for running the scenario
  - Individual Combatants Unit Engagement
- **# of Runs:** 1
- **Run Date:** 12/19/2011 08:05

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Preliminary Results

- Best Practices for Model Deployment, Configuration, Initialization & Monitoring for Encapsulation, Automation and Reuse
  - Separation of technical and functional configuration and initialization
  - Standard technical configuration formats for automation

- Application of State-of-the-Art in Cloud Computing to Distributed M&S
  - Virtual Machine Management / Deployment
  - Platform as a Service

- Warfare Decomposition to Technical Implementation
  - Encapsulating design into customizable building blocks
  - Middleware, object model and implementation agnostic execution tools
  - Business logic execution per intended use cases: SoS Use Cases drive SoS Functional Requirements which drive SoS Interface Requirements
Summary

- M&S is unnecessarily complex
  - Timelines tend to be short
  - The universal set of “what’s out there” is large and inconsistently documented
  - Development can be understandably hard so collaboration and reuse are critical

- Most M&S systems engineering is actually software engineering

- Executable Architecture Systems Engineering (EASE) provides a way to formalize the M&S discovery, selection and development process
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