



*Live-Virtual-Constructive
Distributed Environments
in Support of Test and Evaluation*

*Major Kelly A. Greene, Ph.D.
Air Force Agency for Modeling and Simulation*



NDIA 22nd Annual National Test and Evaluation Conference



U.S. AIR FORCE

Outline

LVC Distributed Environments in Support of T&E

- **Air Force Agency for Modeling and Simulation (AFAMS) Mission**
- **Air Force Modeling and Simulation (M&S) Thrusts**
 - **Accelerated Acquisition**
- **Live-Virtual-Constructive (LVC) Distributed Environments**
 - **Air Force Integrated Collaborative Environment (AF-ICE)**
 - **Joint Mission Environment Test Capability (JMETC)**
- **Test and Evaluation Activities using LVC Distributed Environments**
 - **Multi-Service Distributed Event (MSDE)**
 - **Joint Expeditionary Force Experiment (JEFX)**
- **Joint Test and Evaluation (JT&E) / Joint Feasibility Study (JFS) Activities using LVC Distributed Environments**
 - **Joint Test Environment Methodology (JTEM)**
 - **Joint Command and Control of Net-Enabled Weapons (JC²NEW)**
- **Our Future**
 - **Net-Centricity and Ultimately Net-Enabled Decision-Centricity**
 - **Testing in a Joint Environment**
 - **Key Pieces to Success**



U.S. AIR FORCE



Air Force Agency for Modeling and Simulation, Orlando Florida

“Advancing Air Force Modeling and Simulation”

Role

Air Force lead for translating policy/direction into effective M&S capabilities integrated across the Air Force and with the rest of the Department of Defense

Chain of Command

- SAF
- SAF/XC
- SAF/XCO
- AFAMS

People

- 74 Total
- 19 Military
- 16 Civilians
- 39 Contractors

Liaisons

- AFRC ■ DMSO
- AFRL ■ SOCOM
- AF/XO

Laying the Foundation

- M&S Foundations
- Databases/Repositories
- Standards/Coord Tools
- Architectures/Reqs
- AF M&S Strategy

Warfighter Applications

- Trng/Msn Rehearsal/Decision Spt
- A&S Constructive Environment
- Distributed Mission Operations
- Accelerated Acquisition
- Concept Initiatives/Demos
- Experiments/Tech Transition

Building the Community

- Publicizing M&S Story
- Education/Outreach
- Prof Development
- Adv Distr Learning
- Community Forums

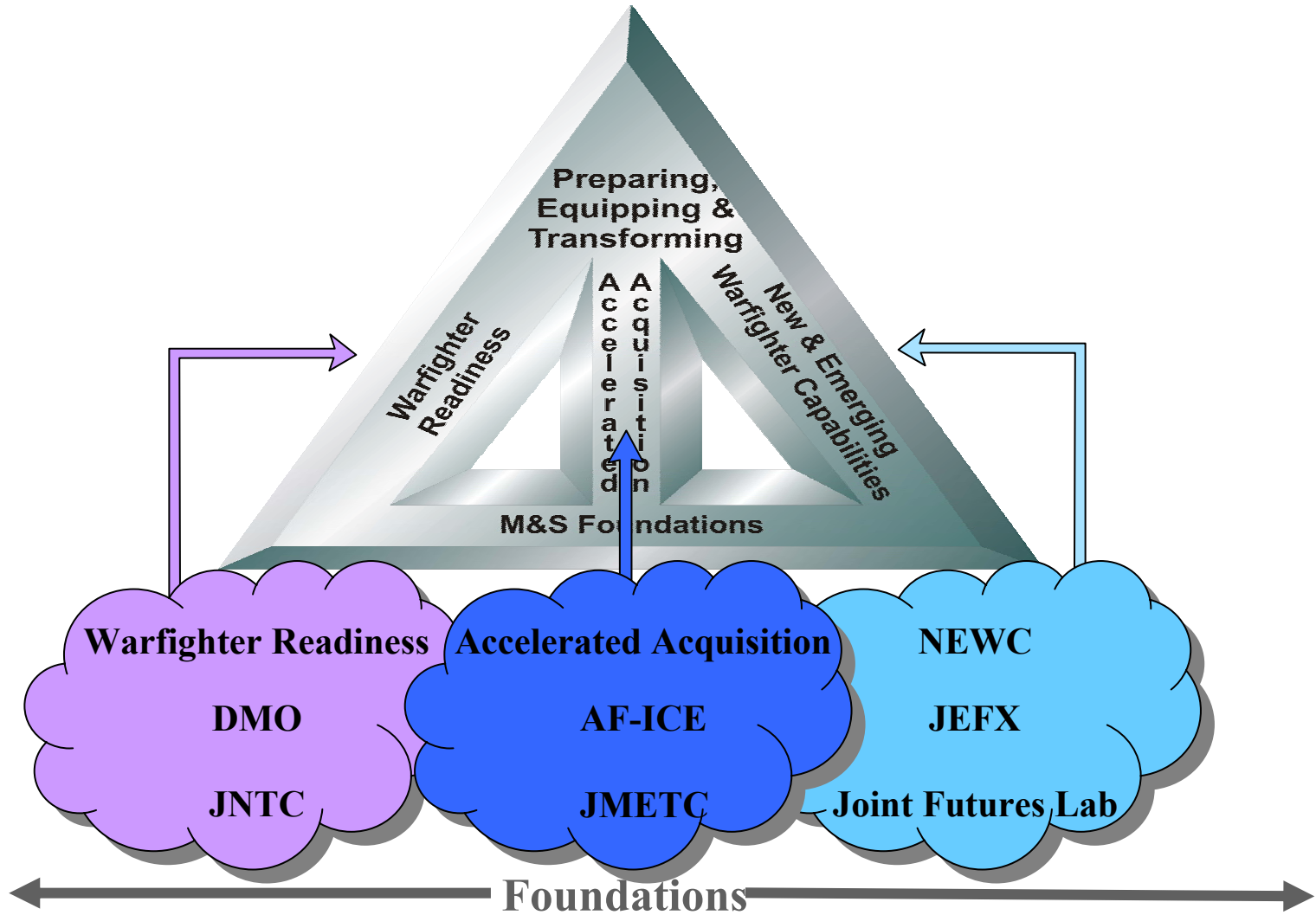
Concept Visualization

- Portal into M&S Exercises & Activities
- C4ISR Demos and Trials
- New Technology Demos



Air Force M&S Thrusts

U.S. AIR FORCE



Integrity - Service - Excellence

Air Force – Integrated Collaborative Environment (AF-ICE)

New & Emerging Warfighting Capabilities **Accelerated Acquisition** **Warfighter Readiness**

Analytical Needs



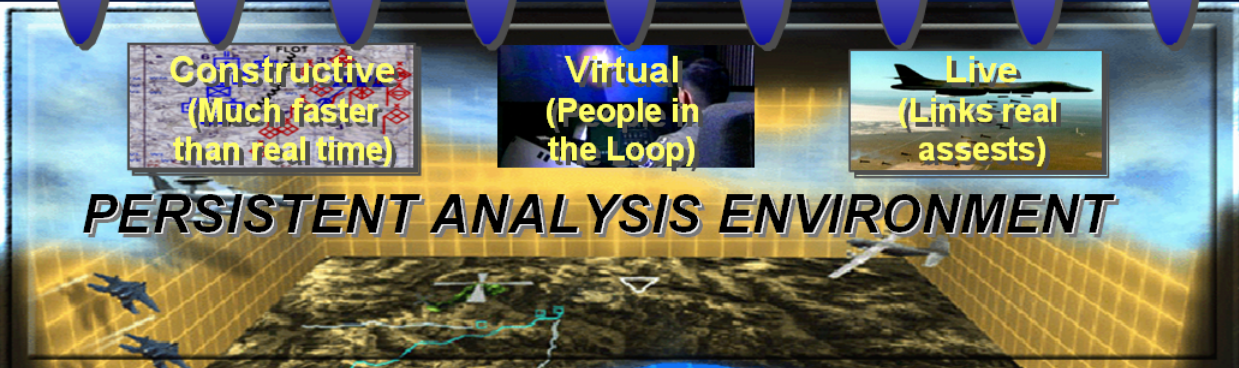
MS&A Collaboration Capability
Technical and Business Operations and Solutions
Acquirers, Testers, Operators, Industry

Standards
 Procedures
 Templates
 Business rules
 M&S meta data
 Lessons learned
 M&S Reuse

Foundations M&S
 Technical Reference Model

Legend

- Gaps/ Questions
- Analytical Needs
- Decision Quality Information Analysis



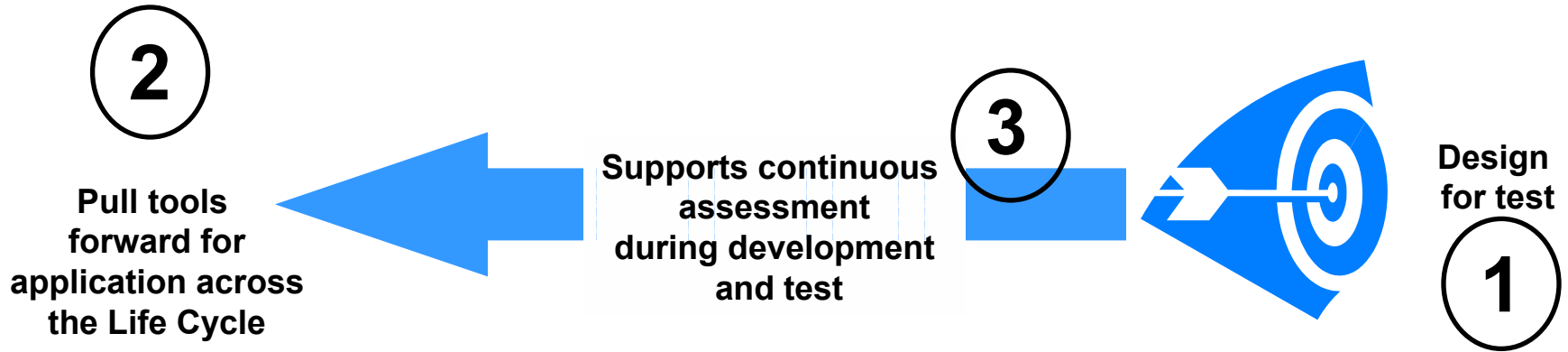
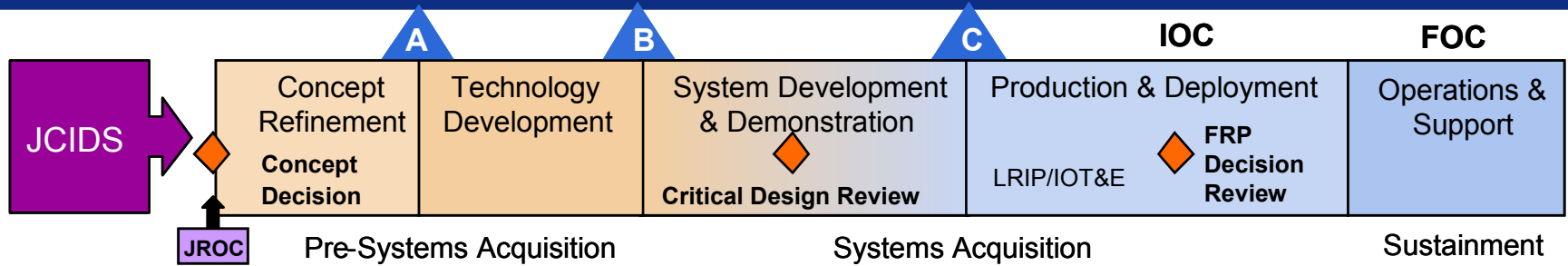
AF-ICE is to Acquisition what DMO is to Training

Decision-Quality Analytical Information For War-Winning Capabilities



Begin with the End in Mind . . . T&E

U.S. AIR FORCE

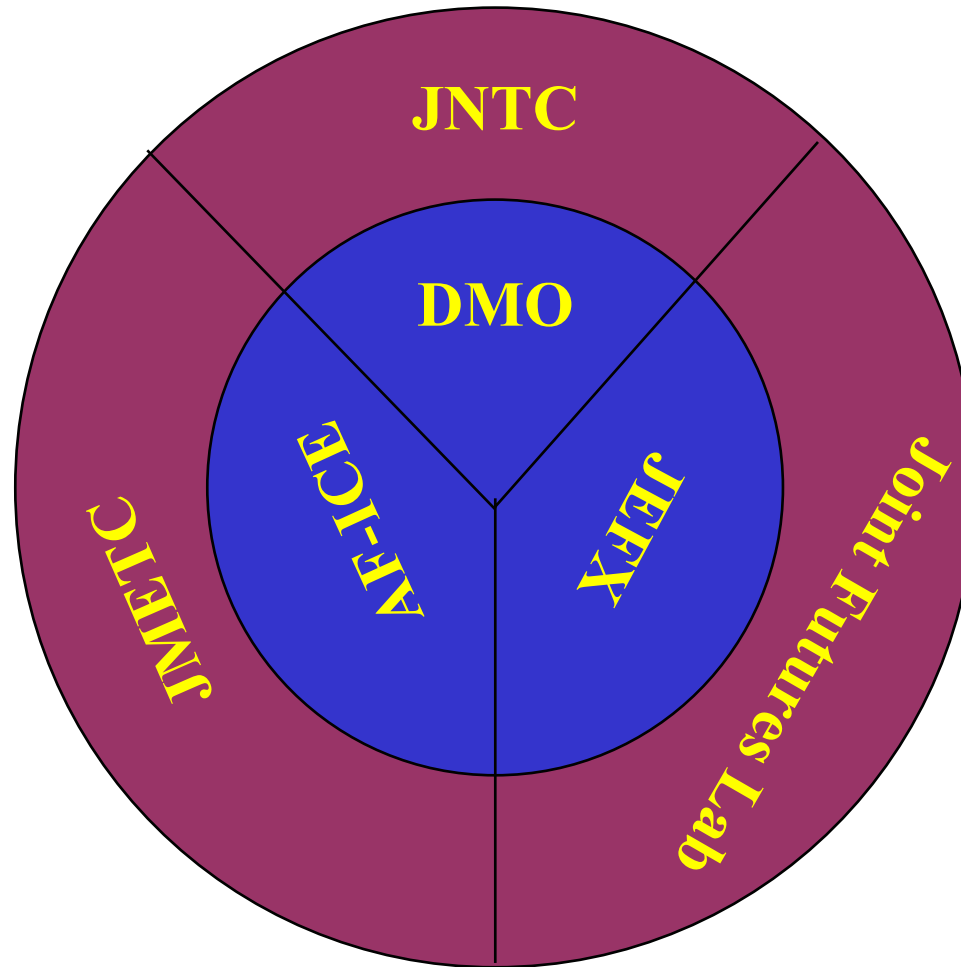


Goal – Reuse data across the acquisition timeline... reduces risk and cycle time



U.S. AIR FORCE

Joint Mission Environment Test Capability (JMETC)



Multi-Service Distributed Event (MSDE) Aug 2005





Joint Expeditionary Force Experiment (JEFX)

U.S. AIR FORCE

- **JEFX '06: Exploration of Network Centric Operations (NCO)**
 - 9 Air Force Initiatives (ConstellationNet, AOC Fusion, Homeland Defense, etc)
 - 5 Army Initiatives (Future Combat Systems)
 - 1 Navy Initiative (Global Hawk Maritime Demonstration)

- **Theater Battle Management Core Systems (TBMCS) Version 1.1.4 Development Test**
 - Theater Battle Operations Net-centric Environment (TBONE)
 - Spirals Nov 05, Jan 06, Mar 06
 - Execution Apr-May 2006

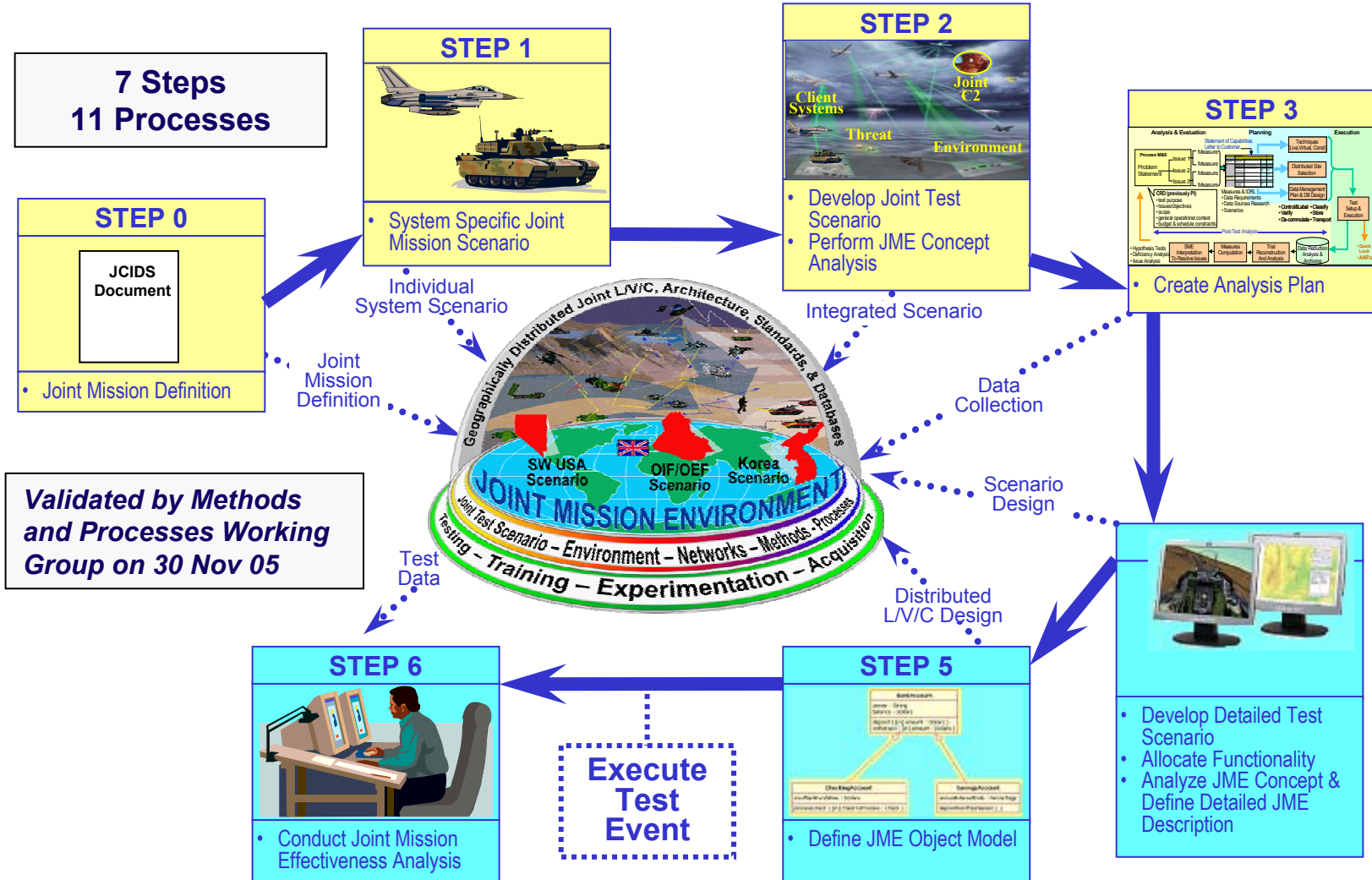
- **JEFX '08 Theme to Focus on Joint Command and Control**





U.S. AIR FORCE

Joint Test Environment Methodology (JTEM)





U.S. AIR FORCE

Joint Command and Control of Net-Enabled Weapons (JC²NEW)

- **Weapon In-flight Tracking**
 - **Strike De-confliction and Synchronization**
 - **Health, Arming Status, Location, Target Acquisition, ...**
- **Weapon In-flight Target Update**
 - **Key For Moving and Mobile Targets**
 - **Key Enabler for Interdiction Role**
- **Weapon Retargeting**
 - **Importance Increases with Standoff**
 - **Enhanced Time-Sensitive-Target Capability**
- **Weapon Impact Assessment (WIA)**
 - **Post-strike Assessment and Re-strike Decisions**
- **Weapon Abort**

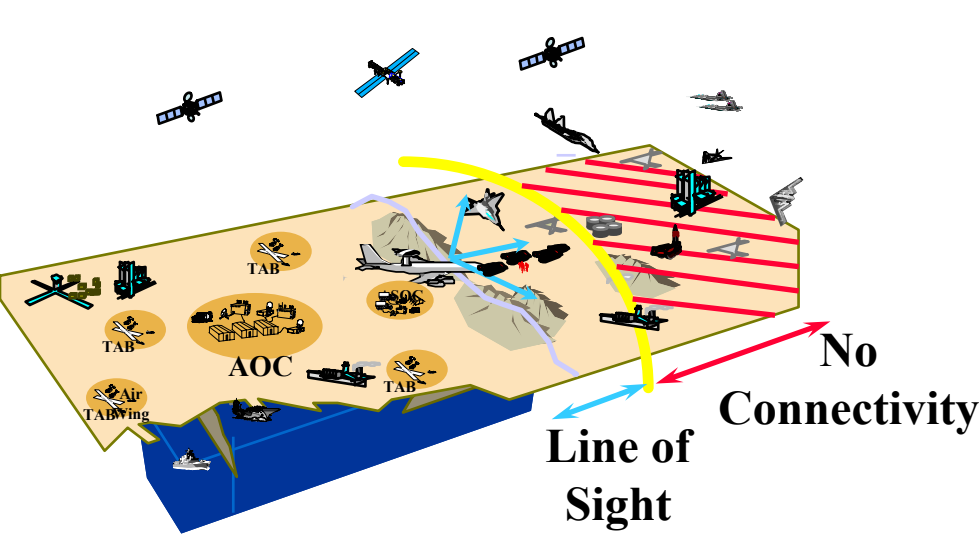


Net-enabled weapons complete the “Kill-Chain” – from desired actions to direct effects on the battlefield, while providing the conduit for near-real-time feedback to decision makers



U.S. AIR FORCE

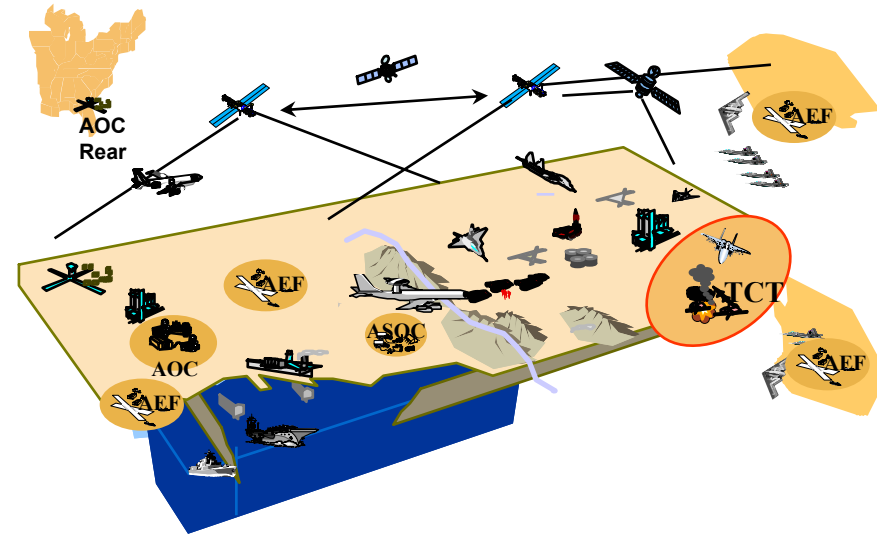
Net-Centricity



STOVE-PIPES

Platform-Centric Operations

- Limited Situational Awareness
- Limited Real Time Control
- Limited En Route Planning



NO WARRIOR FIGHTS ALONE!

Net-Centric Operations

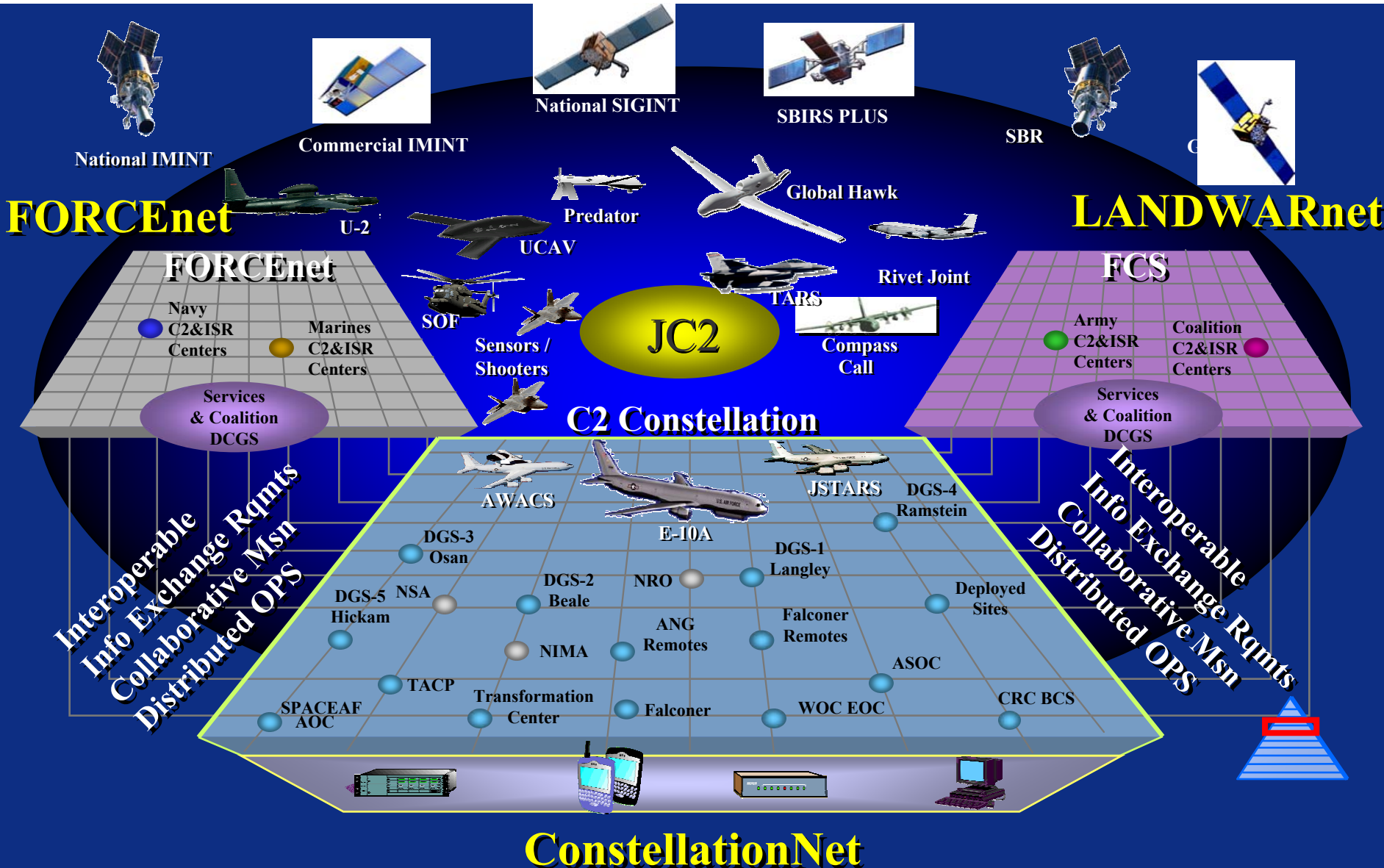
- Distributed Forces
- Family of Integrated Operational Pictures
- Real Time Situational Awareness
- Precision Engagement
- En Route Planning & Targeting

*The Ultimate End State is Decision-Centric Operations
Employing a Network-Centric Infrastructure
"NETWORK-ENABLED WARFARE"*



U.S. AIR FORCE

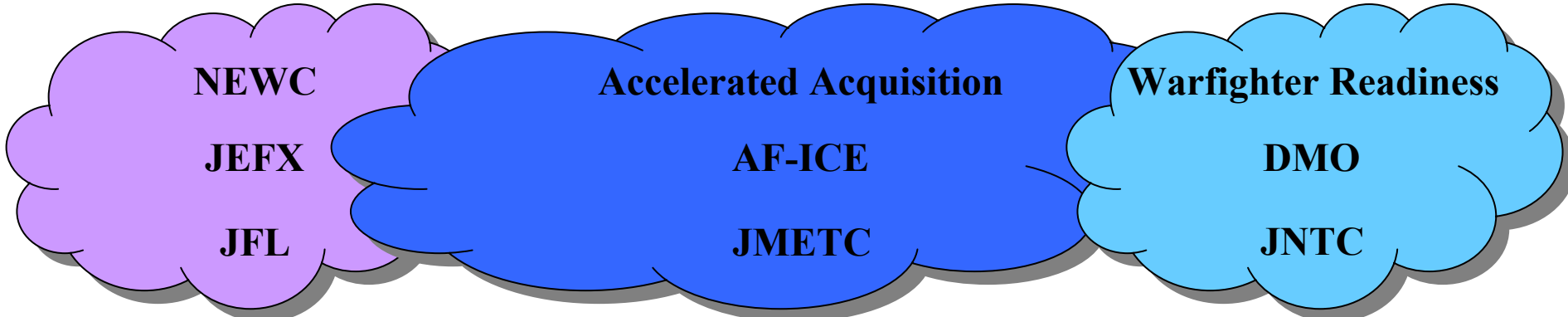
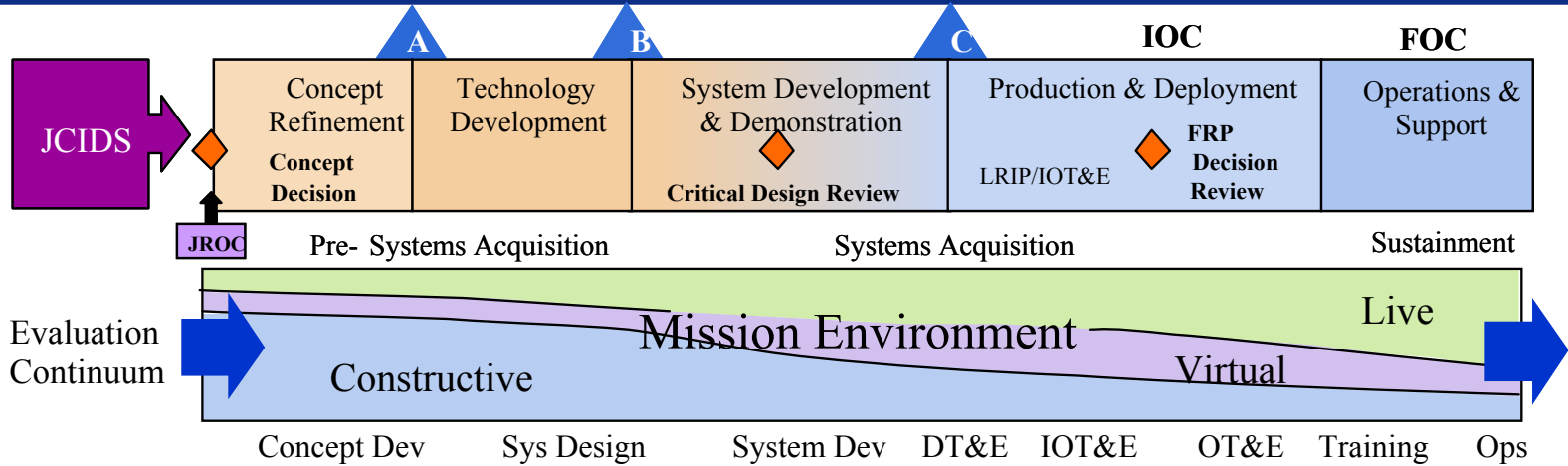
Decision-Centricity Joint Integration through the Global Information Grid





Testing in a Joint Environment

U.S. AIR FORCE



Foundations

Integrity - Service - Excellence

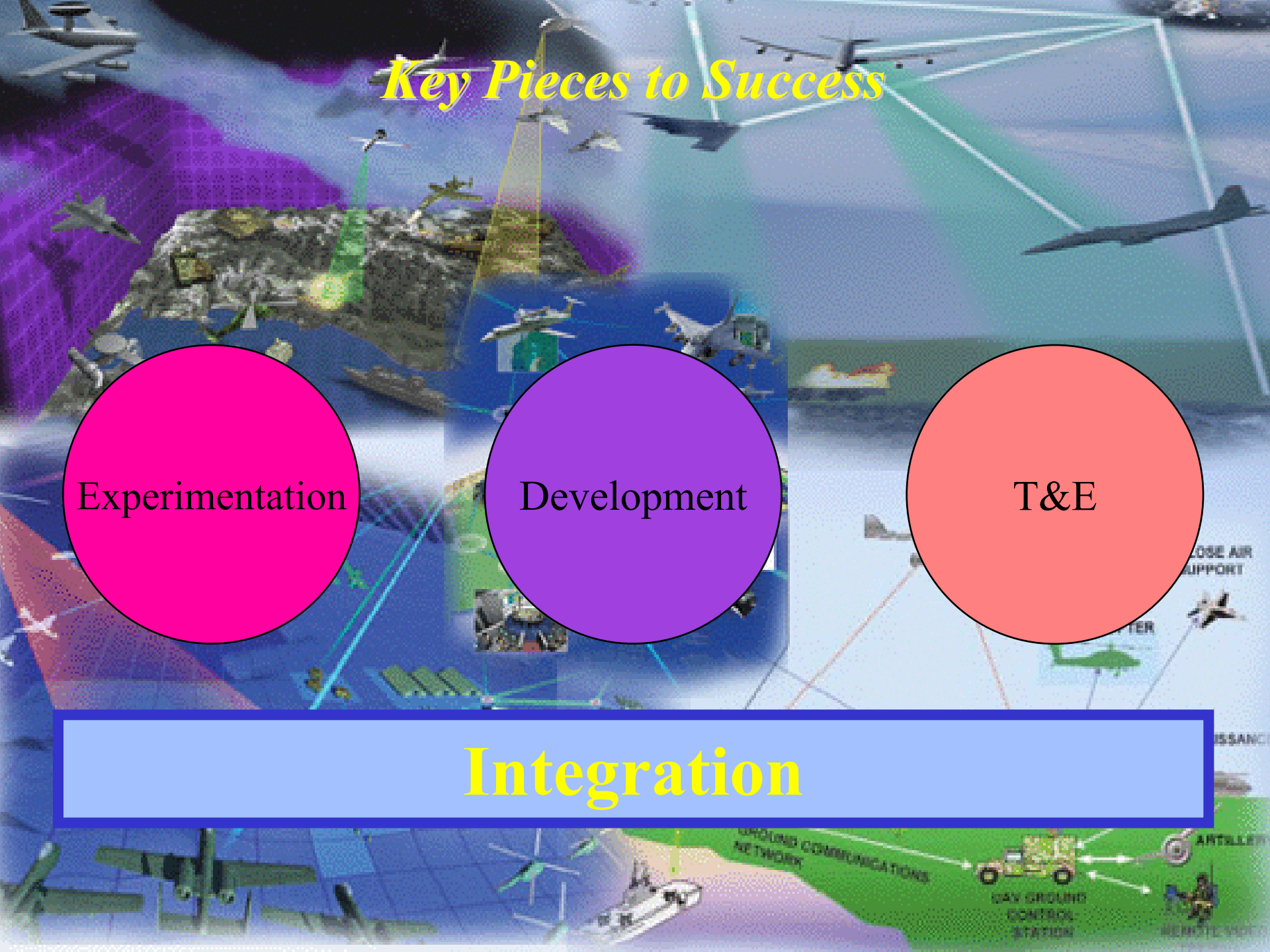
Key Pieces to Success

Experimentation

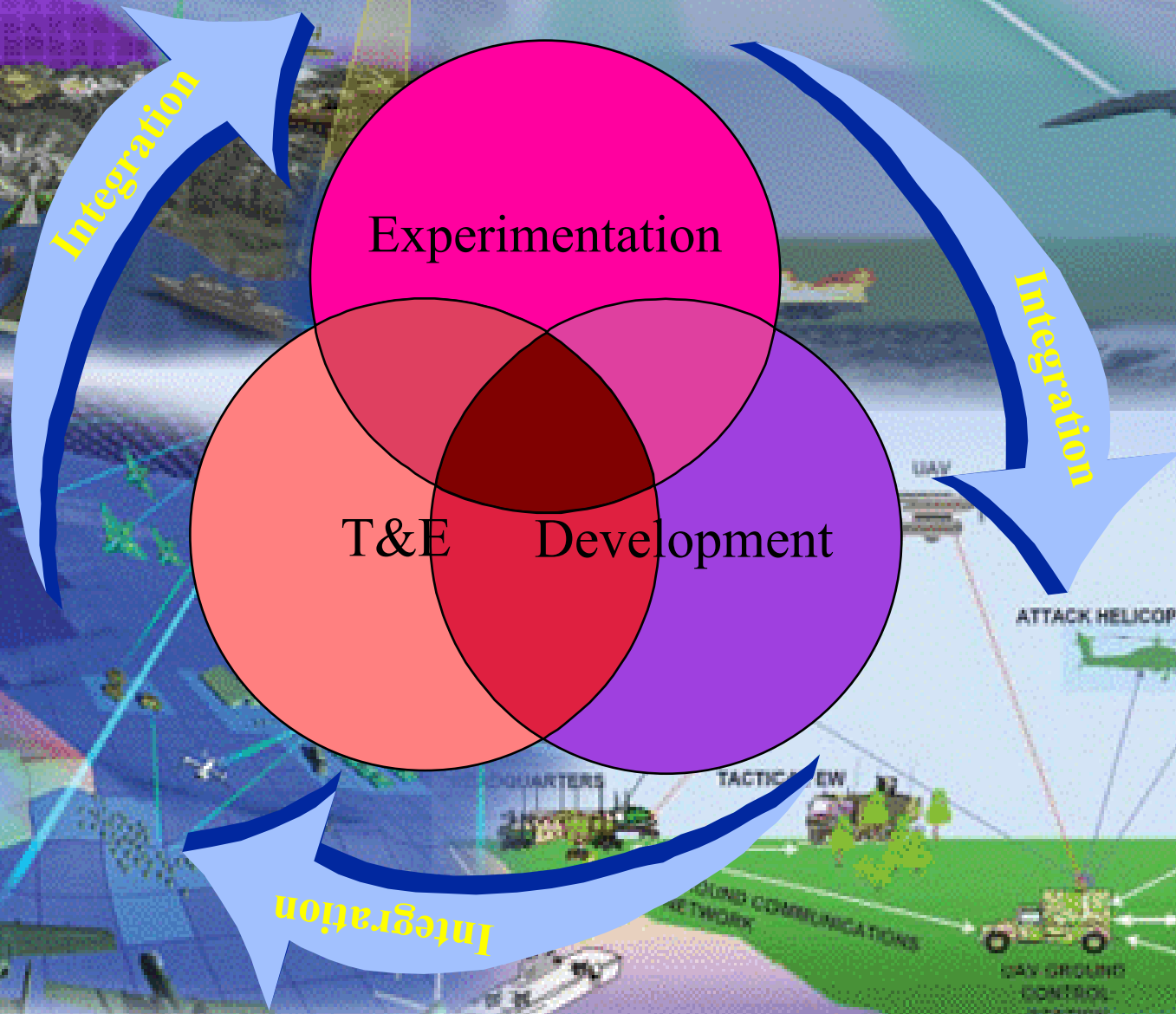
Development

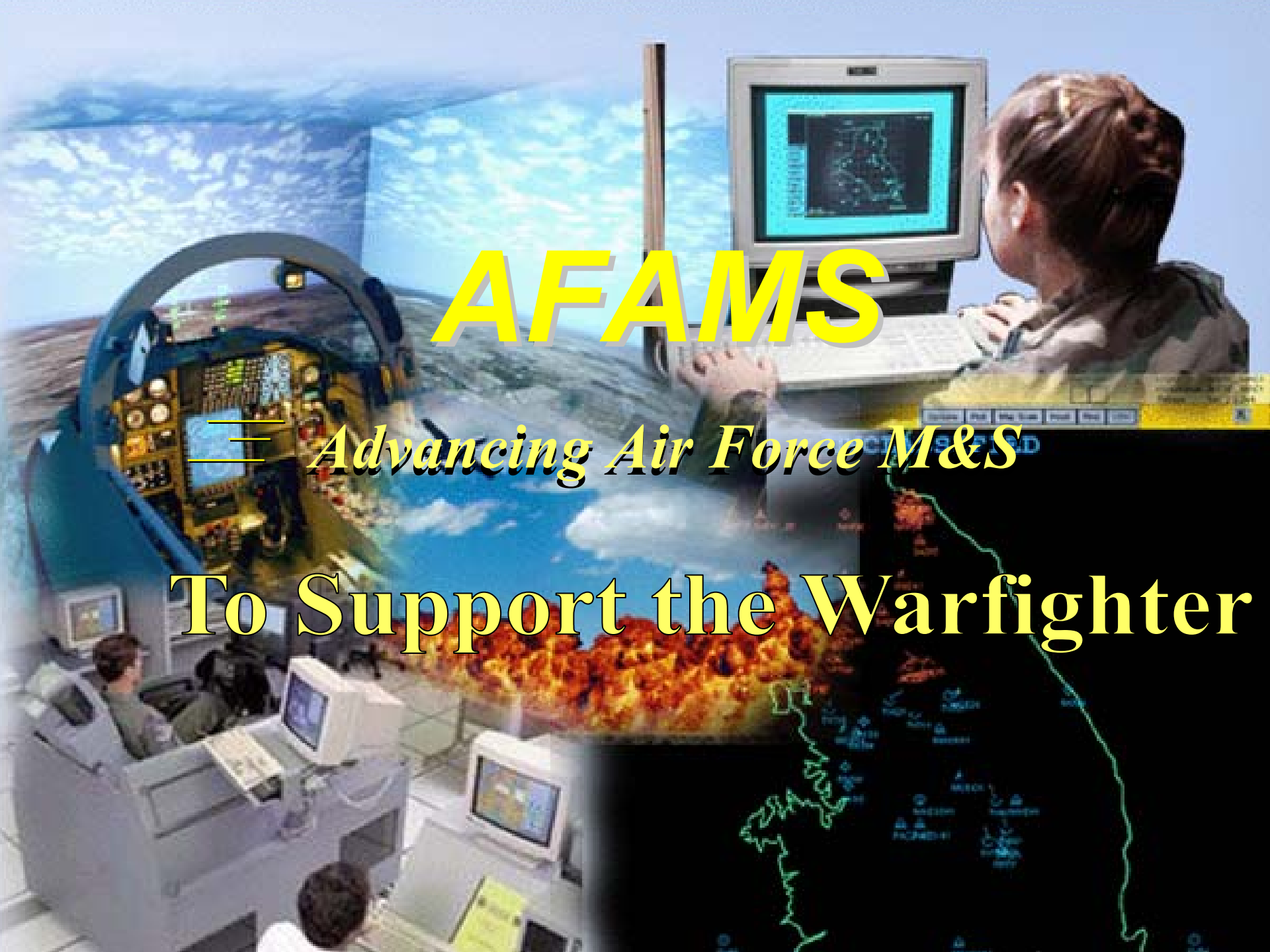
T&E

Integration



Key Pieces to Success An Iterative Cycle





AFAMS

— *Advancing Air Force M&S*

To Support the Warfighter