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# Life Cycle Management Center



AFLCMC... Providing the Warfighter's Edge



## Joint Simulation Environment for United States Air Force Test Support

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*Timothy Menke,  
Technical Director,  
USAF AFMC/AFLCMC/XZS (SIMAF)  
(+1) 937-938-3772  
email: [timothy.menke@us.af.mil](mailto:timothy.menke@us.af.mil)*



# Overview



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- What is the JSE?
- Test Vision
- Test Challenges
- Future Test Needs
- Design
- Regions of Interest
- OV-1
- Architectural View
- Message Exchange Example
- Summary



# The Joint Simulation Environment



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- Chief of Staff of the Air Force (CSAF) Directed Activity
- Funding started in FY19
- Initial Operating Capability in 2023
- Test Capabilities at Edwards Air Force Base and Nellis Air Force Base
- Continue to team with our Navy/Marine Corps partners
- Build a Digital Test Environment to support Developmental & Operational Test as well as support/use for Training



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# The Test Vision



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- **Multi-Platform Capable**
  - Supports Multiple Programs
- **Government Owned Environment**
  - Level Playing Field
- **Open Architectures**
  - Service Based Approach
- **Interoperability**
  - System of Systems
- **Opportunities for Partnering**
  - Sharing of Ideas & Information





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# The Test Challenge



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- **Geographical Constraints**
  - Physical Size, Longer Range Weapons, Cooperative Operations
- **Technology Limitations**
  - Inability to replicate critical phenomenology at the appropriate fidelity
- **Electronic Warfare**
  - Inability to replicate dense and complex electronic warfare in real time
- **Frequency Spectrum**
  - Limitations to the type/strength of electronic signals that can be broadcast
- **Operational Limitations**
  - Limitations on the full range of engagements within a kill chain
- **Safety**
  - Limitations on aircraft maneuvers in airspace

**Aircraft capabilities have outgrown our physical test ranges!**



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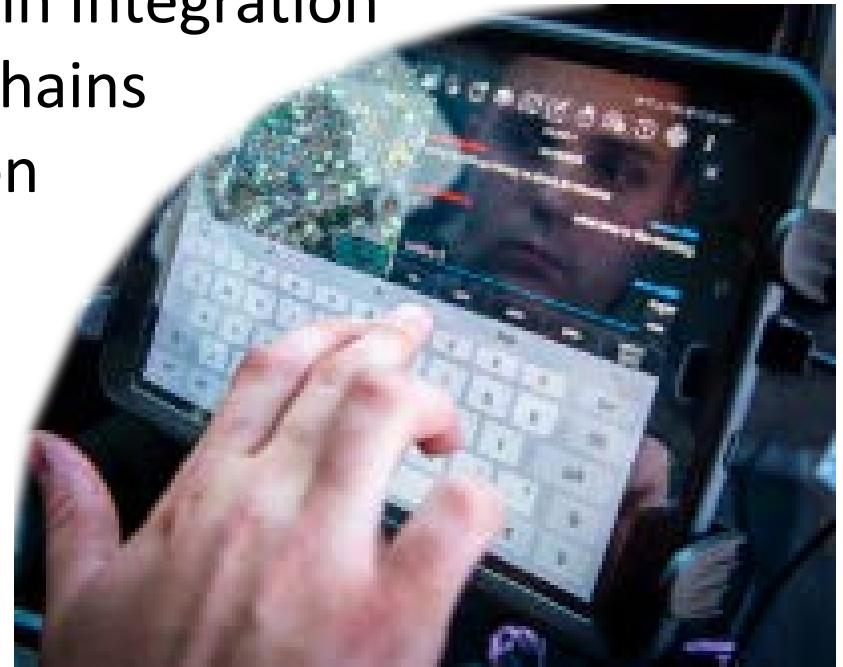


# Future Test Needs

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- Battlespace Density/Complexity
- Geo-Specific Place/Time for Testing
- Future Rapid/Adaptive Threat Capabilities
- Multi-Domain Integration
- Future Kill Chains
- Collaboration
- Automation
- Weather
- EW
- Security



**Threat Improvements, Technology Improvements, Information Centric War-Fighting, & Test Complexity are driving the need for new Test Capabilities**



# Design Attributes



- Establish a Baseline – Low Barriers for Entry
- Limit New Development
- Use Rehosted Operational Flight Program (OFP) code
- Design an Agnostic Information Broker
- Support Distributed Operations
- Blend Commercial/Government Environments
- Foster Collaboration

**Balance Cost and Risk to produce continuous, measurable test capabilities!**





# JSE\_AF Regions of Interest

## Context/Constraints for the Battlespace for Test



### REGION A:

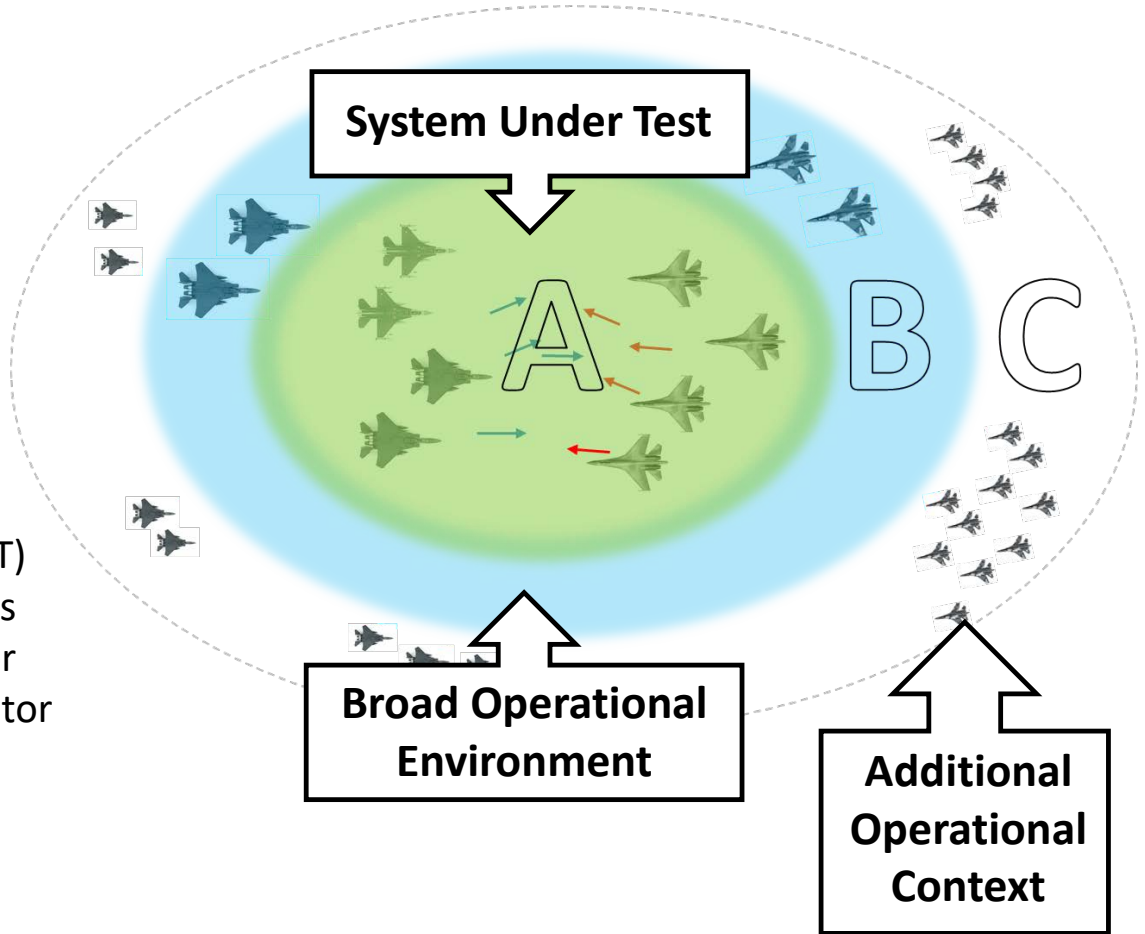
- ✓ System Under Test (SUT)
- ✓ Virtual Air Threats (VAT)
- ✓ Lower Fidelity Blue Simulators
- ✓ Weapon Models
- ✓ Common Services required to support the SUT
- ✓ Threat Components
- ✓ Analytic Services

### REGION B:

- ✓ "Stand By" Virtual Air Threats (VAT)
- ✓ Lower Fidelity Blue System Models
- ✓ Blue Constructive Entity Generator
- ✓ Threat Constructive Entity Generator

### REGION C:

- ✓ Low Fidelity Constructive Air Entities for Battlespace Context



Regions of various fidelities to support Test needs





# Joint Simulation Environment

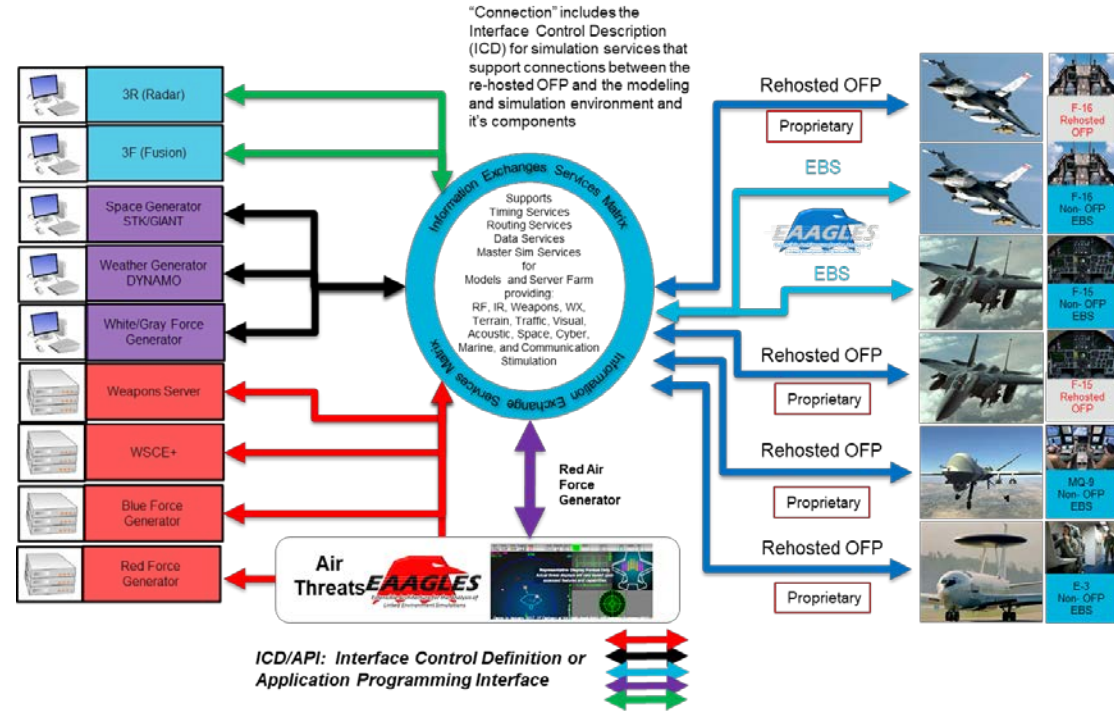


## Operational View (OV-1)

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### Attributes:

- Uses an agnostic Information broker
- Blends Components into a seamless environment
- Fidelity where it is needed



### Services:

- Core – Moves properly formatted and timed information
- Common – Ensures a fair fight for virtual entities
- Edge – Operational Components (simulators, environments, etc.)
- Exercise – Tools to aid the user in operating the JSE for Test or Training



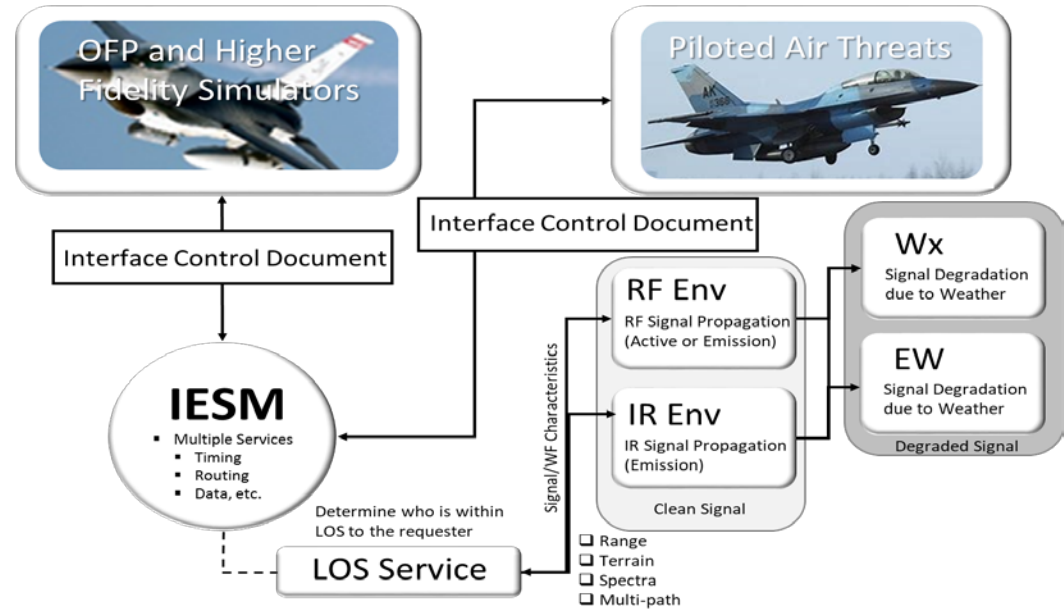
# Joint Simulation Environment



## Architectural View

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- Integration of Services
- Routing of Information
- Ensuring Quality of Service is met
- Architecture is designed around support to the System Under Test (SUT) or Training (SUTR)



- Developed through an iterative agile process with contributions from multiple US partners
- Continuous development of the baseline over time incorporating more systems, additional features, and improved model fidelity

Common Architecture between the United States Air Force, Navy, & Marine Corps



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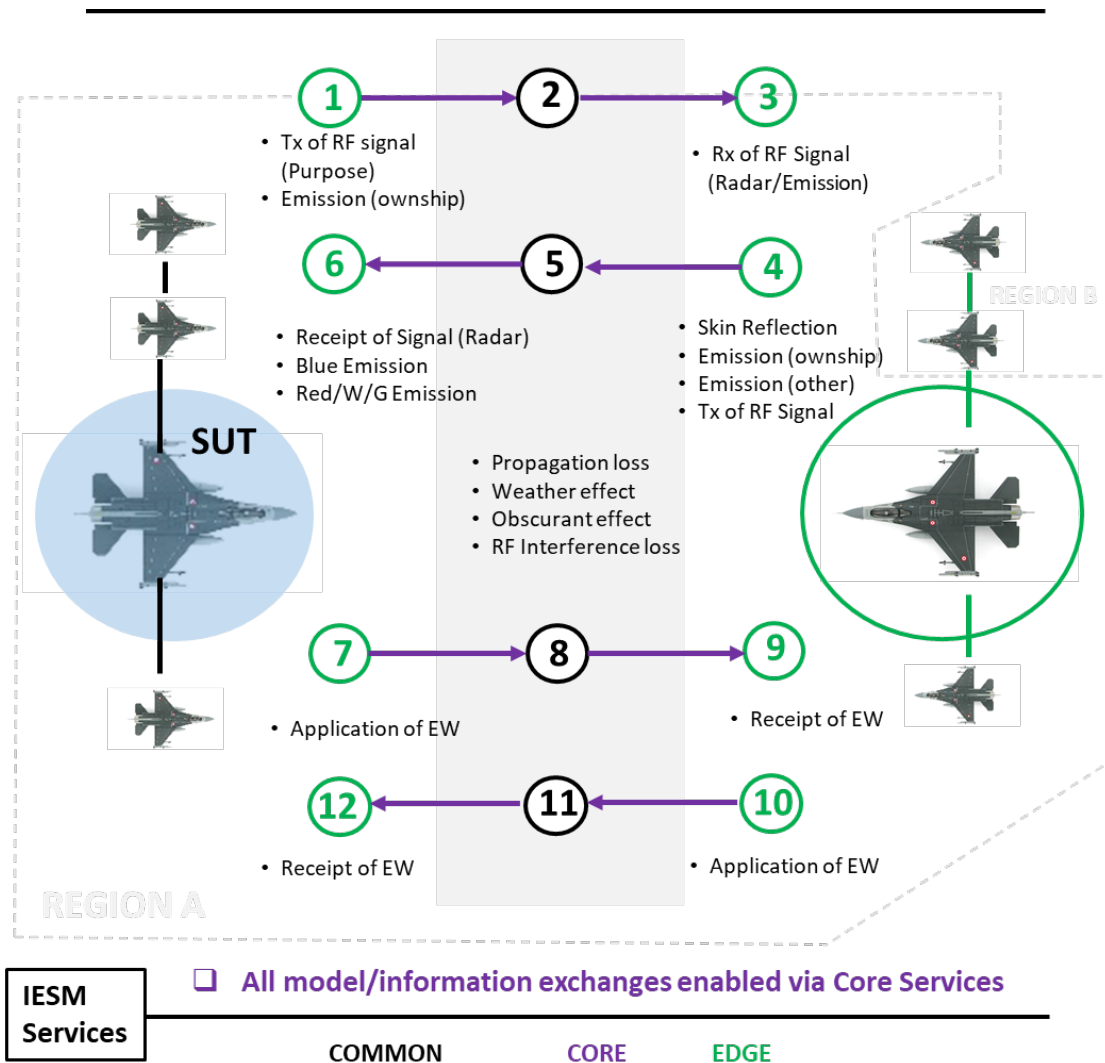
# Joint Simulation Environment

## RF Exchange Example



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- Services work in concert to appropriately move data
- Services are developed at multiple locations and can be readily upgraded
- Information flows between all edge services (as required) with virtual entities utilizing common and core services to support required fidelity





# Summary



- The Joint Simulation Environment (JSE) is under development with an IOC of 2023
- This Government owned test capability will augment the USAF, USN/USMC existing physical test ranges with a digital test range
- JSE is a service-based open-architecture to address future test needs