INSERTION OF EMBEDDED INFOSPHERE SUPPORT TECHNOLOGY (IEIST)

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Vision and Operational Challenge

- **Air Force Vision (AF Vision 2020) calls for magnitude increases in exchange of information to assess, plan, and execute war and peace-time missions**

- **Comparatively few new systems (platforms) will be added to meet these missions**

- **Existing systems are very platform-centric with closed architectures**

- **Existing systems must be adapted to meet future mission requirements**

Information Directorate Mission

The advancement and application of Information Systems Science and Technology to meet Air Force unique requirements for Information Dominance and its transition to aerospace systems to meet warfighter needs.
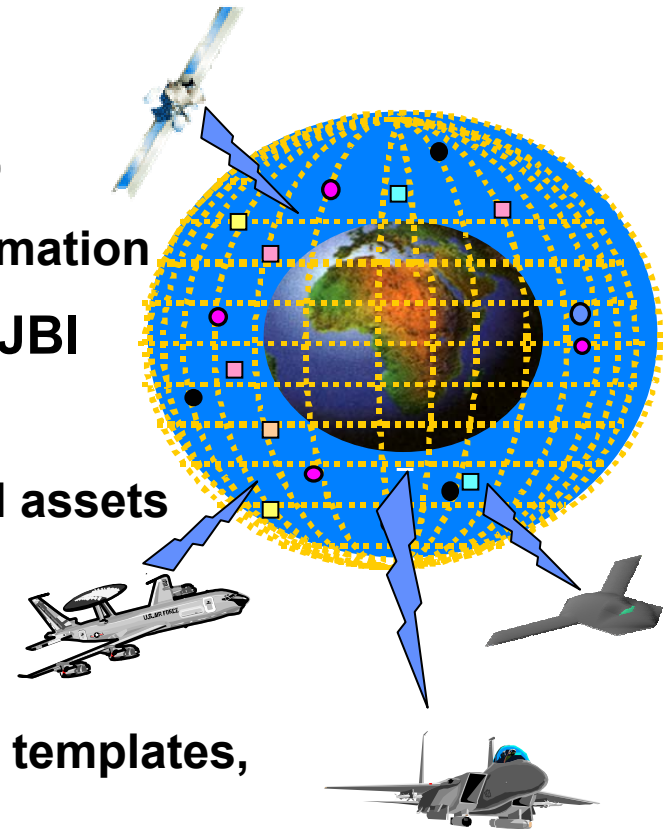
Insertion of Embedded Infosphere Support Technology (IEIST)

Knowledge Mining and Filtering for Military Aircraft

- **Demonstrates attack aircraft connection to emerging Joint Battlespace Infosphere (JBI)**

  - **Publish & subscribe for mission critical information**

- **Demonstrates new warfighter capability via JBI**

  - **Three-way collaborative planning**

  - **Real-time information extraction from tactical assets**

- **Transitionable Products**

  - **UCAV and Airborne C2 components**

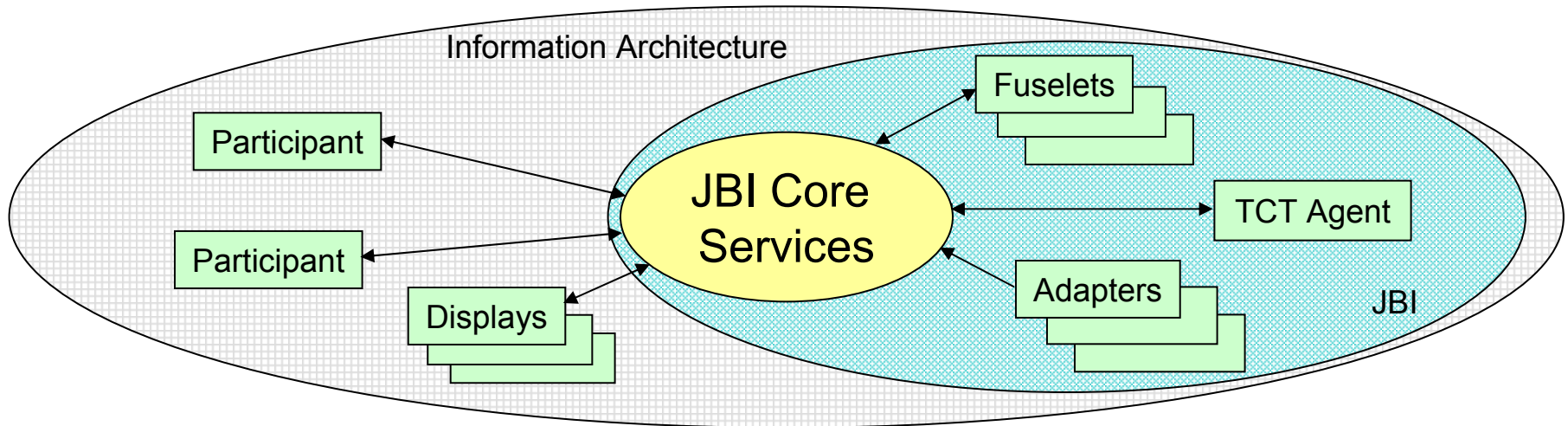 - **Tactical Aircraft OFP components, e.g., force templates, fuselets**

> *The Right Information at the Right Time via Machine to Machine Software Agents*
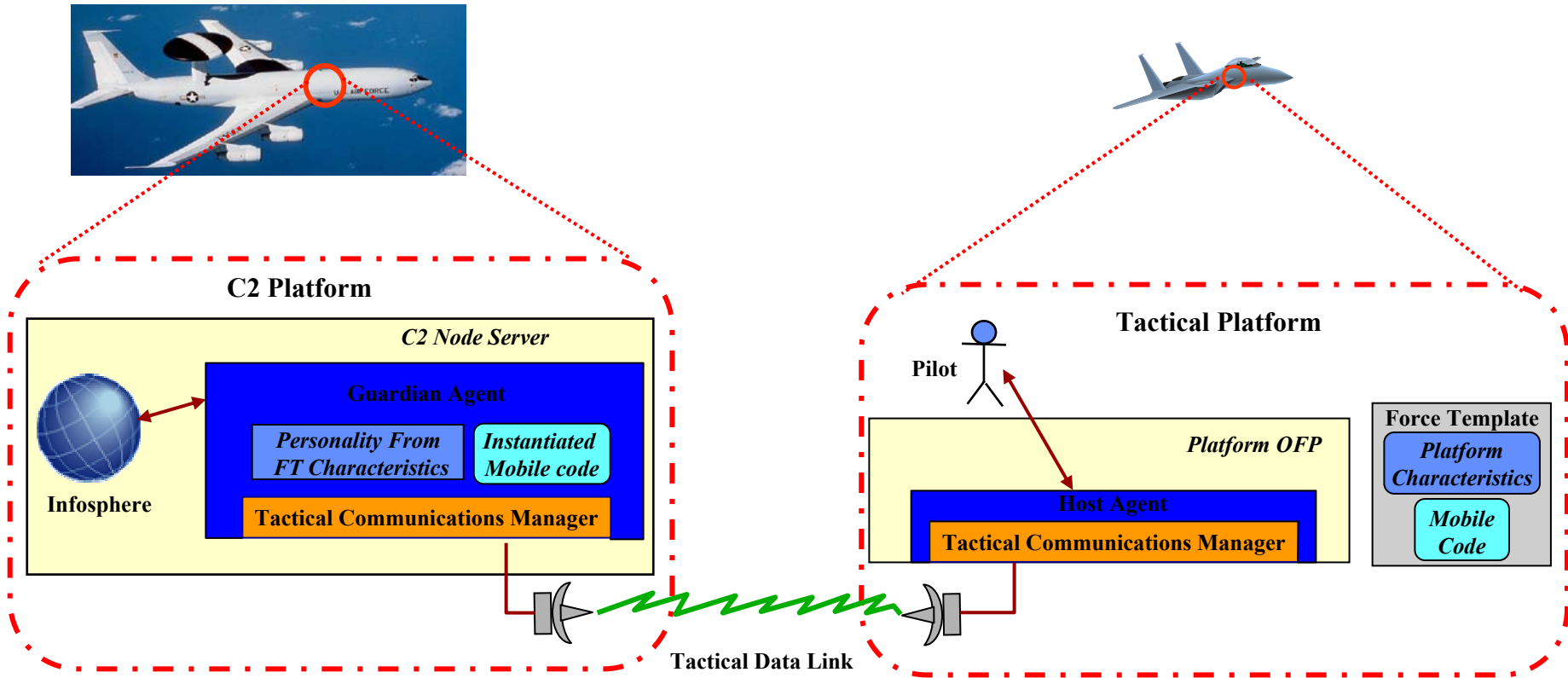
JBI Library

- **In addition to the set of Core Services, JBI offers a Library of Domain Specific Applications that currently includes:**

  - **Adapters to enable legacy Time Critical Target (TCT) data sources to interface with JBI Core Services.**

  - **Fuselets to convert track, intel and imagery data from different sources into a common format.**

  - **Agents to track possible TCTs and publish Evidence files.**

Information Architecture

Participant

Participant

Displays

JBI Core Services

Fuselets

TCT Agent

Adapters

JBI

The Guardian And Host Agent Concept Has Evolved Out Of The IEIST Program

C2 Platform

C2 Node Server

Guardian Agent

Personality From FT Characteristics

Instantiated Mobile code

Tactical Communications Manager

Infosphere

Tactical Platform

Pilot

Platform OFP

Host Agent

Tactical Communications Manager

Force Template

Platform Characteristics

Mobile Code
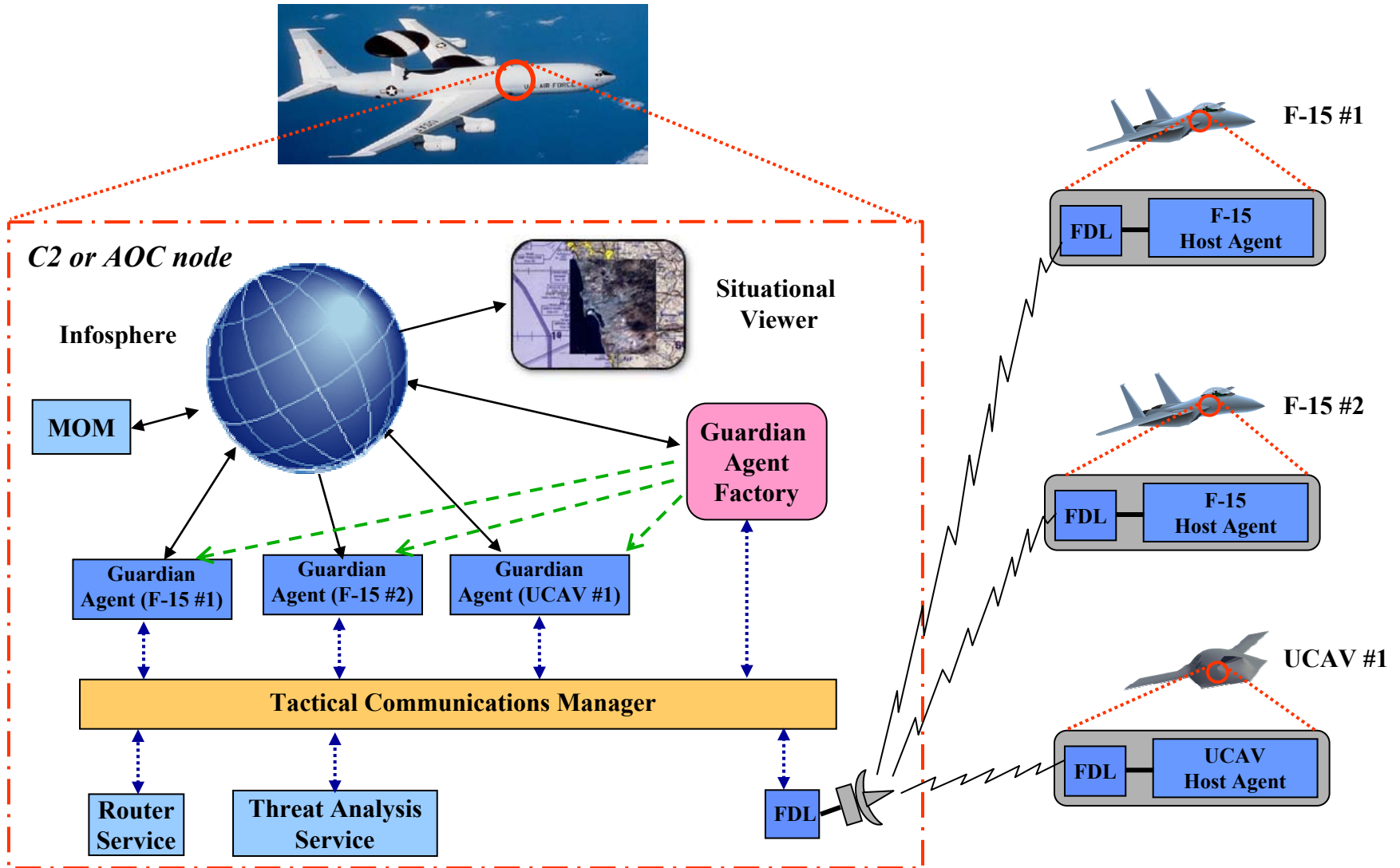
Tactical Data Link

Guardian Agent – Performs services for it's guarded platform using information from the Infosphere. Services include threat detection and dynamic mission support. The GA also supports putting tactical platform data into the Infosphere.

Host Agent – Provides the interface between the Guardian Agent And the tactical platform OFP and/or pilot.

Force Template – Provides definition of the platform for instantiation of it's Guardian Agent. It also provides mobile code that can contain platform-specific behavior for the instantiated Guardian Agent.
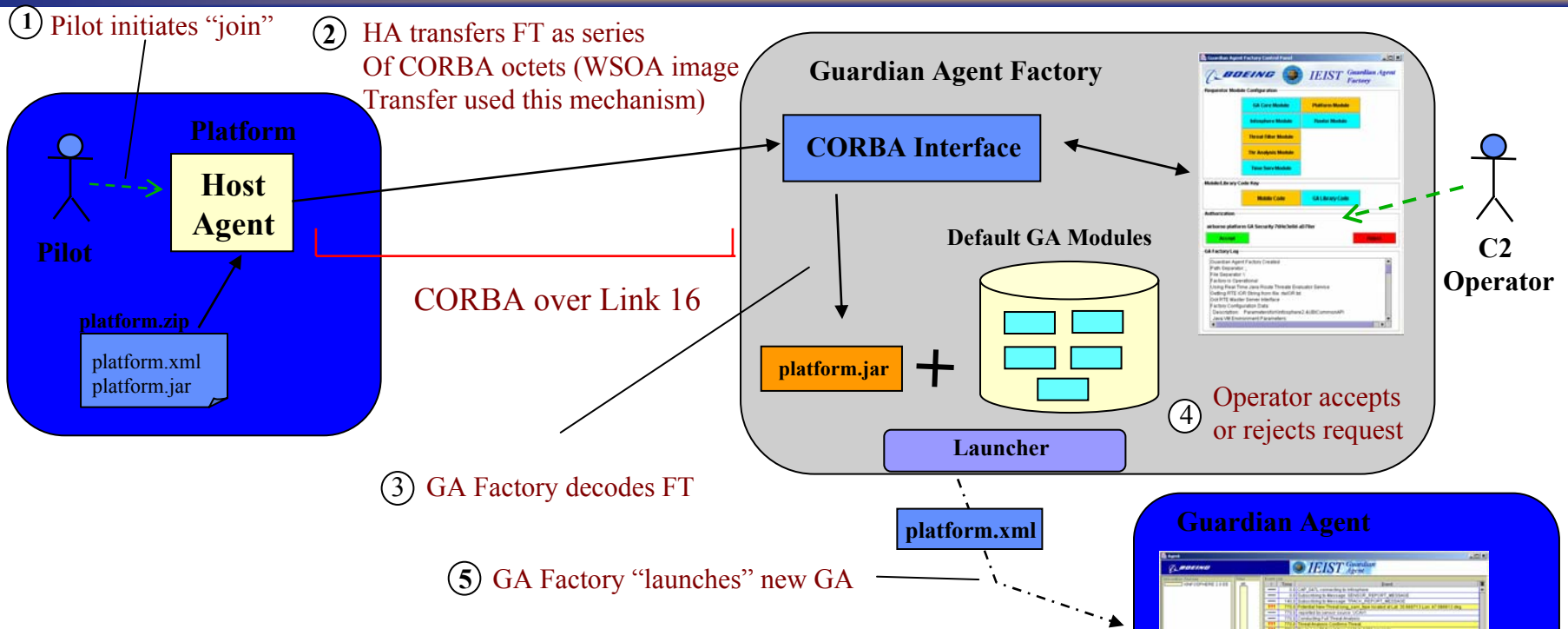
IEIST Operational Architecture

How A Platform Joins The Network

① Pilot initiates "join"

② HA transfers FT as series
Of CORBA octets (WSOA image
Transfer used this mechanism)

Platform

Host Agent

Pilot

platform.zip

platform.xml
platform.jar

CORBA over Link 16

Guardian Agent Factory

CORBA Interface

Default GA Modules

platform.jar +

C2 Operator

④ Operator accepts
or rejects request

③ GA Factory decodes FT

Launcher

platform.xml

⑤ GA Factory "launches" new GA

Guardian Agent

- **HA indicates which modules of its GA it is providing**

- **Factory receives FT and mobile code information.**

- **Operator approves/disapproves join request**

- **Factory constructs GA based on FT provided mobile code and GA default module library code.**

- **GA is launched by Factory**

- **Platform joins with simulation or battle "in progress"**

Summary

- **Tactical - Provide New Capabilities**

  - **Fundamental improvement in shooter ability to exploit "InfoSphere" data and react to real-time information**

  - **Concepts for dissemination/utilization of shooter-collected information**

- **Transition - Exploit Current Research**

  - **Leverage current open systems and AFRL research to demonstrate the value of these technologies**

  - **Assess COTS products for Joint Battlespace Infosphere (JBI)**

- **Technology - Extend State-of-the-Art**

  - **Mature and develop technologies supportive of information sharing systems involving JBI integration**

IEIST Milestones

- **IEIST integration with DARPA/IXO Mixed Initiative Control of Automa-teams (MICA) Open Experimental Platform (OEP) – Aug 03**
  - **Including JVIEW**
- **Conference Demos/Briefings**
  - **Software Technology Conference – Apr 03**
  - **Boeing Tech Expo at ESC – May 03**
  - **International C2 Research & Technology Symposium – Jun 03**
  - **Joint Advanced Weapons Systems Sensors, Simulation and Support Symposium – Jul 03**
  - **Software & Systems Technology Conference – Apr 04**
- **Pursue transition opportunities**
  - **AWACS 40/45 - TBD**
  - **UCAV - TBD**
- **IEIST Demonstration III – Hardware-in-the-loop – FY 04**

What is a Software Agent?

- An autonomous software element

- Deployed in a publish/subscribe environment to solve a specific problem

- Is data oriented, rather than process oriented

- Subscribes to all data objects necessary to solve a problem, and publishes a data object which is the solution to the problem.

- Is usually rule-based

- Performs no user interfacing

Infosphere Terminology

- **advertise - send a message to the infosphere describing the data to be published.**

- **publish - make data available for sharing.**

- **subscribe - make a request to the infosphere for future data.**

- **query - make a request for a one time transfer of historical data.**

- **participant - any application that sends or receives data.**
  - **fuselet - performs simple tasks on data objects. Ex., filtering, aggregation, transformation.**
  - **adapter/wrapper - adapts legacy data for use in the infosphere.**
  - **agent - solves a specific problem. Ex., SCUD Launch Detection Agent.**