



**Program Executive Office
Command, Control, Communications,
Computers and Intelligence (PEO C4I)**

**Modernizing Command and Control in
support of Information Dominance**

**21MAY2010
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**Information Dominance
Anytime, Anywhere...**





Navy C2 Objective Architecture



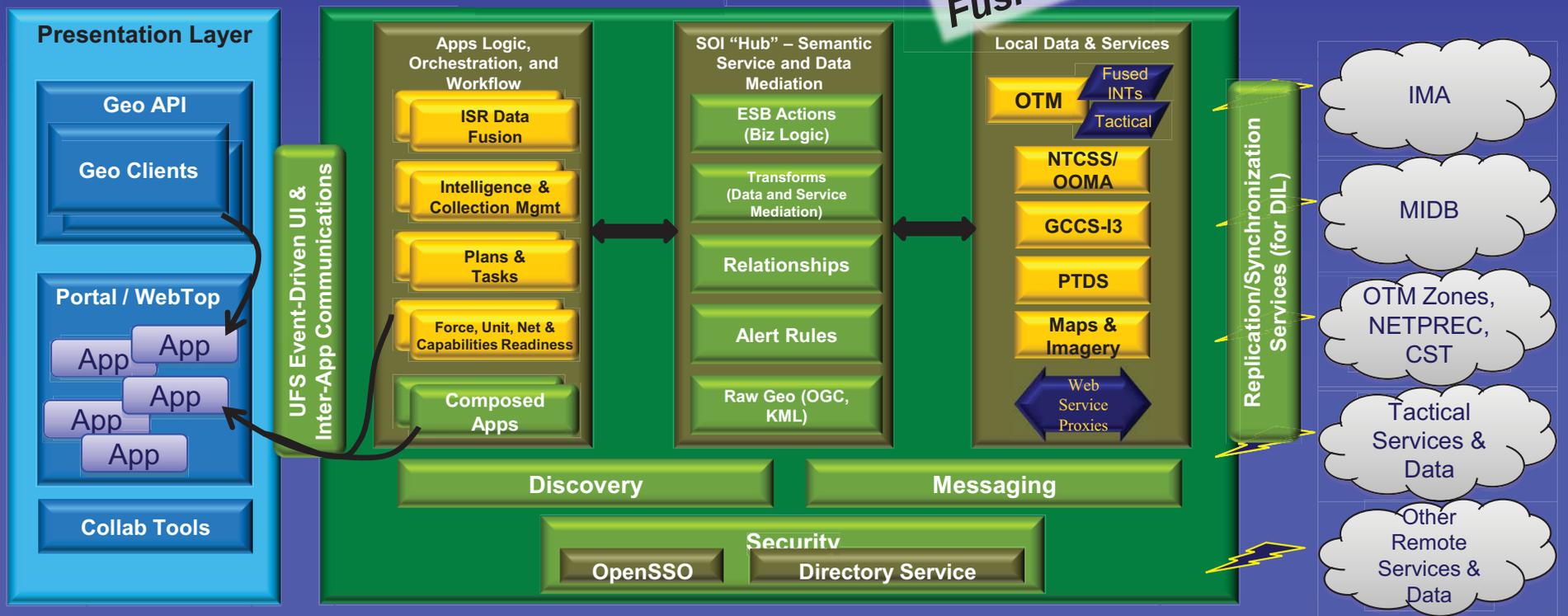
Platform	DKRS	ASW
USS Ben Scott(FPG)	1	●
USS Charlie Weis(DDG)	1	●
USS Don Hanley(SSN)	1	●
USS Eric Clapton(SSN)	1	●
USS John Lennon(SSN)	1	●
USS Mick Jagger(FFG)	1	●
USS Sammy Hagar(SSGN)	1	●

IR COP

Plans & Tasks

Capabilities & Readiness

SA Data Fusion



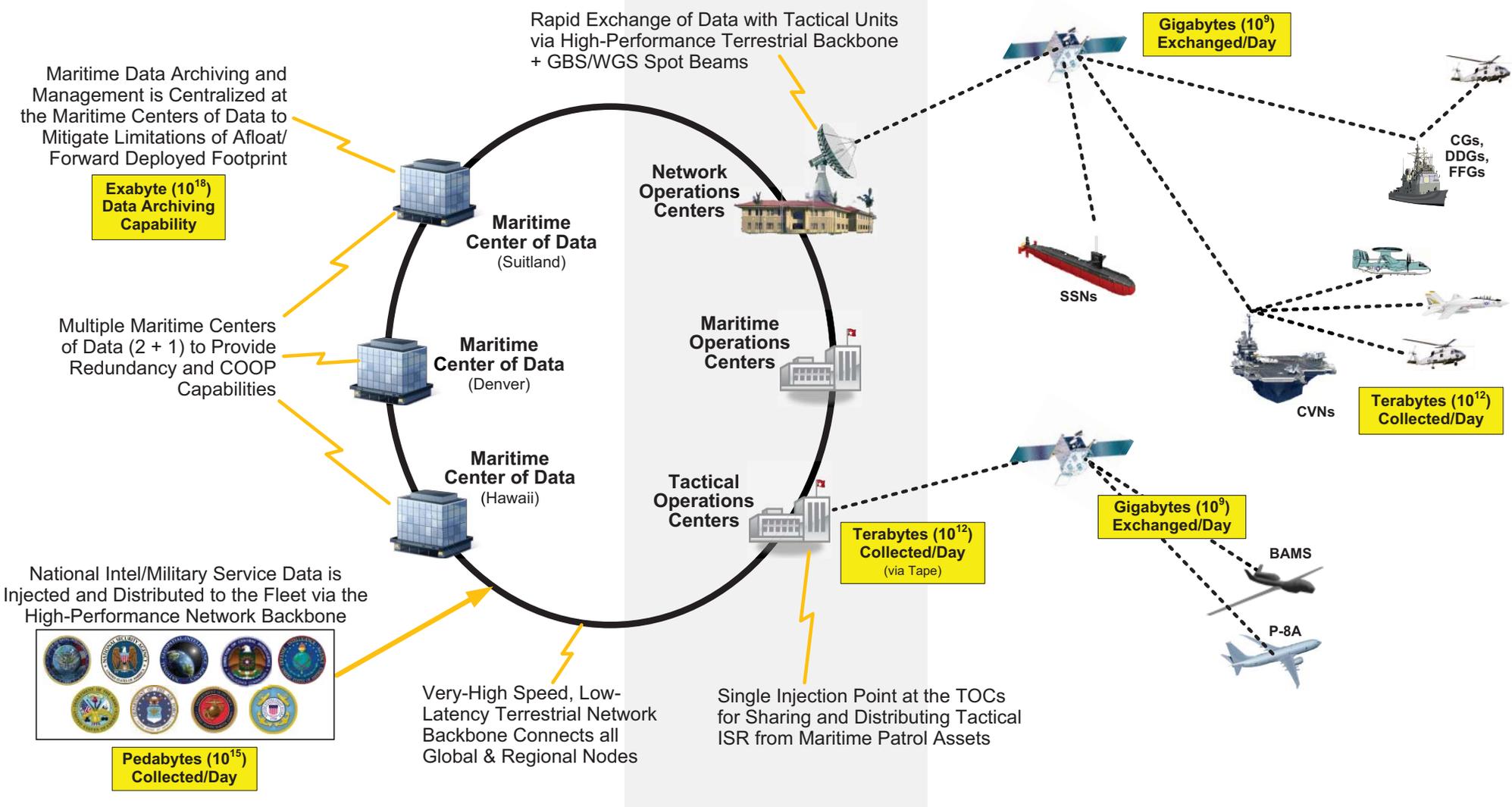


The Maritime Information Enterprise (MIE)

Global Nodes (2 + 1)

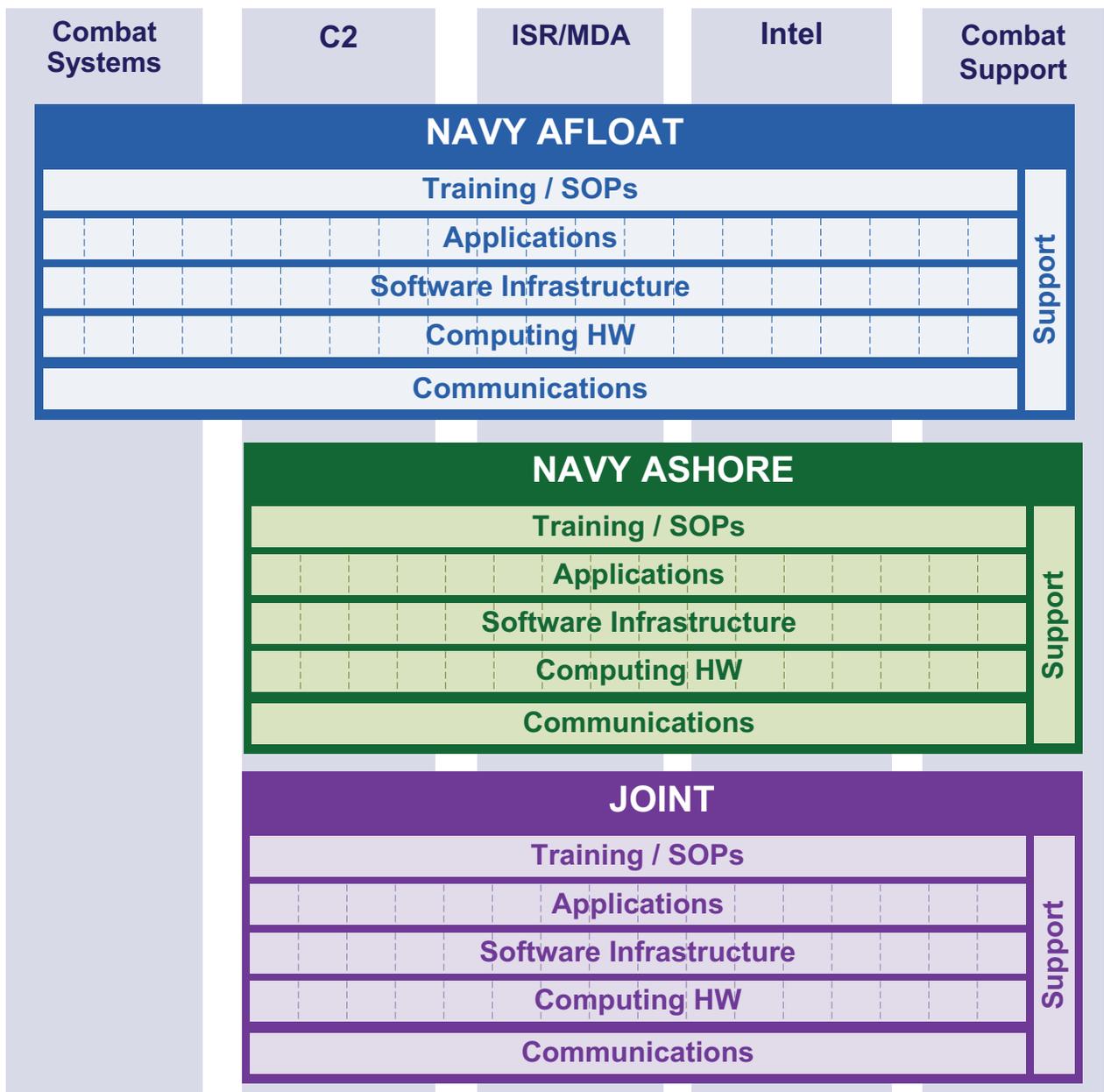
Regional Nodes

Tactical Nodes





C2/ISR/Intel Today: Program/Environment Centric



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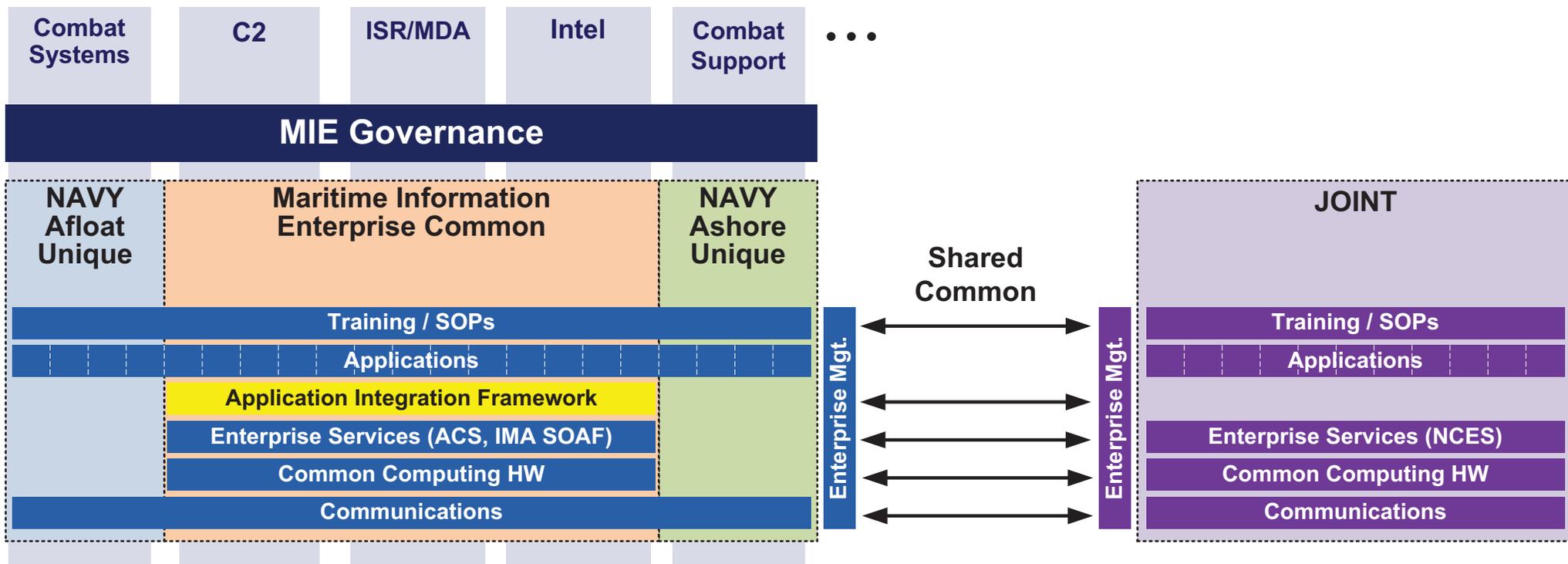
- Program Unique Approaches to:
 - Computing HW
 - Software Infrastructure
 - Distributed Operations of Applications
- Different Approaches for Navy Afloat vs. Navy Ashore vs. Joint Environments
 - Duplicative/Overlapping Acquisition Programs
 - Incompatible Technical Implementations
 - Different Software Support Mechanisms



C2/ISR/Intel with MIE: Enterprise Centric

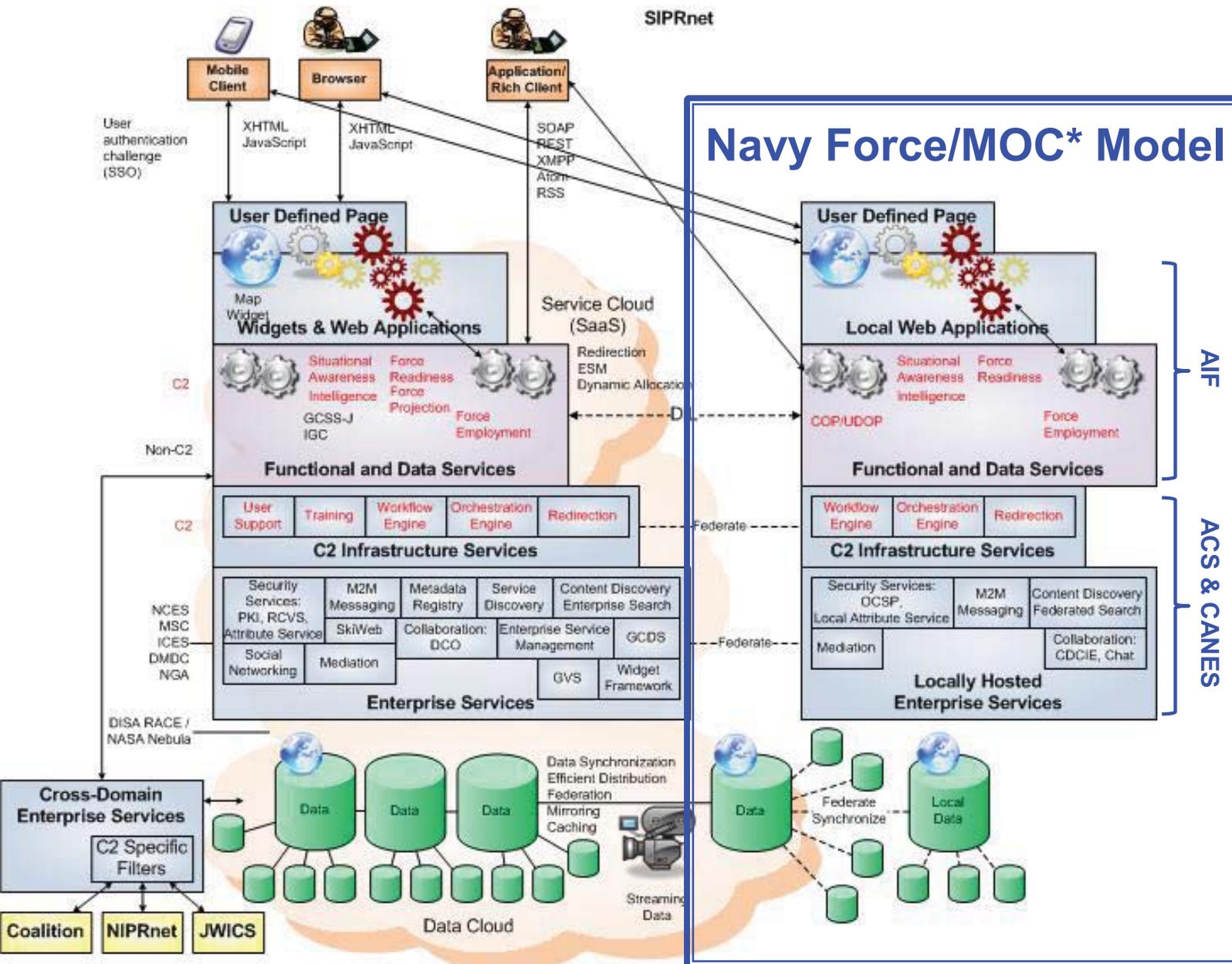


- View as a Single Entity, not a Collection of Parts
- Common Enterprise Computing Hardware and Software Infrastructure
- Operate as a Single Enterprise
- Centralized Acquisition and Governance





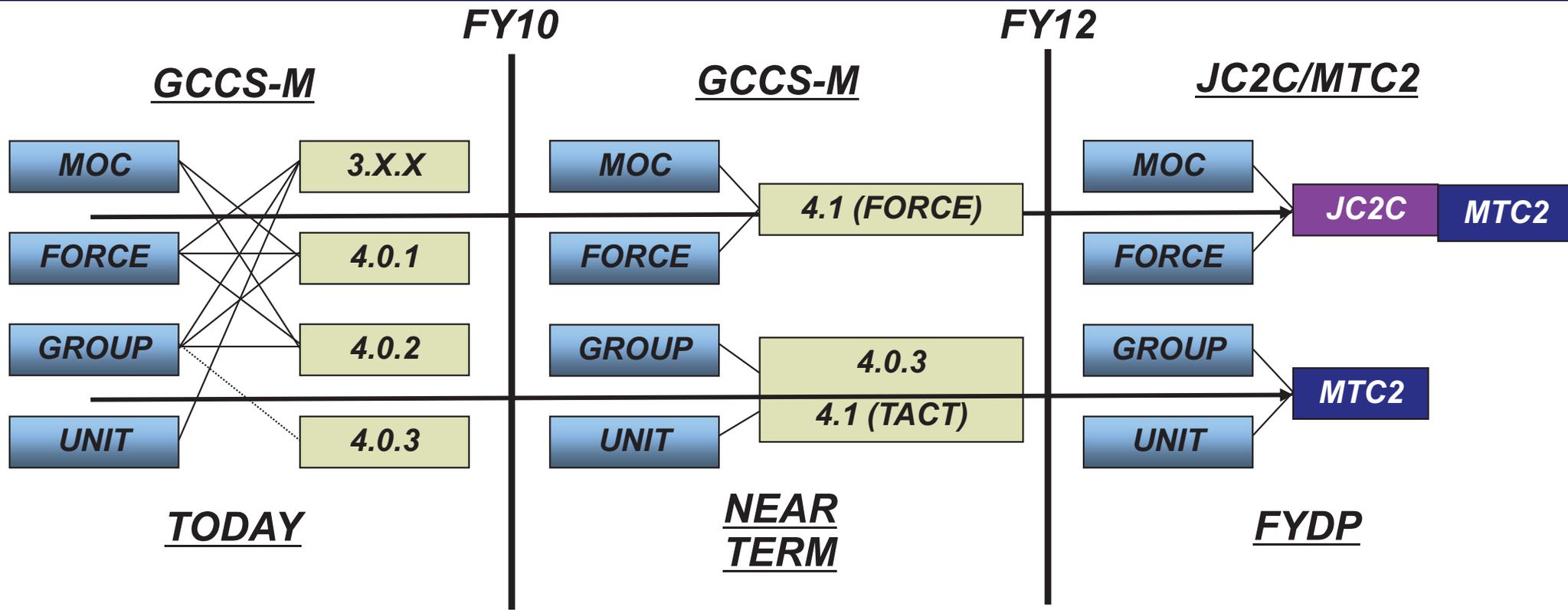
Navy Alignment with Joint C2 Software Objective Architecture



- Navy C2 is Leveraging Experimentation (such as C2RPC and ASW LTE) to Develop and Validate Maritime Solutions in Alignment with Joint Architectures, and Enable Joint Service Interoperability
- Navy Component Capabilities and Data Services are Compliant with CJCS 6212E, NCSS, DIEA, and NEADS
- Interoperable with Joint and other Service Component Capabilities
- ICISM Security Tagging at the Data Object Level on Schedule with Exposure



Maritime C2 Program of Record Migration



GCCS-M provides a robust Situational Awareness of **Who** and **Where** across the Wide Area Network



MTC2 will address "**Who, What, When, Where, Why, How**" in Mission Management Planning, Assessment, and Monitoring tools

New Start Maritime Tactical C2 (MTC2) Program will deliver required new capabilities which will not be addressed in any Joint C2 Program



Potential Science and Technology Efforts/Areas of Interest



- Mechanisms and Strategies for Information Prioritization in Support of Range Of Warfare C2 (ROWC2)
 - Prioritization of Information Needs/Wants Based on Introspection, EMCON, QoS, Available Bandwidth, Throughput, Routes, Low-Probability of Intercept (LPI), Low-Probability of Detection (LPD), Anti-Jam (AJ)
- Mechanisms and Strategies to Support Remote Delivery/Update of Mission Capabilities in Support of Emergent Mission Needs/Requirements
- Strategies and Mechanisms for Delivery of Lightweight C2, ISR, and IO Capabilities in Support of Mobile Devices (the iPhone/iPad App store model)



Potential Science and Technology Efforts/Areas of Interest



- Mechanisms and Strategies for extending “the cloud” to the tactical edge
 - Lightweight Visualization
 - Unified Content Discovery (UCD)
 - Content, Temporal, Event by Event, Geospatial, Resources (things like Topics, Queues, Data Sources/Data Bases, People, Places, Things, etc.), and Services
 - Disconnecting, Reconnecting, and Synchronizing (“Cloudlets”)
- Mechanism and Strategies for Dynamic/Smart Forward Caching in Support of Disconnect, Intermittent, Low-Bandwidth (DIL), and Denied Communications
 - Pre-Stage what the Warfighter might Need/Ask for in the Near Future
 - Actionary vice Reactionary

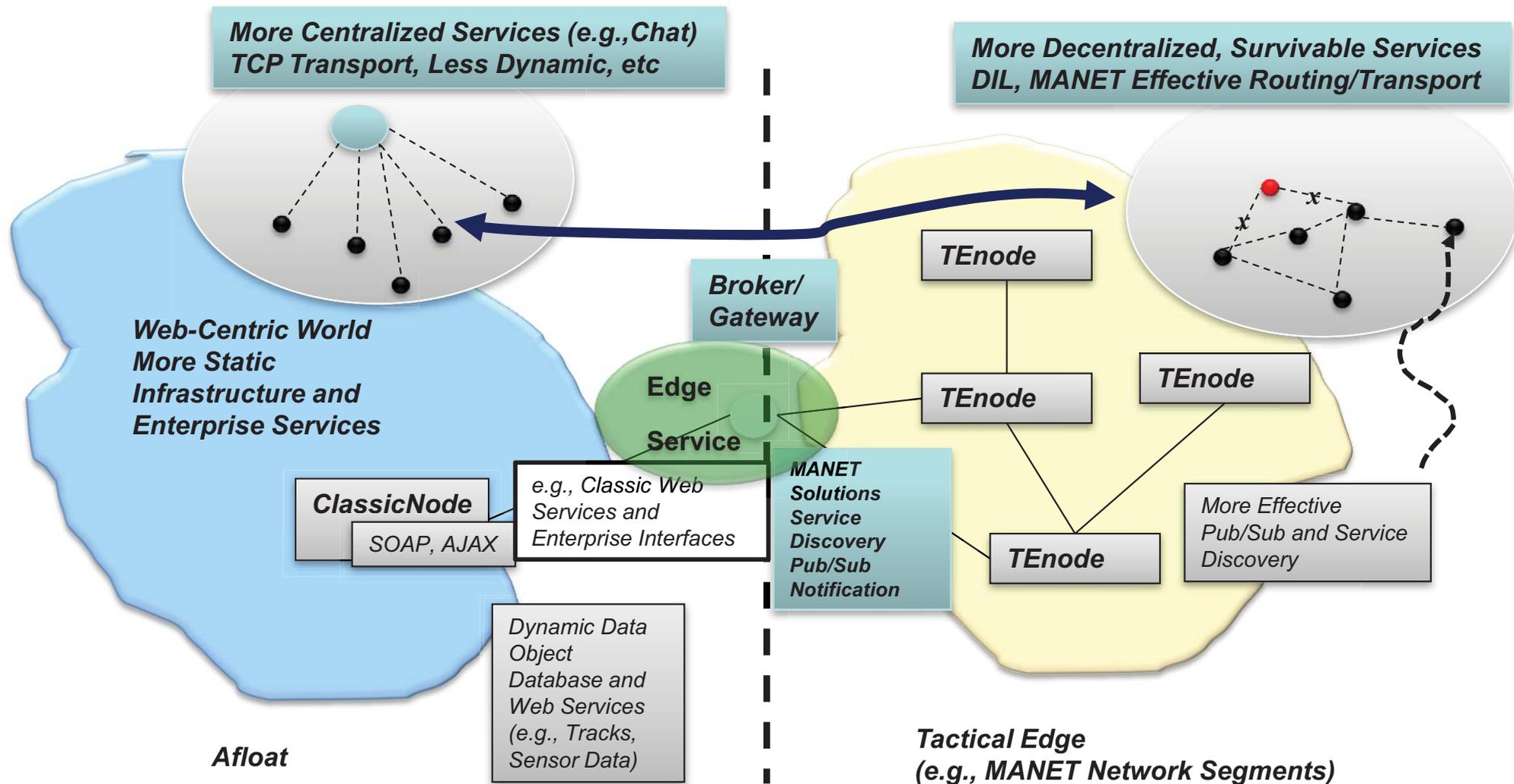


Potential Science and Technology Efforts/Areas of Interest



- Strategies and Mechanisms that Bridge Real-Time/Tactical (Deterministic) with Near and Non Real-Time COI Services
 - Bridge and Edge Services that Translate, Bridge, and/or Mediate between Protocols and Transports Utilized by Each
 - Messaging (LINK to/from XML), Presence
 - Common Information Functions (Exchange Models) that Mediate between Formats and/or Data Models
 - VMF, USMTF, LINK to/from Universal Core
 - Data Management Services like Unified Content Discovery (UCD)
 - Transports and Protocols

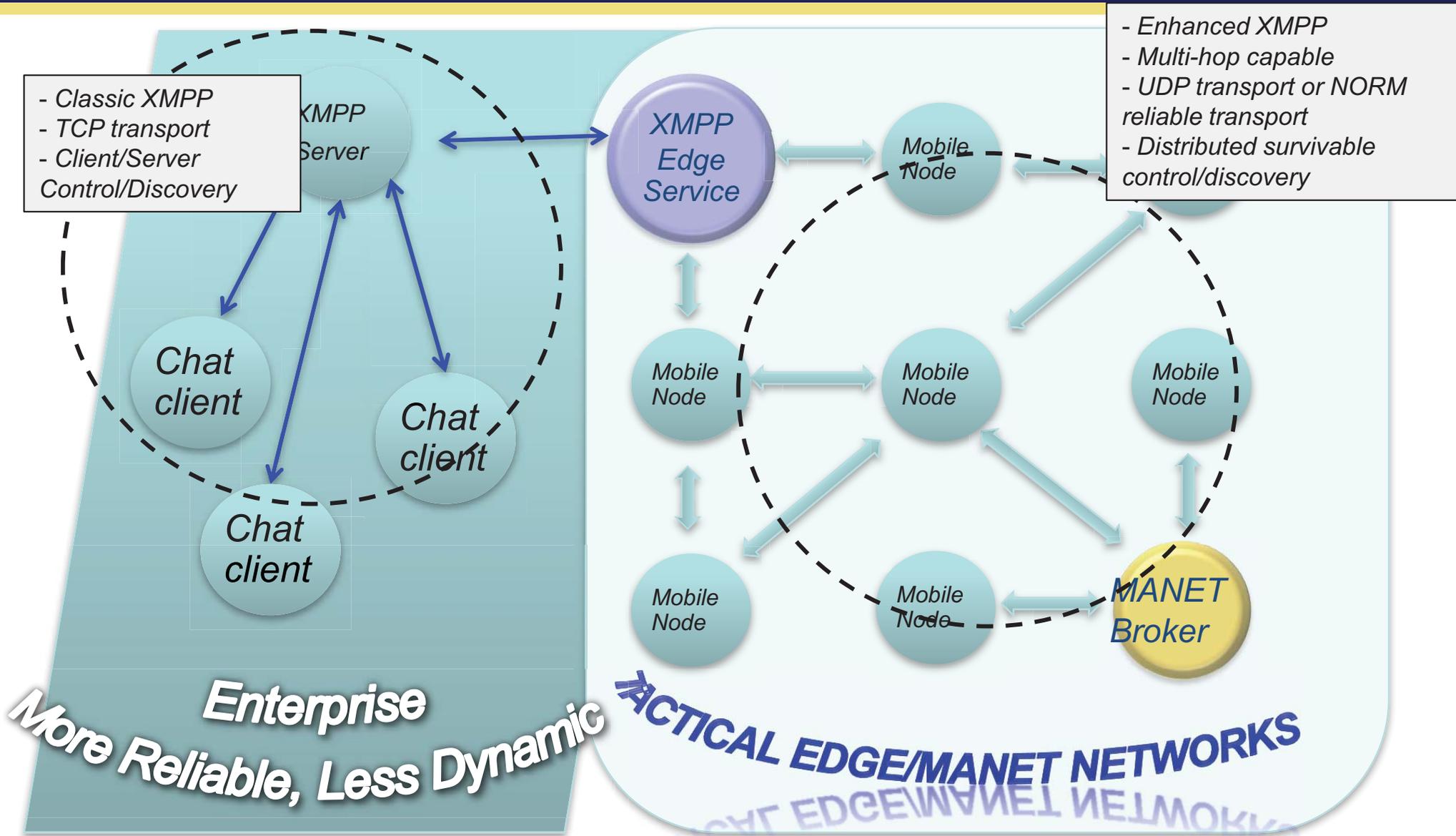
Domain Edge Service Use Case



Goal is to develop, experiment, and demonstrate approaches for tactical use and tactical gateway interaction and interoperability



Example: XMPP Chat as a Domain Edge Service





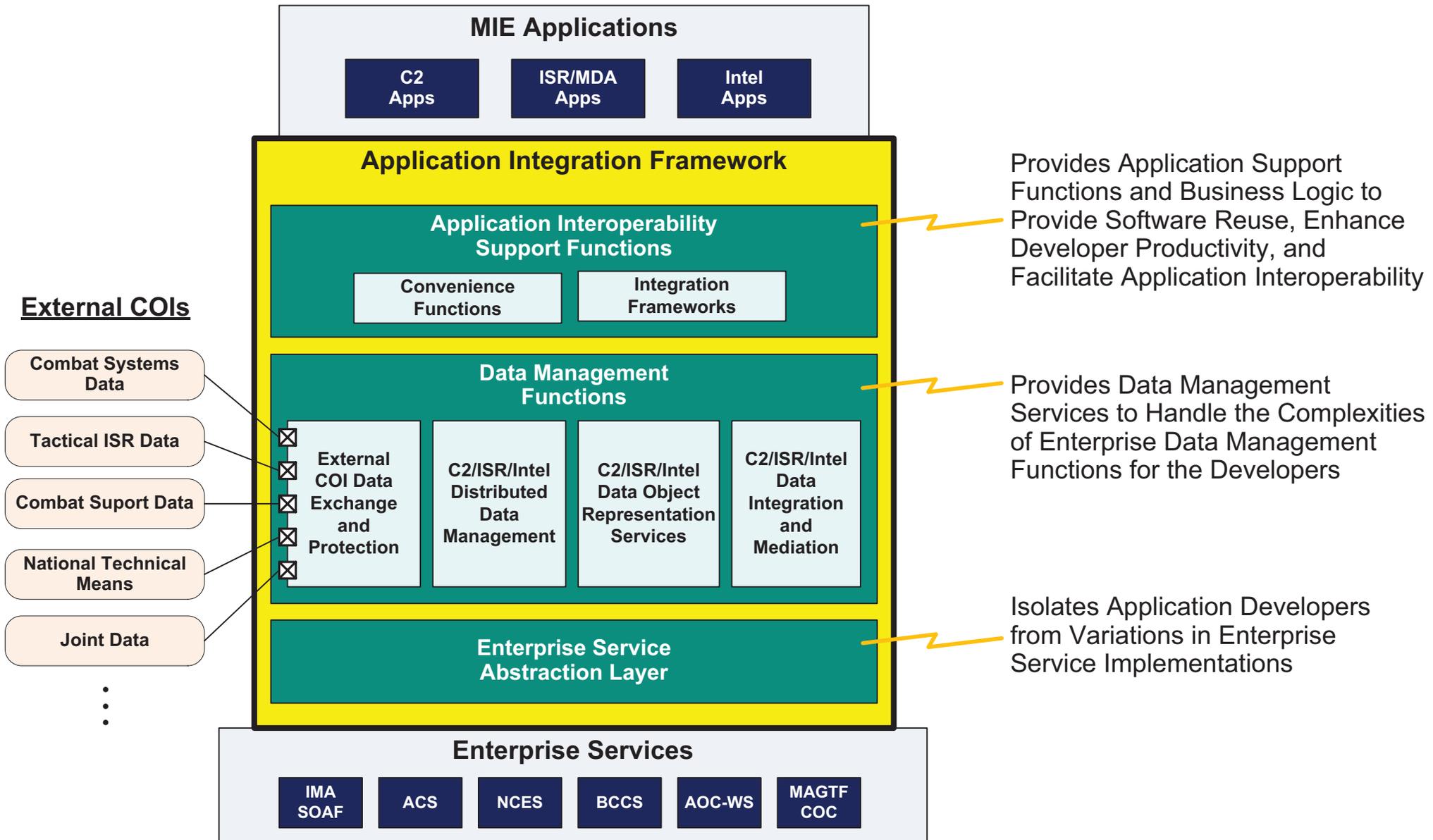
Common Information Functions and COI Services with Application Integration Framework (AIF)



- Isolate, Insulate, Abstract Out C2 and ISR Capabilities from the Underlying Services Implementation
 - Allows Scalability Vertically and Horizontally
- Gather Complex Sets of Calling Sequences (code) into Reusable Widgets, Functions, Methods, Classes, and/or Packages
- Promote Engineering Best Practices (Patterns & Practices) and Coding Best Practices
 - Code it Once
 - Test/Validate it Once
 - Re-use it Everywhere
- Provide an Accreditation & Isolation Boundary in Support of C&A, IA, and WS Certification



Application Integration Framework (AIF)

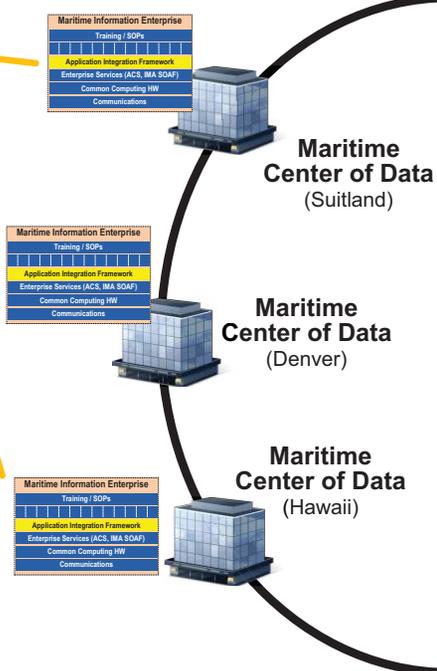




AIF Operational Locations

Global Nodes (2 + 1)

The AIF will be hosted and operated at the Maritime Centers of Data

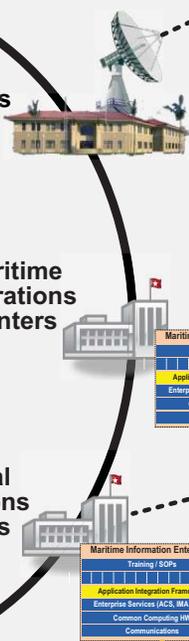


Regional Nodes

Network Operations Centers

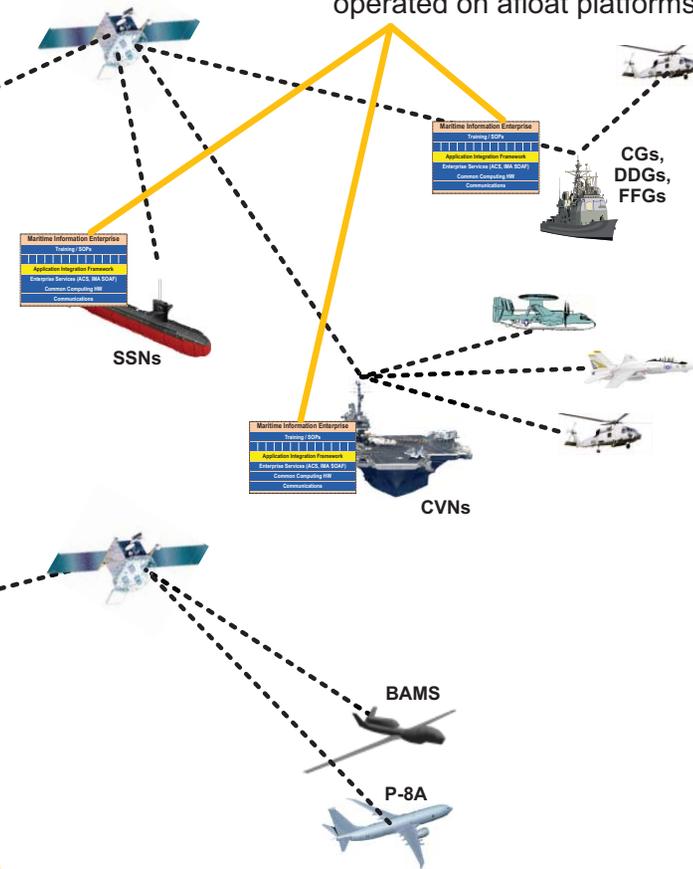
Maritime Operations Centers

Tactical Operations Centers



Tactical Nodes

The AIF will be hosted and operated on afloat platforms

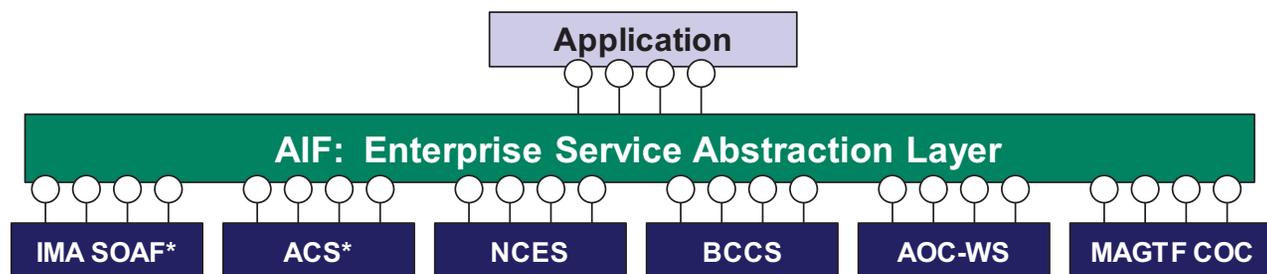


The AIF will be hosted and operated at the MOCs and the TOCs



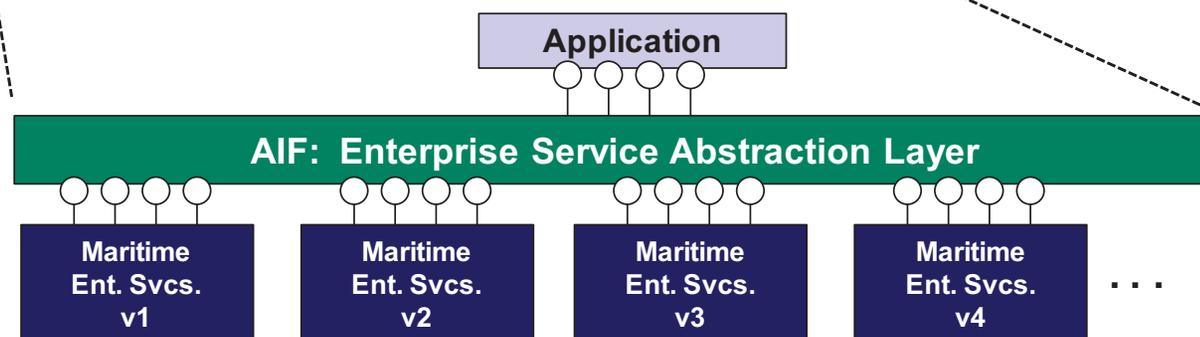
AIF Capabilities: Enterprise Service Abstraction Layer

- Isolates Changes in **Program-Specific** Enterprise Service Implementations



* Assumes that Under MIE, IMA SOAF and ACS Converge to Become a Single Maritime Enterprise Service Implementation

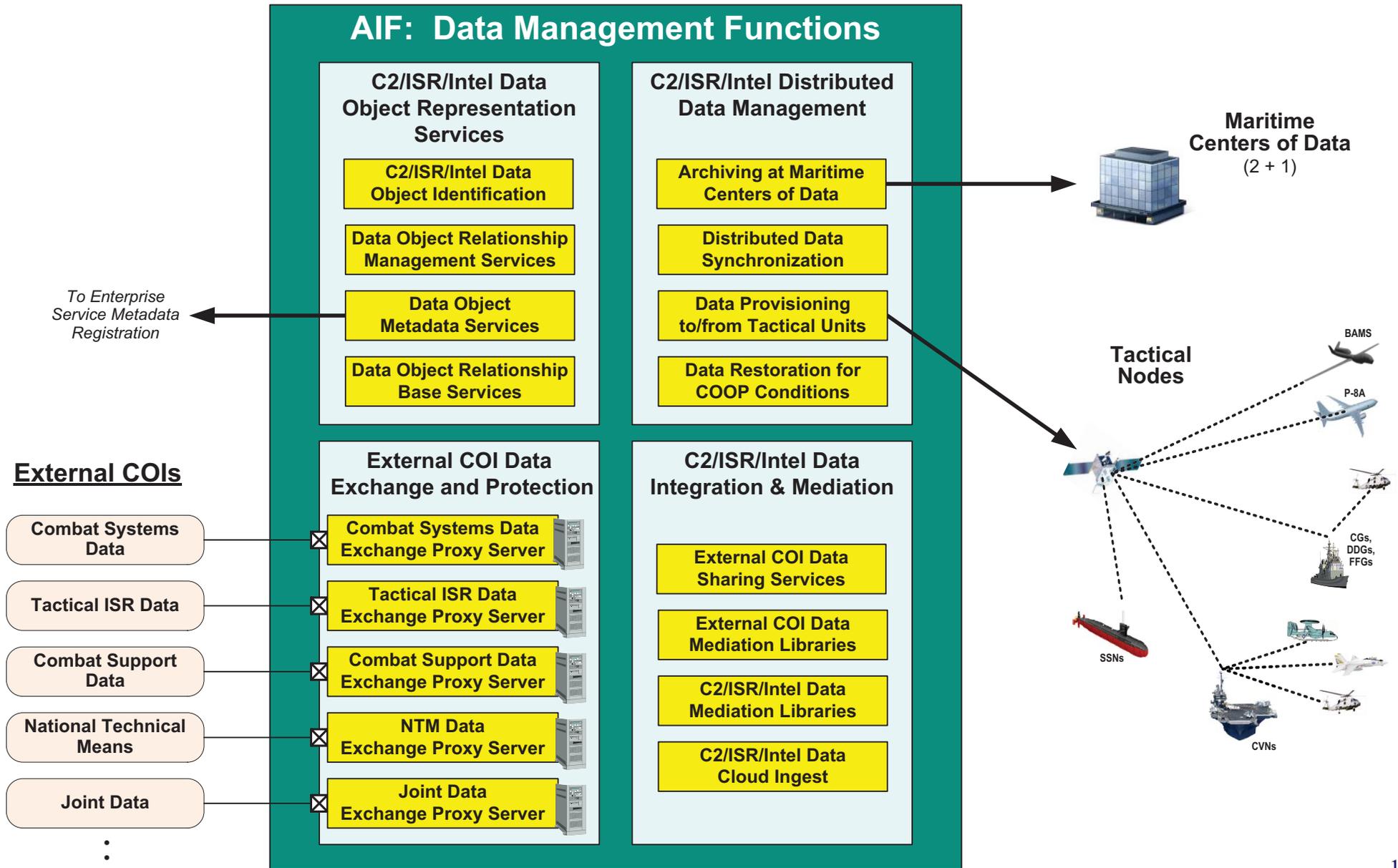
- Isolate Changes in Enterprise Service **Delivery Blocks**
 - v1 = JMS messaging
 - v2 = AMQP messaging
 - v3 = DDS messaging



Isolates Application Developers from Variations in Enterprise Service Implementations



AIF Capabilities: Data Management Functions





AIF Capabilities: Application Interoperability Support Functions

Convenience Functions

- C2/ISR/Intel Message Formatting and Parsing Functions
- Alert Topic Management Functions
- Access Policy Management and Set-Up Functions
 - Widget Access Policies
 - Workflow Access Policies
 - Service Orchestration Access Policies
- Commonly Reused Software Functions as Identified

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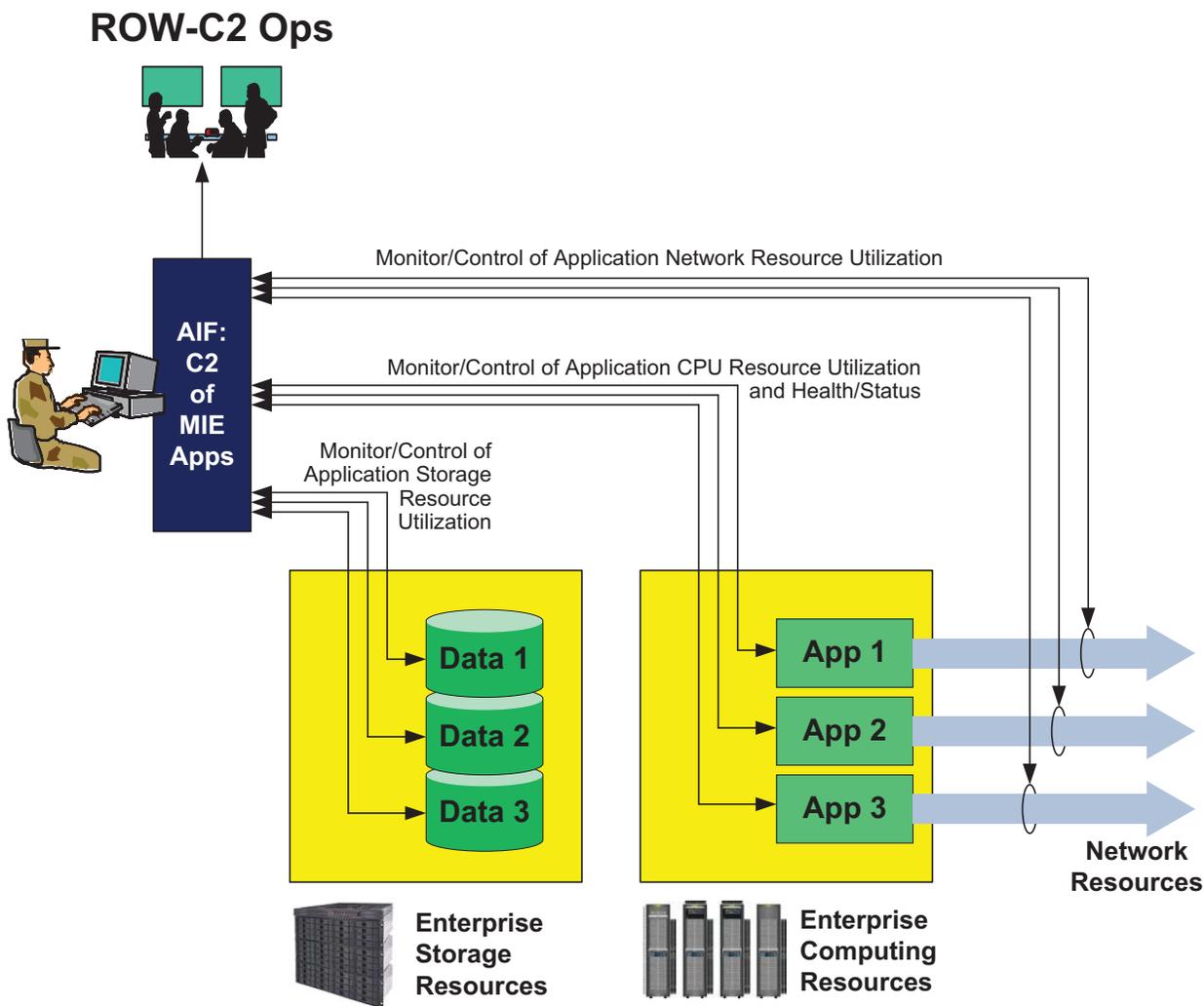
Integrating Frameworks

- Common C2/ISR/Intel Visualization Frameworks and Widget Libraries
- Common C2/ISR/Intel Workflow Engines and Workflow Libraries
- Common C2/ISR/Intel Service Orchestration Libraries
- C2/ISR/Intel Application Packaging Functions

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Enables Software Reuse and Enhances Developer Efficiency

AIF Capabilities: C2 of the MIE Applications



- Tools for Monitoring and Controlling Application Resource Utilization
 - Computing Resources
 - Network Resources
 - Storage Resources
- Tools for Optimal Positioning of Applications to Support Mission Needs

Run-Time Management Tools for C2 of MIE Apps Across Full-Range of Warfare