



referentia

Live, Virtual, & Constructive Simulation Use for Unmanned Vehicle Requirements and Test & Evaluation

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T&E/M&S Context

DOT&E Policy Memo (4 June 2002)

- ◆ ...we must continue to focus on, "...the real system, in the real environment, with the real operator..."

...however...

- ◆ Models should help us predict performance throughout the mission space
- ◆ Models should help us design tests to maximize our learning and optimally apply our resources
- ◆ Models (stimulators) should help us replicate the environment during test to realistically stress the system under test

Thomas P. Christie
Former Director,
Operational Test and Evaluation

More T&E/M&S Context

◆ Modeling and Simulation in T&E

- Modeling and Simulation (M&S) is integral to and inseparable from T&E in support of acquisition. For T&E, M&S is an essential and proven tool. Each military department has extensive guidelines for use of M&S in acquisition and in T&E. These guidelines are intended to supplement other such resources.
 - Defense Acquisition Guidebook
- Appropriate use of accredited models and simulation shall support DT&E, IOT&E, and LFT&E.
 - DoD Instruction 5000.2

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National Defense Authorization Act FY 2001

- ◆ “It shall be a goal of the Armed Forces to achieve the fielding of unmanned, remotely controlled technology such that – by 2010, one-third of the operational deep strike aircraft of the Armed Forces are unmanned; and by 2015, one third of the operational ground combat vehicles of the Armed Forces are unmanned.”

Focusing on

- ◆ Mission test & planning support for unmanned systems in ground unit protection scenarios
- ◆ Mission test & rehearsal for unmanned systems using Live, Virtual, and Constructive (LVC) M&S
- ◆ Overall T&E of unmanned systems especially with LVC M&S

For use by the Planner / Warfighter

Unmanned Vehicles: Ground Side



TAGS UGV



JBC2S



C2 Vehicle



AN/PPS-5D
GSR



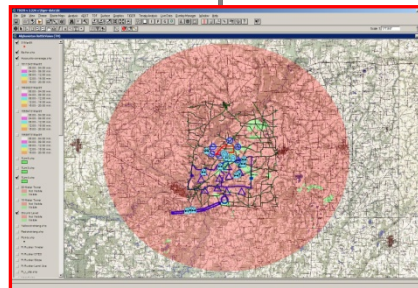
MPR Tool



BAIS



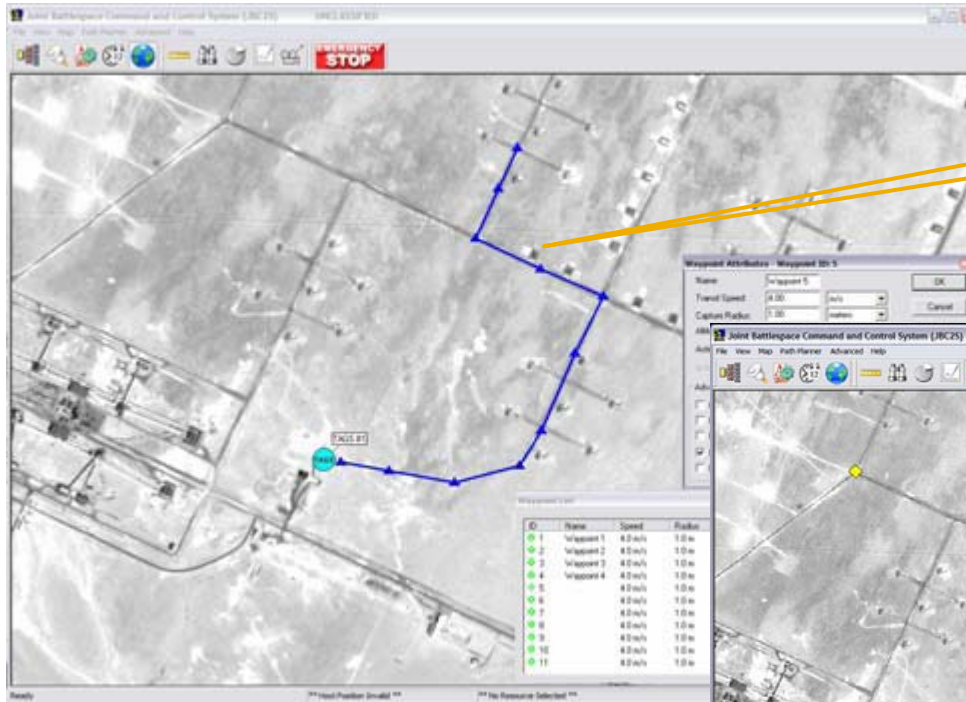
SeaFLIR



RSS w/Sensor Suite



Unmanned Ground Vehicle Control using Joint Battlespace Command & Control System (JBC2S)



Lay Out Route Points

Control & Monitor



JBC2S

◆ Based on:

- Mobile Detection Assessment Response System (MDARS)
- Multiple Resource Host Architecture (MRHA)
- Multi-Robot Operator Control Unit (MOCU)



Mission PAGES

The screenshot displays the Mission PAGES software interface. The main window title is "E:\My Documents_Projects\INDEX 07\MissionPages\testPlanV-4.xml * - Mission PAGES". The interface is divided into several panels:

- Plan Elements:** A list of assets from BAIS Asset-3 to BAIS Asset-11. BAIS Asset-10 is selected and highlighted in blue.
- Plan Element Properties:** A table showing properties for the selected asset:

Misc		
Category	Ground	
Threat	Friendly	
Static		
Min Speed	0.0 km (0.0)	
Max Speed	0.0 km (0.0)	
BAIS		
- Metrics:** A table showing performance metrics:

Metric Name	Result	Weight
Closest Standoff	0.0 km	6.0
Average Standoff	0.0 km	1.5

Total Metric: 0.0
- Map:** An aerial map showing the mission area. A green dashed line outlines a path or area. Three circular green zones are visible, labeled BAIS Asset-5, BAIS Asset-6, and BAIS Asset-10. A scale bar at the bottom right of the map indicates 1.3158901 km. The map also shows a coordinate readout: Latitude, Longitude (30.58765, -86.45497).

Mission Planning and Graphical Editing System

◆ Assist Military Planners

- Quickly create deployment plans for multiple UVs in response to a new unit protection threat.
- Evaluate unit protection plans w/CONOPS-oriented metrics

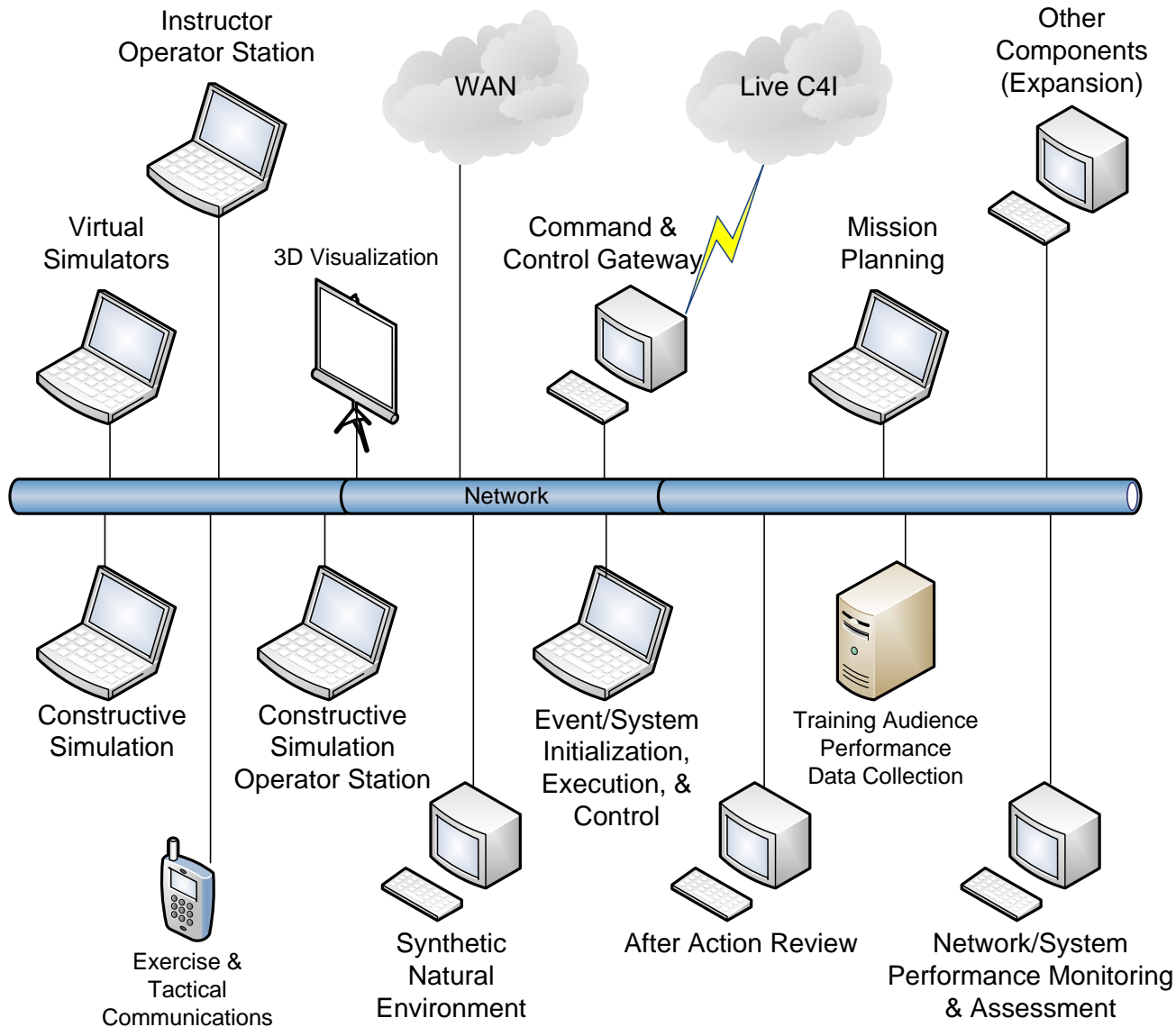
◆ “What if” planning and evaluation

- Effects of changing deployment patterns
- Effects of degraded sensors

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Notional Architecture



◆ Robust capabilities exist today

- Computer Generated Entities (Constructive)
 - JSAF (Navy, JFCOM), JCATS (LLNL), OneSAF (Army), VRForces (Commercial)
 - Users: Army/Navy/Air Force (T&E, Training), Joint (Experimentation, CONOPS, and Training)
- C4I connectivity
 - Use real world systems to control simulated assets
 - Joint LVC Data Translator, SIMPLE, others
- Visualization
 - Really too numerous to mention
- Standards based communication protocols
 - Distributed Interactive Simulation (DIS)
 - High Level Architecture (HLA)
 - Voice over Internet Protocol (VoIP)

Virtual Simulators



Driver View



Driver View - Internal

GOTS & COTS SOLUTIONS

Gunner View



Typical
Virtual
Simulator



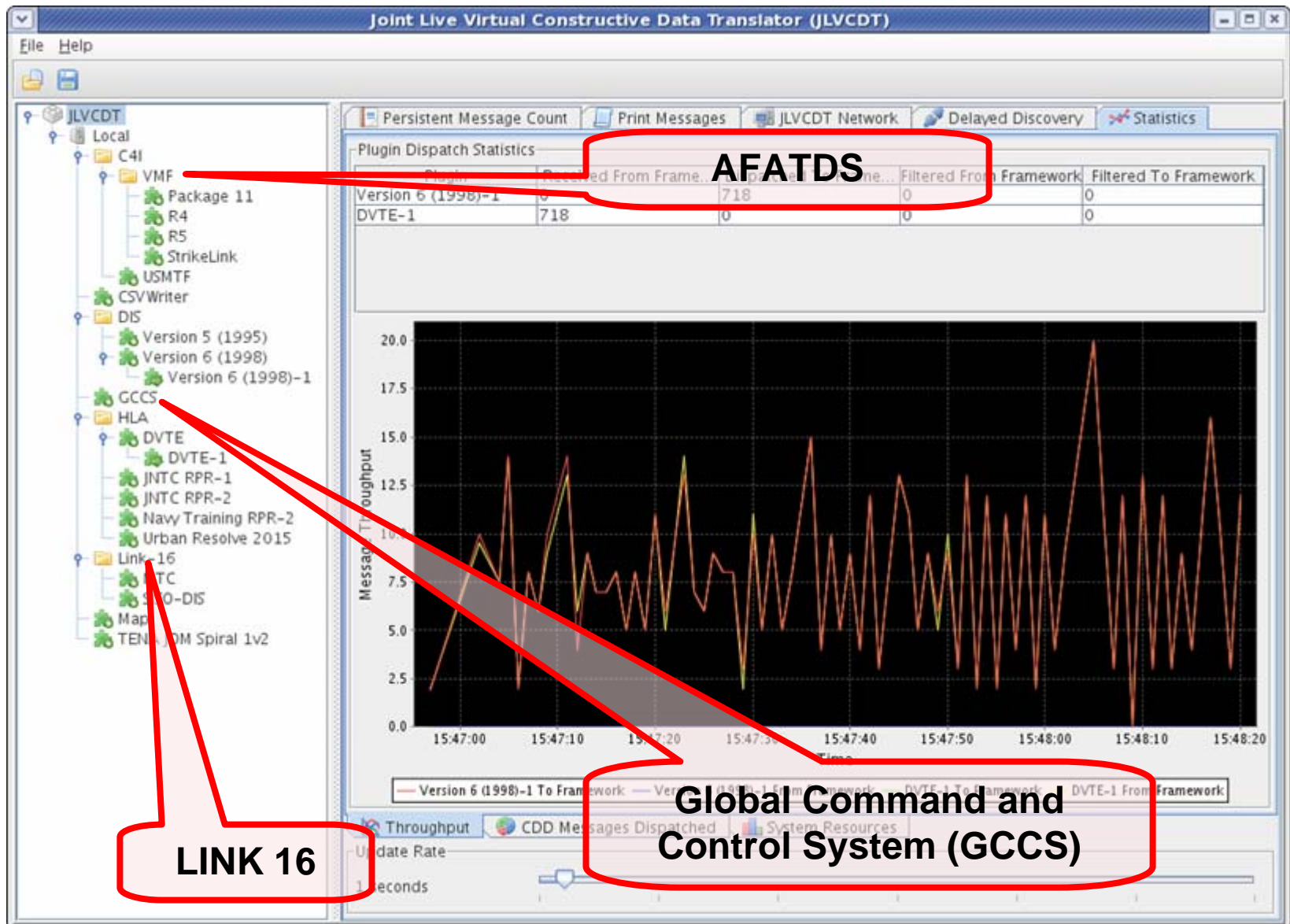
“Real World” Command & Control

◆ Example: Advanced Field Artillery Tactical Data System (AFATDS)

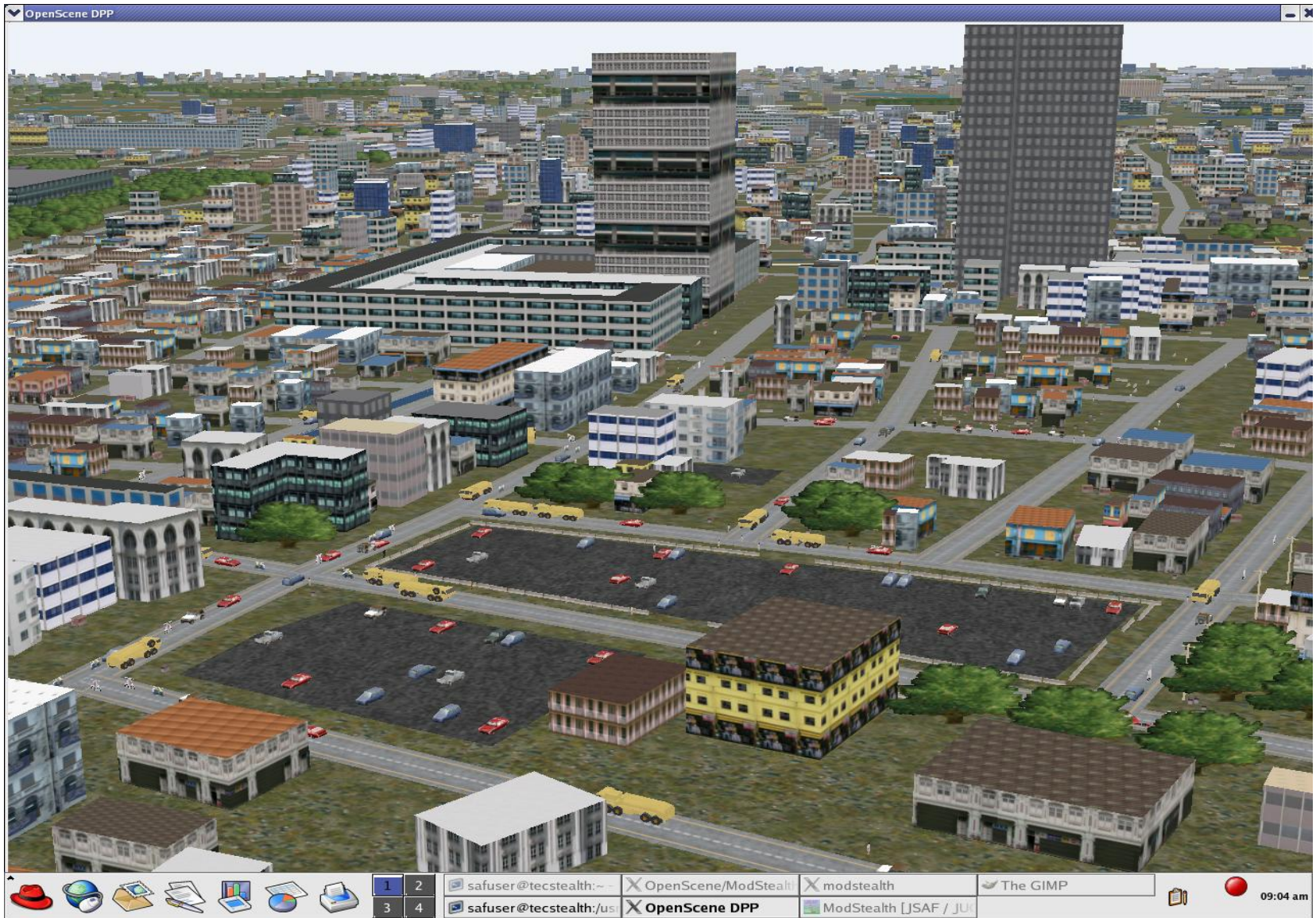
- Processes fire mission and related information to coordinate/optimize the use of all fire support assets
- Includes mortars, field artillery, cannon, missile, attack helicopters, air support, and naval gunfire



C4I Connectivity



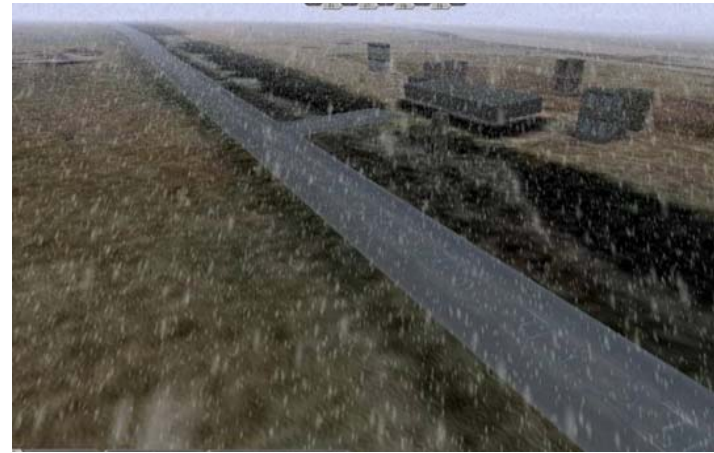
Urban Environment – 3D Viewers



Synthetic Natural Environment



Cloud Cover, Sun Angle, Night & Day



Obscurants: Snow, Rain, Dust

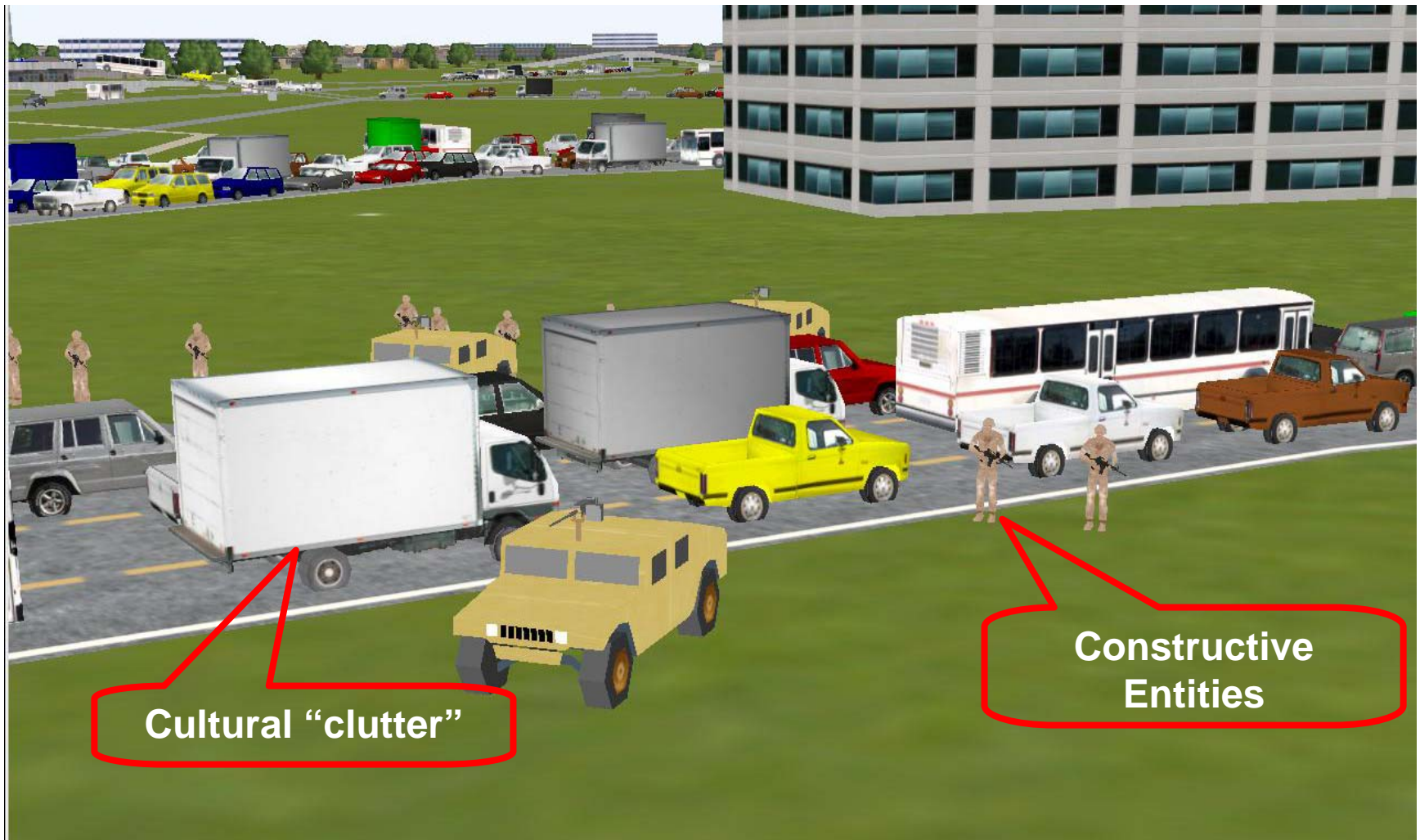


Weapon fly outs, contrails

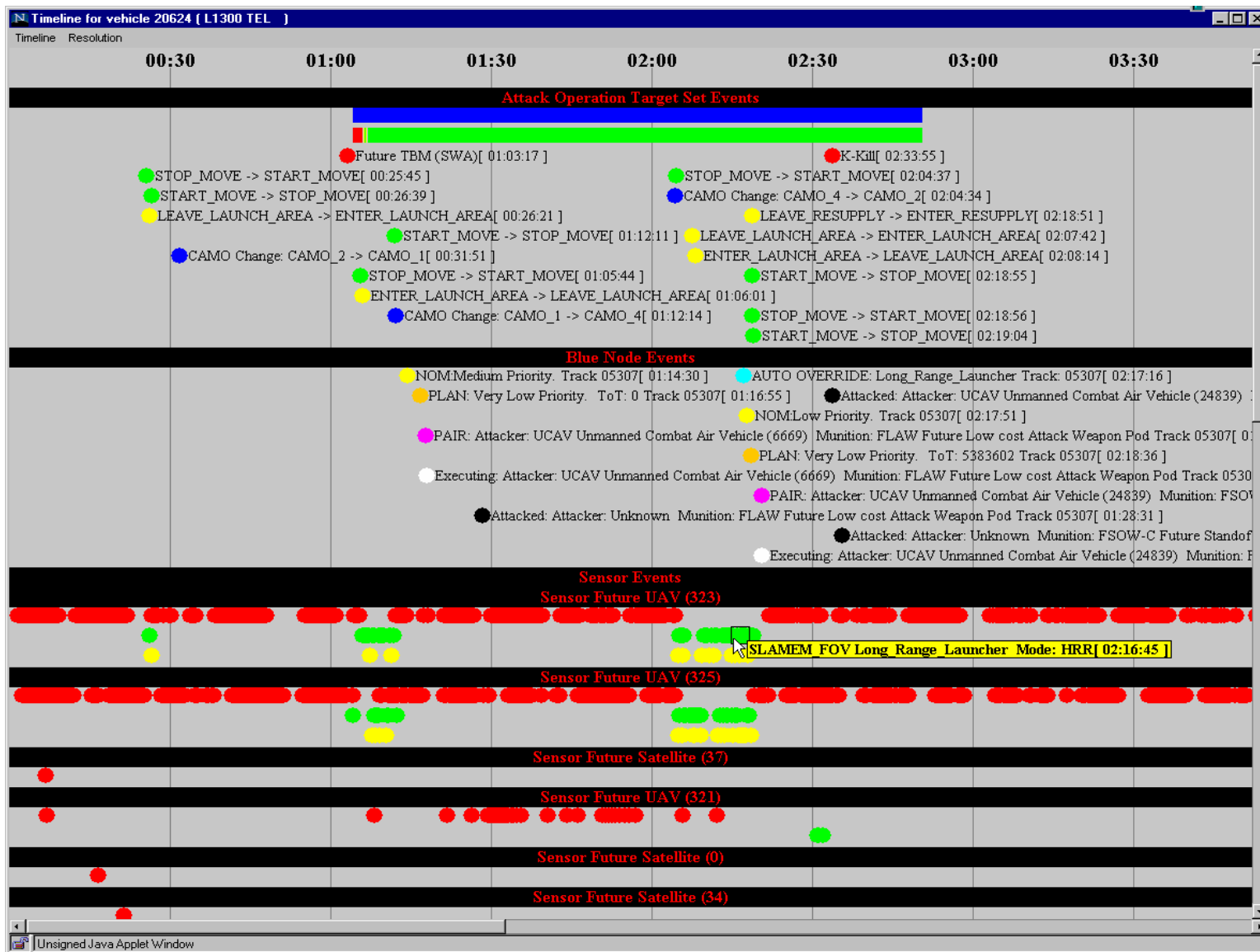


Dynamic changes: Debris, Fire, Smoke

Urban Environment & Culture



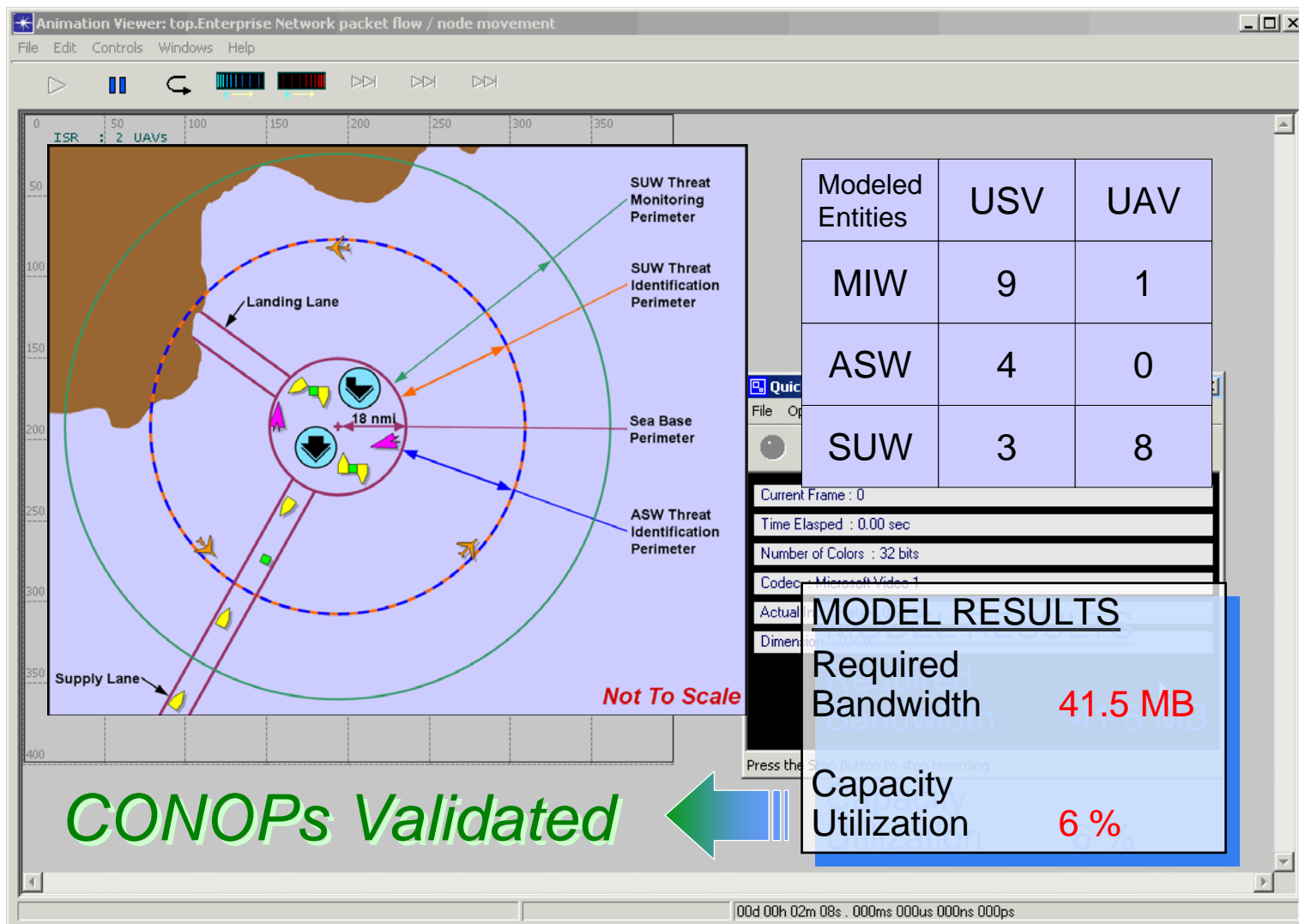
After Action Review (Test Data)



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CONOPs Simulation



In-Flight

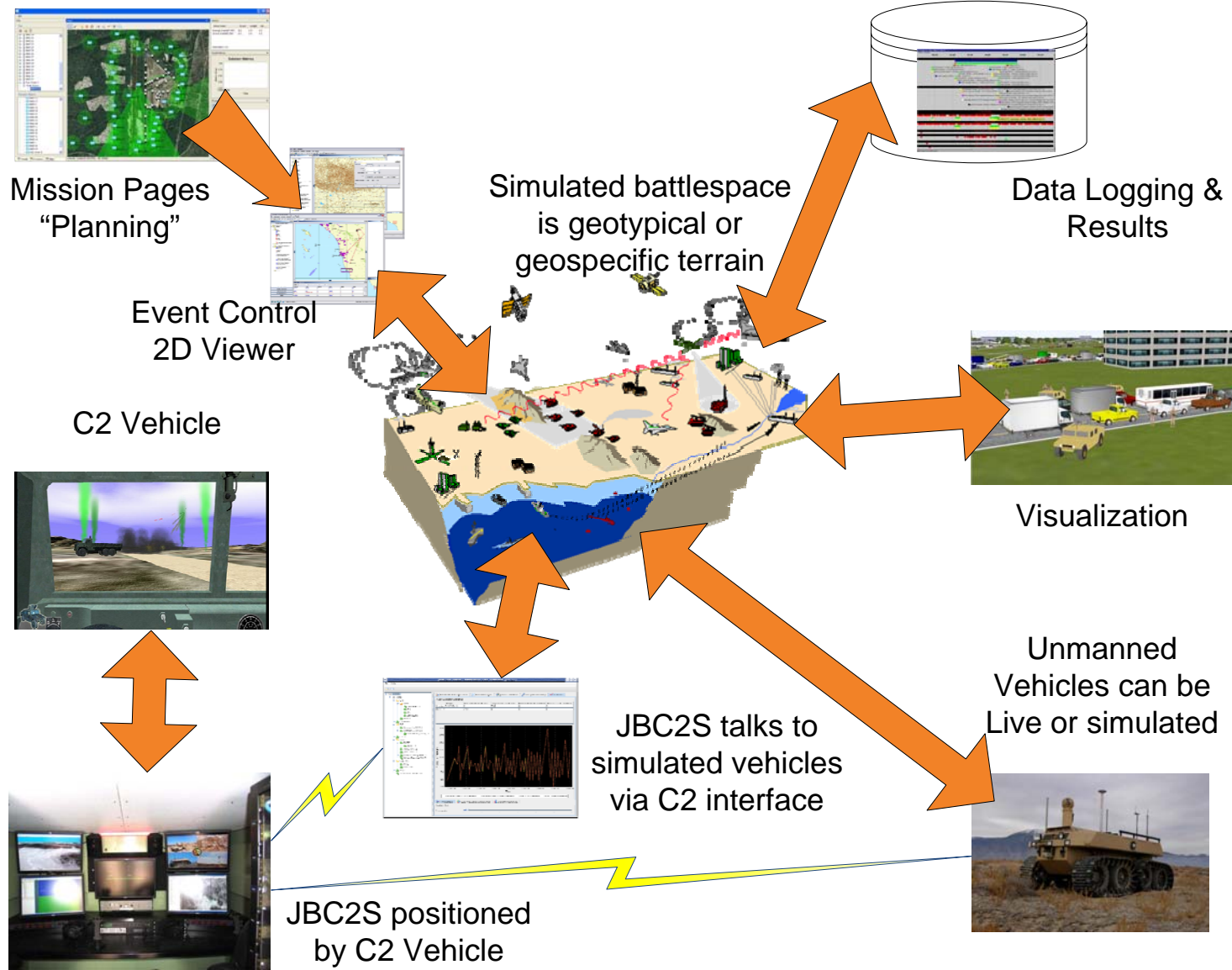


Surface



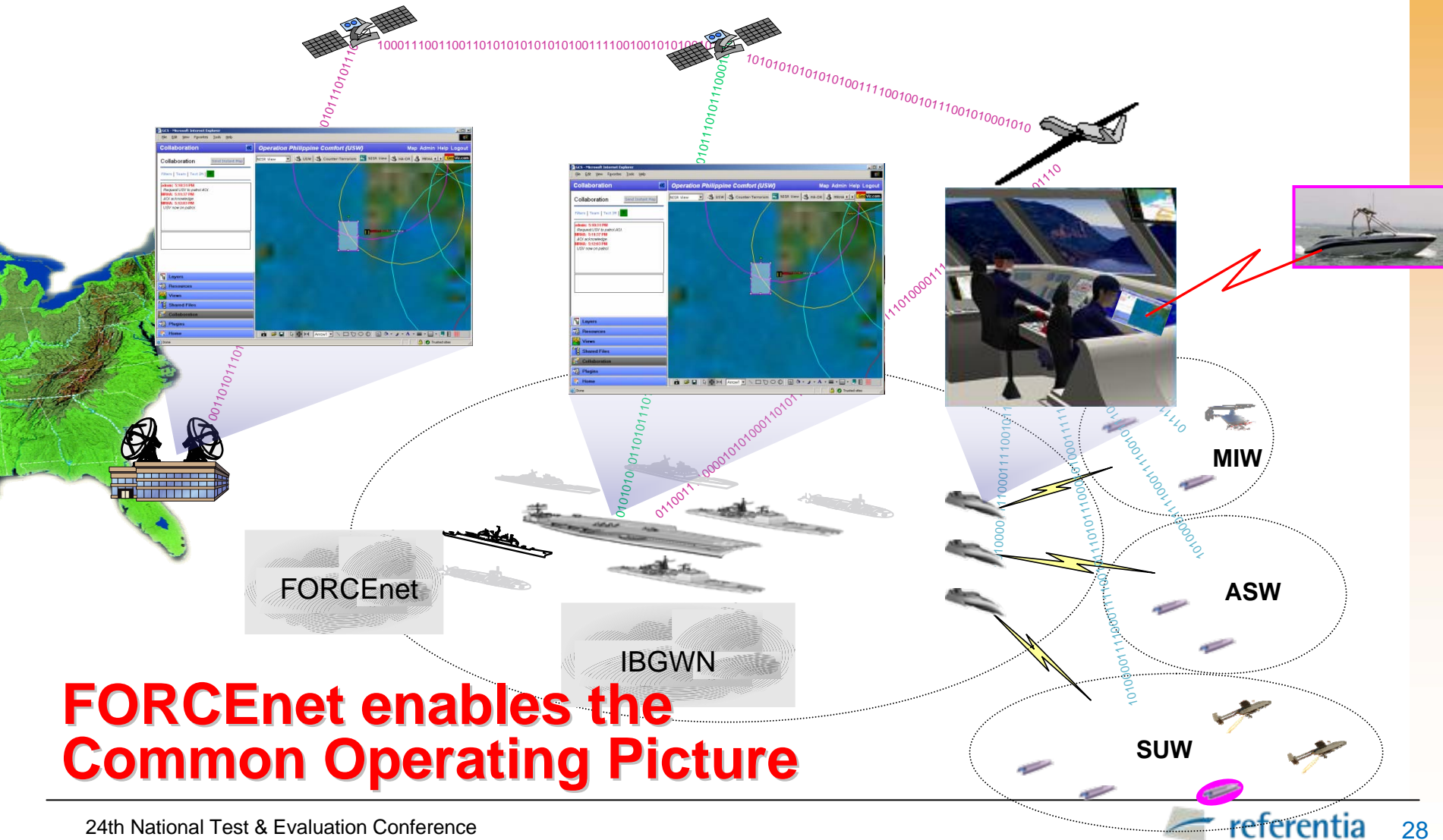
Subsurface

The Exploration & Test Environment



Scaleability

UV SENTRY OPERATIONAL CONCEPT





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Mahalo!

Questions?



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