

*Modeling & Simulation - Session 3D5*

# *Analysis, Interaction, Modelin Simulation Framework (AIMS)*

*John Rivers, Lockheed M  
Chief Mission Advocate - AOC*

*9<sup>th</sup> Annual Systems Engineering Conference  
National Defense Industrial Association*

# *Space Operations Center Weapon System (AOCWS) Rapid Operational Improvement Engineering Solutions*



*Case Study: Applying OMEGA Methodologies  
for AOCWS Program Solutions*

# ***Air and Space Operations Center (AOC)***

***AOC is the operational-level command and control (C2) center for the Joint Force Air Component Commander (JFACC) with the authority to direct and supervise the activities of assigned and attached units and to monitor the actions of both enemy and friendly forces.***

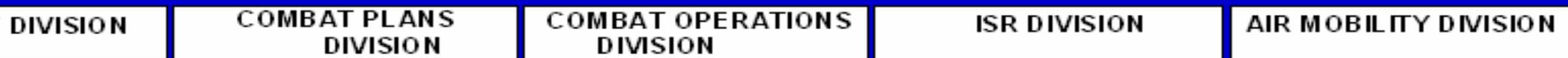
***AOC is the senior element of the Theater Air Control System (TACS)***

***AOC requires connectivity to operations centers of higher echelons, lateral headquarters, and subordinate units***



# Primary Engineering Task – The Weapon System

## ORGANIZATIONAL LAYER - PEOPLE



Source: AFI 13-1 AOC V3

## PRODUCTION LINE – AIR TASKING CYCLE (UNWRAPPED) - PROCESS



(Source AFO)

TACTICAL/OPERATIONAL/CAMPAIGN ASSESSMENTS & COA

## 10.1 ARCHITECTURE - TECHNOLOGY

APPLICATIONS: CMMA - CSEL - C2IPS - C2PC - GALE Lite - GCCS - IPL - IMPC - ITS - JDISS - PCI3 - PRMS - PFPS - PDSM - PDROP - SBMCS - TBMCS - ADOCS - ASSET - CTII - GCCS-13 - JMS - Falconview TST Enhancements - WSV

NETS: Air Operations Net - DMS - GBS - IWS - Predator Video - Purple Net - GPL - - Multimedia Message Manager

ENABLED TOOLS: GDSS - GTN - INTELINK and INTELINK-S - RMS

INFRASTRUCTURE: AOC Comm Enhancement Pkg - C2 Weapon System Part Task Trainer - ADSI - Deployable Transit-Case System - PLGR - Tactical Receive Suite/Client - C2 Network Access - Infrastructure Core - Cross Domain Solutions - IBS - Boundary Security System

Source: ESC/AOC WS S

WS Support – Sustainment, Training, Maintenance



# Enhancing Mission Planning Expectations

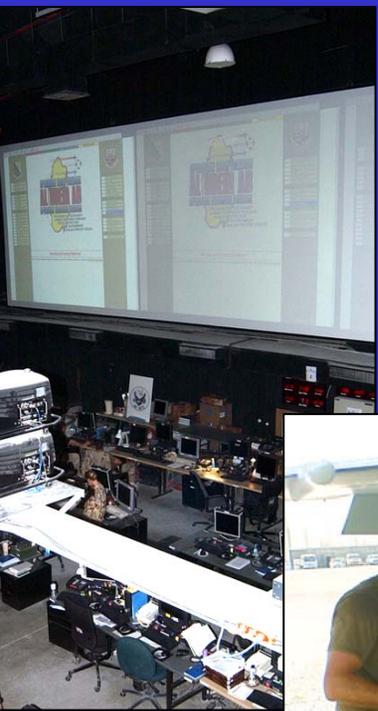
...ge is we are constantly presented with great ideas on combat ca  
nts but not being told the leverage points for best return on each

...overnment-Industry team decision-making on modernization effo  
...ag approach to find the leverage points between effectiveness &

”

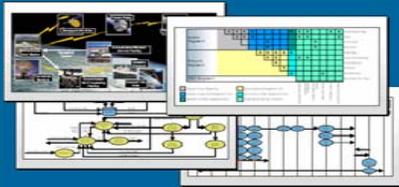
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General Ron Keys, Commander, Air Combat  
During orientation visit to the Center for Innovation (Lighthouse) o



## Integrated Architectures

### DoDAF



SoS Architectural Solutions

## Executable Architectures

### Dynamic CONOP Analysis



Operational Behavior / Interoperability

## Operational Analysis

### Effects-Based M&S

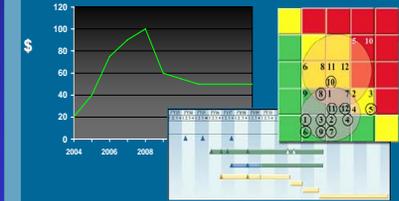


System Performance (MOP)

Operational Utility (MOE, MOO)

## Cost & Risk Analysis

### Cost, Schedule & Risk Analysis



### Role

Provide organizing construct to support engineering process through systematic creation of product views and extensions

### Tools

System Architect  
DOORS  
Rational Rose

### Role

Provide advanced architecture modeling and simulation capabilities

### Tools

CONOPS Simulator  
System Architect  
CORE  
Satellite ToolKit  
SATSIM

### Role

Identify Scenarios and provide Campaign / Mission Performance Modeling & Analysis results

### Tools

EADSIM  
JWARS  
JSAF

### Role

Provide Parametric Cost & Risk Modeling capability to support architecture trades

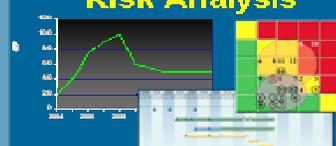
### Tools

ACAM, RCAM, PCAM  
SEER SEM  
RiskWeb  
Cocomo

**Credible, Defensible, Knowledge-Based Analyses**

**Evaluate & Improve**

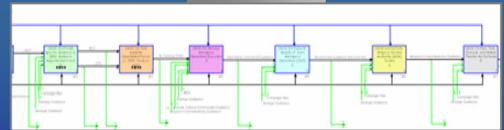
**OMEGA Provides Integrated Methodologies, Approaches and**

<b>Engineering</b>	<b>Integrated Architectures</b>	<b>Executable Architectures</b>	<b>Operational Analysis</b>	<b>Cost &amp; Risk Analysis</b>	<b>Business Re-Eng</b>
<b>Decision Work</b> Goals Effects Capabilities	<b>DoDAF</b>  SoS Architectural Solutions	<b>Dynamic CONOP Analysis</b>  Operational Behavior / Interoperability	<b>Effects-Based M&amp;S</b>  System Performance (MOP) → Operational Utility (MOE, MOO)	<b>Cost, Schedule &amp; Risk Analysis</b> 	<b>Business Re-Eng</b> Business process integration
Providing credible, program mapped to mission needs 'what-if'	<b>Role</b> Provide organizing construct to support engineering process through systematic creation of product views and extensions <b>Tools</b> System Architect DOORS Rational Rose	<b>Role</b> Provide advanced architecture modeling and simulation capabilities <b>Tools</b> CONOPS Simulator System Architect CORE Satellite ToolKit SATSIM	<b>Role</b> Identify Scenarios and provide Campaign / Mission Performance Modeling & Analysis results <b>Tools</b> EADSIM JWARS JSAF	<b>Role</b> Provide Parametric Cost & Risk Modeling capability to support architecture trades <b>Tools</b> ACAM, RCAM, PCAM SEER SEM RiskWeb Cocomo	<b>Role</b> Provide a statistical change of program <b>Tools</b> WebSphere Integrat Verity DataDrill SAS, EXC

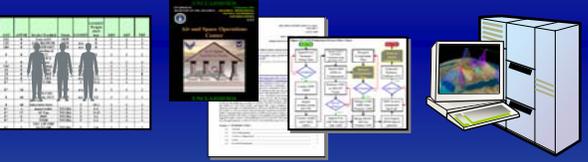
**COTS**

**GOTS**

OMEGA Encourages the Use of Any Needed COTS/GOTS M&S Tool – User Need Drives Selection



**DODAF System Architect - Plus -**



**People, Process & Equipment**

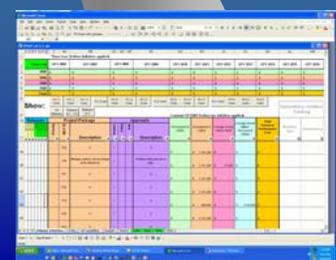
**Rational®**

**WebSphere®**

**Advanced Architecture Modeling & Sim**

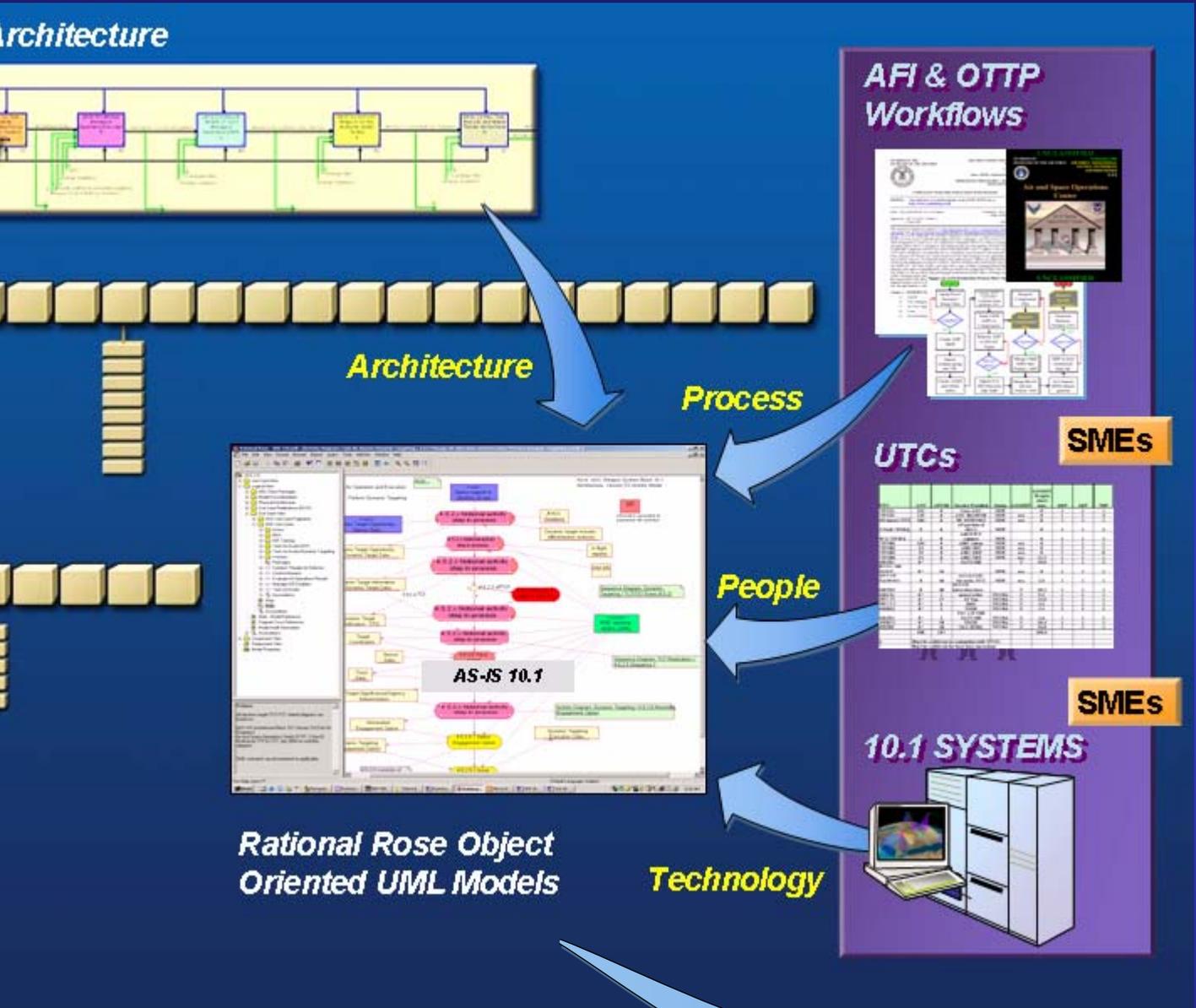



**EADSIM for Combat Utility M&S**



**EPCAT What-If Analysis**

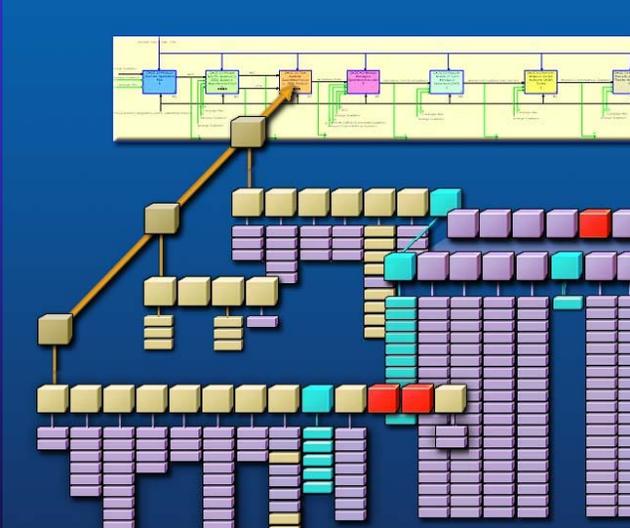
am OMEGA Based Analysis, Interactions, Modeling & Simulation (AIMS) Framework and Tool

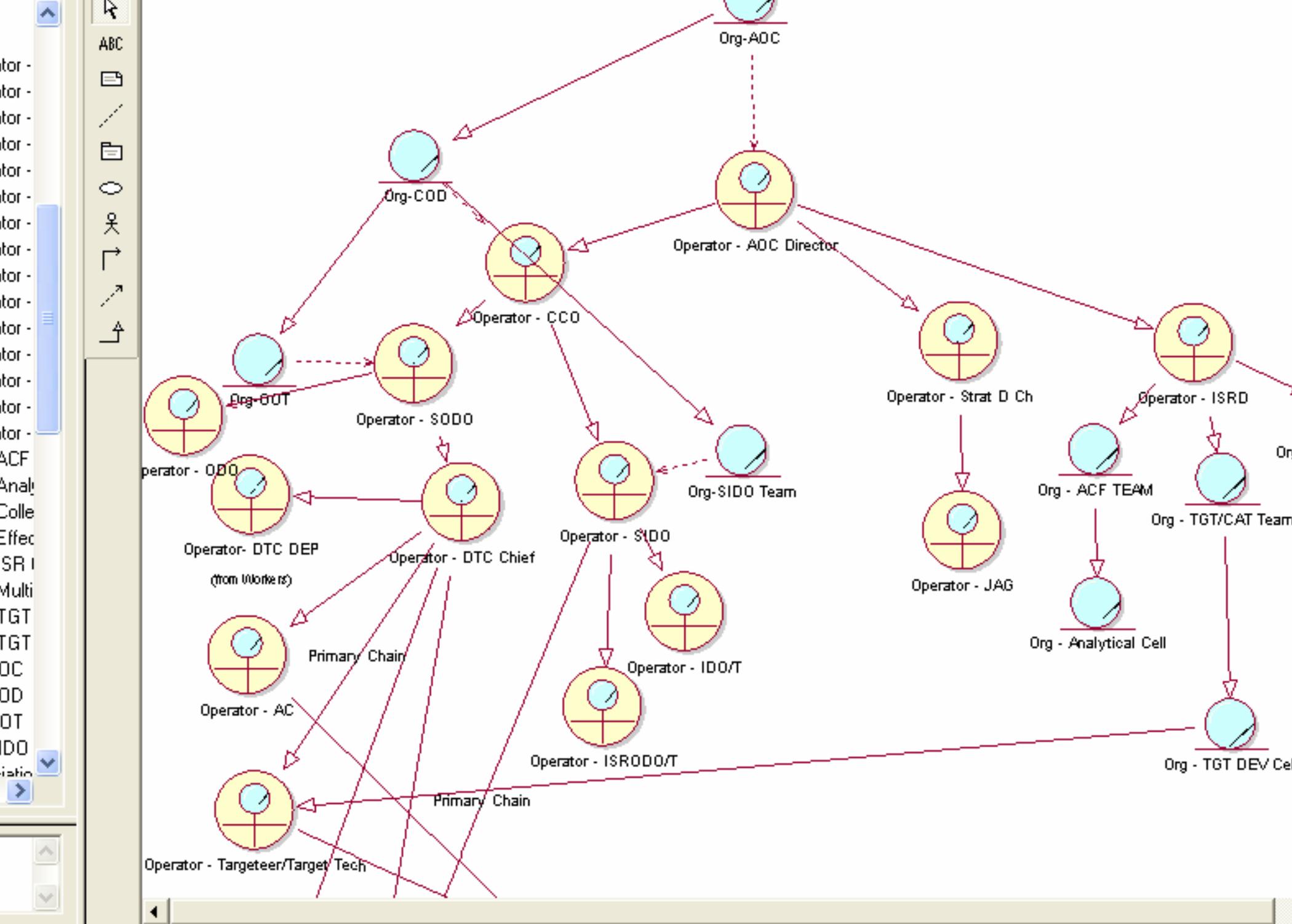


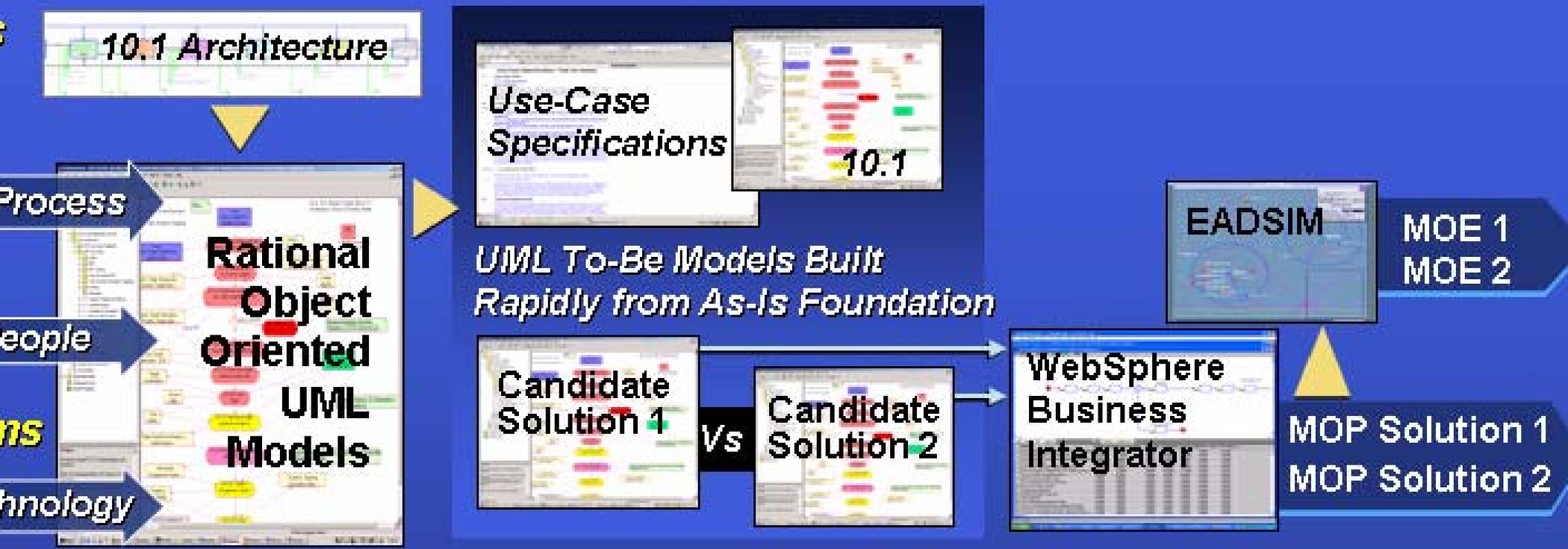
# AIMS Integrated Team (IAT)

- Merge Architecture, People, Process, and Equipment
- Full Definition of Systems and Interactions

Understanding of How the Current System Downstream AIMS Capability Needs is of Alternatives, Trades and BPR



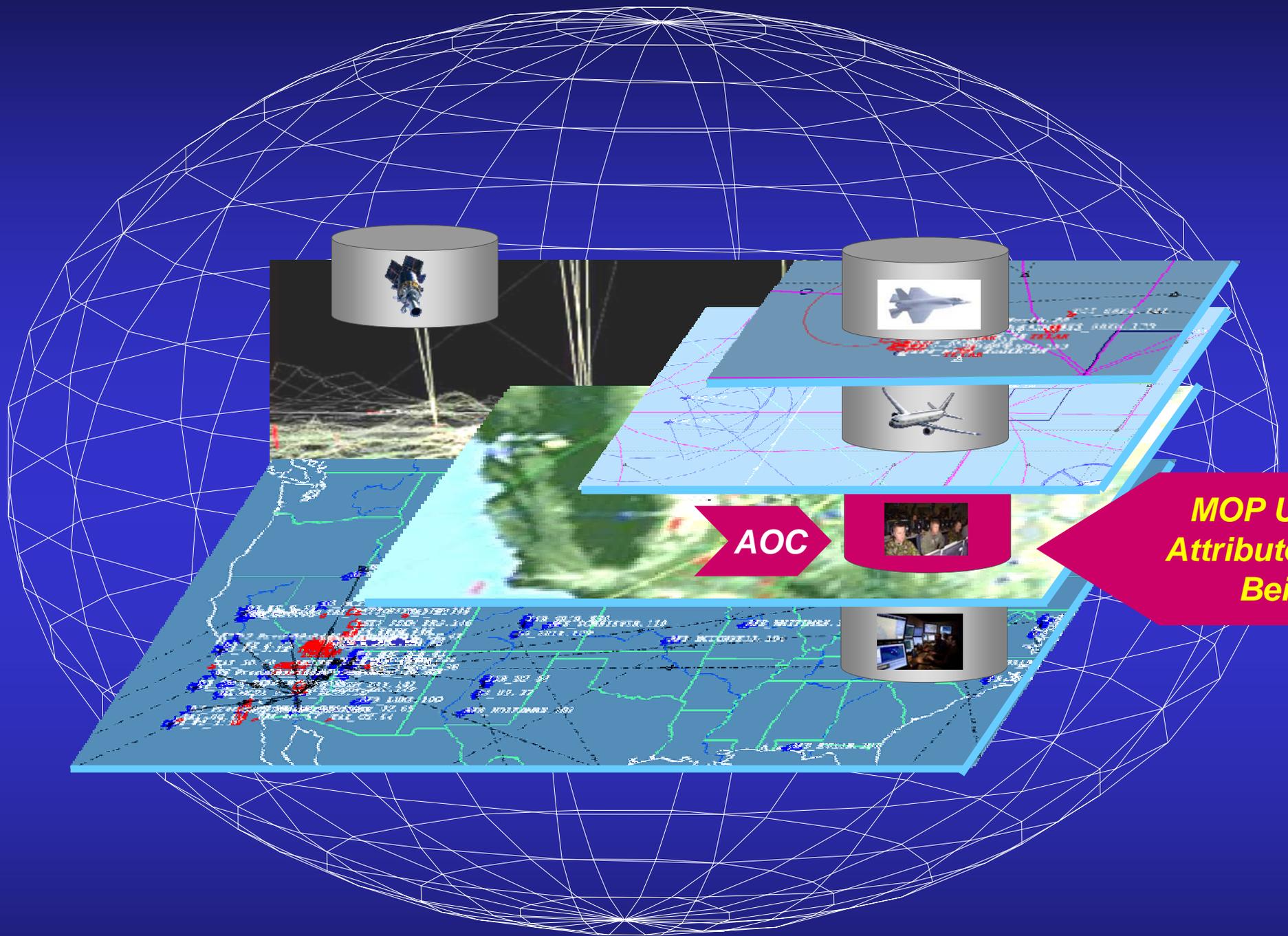




Integrated Modeling Team Rapidly Generates Object-Oriented UML Models  
 Activities Modeled  
 Dynamic Models  
 Mission Scenario Executable Models and Simulations  
 Web-Based Orchestrated Service Thread  
 Support for 3<sup>rd</sup> Party Innovators

*Smart Solutions Into Warfighters' Hands Faster*





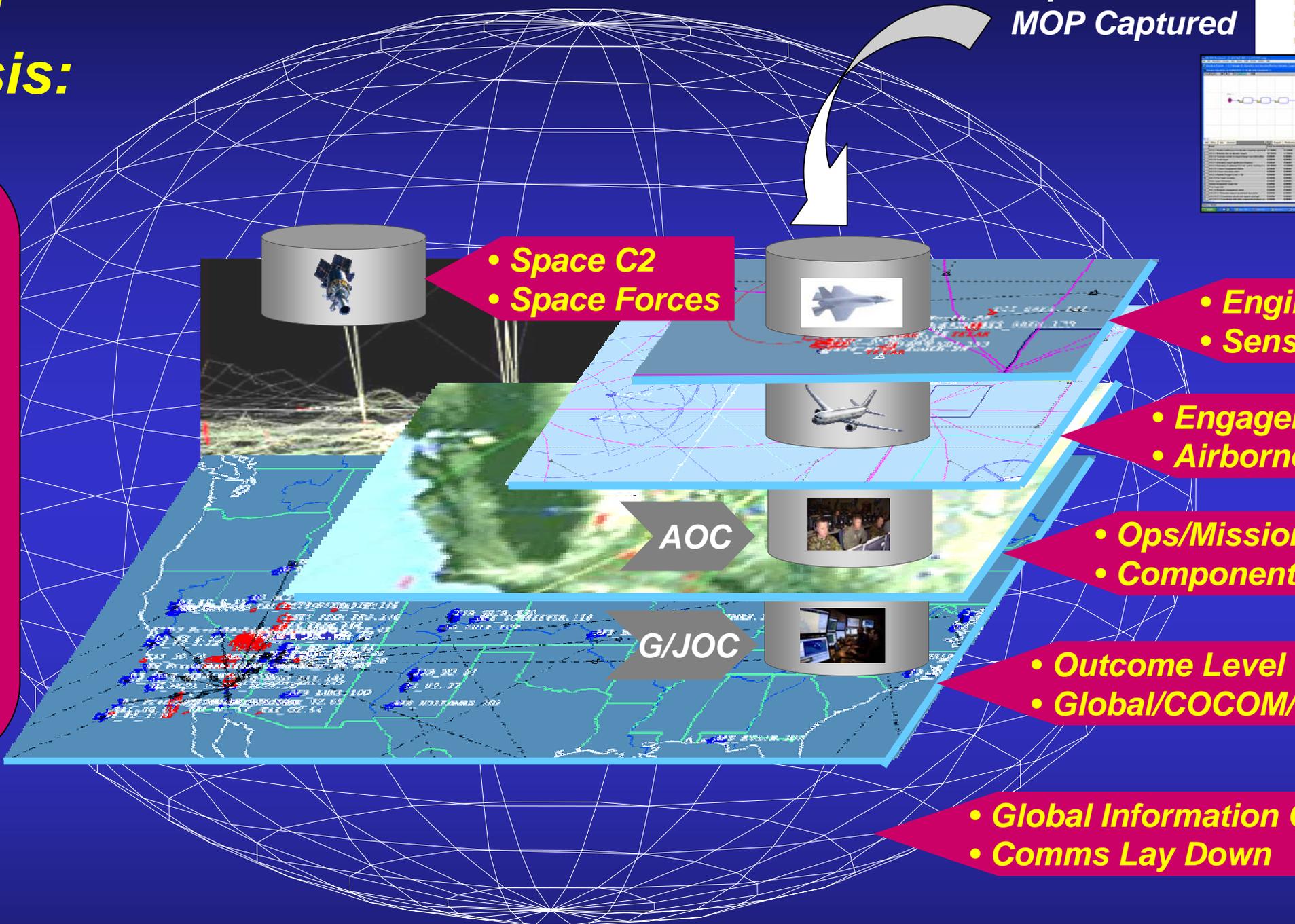
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# Colored analysis:

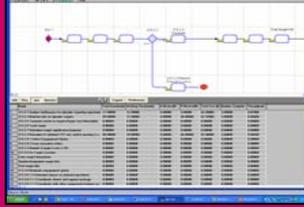
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MOP Captured

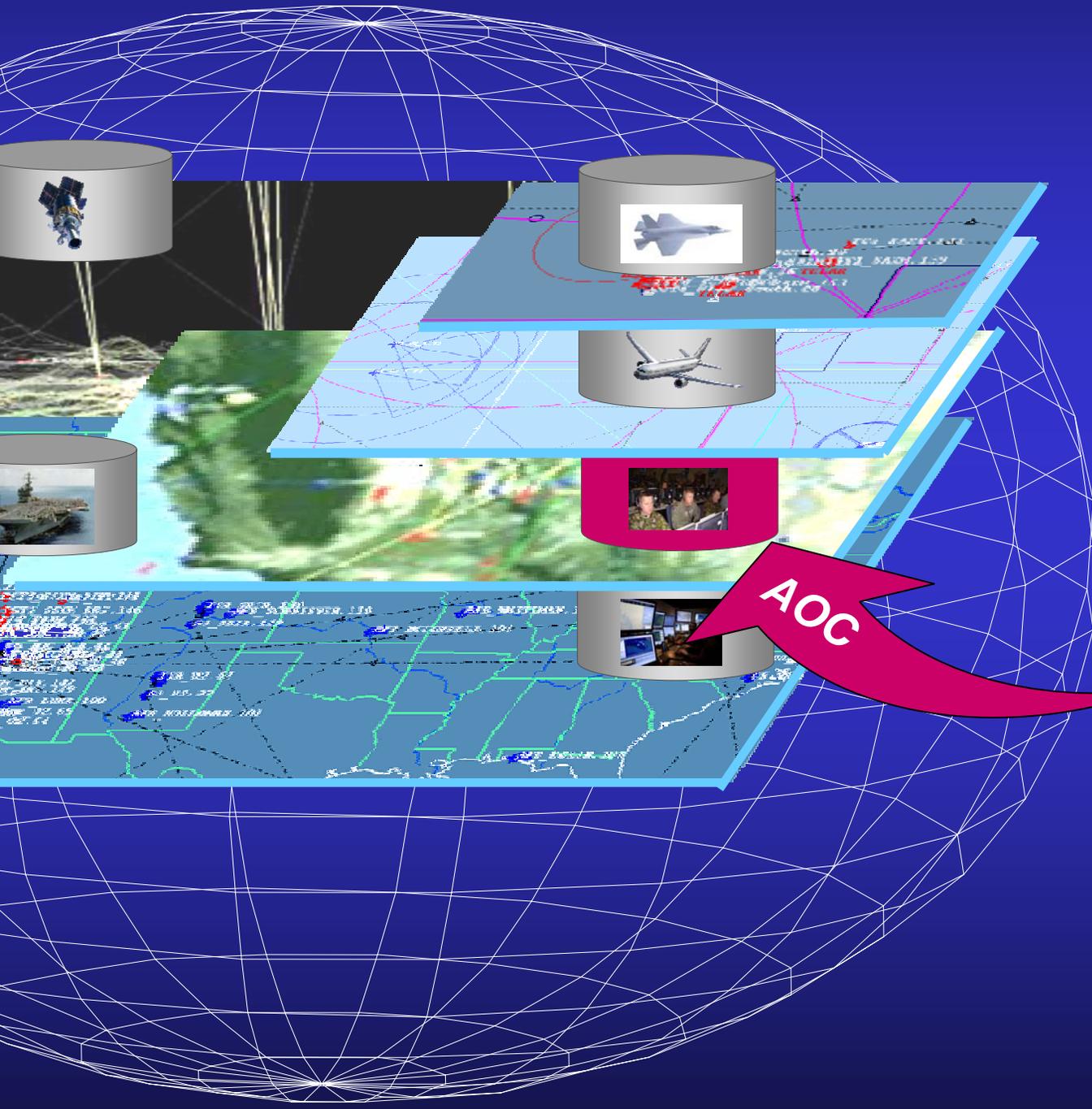


Power MOP Inputs (IBM Web Sphere Business Integra

**AOC Performance Simulations Run**



**Improvement MOPs Captured**



# Model In

**MOP Converted to Characteristics of C2ISR Node Candidates**

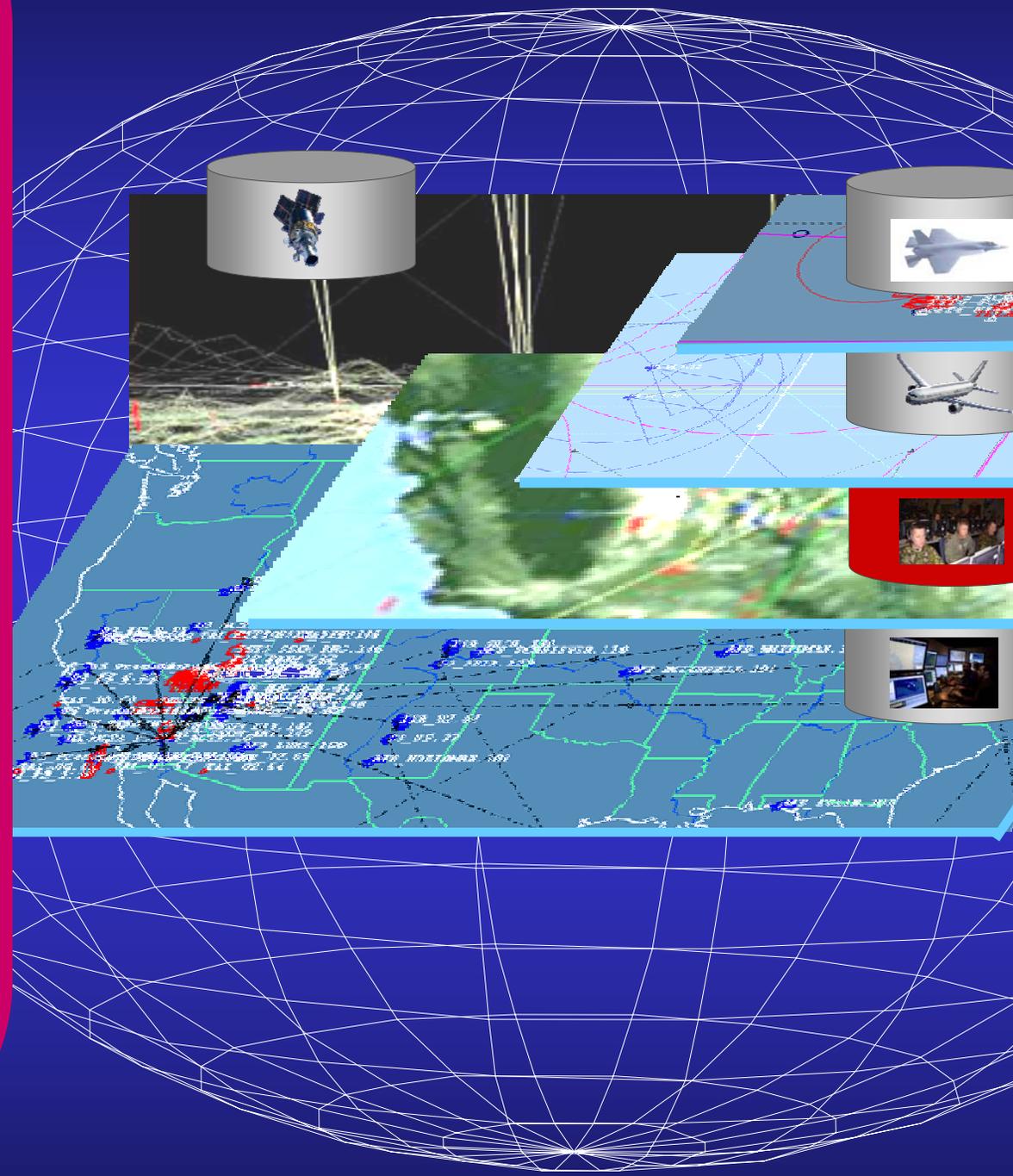
- **Process Cycle Times**
- **Bandwidth Use**
- **Task Cycle Times**
- **Comms**

# Control Inputs:

## Battlespace Characteristics

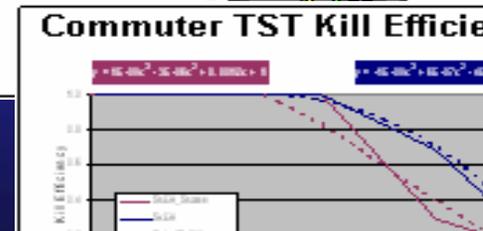
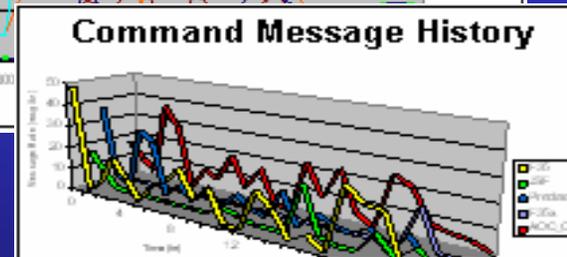
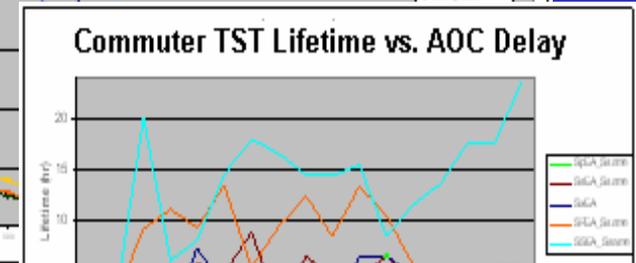
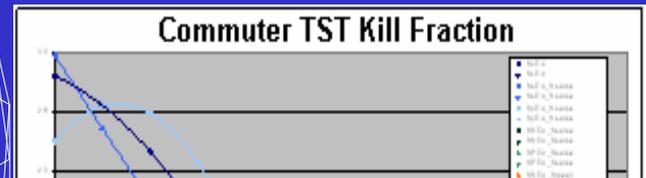
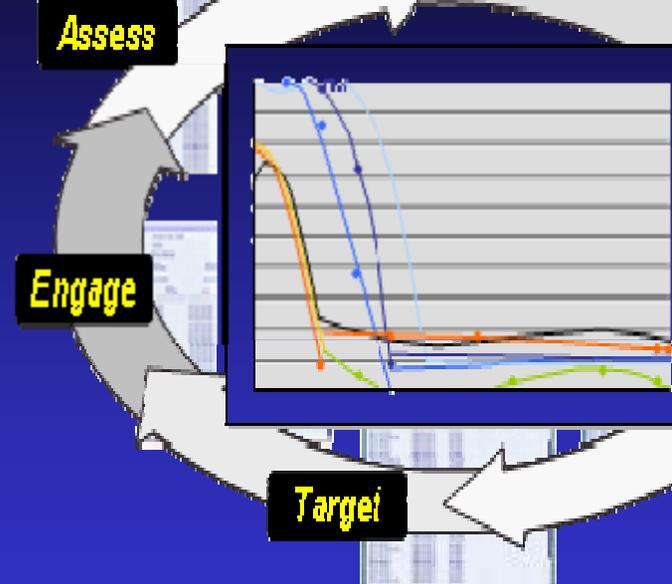
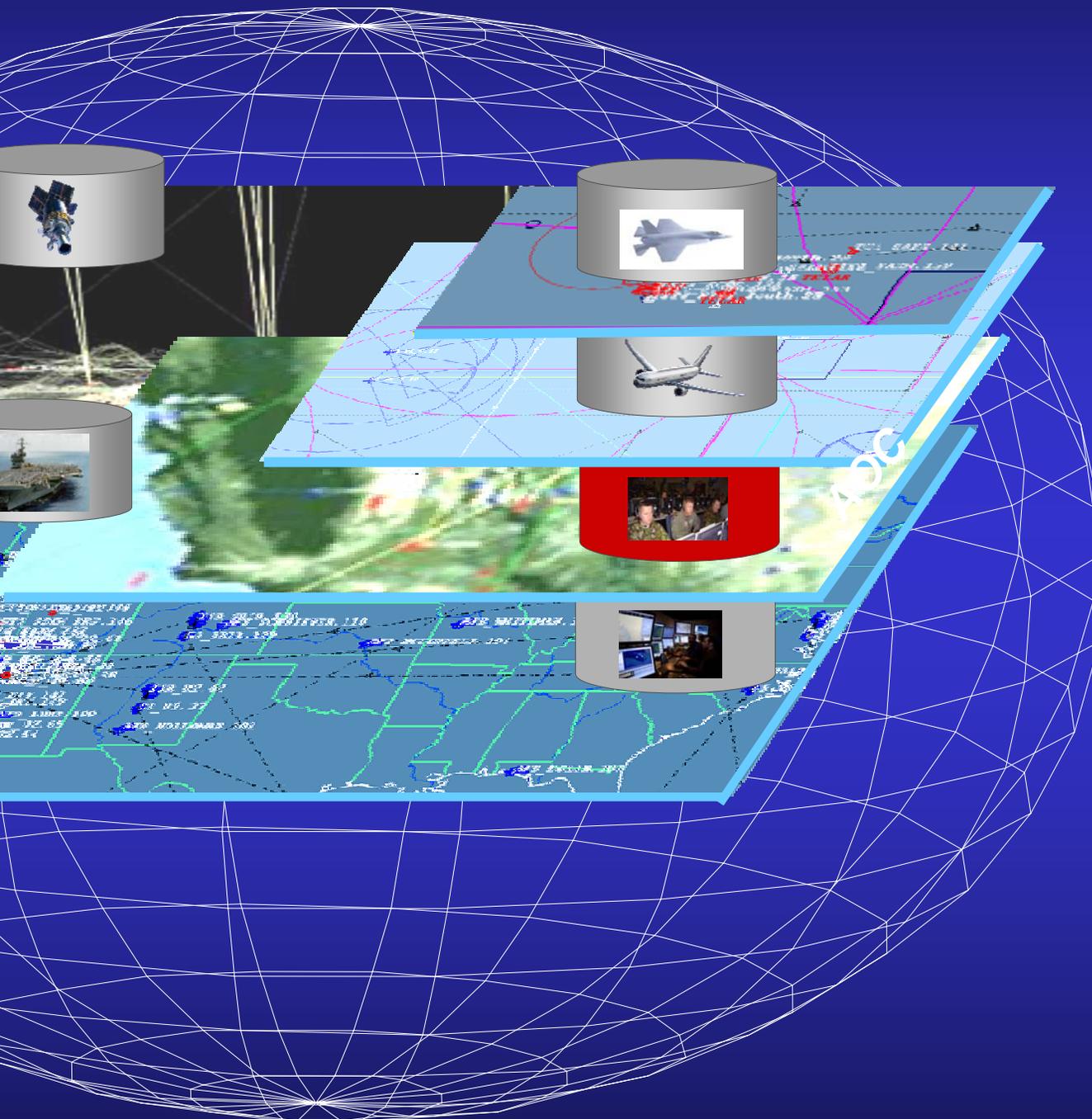
- Sensitivities/Control**
- Sensor-Shooter Attributes**
- Weapon Attributes**
- Target Attributes**
- Force Definitions & Capabilities**
- Surprise Business Rules**
- Weather & Noise Levels**

## Realistic Battlespace for Improvement Assessment





# Combat Utility MOE



# Summary

***About the Warfighter (Customer)***

***Provides Methodologies, Approaches and Tool Sets That Support the Warfighter's Need for Tailoring Solutions To the Warfighters' Need – Addressing the Challenges***

***OMEGA To Design Fact-Based Solutions for Our Programs***

***SI Used OMEGA Foundation To Design AIMS Engineering Support AOC WS Integration Cycle System Engineering and Program***

***Need - C2ISR Wind Tunnel – Role for NDIA***