Embedding Simulation Into Mission Command Systems

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Objective

Embed simulation INTO a fielded mission command suite to support operations, embedded training, and war gaming.

- **Course of Action Analysis:** Run a constructive simulation with little or no human intervention to simulated several friendly and enemy courses of action many times and report useful metrics to aid in commander's decision making. Requires a simulation that can run much faster than real time.
- **Planning Support:** Simulating the plan even as it is being created to identify risks and opportunities.
- **Mission Execution Monitoring:** Running the simulation in real time to slightly faster, racing ahead from time to time, comparing the planned state of the operation to the actual state of the operation, raising a flag when things seem to be going awry, and running the simulation much faster than real time to determine if any differences between planned and actual impact to the outcome of the operation.
- **Embedded Training:** Operators create plans in the MC system and then run them seamless in the embedded simulation to stimulate command and control processes.
- **War gaming:** The employment of simulated military resources in operations, either exploring the effects of warfare or testing strategies without actual combat.
- **Learning Simulations:** Enabling simulations to monitor the real operation, update their parameters, and become better predictors over time.

Challenge

- In military operations, COA is facilitated by "wargaming." This is currently a manual process in which the staff looks at each stage of a COA, using an action-reaction-counteraction paradigm.
- Wargaming, though a formal part of doctrine, is only a semi-formal process, subject to the bias, experience, fatigue, and competence of the participants.
- The purpose of integrating a simulation to support COA analysis is to mitigate the human factors and provide more rigorous assessment of each COA.

- **We have a generation of officers that are used to CONOPS and directed COAs who do not have experience with conducting COA analysis.**
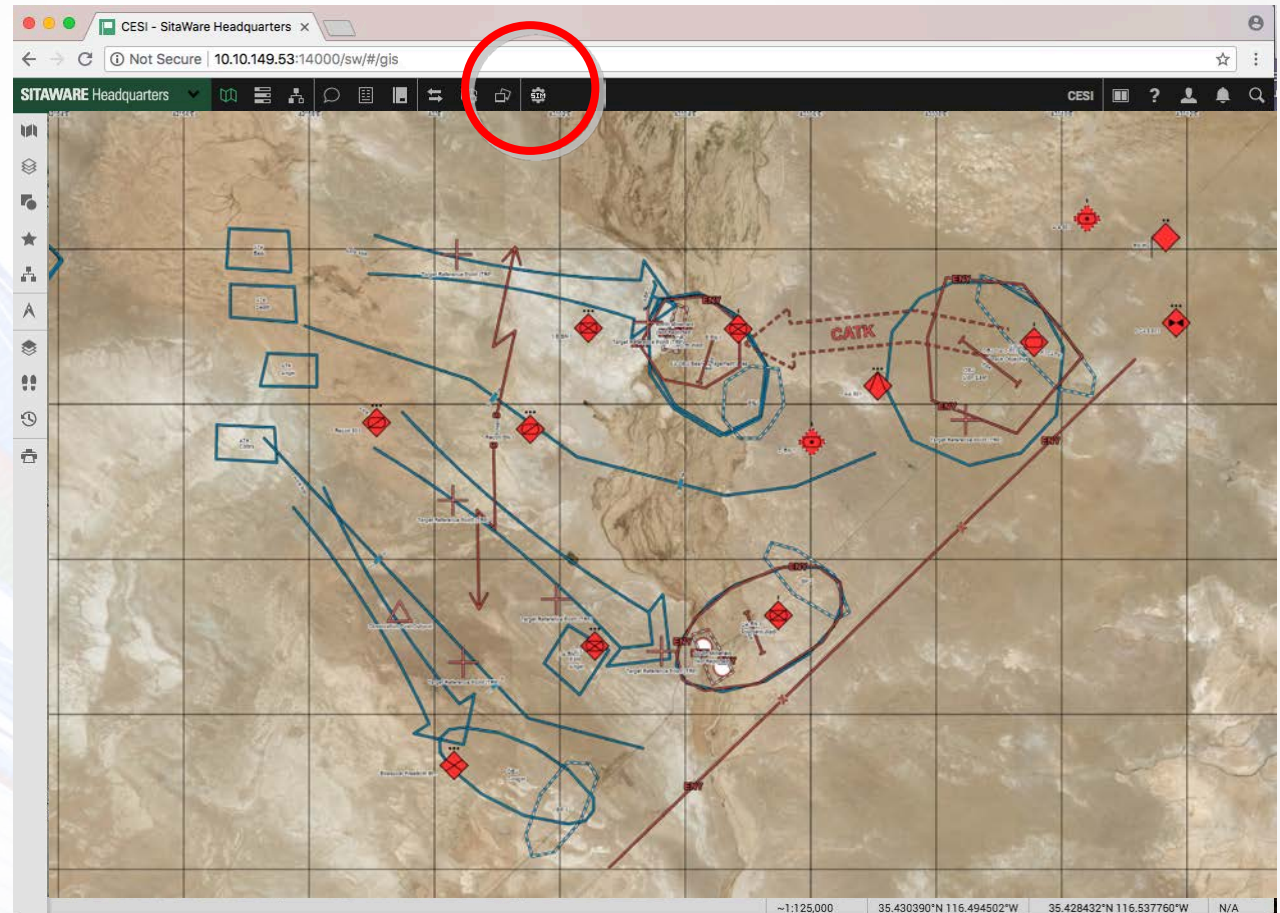
How it Works

- Develop plan using native SitaWare planning capability.
- Used Operation Tiger Claw scenario from Maneuver Center of Excellence.
- No special planning tools to learn.
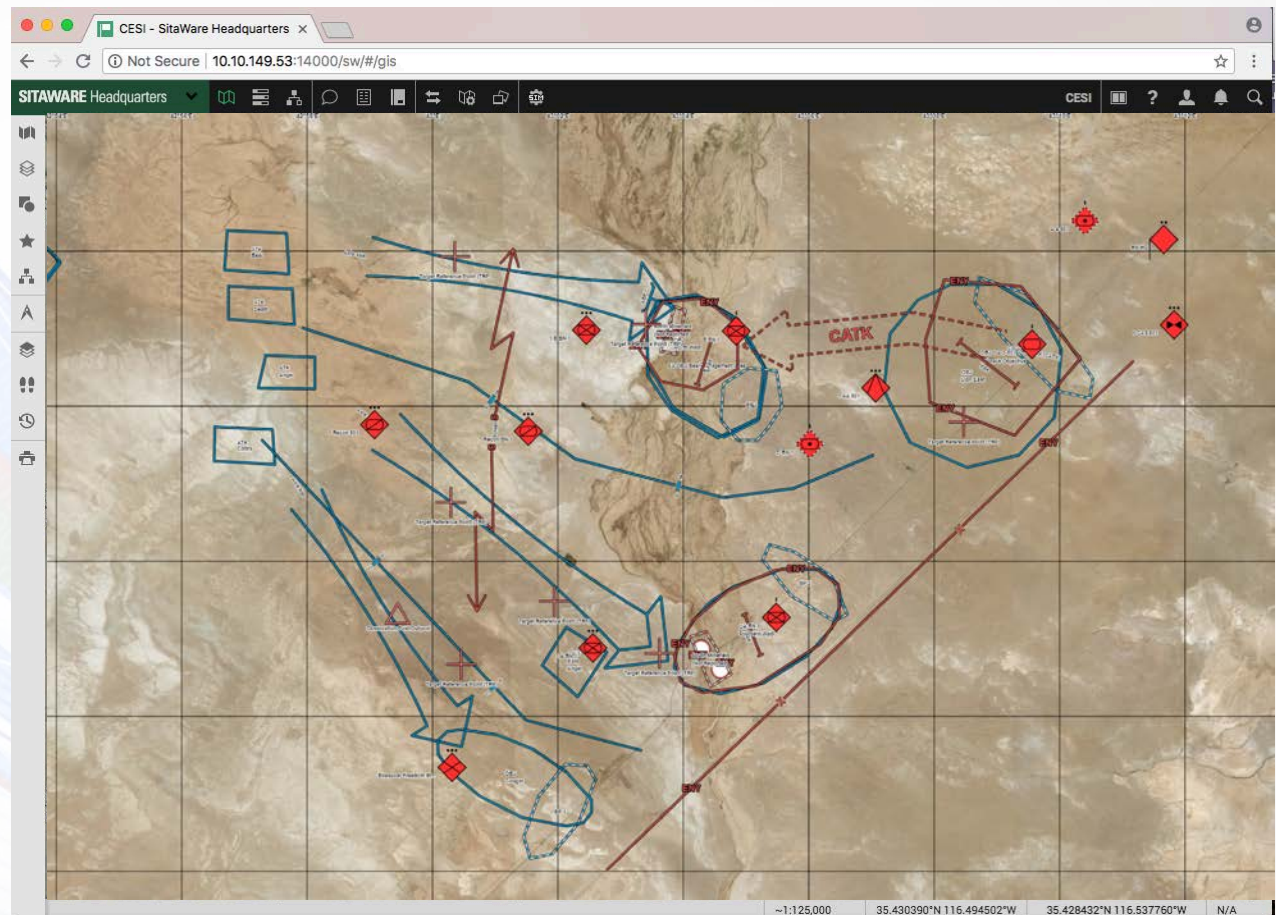
How it Works

First interaction with the simulation is merely to click on the icon in the tool ribbon.

Drag, Drop, and Start

Select simulation speed

Click "Start"

When the operators hits "start," the system pulls the plans from the SitaWare data store – **without human intervention** – and initializes the simulation.

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Intermediate Results

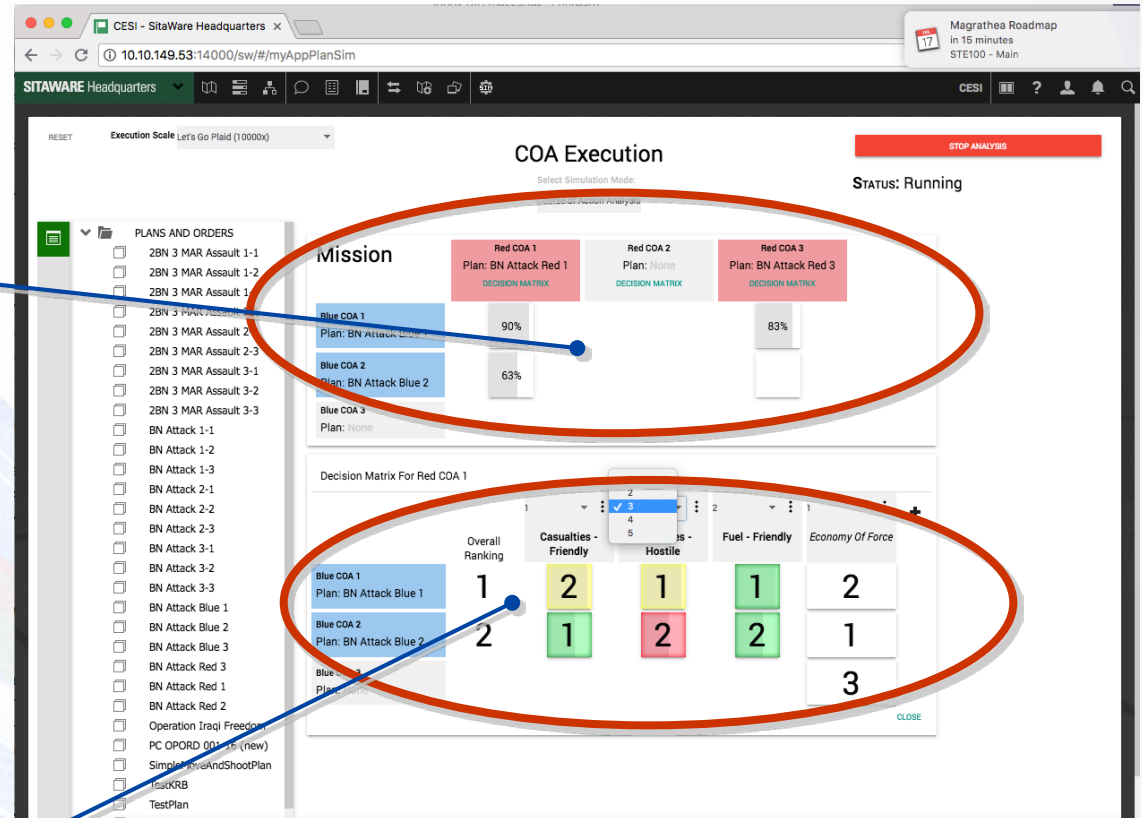Simulation starts
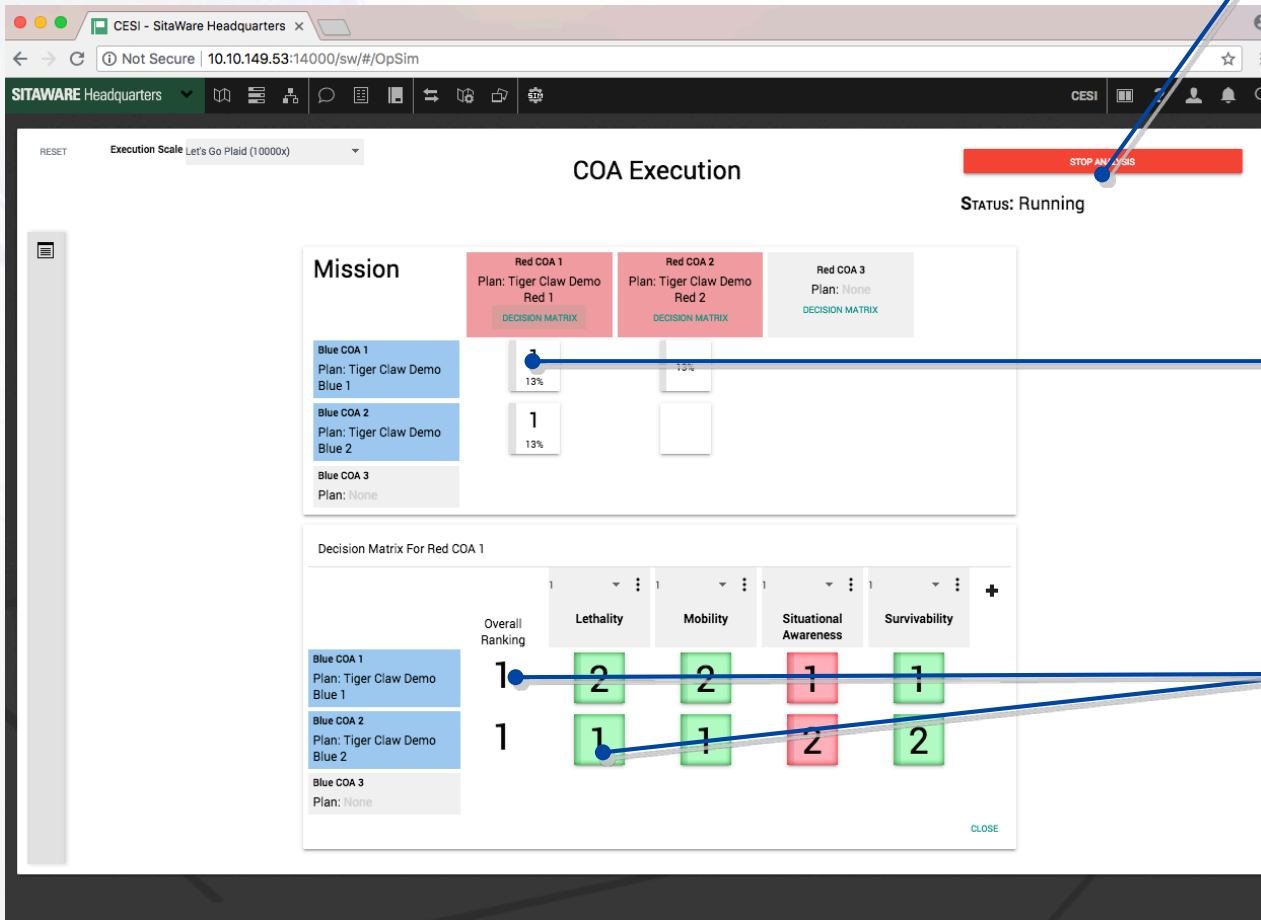
Simulation progress

Running estimate of how the COA is stacking up against a particular Red COA

Exploring Simulation RESULTS

Progress and results rollup matrix
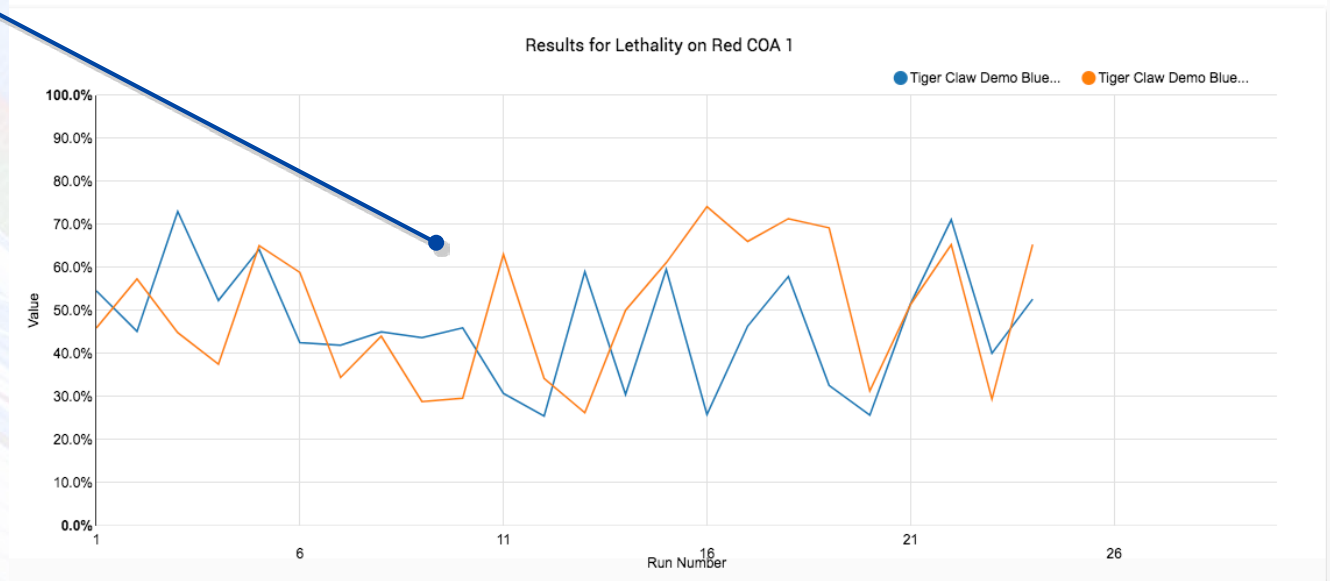
Traditional matrix that compares Blue COA performance against Red COAs.

# Deeper Dive

Results are reported by simulation run.

Each pairing of Red and Blue COAs is simulated many times to generate statistically-significant results.
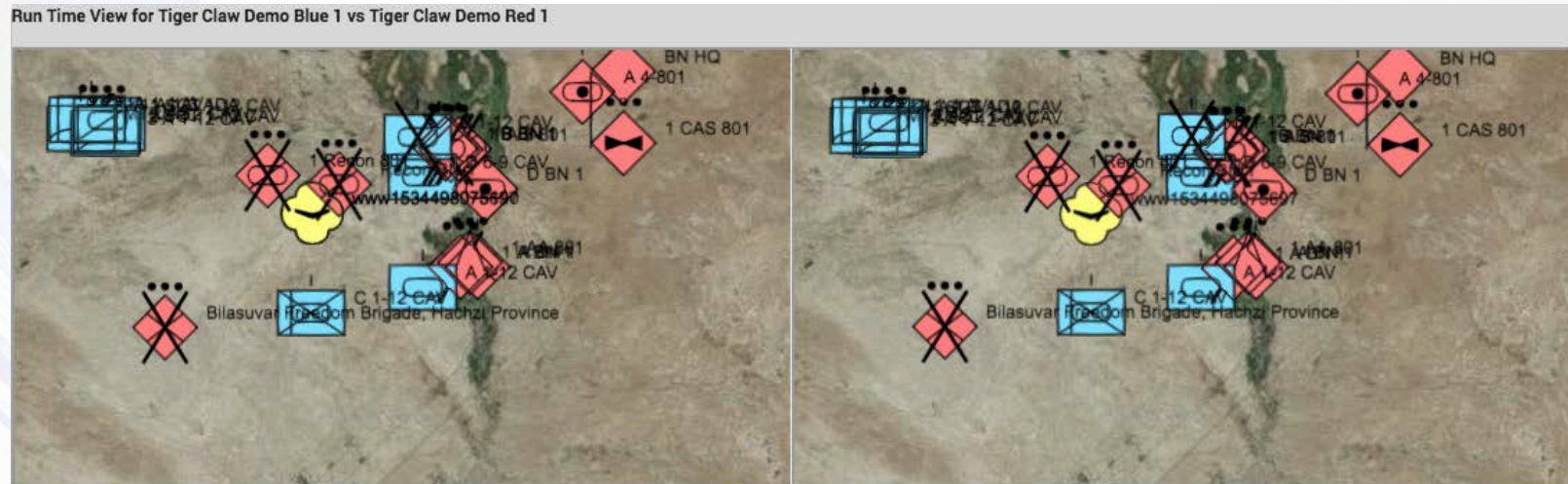
Adjusting Weights

Decision Matrix For Red COA 1

	Overall Ranking	
✓ 1		
2		
3		ty
4		
5		

Blue COA 1
Plan: Tiger Claw Demo Blue 1 — **1** — 1

Blue COA 2
Plan: Tiger Claw Demo Blue 2 — **2** — 2

Blue COA 3
Plan: None

Staff can adjust weights of evaluation criteria.
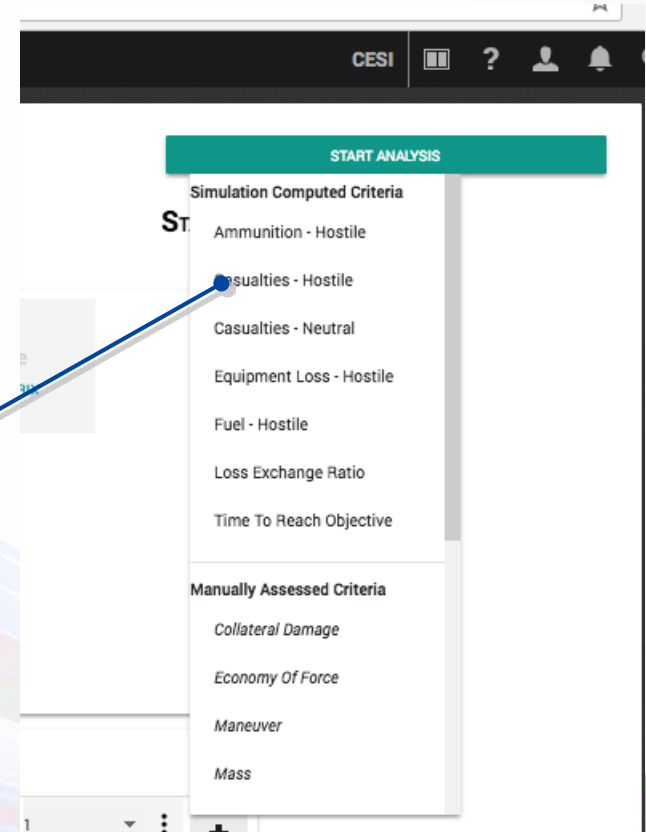
- Staff can select from a broad set of objective and subjective evaluation criteria.
- Staff manually assess the subjective criteria.

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START ANALYSIS

Simulation Computed Criteria

Ammunition - Hostile

Casualties - Hostile

Casualties - Neutral

Equipment Loss - Hostile

Fuel - Hostile

Loss Exchange Ratio

Time To Reach Objective

Manually Assessed Criteria

Collateral Damage

Economy Of Force

Maneuver

Mass

Viewing the Simulation as it Executes

Run Time View for Tiger Claw Demo Blue 1 vs Tiger Claw Demo Red 1

The mission command operator need not know how to operate the simulation. This view allows the operator to view the execution of the COA to gain insight.

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Note:

The operator never sees the simulation.

Just simulation RESULTS.

The correct approach is to HIDE complexity from the users, not add complexity.

Summary

- Many use cases for embedded simulation in mission command systems.
    - Course of Action Analysis
    - Planning Support
    - Mission Execution Monitoring
    - Embedded Training
    - War gaming
    - Learning Simulations
- We implemented this with three simulations: OneSAF, MTWS, and OpSim (purpose-built simulation).