

Achieving The Integrated C2 System (IC2S)

An Engineering Perspective

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Outline

IC2S Engineering Perspective

- The Air Force C2 Vision Revisited
- The Road to the IC2S
- Innovation in Business and Acquisition
- Summary

Affordable, Effective, and Easy to Use

C2 Vi

Pervasive, Guaranteeing Service That Provides Transaction Reliability across large communities

Perspective

Responsive, Providing Service That Meets Time Constraints

Inherently Joint and Coalition Capable

Interoperable Across all Elements of the System

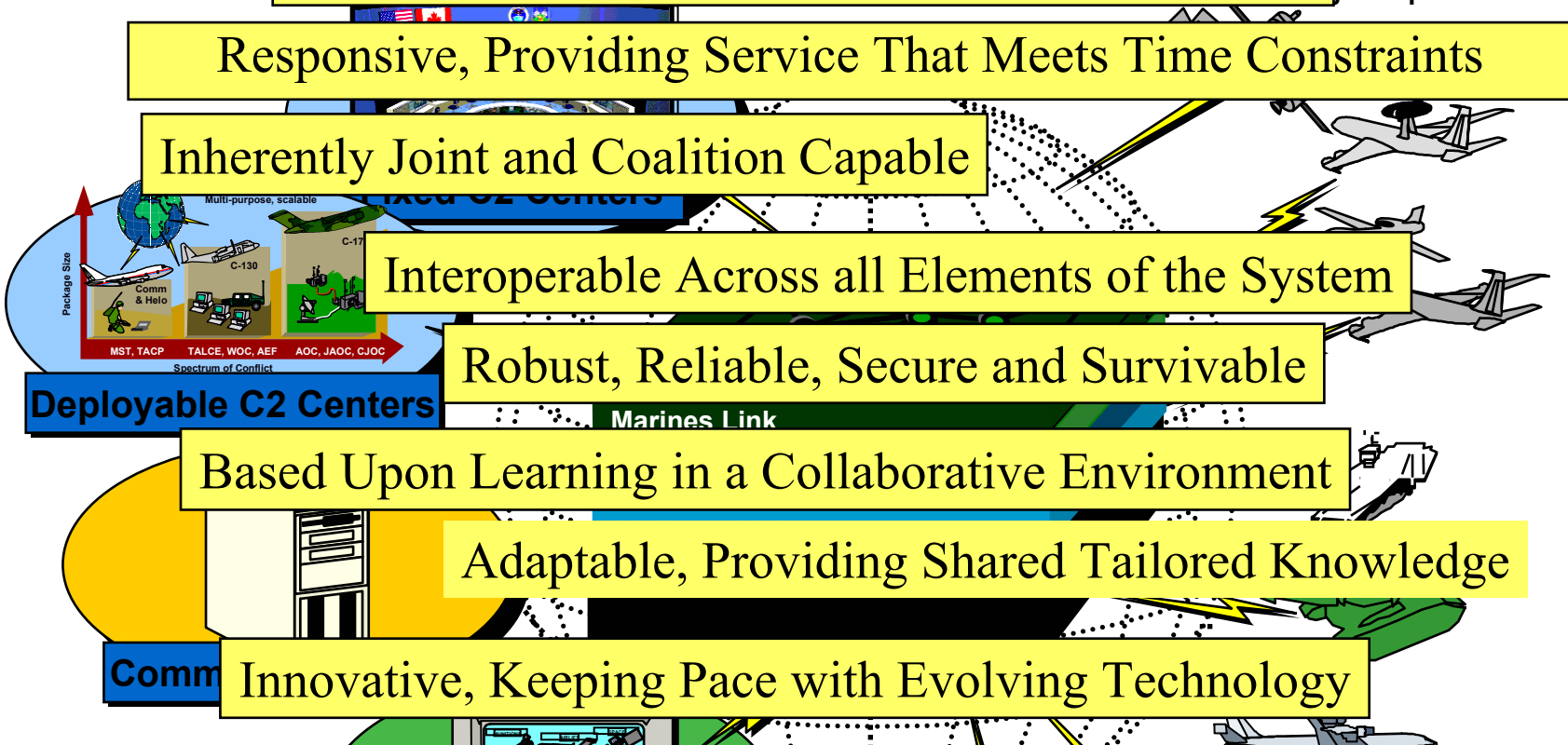
Robust, Reliable, Secure and Survivable

Based Upon Learning in a Collaborative Environment

Adaptable, Providing Shared Tailored Knowledge

Innovative, Keeping Pace with Evolving Technology

Key: An Integrated C2 System will enable new Operational Concepts and the timely introduction of new capabilities based on emerging technologies



Deployable C2 Centers

Comm

IMPLICATIONS OF THE VISION

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FROM STOVEPIPE PRODUCTS

Limited connectivity

TO AN INFORMATION-CENTRIC SYSTEM

We Must Build an INFORMATION-CENTRIC IC2S based on:

- **A Sound Architecture**
 - **Info Management and Common Operational Picture**
 - **Dynamic Planning and Execution**
 - **A Global Grid**
- **Innovation in C2 Business & Acquisition**

Mission-specific focus

Single service, US focus

Batch processing

Multimedia

Cross-service, coordinated action

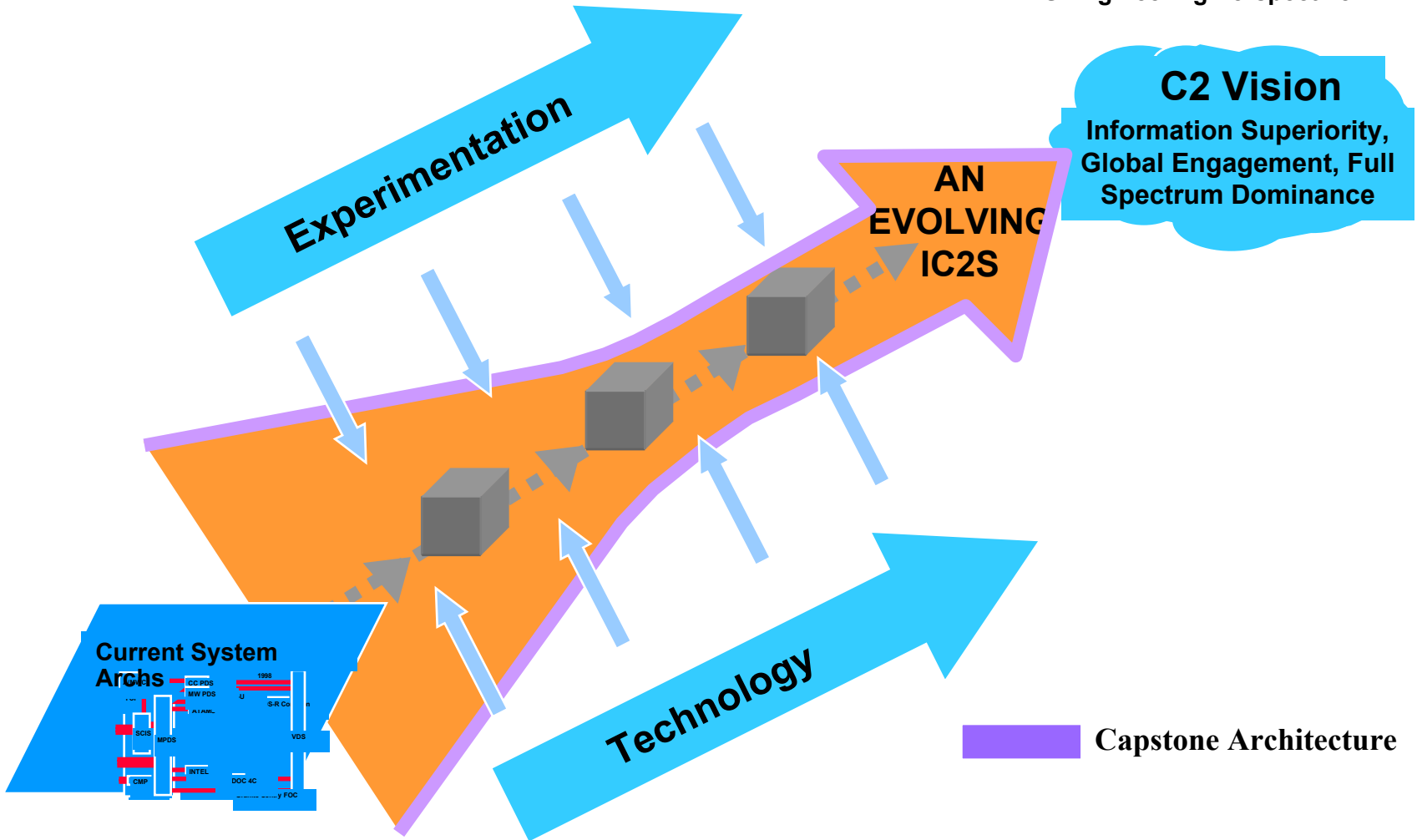
Joint, Coalition focus

onal decisions

The World-wide Web has spurred the notion of achieving flexibility and enhanced capability using a common infrastructure

Road To IC2S

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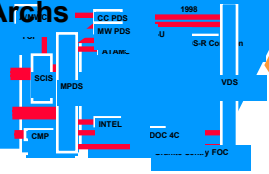


C2 Vision

Information Superiority,
Global Engagement, Full
Spectrum Dominance

AN
EVOLVING
IC2S

Current System Archs

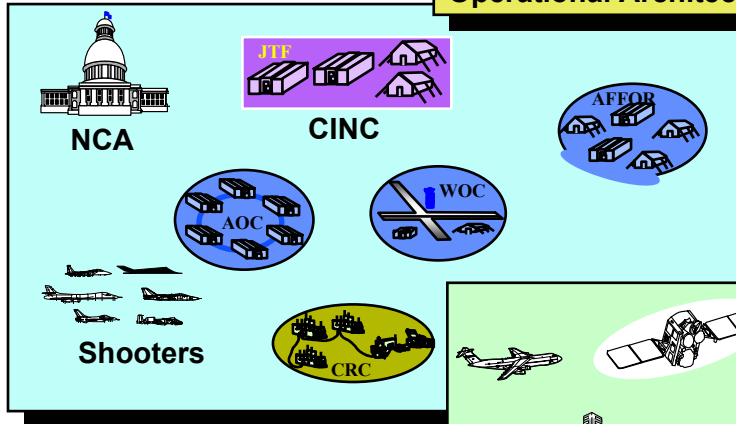


Capstone Architecture

DoD Baseline Architectures (IAW C4ISR Architecture Framework)

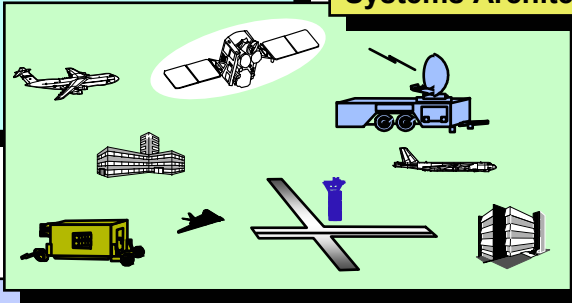
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Operational Architecture



- Information required
- Information form (voice, data, imagery)
- User functions
- Operational /unit relationships
- Performance bounds

Systems Architecture

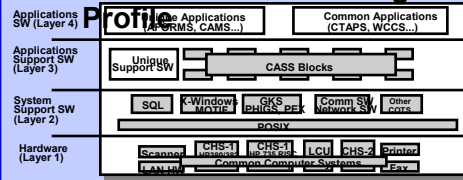


- Components and their topology
- Networks/internetting
- Capacity/performance

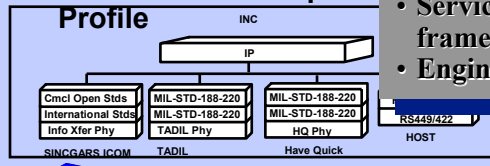
Technical Architecture

- #### Information Standards
- Common Data Repository System**
- C2 Core Data Model
 - Variable Message Format
 - TADIL

Information Processing Profile



Information Transport Profile



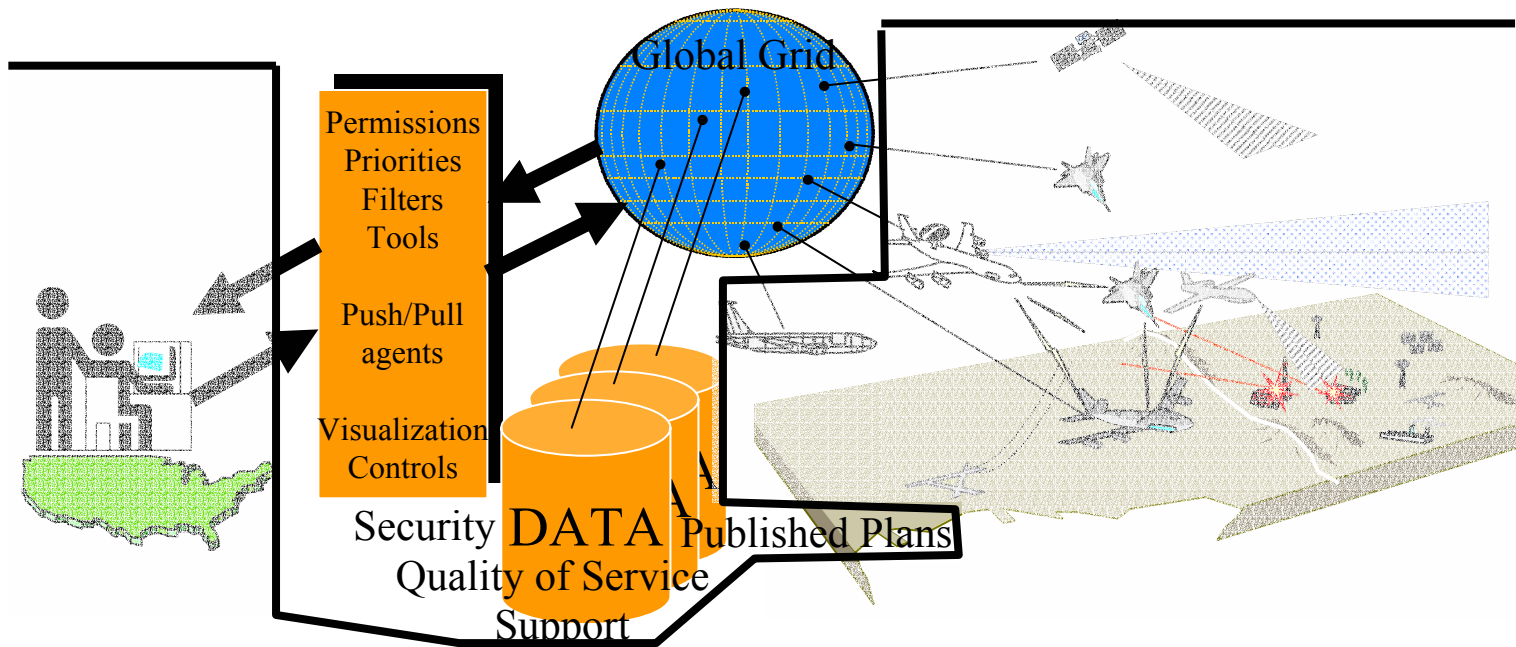
- Info Technology Standards
- Services & interfaces framework
- Engineering specifications



Information Management

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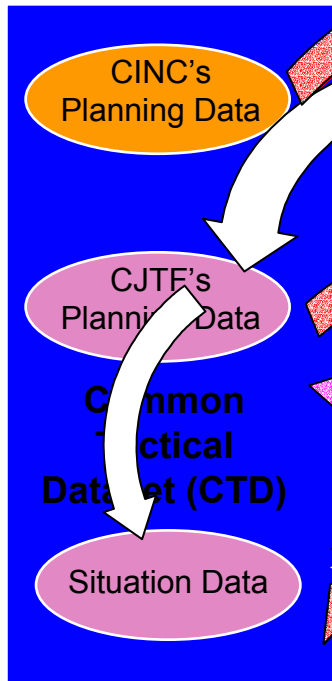
- **The Joint Battlespace Infosphere:** all the data and tools necessary for planners, decision-makers, and war fighters to achieve Tailored Situational Awareness



Forming the Common Operational Picture

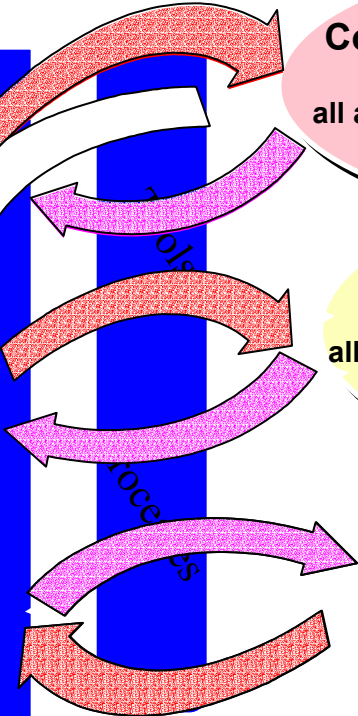
CINC can drill down to any level of data

Least perishable



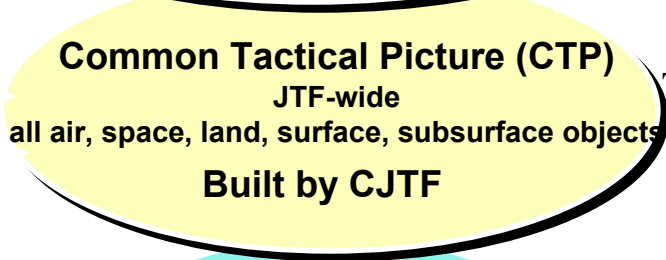
Most perishable

Information rolls up to suit commanders' needs



Common Operational Picture (COP)
CINC-wide
all air, space, land, surface, subsurface objects
Built by CINC

CINC's picture
--can be multiple theaters



Common Tactical Picture (CTP)
JTF-wide
all air, space, land, surface, subsurface objects
Built by CJTF

Theater Commander's picture



Situation Awareness Data
JTF-wide--Data Link tracks, INTE

Link 16, track-type data used by Component Commanders

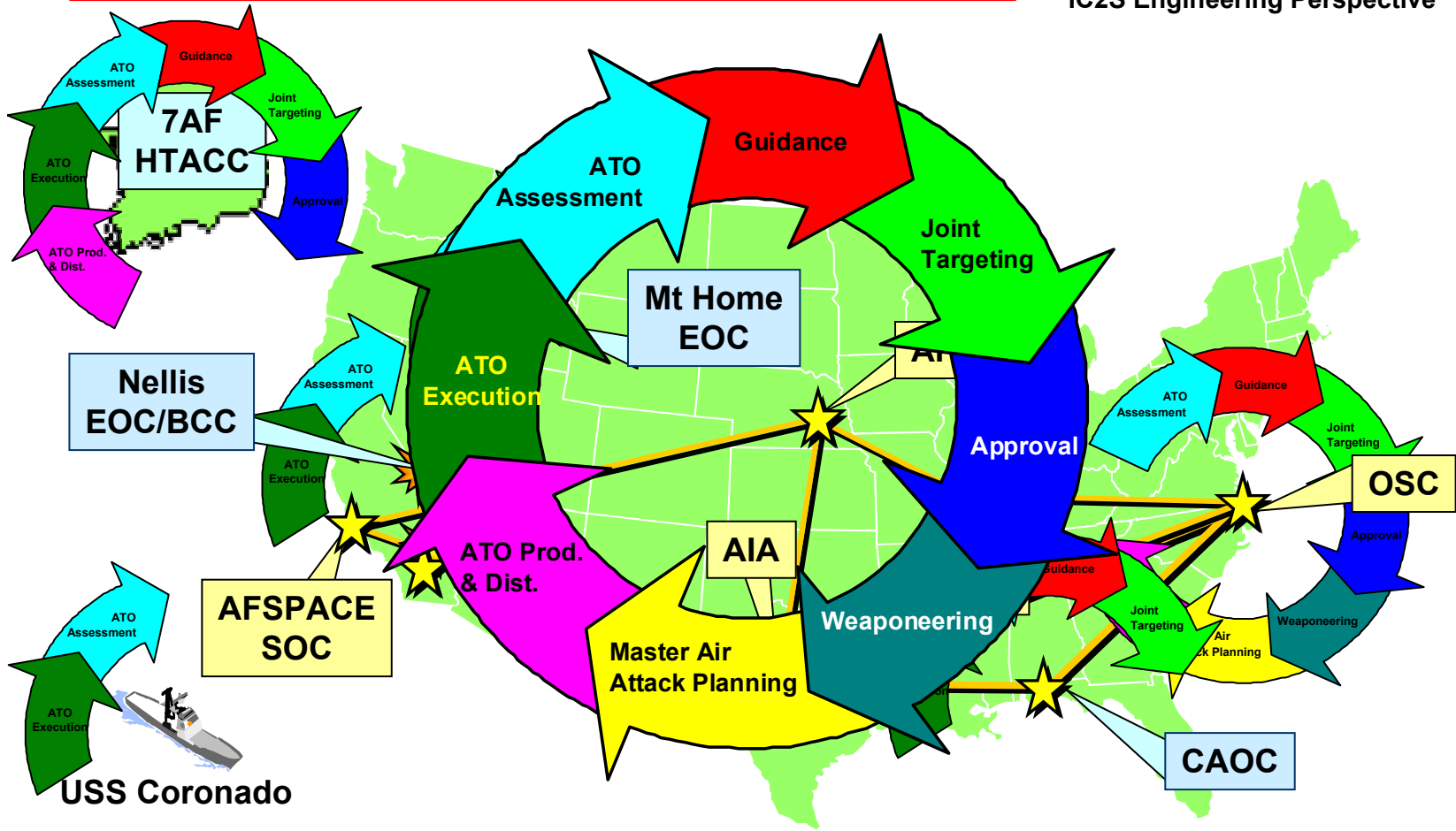


Fire Control Quality Data
JCTN Contribution--shared measurement information

Radar dots, CEC-type data used by weapon systems

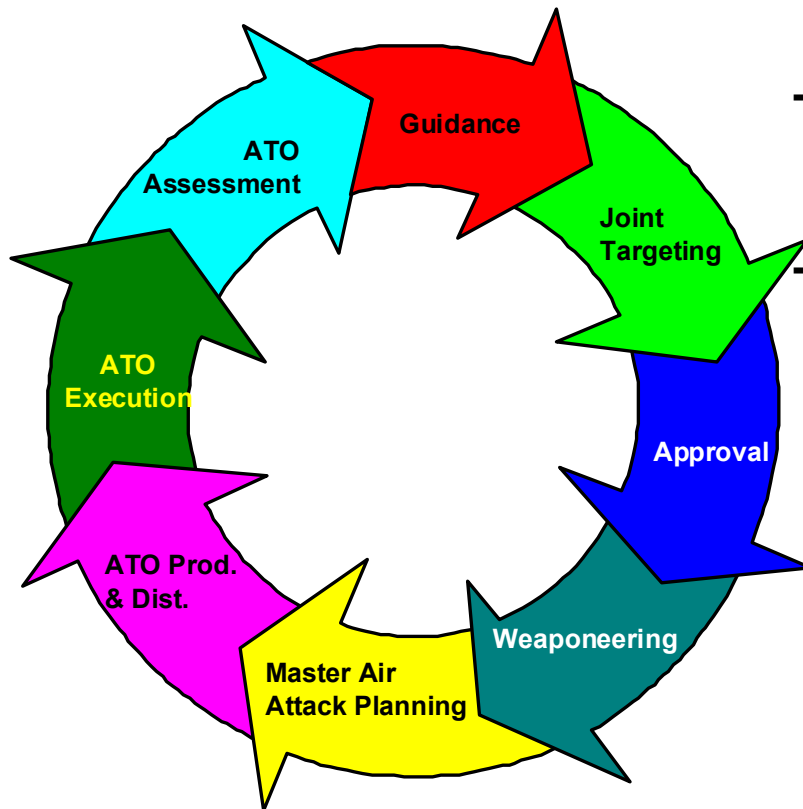
Distributed Planning and Execution Process

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Dynamic Planning and Execution

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**Today:
Serial Process**

**Tomorrow:
Introduce parallelism
into planning and execution cycles**

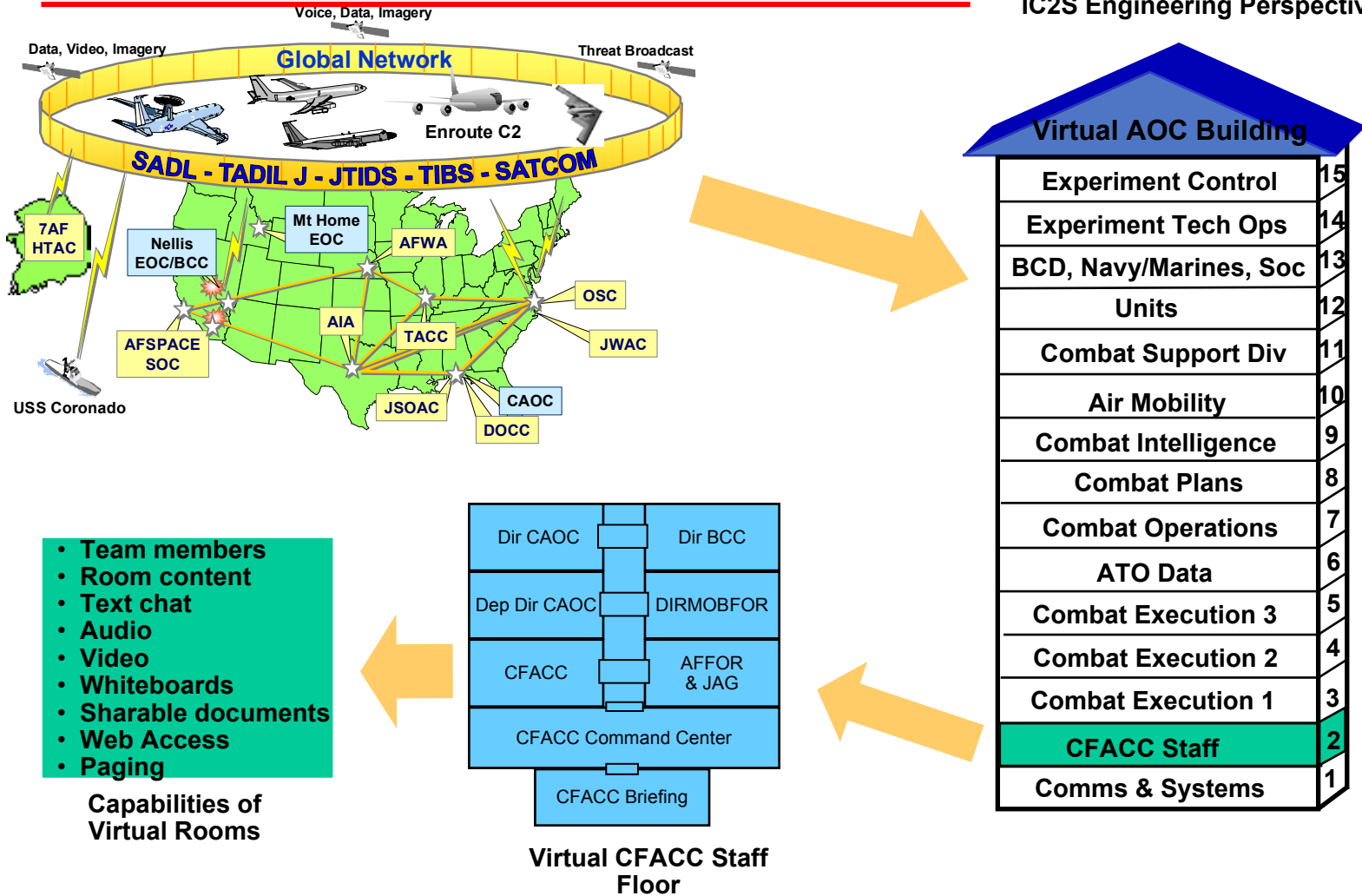
Dynamic re-targeting

Dynamic re-allocation of ISR resources

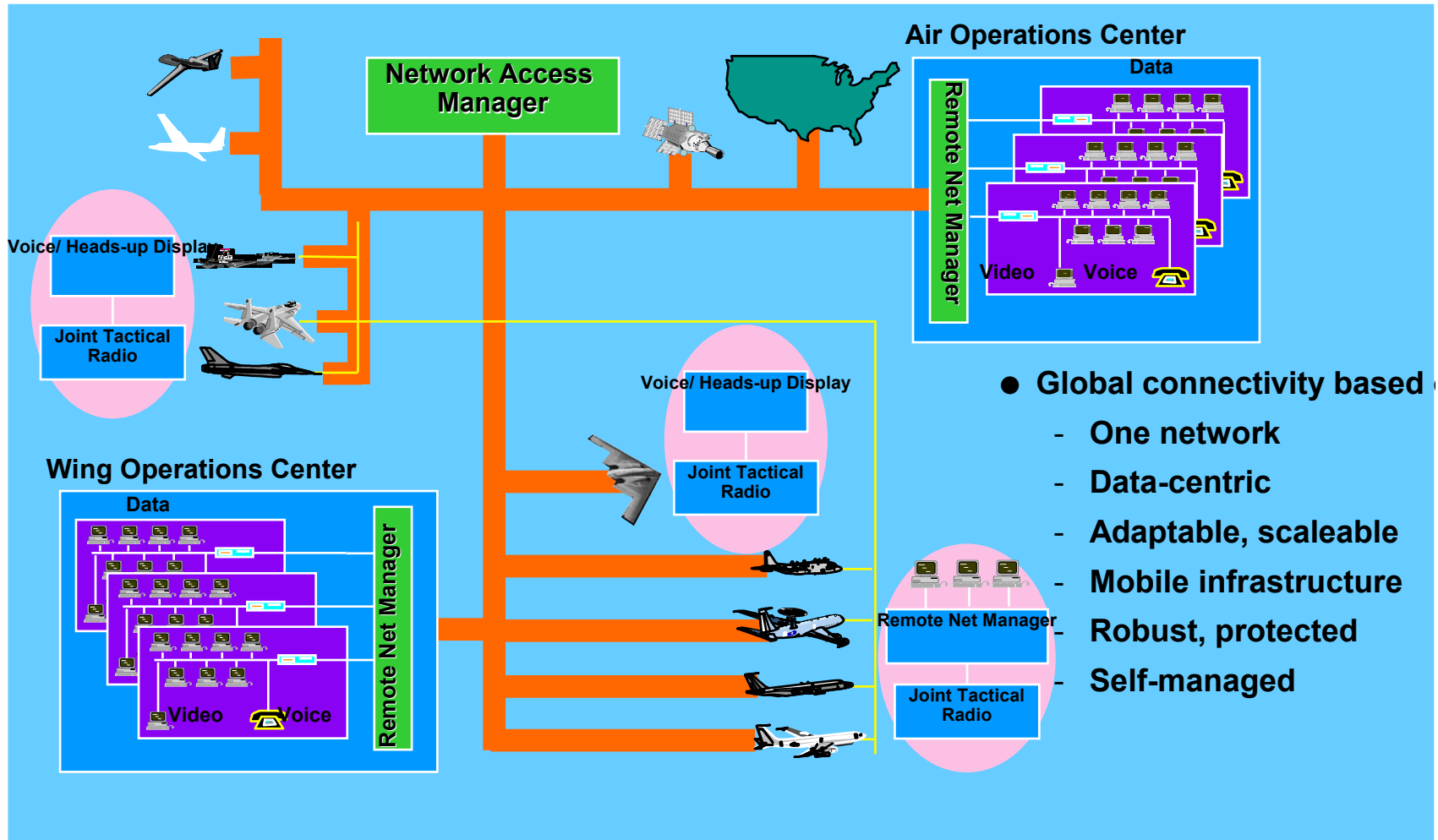
**Collaboration on Air Ops Planning
with geographically distributed nodes**

JEFX 99 Collaboration Environment The Virtual Air Operations Center (AOC)

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Global Grid Communications Architecture



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Innovation in C2 Business and Acquisition

Leveraging Internet Technology

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- Pervasive desktop applications
- Large world-wide base of developers
- Innovation on a stable infrastructure
- Products to market in 12-18 months
- Competing on integration of new capabilities

Leveraging Internet Technology Message Text formats and XML Related Technologies

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- | | | |
|-----------------------|---|-----------------------------|
| ● MTF Message | ↔ | ● XML Document |
| ● Mission Files | ↔ | ● XML Schemas |
| ● AQL Queries | ↔ | ● XQL Queries |
| ● AQL Shell Templates | ↔ | ● XSL Stylesheets |
| ● MTFTools API | ↔ | ● DOM API |
| ● MTF Validators | ↔ | ● Validating parsers (many) |
| ● MTF Processors | ↔ | ● MS Windows, Excelon |
| ● MTF Editors | ↔ | ● Validating Editors (many) |
| ● MTF Browser | ↔ | ● Web Browsers |
| ● MTF Autogen | ↔ | ● Oracle 8i, DBXML |

15 Years GOTS

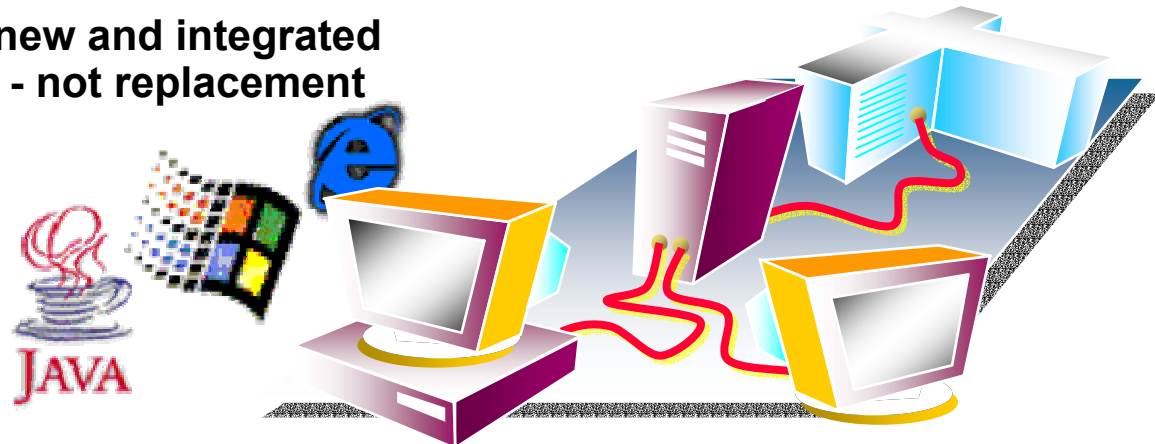
1 1/2 Years COTS

XML approaches are industry standard, inexpensive, powerful and rapidly evolving - being driven by the dynamics of the commercial marketplace. The military-proprietary suite of MTF capabilities will remain relatively static.

A Lesson from Commercial Business: Increasing Innovation Pressure

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- Dramatic advances in Web technology creating urgent E-business opportunities
- Post Y2K will see explosive growth
 - Application demand
 - Startups, buy-outs, partnerships!!!
- No one will “own” the architecture - agility, flexibility and extensibility are economic realities
- Demand for new and integrated functionality - not replacement



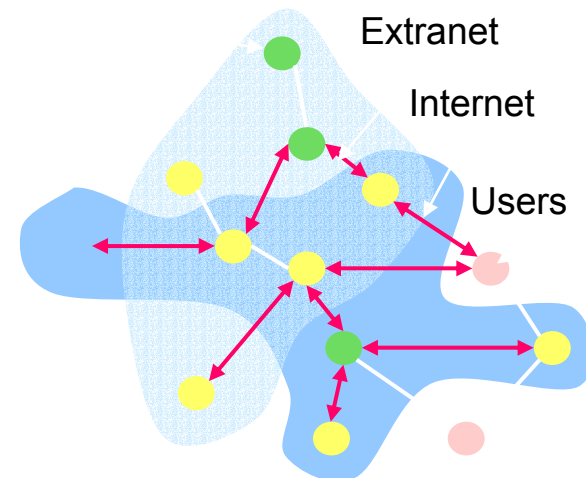
Source: Butler Group

Implications to C2 Acquisition

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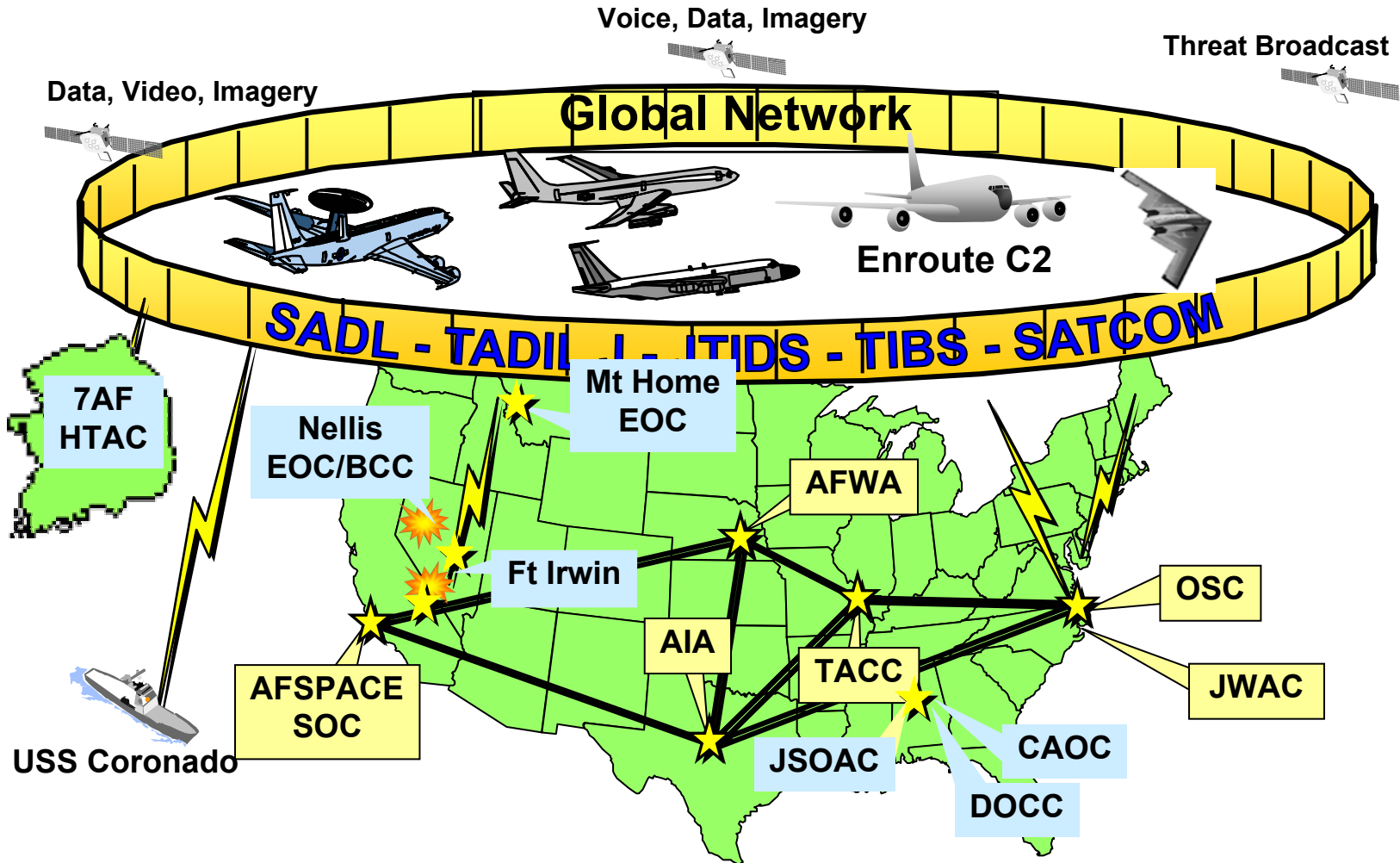
- Information Technology is the “heartbeat” of Command and Control
- Essential to use commercial standards, frameworks, architectures, infrastructures that are designed to:
 - Allow Change
 - Enable Integration
 - Adapt
- We **MUST** seek partnerships among Government, DoD contractors, and Commercial Industry to align with Commercial technology and Business strategies
 - The C2 Consortium

Network-Centric C2 New Millennium



Innovative Acquisition: Experimentation JEFX 99

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Summary

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- **Need to synthesize the IC2S from a single Capstone Architecture**
- **Need to leverage emerging commercial technologies**
- **Need innovative business models**
 - **Partnerships**
 - **Experimentation**