



AFOTEC Technology Challenges

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Overview



- **AFOTEC Mission...Background**
- **Technology challenges**
 - 5th Gen system of systems terrain
 - Model and Simulation
 - Cybersecurity testing
- **Closing Thoughts & Discussion**





Mission



**Test and Evaluate
New Capabilities in
Operationally
Realistic
Environments to
Inform Warfighters
and Influence
National Resource
Decisions**



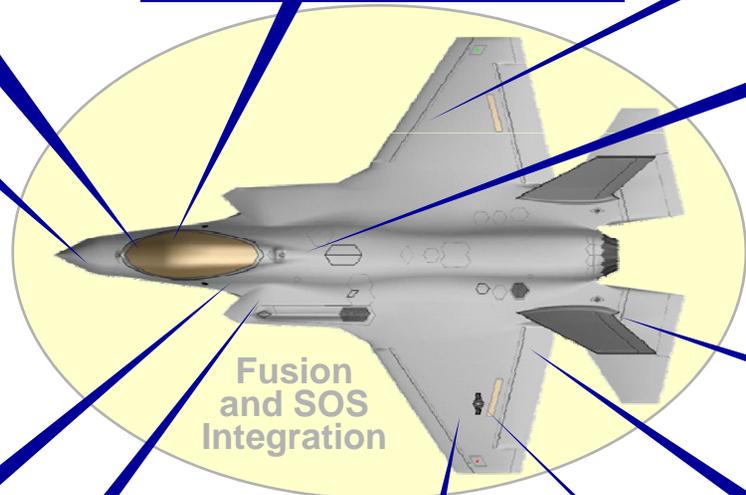


Today's AFOTEC

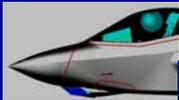




F-35 & F-22 as a System-of-Systems



EOTS



Low Profile Window
Optimized for Visibility &
Configuration Integration

Radar



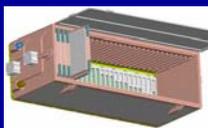
Half the Weight,
Half the Cost Goal
Being Realized

ICP



COTS Technology Refresh
Demonstrated

Common Components



Economy of Scale Savings

Cockpit



Projection
Display Technology for
Enlarged Screen Area
and Availability

EW



More Capability at
1/2 the Cost -
Digital Modules,
Production Processes,
Apertures

DAS



Demonstrated
Significant Contributions
to Situation Awareness

CNI



Critical H/W Elements and
S/W Reuse Demonstrated

Weapons



Finalized Carriage Concepts
Support All Weapons

Mission Support



Finalized Carriage Concepts
Support All Weapons

Open Architecture / Software

Standard Interfaces, Loose
Coupling, Object Oriented
Design, Commercial Tools
for Simpler Integration

Fusion
and SOS
Integration



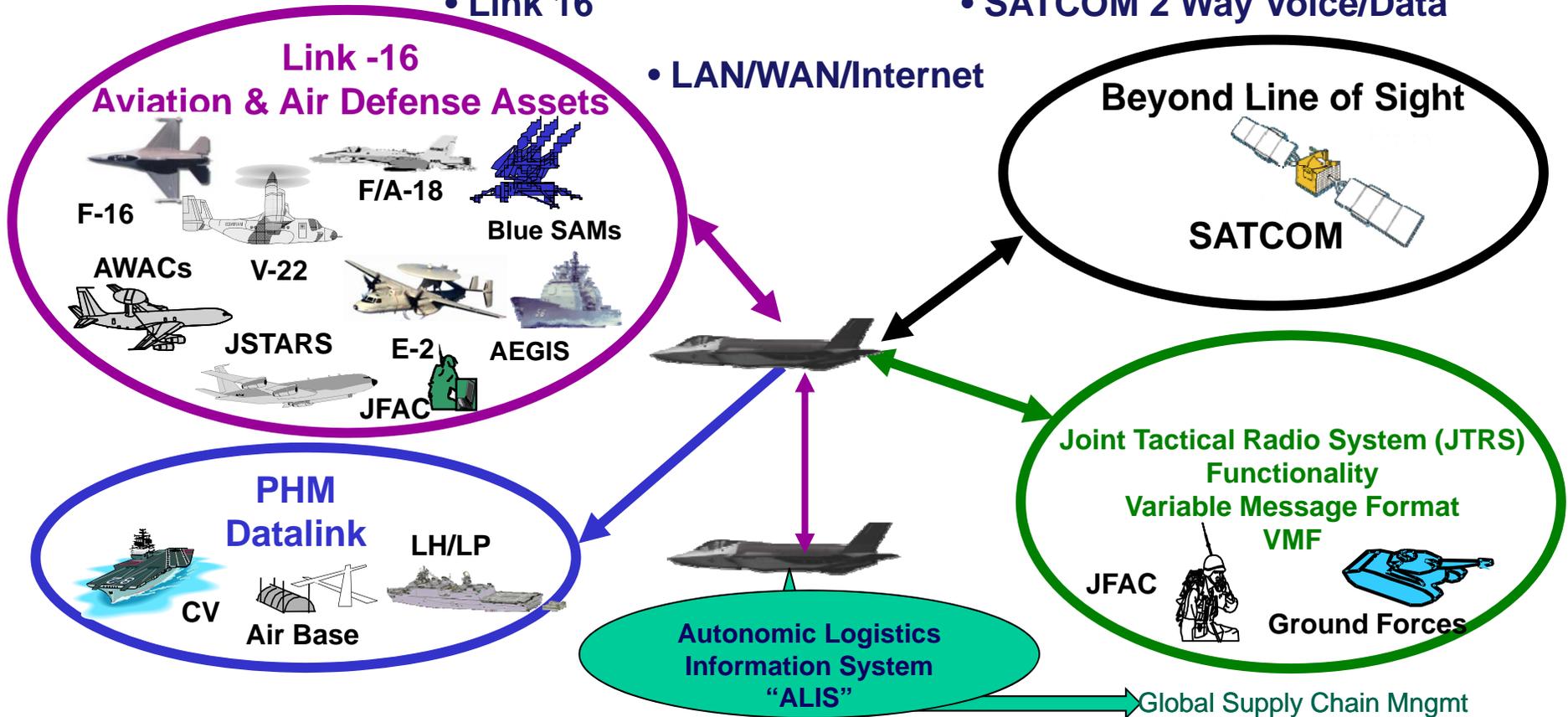
“A System-of-Systems-of-Systems”



- Link 4/ACLS, ICLS
- Link 16

- UHF/VHF Voice/Data
- SATCOM 2 Way Voice/Data

• LAN/WAN/Internet



94 Information Exchange Requirements to Ensure Interoperability Across US and Coalition Forces



S-o-S Testing Challenges



- **Where do you draw the test boundaries on a SoS weapons system?**
 - Fifth-generation platforms are redefining classical boundaries as systems evolve from cooperative...to integrated...to *interdependent*
- **How do you appropriately measure “suitability”, “effectiveness” and “Mission Capability” in a System-of-System weapons platform?**
 - If the autonomic Logistics Information System is compromised can the F-35 be Suitable and Mission Capable in the operational environment?
- **Open-air testing constraints**
 - GPS jamming restrictions
 - Full system employment constraints due to adversary exploitation concerns



5th-Gen Testing Challenges



- **Raptors & Lightnings have voracious appetites; they chew through the adversary with volume & velocity...**
 - Very difficult to generate the threat density and complexity to meet 5th-gen operational test requirements
 - Advanced SAMs, advanced adversary aircraft, and Digital Radio-Frequency Memory (DRFM) Jamming
- **Creating a complex, threat-dense environment is key to an effective 5th-gen IOT&E and for accurately quantifying operational risk**
 - Limits to what can be accomplished in the air
- ***How do we crack this nut???***



Modeling & Sim Challenges



- **Creating an advanced modeling & simulation environment**
 - There are tough challenges posed by 5th gen M&S:
 - Creating the virtual battlespace and how the stealthy air vehicle dynamically interacts within it
 - Accurately modeling advanced threats
 - Inserting blue forces into the virtual battlespace
- **Creating this environment is key to an effective 5th gen IOT&E and for accurately quantifying operational risk**





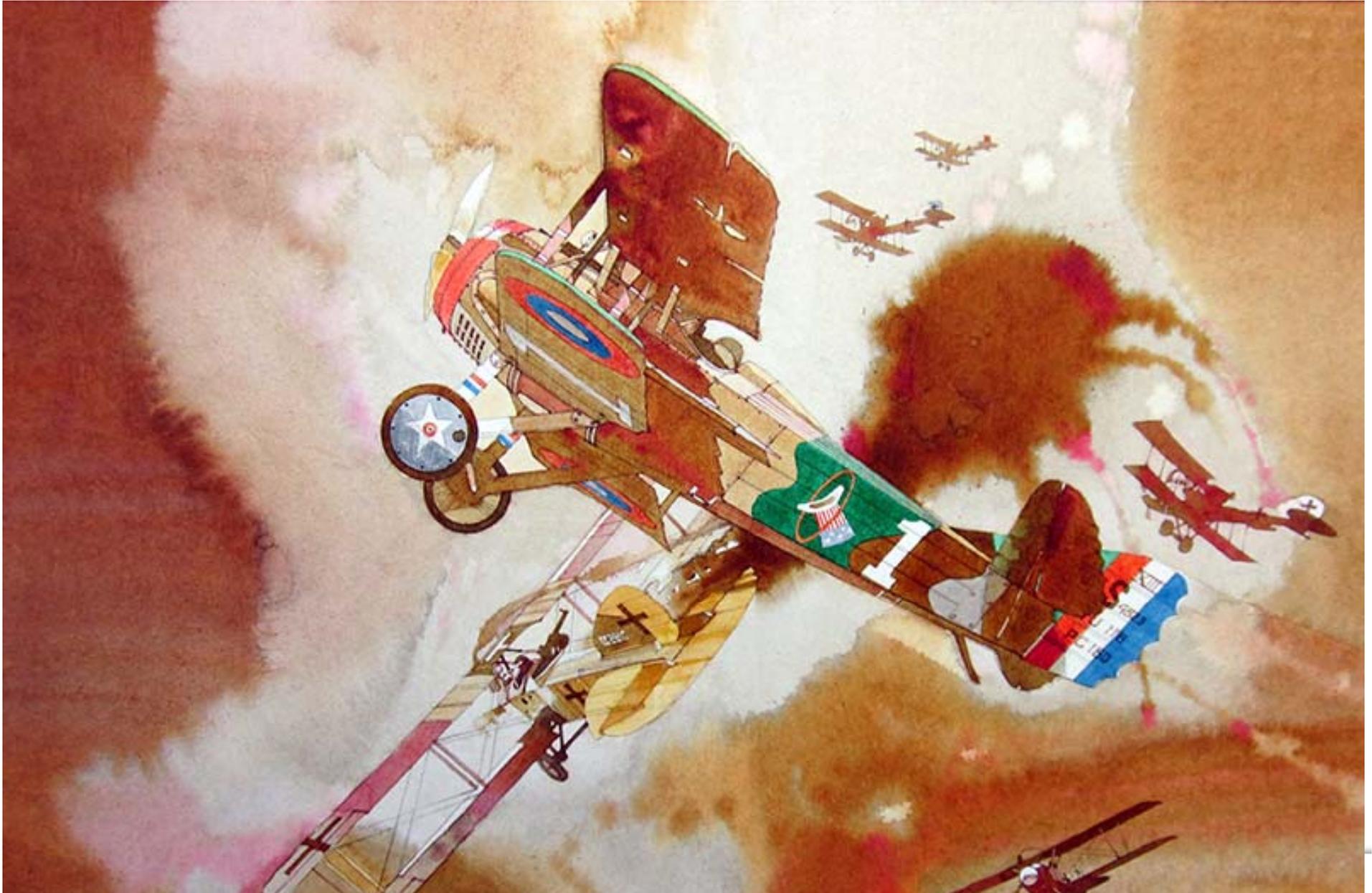
Cyber testing



- **Complex task to define “cyber boundaries”**
 - **Must take a system-of-systems approach**
 - **Information assurance & Risk Management good for IA but what about Mission Assurance?**
- **Cyber warriors are “HD/LD” assets**
 - **Can’t grow them fast enough to meet demand signal**
 - **Need to grow weapons and platform experts and space expertise**
 - **Need to educate everyone in this area**
- **AFOTEC is reaching out for assistance:**
 - **To the Total Force for assistance**
 - **To AFRL--bringing a “STEM” analytical approach to security**
 - **To AF Test Center to partner on assessment teams**
 - **Taking advantage of intern programs**



Questions & Comments





Back up material



JSF Autonomic Logistics System



Highly Supportable Aircraft

- Smart / Reliable Design
- Prognostics and Health Management
- Remove and Replace (R/R) Maintenance
- On Condition Maintenance

Training System

- Integrated Training
- Embedded Pilot Training
- On Demand Maintenance Training
- Air Vehicle Software Reuse



Support System

- Sustaining Engineering
 - 24/7 Help Desk
- Electronic Joint-Service Tech Data
- Intelligent Maintenance Management
- Global Supply Chain Insight
- Support Equipment Management

Autonomic Logistics Information System

- Distributed Information System
- Enterprise Resource Solution
- Secure
- Scalable
- Deployable

Cyber-enabled Jet....