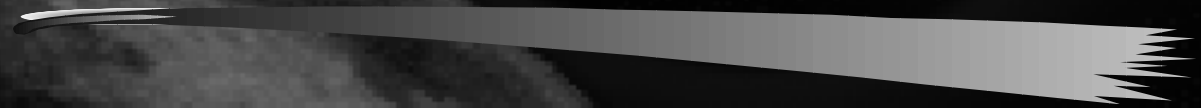




**JAWS S3 Panel IV**  
**Building the Analytical Bridge Between**  
**the Warfighter and the Engineer**



**NSA**  
**Directorate**

**16 June 1999**



# Panel IV

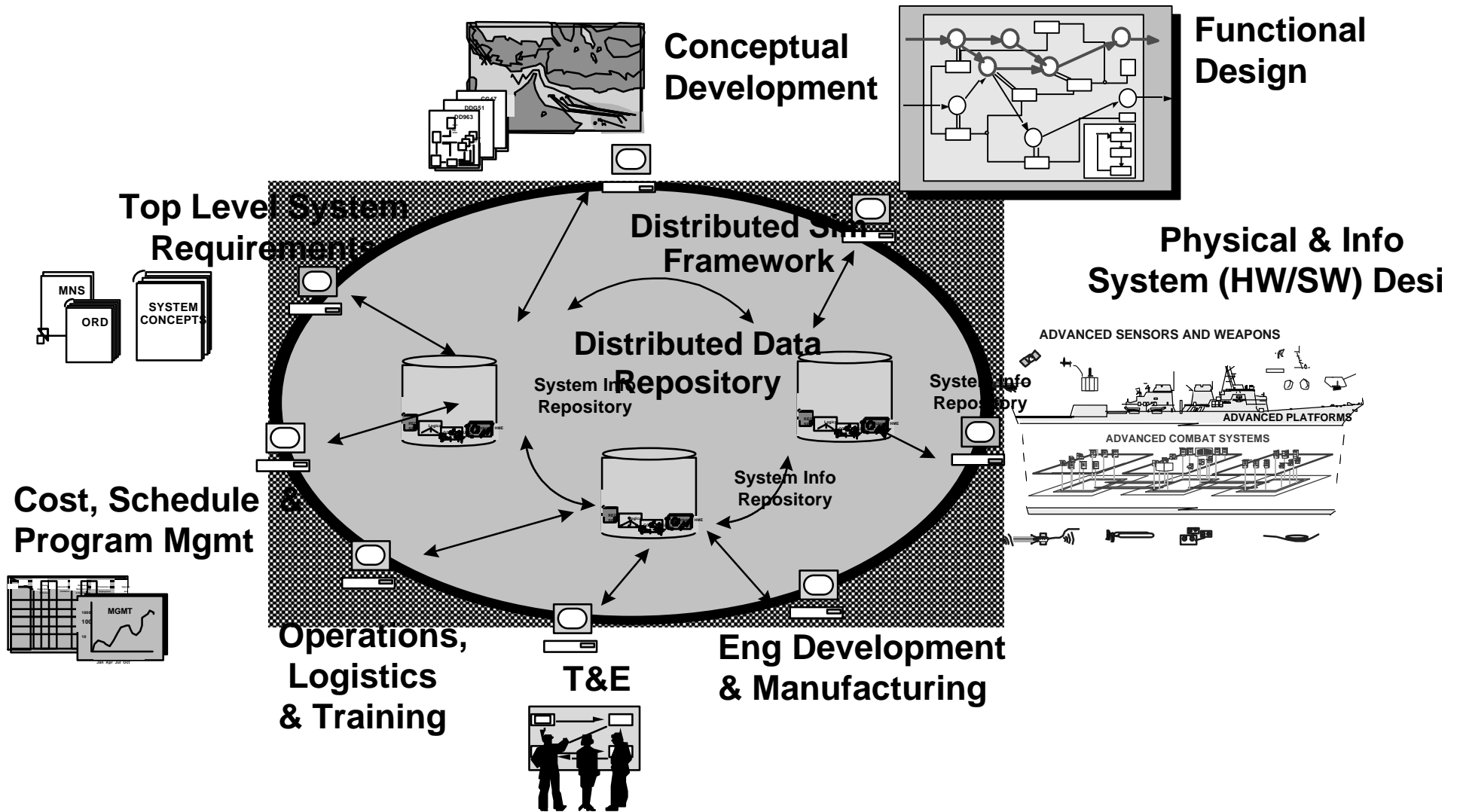


DIRECTORATE OF COMMAND & CONTROL

- Task: Build an analytical bridge between the warfighter and the engineer
  - 
  - **Byproduct: Create synergy (vice tension) between “requirements pull” and “tech push”**
  -
- Framework: Simulation Based Acquisition
  - Examples of ‘bridges’:
    - JSF
    - USAF C2
  - Some bridge building tools:
    - AFRL Virtual Testbed
    - JMASS

# SBA Operational Concept Illustration

(Digital Information Based Process)



**Extensive Re-use Across Phases and Across Acquisition Programs**



# Simulation Based Acquisition



DIRECTORATE OF COMMAND & CONTROL

- **Revamp acquisition process to capitalize on the advances, advantages & potential of digital information technology**
- 
- **Use shared access to distributed information to:**
  - **Closely link stakeholders in product development**
  - **Facilitate iterative, spiral development**
  - **Facilitate collaborative, concurrent processes, IPPD**
  - **Create synergy between requirements pull & technology push**



# Anticipated SBA Impact on Analytical Link



DIRECTORATE OF COMMAND & CONTROL

- Better, more consistent models
- More support for development of M&S tools
- Better access to data, authoritative information
- Better synthetic environments
- Earlier access to product information
- Better understanding & definition of requirements
- Better linkage of requirements to performance
- Better understanding of thresholds
- Easier to identify & focus on prime OT&E areas
-



# SBA Analytical Linkage: Examples



DIRECTORATE OF COMMAND & CONTROL

- 
- 
- Joint Strike Fighter
- 
- USAF Command & Control



# SBA Analytical Linkage Example: JOINT STRIKE FIGHTER



DIRECTORATE OF COMMAND & CONTROL

- **Delay locking in requirements**
  - JSF has used 'interim requirements'; no ORD until '00
- **Evolve requirements with an integrated set of simulations**
  - Campaign/mission modeling with constructive simulations (95-96)
  - Virtual simulations (w/man-in-the-loop)
  - Interactive digital simulations to evaluate specific functional requirements (97-99)
  - Virtual Strike Warfare Environment exercises (98)
- **Provide early weapon system experience for warfighters for conceptual development**
- **Use SBA analytical construct for cost & operational performance trades, within warfighter CONOPS**



## SBA Analytical Linkage Example: AF Command & Control



DIRECTORATE OF COMMAND & CONTROL

- **ESC SBA initiative:**

Link requirements M&S tools/data (used by C4ISR operators) with system design & build tools/data (used by C4ISR developers)

- **Intent:**

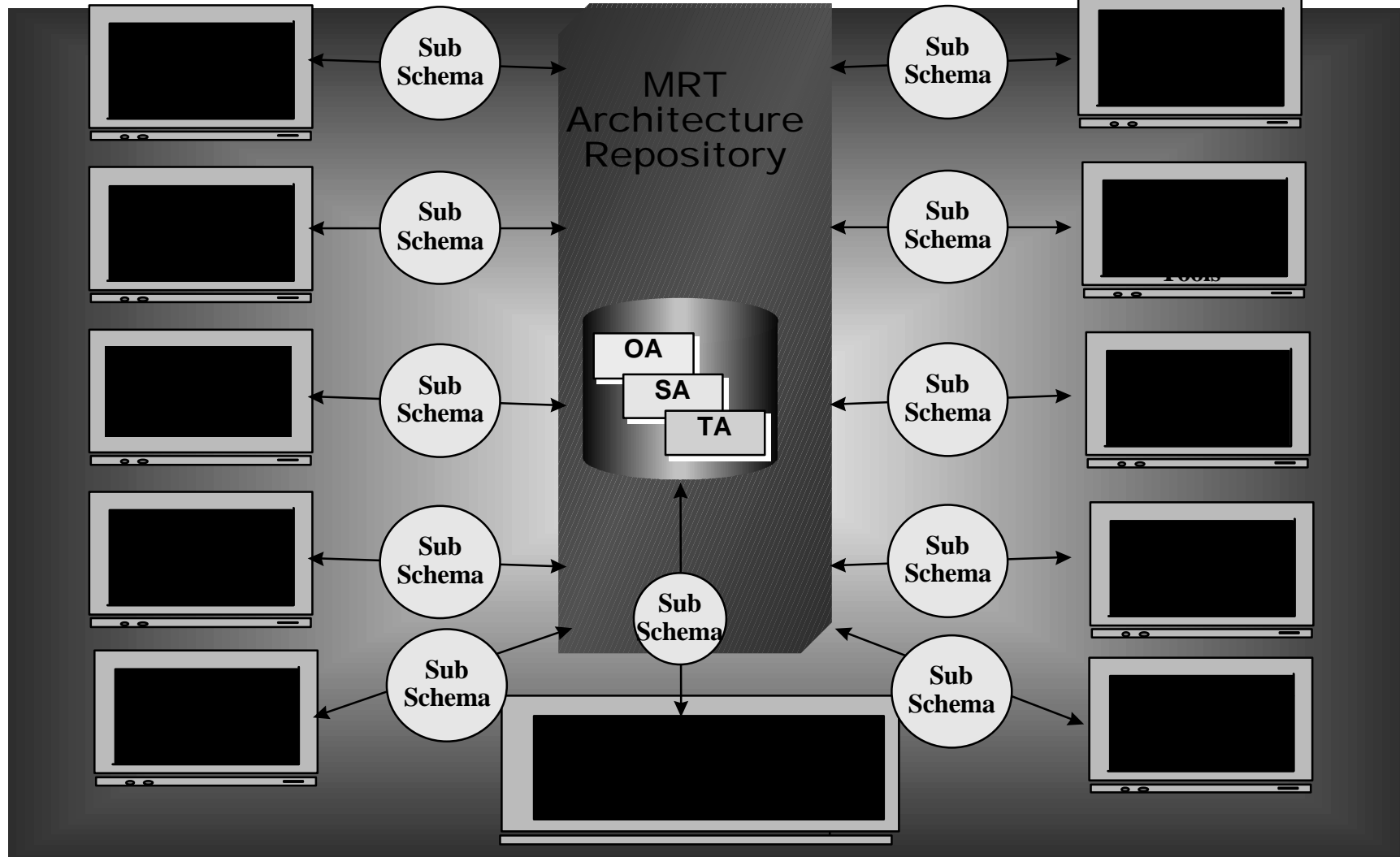
- Provide single continuous, traceable flow of data from operational need to system capability
- Integrate/map CINC C2 requirements with Service baseline system capability
- Merges Joint C4ISR Architecture & Planning System (JCAPS) and proven model-based system engineering process (Model Reference Technology)



# SBA for C2 at ESC: Model Reference Technology

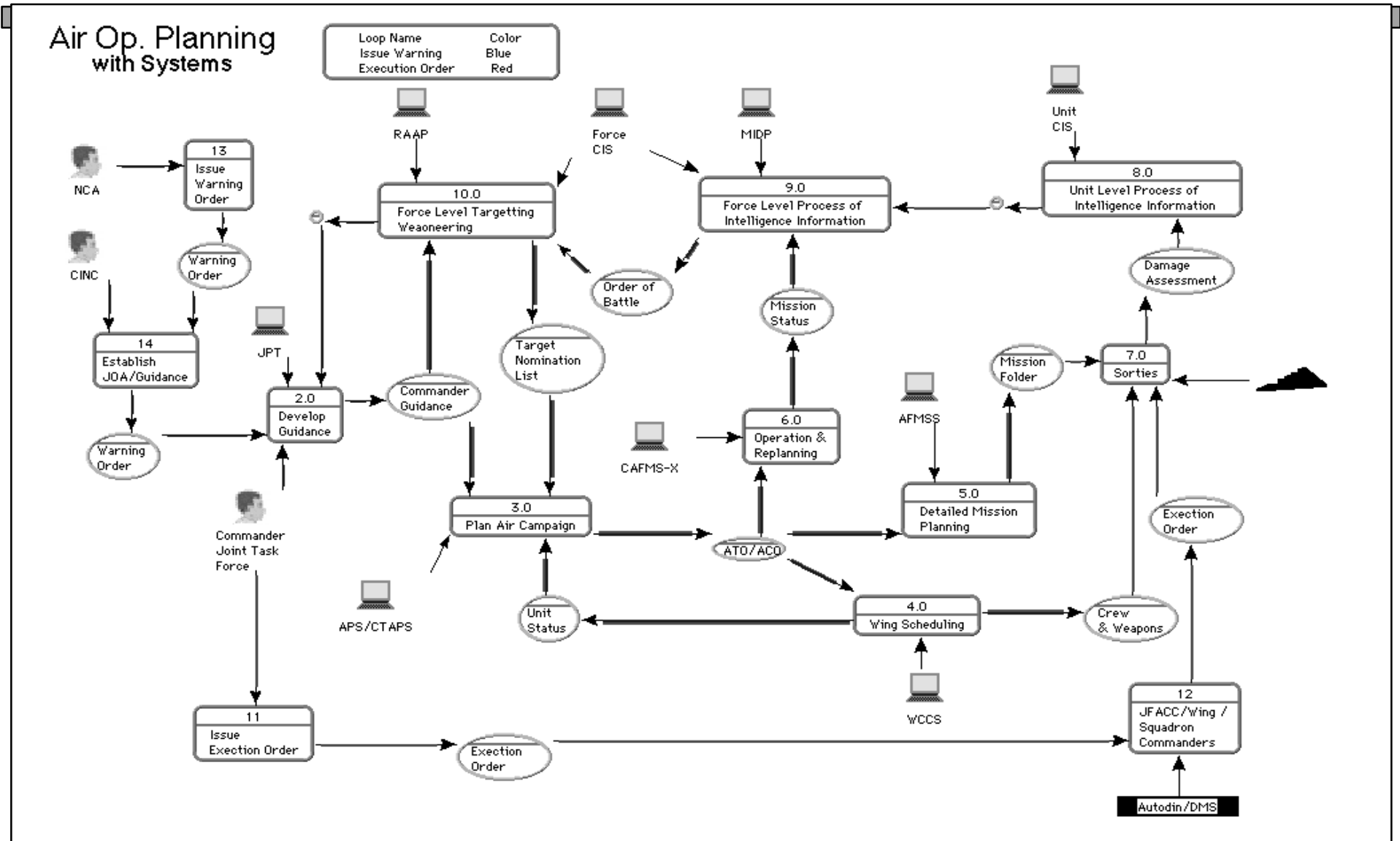


DIRECTORATE OF COMMAND & CONTROL





# Integrated Operational/Systems Architecture Threads





# SBA Analytical Tools: Examples

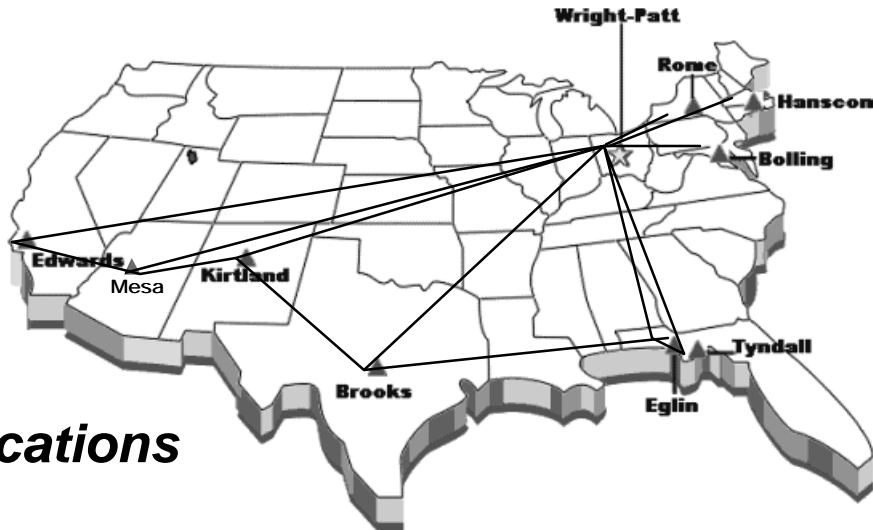


DIRECTORATE OF COMMAND & CONTROL

- 
- AFRL Collaborative Enterprise Environment
- 
- JMASS



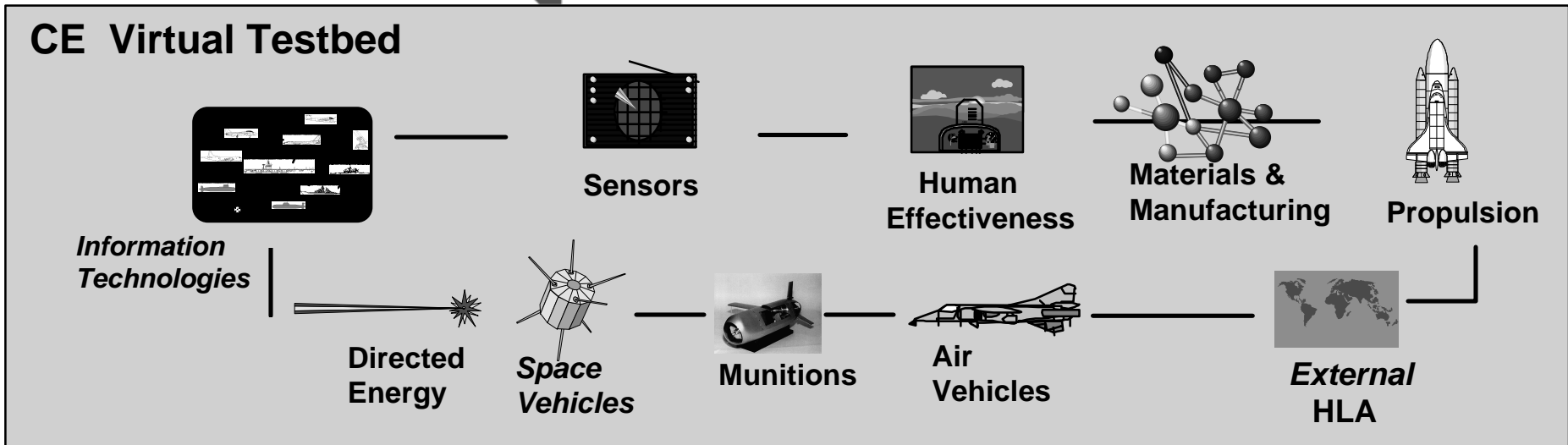
# AFRL Collaborative Environment Virtual Testbed



## DIRECTORATE OF COMMAND & CONTROL

- Requirements Definition
- Technology Integration
- Survivability/Vulnerability
- Military Worth
- Virtual Flight Tests
- Seamless Constructive/  
Virtual Simulation

**AFRL Locations**



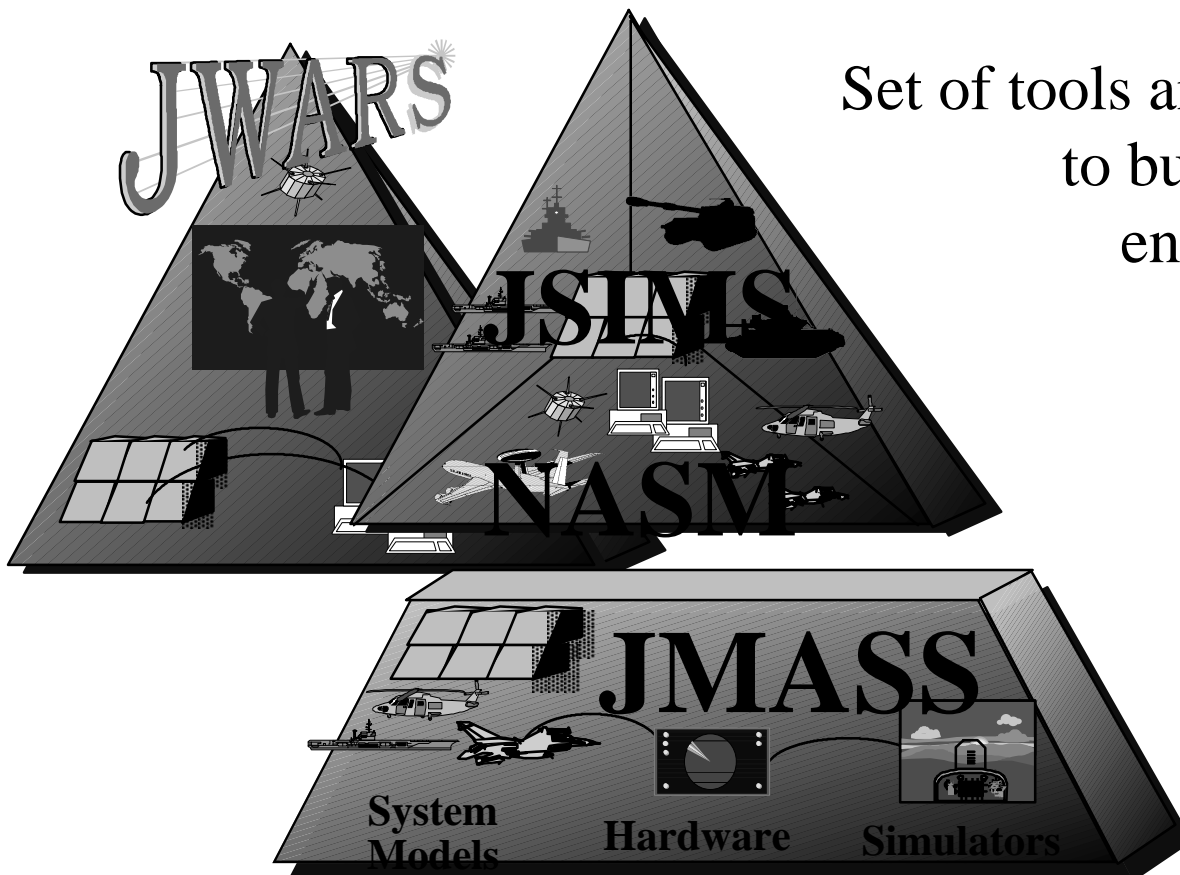
***“The Network is the Simulator”***



# SBA Analysis Tool: JMASS



DIRECTORATE OF COMMAND & CONTROL



Set of tools and services that allow user to build, configure and execute engineering and engagement level simulations

Now a Joint Program



# The Essence of JMASS

DIRECTORATE OF COMMAND & CONTROL

## ■ Model Standards

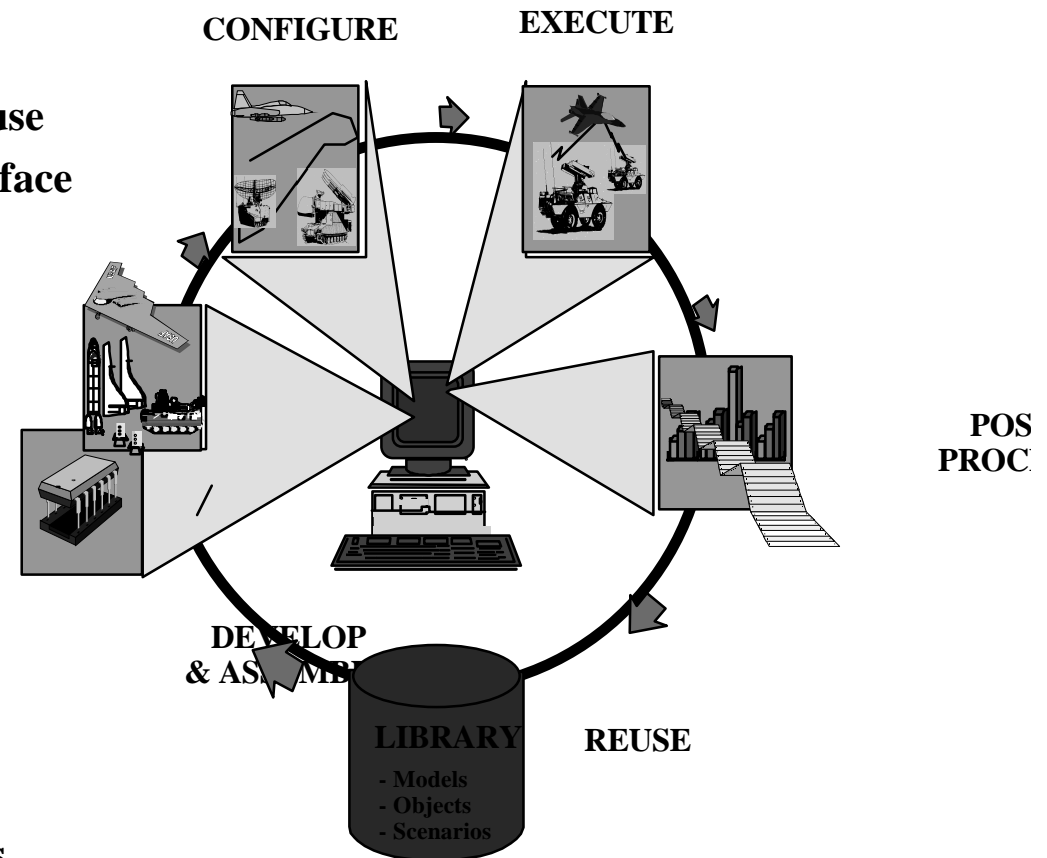
- ◆ SEI Software Structural Model for Reuse
- ◆ Model Application Programming Interface

## ■ Simulation Support Environment

- ◆ Simulation Engine
- ◆ Communications Architecture
- ◆ Visual Development Tools
- ◆ Analysis Tools
- ◆ COTS & Legacy Tool Interface

## ■ Model Library & Repository

- ◆ Local Model and Data Library
- ◆ Remote Model Repository
- ◆ Contains DIA-validated threat models



*Yield is common, reusable, interoperable, validated models*



# Summary



DIRECTORATE OF COMMAND & CONTROL

- **Simulation Based Acquisition provides framework to analytically link warfighter to developer, other stakeholders**
- **SBA approach will emphasize and improve analytical tools, product models, visualization**
- **SBA will enhance access to critical authoritative information needed for warfighter and developer tradeoff decisions**
- **Programs are already embracing the SBA construct**