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Aeronautical Systems Center



Dominant Air Power: Design For Tomorrow...Deliver Today

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Opening Avionics: Need For Change

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First Step: Linking Avionics



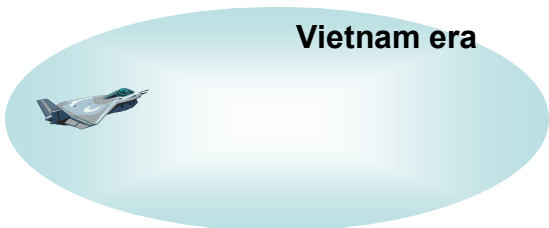
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Cognitive Domain

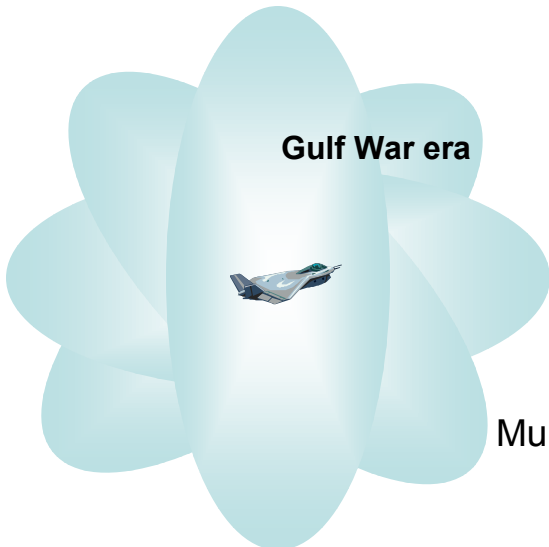
WWI
WWII



Vietnam era



Gulf War era



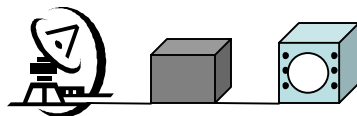
Sensor



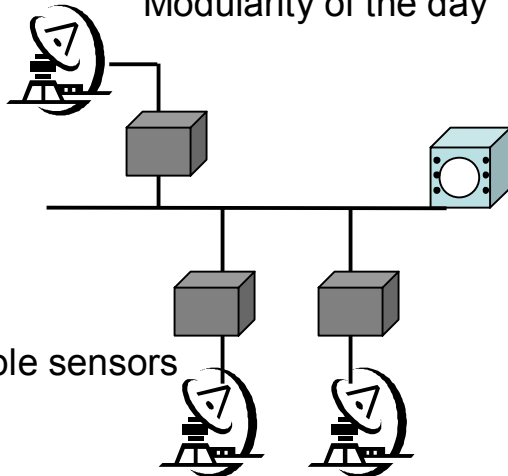
Network

None

Stand-alone
Single thread



Federated/Partitioned/
"Modularity of the day"



Multiple sensors

Capability

Many bombs for 1 target

Kentucky windage-large CEP
(Decades Between Changes)

Need For Change

Result: Avionics assisted Missions

Increase situation awareness

Increase survivability

Decrease CEP

Dedicated "Closed" Connections
(Years Between changes)

Need For Change

Result: Linked Avionics

Utilize multi-source data

Consider sensor data quality

Increase situation awareness

Increase survivability

Decrease CEP

Collaboration with like weapon systems

(Months Between Changes)

Next Step: Linking Aircraft

Message Based Data Sharing From Compatible System High Platforms



Message

Radar Track

1. Off-board source sends striking aircraft target coordinate message
2. Striking aircraft slews on-board sensor to locate/track target
3. Weapon guidance based upon striking aircraft sensors

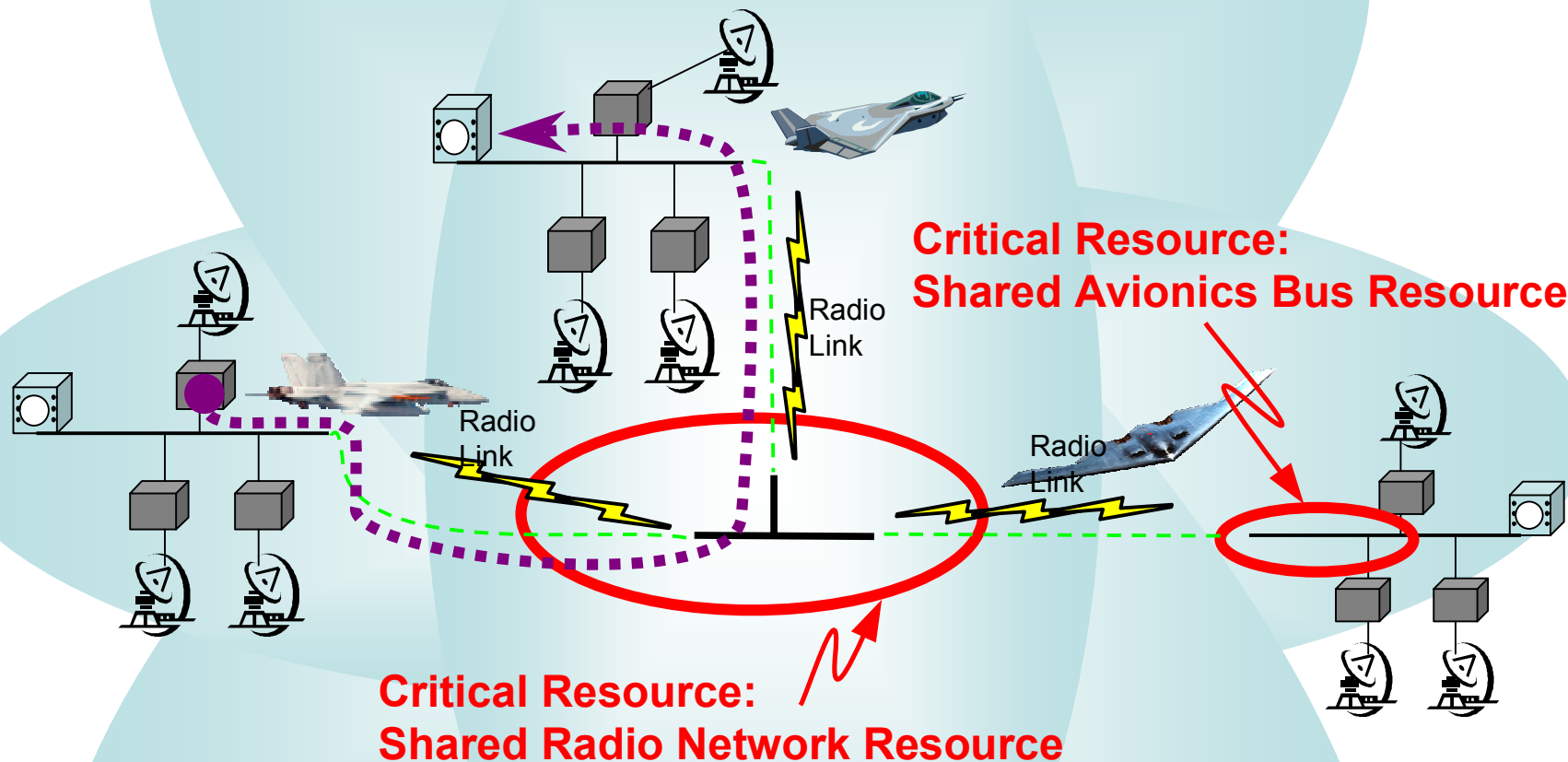
Off-board situation awareness data cues avionics sensor for weapon quality track



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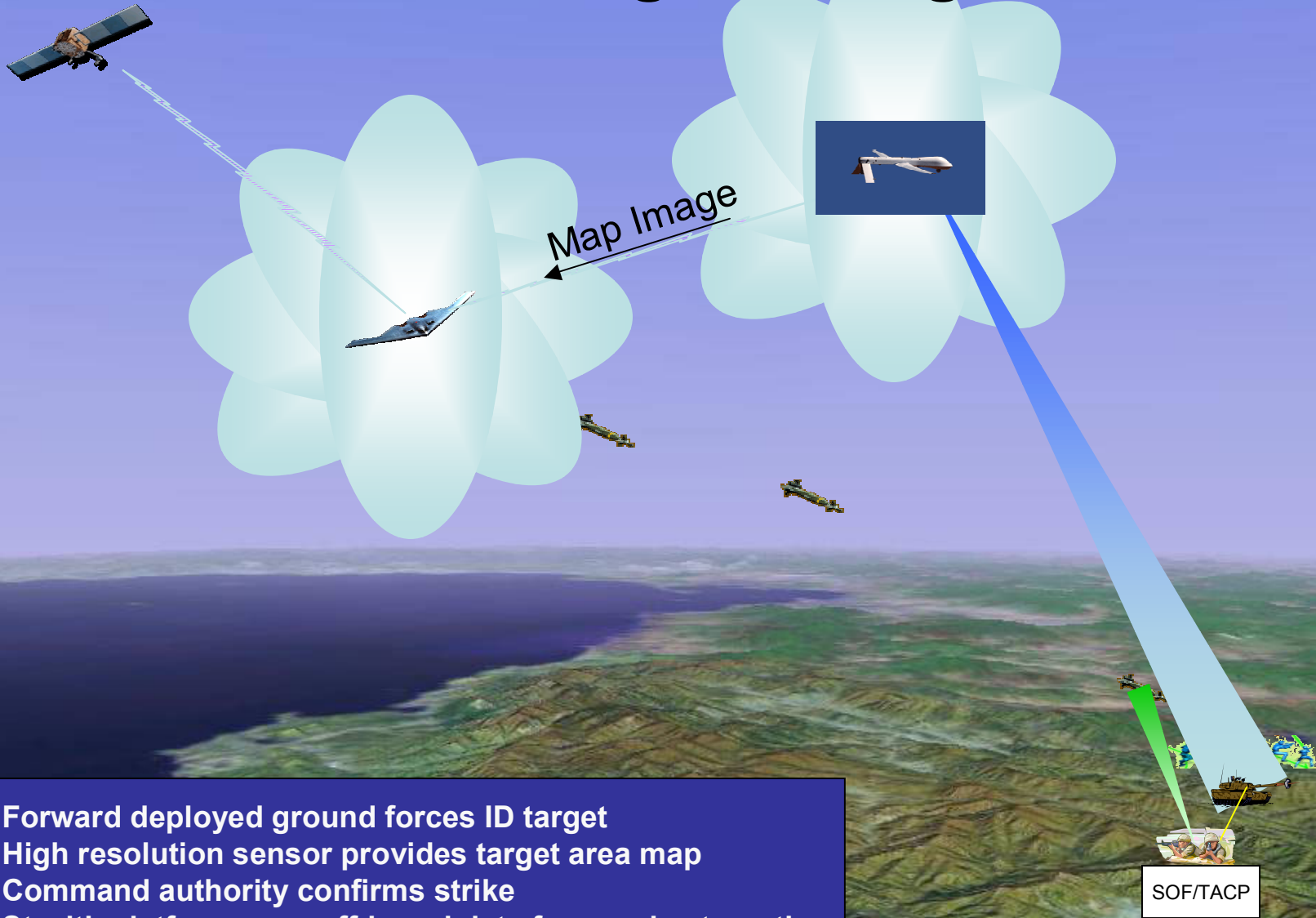


Third Step: Networking Systems Over Shared Resources



Decide and act on best available information
Collaboration of dissimilar systems is a force multiplier
Timeliness and accuracy of information needs to be identified
The network is governed by real-time principles
Effectiveness is the measure for networked operations
Made Possible by the Use of Shared Resources

Networking CAS Vignette



1. Forward deployed ground forces ID target
2. High resolution sensor provides target area map
3. Command authority confirms strike
4. Stealth platform uses off-board data for passive targeting
5. Stealth platform exits threat environment
6. Ground units steer weapon on final approach
7. Ground targets destroyed



Desired Characteristics of Networks



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- Predictable Performance
 - Timely transport and accurate information
- Mission Availability using Shared Resources
 - Recovery after temporary overloads
- Efficient Use of Shared Resources
 - High utilization enhances growth provisions

Technology Is Needed for Change



Open Architecture Technology as a Means to Satisfy "Need For Change"



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Constructive, Virtual, Modeling Simulation & Analysis

Operator Evaluations & Inputs

User/Mission Capability Requirements

Capability Testing and Delivery

Compatible With Legacy Warfighter Requirements Process

Definition & Decomposition

Multiple System Capability Requirements

Integration

Integration & Verification

Open Process Addresses "Need For Change"

Multi-System Architectural Models (Open)

Open Architecture Development Tool (Open)

Multiple OFPs

Multiple Hardware

Open Architecture Tool Coordinates Sharing of Resources

Hardware & Resource Characteristics

- Multi-System Networked Capabilities
- Allows Frequent User Input
- Consistent With Short Tech Refresh Cycles

- Affordable
- Sustainable
- Flexible



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Summary



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- Airborne networking involves more than radio links
- Networked warfighting needs make current development processes obsolete
- Development process needs to incorporate ability to accommodate rapid changes in requirements
- Open architecture technologies can provide needed warfighting capability at an affordable cost

Open Architecture Technology Is Needed for Change



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BACKUP

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Modeling Simulation & Analysis



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