Composeable FORCEnet:

Composeable Command and Control for Joint Expeditionary Decision Making

presented at

The Tenth Annual

Expeditionary Warfare Conference

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“The U.S. Navy announced that it has released a senior Al Quaeda terrorist after questioning him extensively for 27 days while being held prisoner aboard a U.S. Navy aircraft carrier in the Arabian Sea. In a humanitarian gesture, the terrorist was given $50 U.S. and a white 1962 Ford Fairlane automobile upon being released from custody.”


In 2005, the U.S. Navy institutes
its new “Terrorist Catch and Release Program”

Joint Battlespace Awareness Command and Control The Nature of the Challenge

- **Joint Expeditionary Warfare arguably the most challenging operational mission**
- **Joint Expeditionary Warfare is more than Joint, it is interagency and coalition**
- **Battle Management Command and Control is crucial to the Commander's ability to *command* and influence the outcome**
- **BMC2 systems must deliver the requisite degree of situation awareness to *all* players – not just the commander on the flagship**

…so how are we doing?

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"The net-centric idea of lifting the fog of war by creating this giant strategic technological eye in the sky has been an abject failure with hundreds of billions of dollars wasted.

MGEN Robert Scales USA (ret)

Commenting on US Army Ops in OIF

"Operation Peach"

***Defense News* September 12, 2005**

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“The enemy has moved into a situation where American power that is dominant is increasingly irrelevant. The enemy has moved into urban areas where our technology is less relevant and we can’t bring as much technology to bear. So…we do have to reverse course and get more technology in support of the rifle squad.”

Lieutenant General J.M. Mattis
Commander MCCDC

Joint Battlespace Awareness Command and Control
What Should We Deliver to the Warfighter?

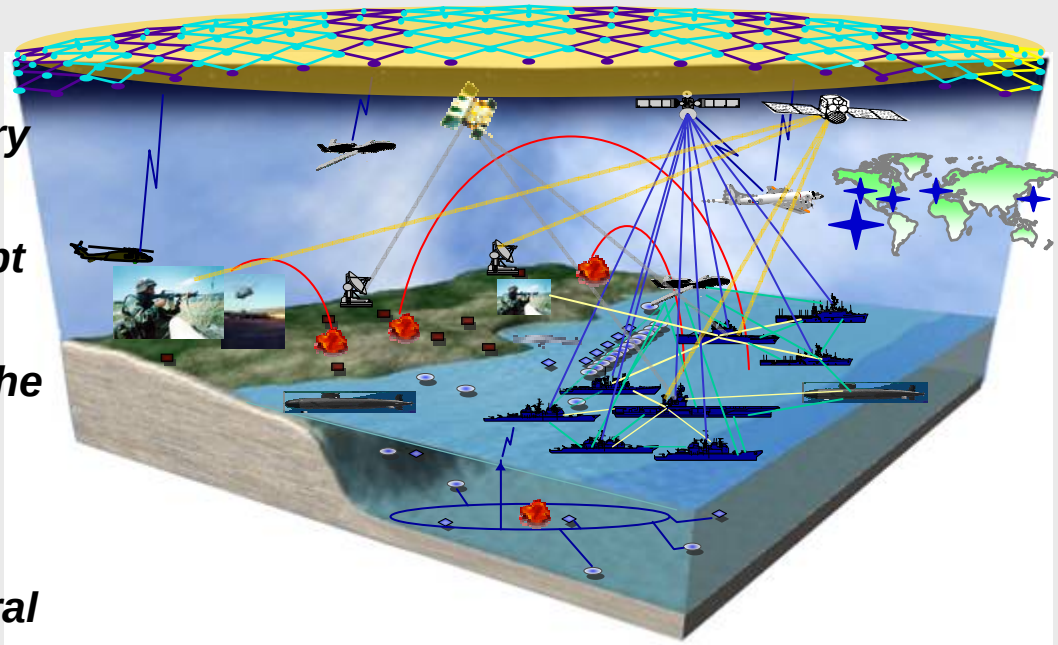
- Exploit every source of information
- Provide shared situational awareness
- Support dominant speed of command
- Permit precise fire control execution
- Operate synchronously & asynchronously
- Provide agility and flexibility

…so how do we deliver a C4ISR solution?

The Goal of C4ISR: To Support Joint Battlespace Awareness Command and Control

The goal has changed little over history

What Is FORCEnet?



Network Centric Warfare Is the Theory

Net-centric Operations Is the Concept

FORCEnet Is the Process of Making the Theory and Concept a Reality

"FORCEnet is defined as the operational construct and architectural framework for naval warfare in the Information Age, integrating warriors, sensors, command and control, platforms, and weapons in a networked, distributed combat force"

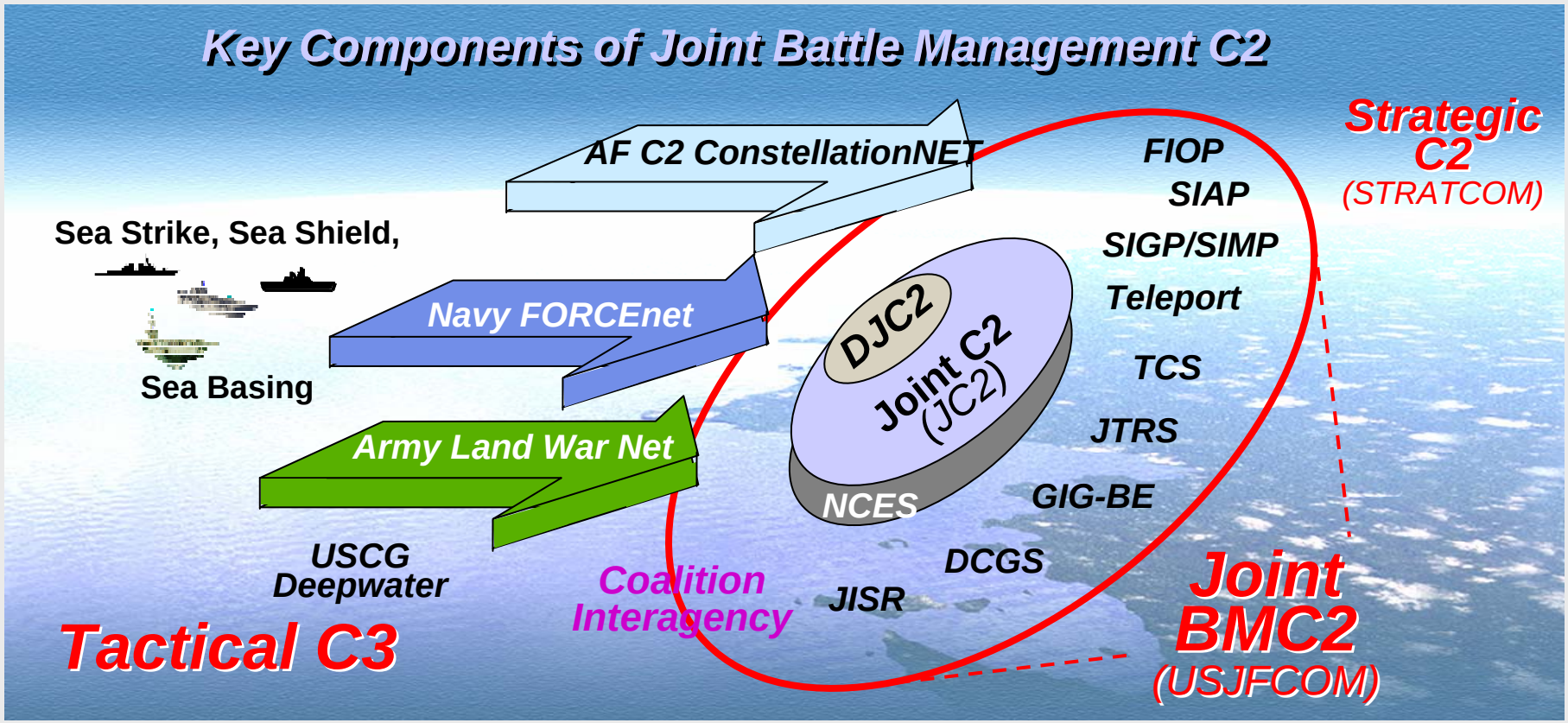
Source - *FORCEnet: A Functional Concept for the 21st Century:*

February 2005

- FORCEnet Is Not
  - A Program of Record
  - A Redundant Effort
  - A Box or System
  - Just a Network

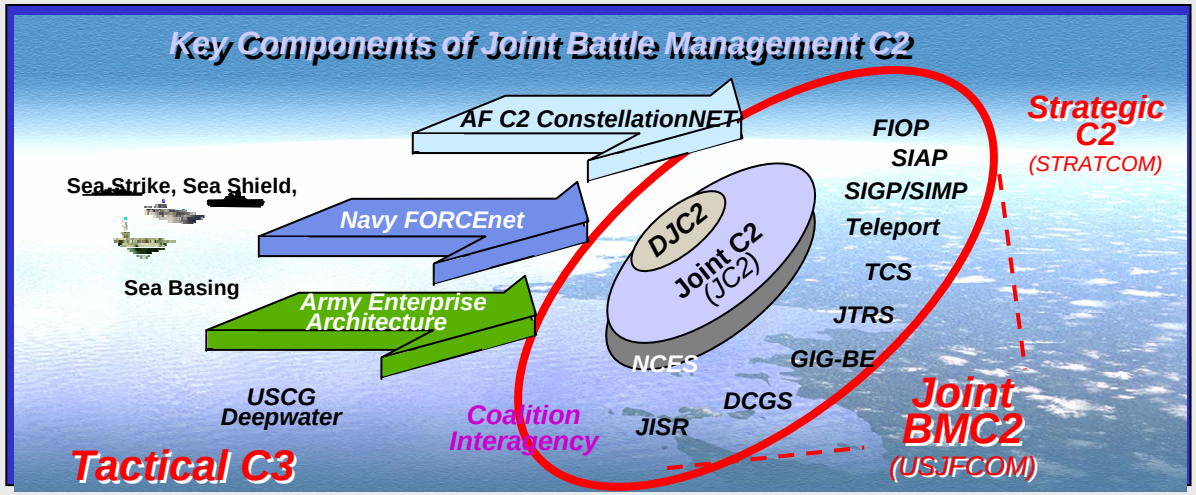
FORCEnet: Naval Component of the Global Information Grid (GIG)

FORCEnet Is an Inherently Joint/Coalition Concept.



FORCEnet

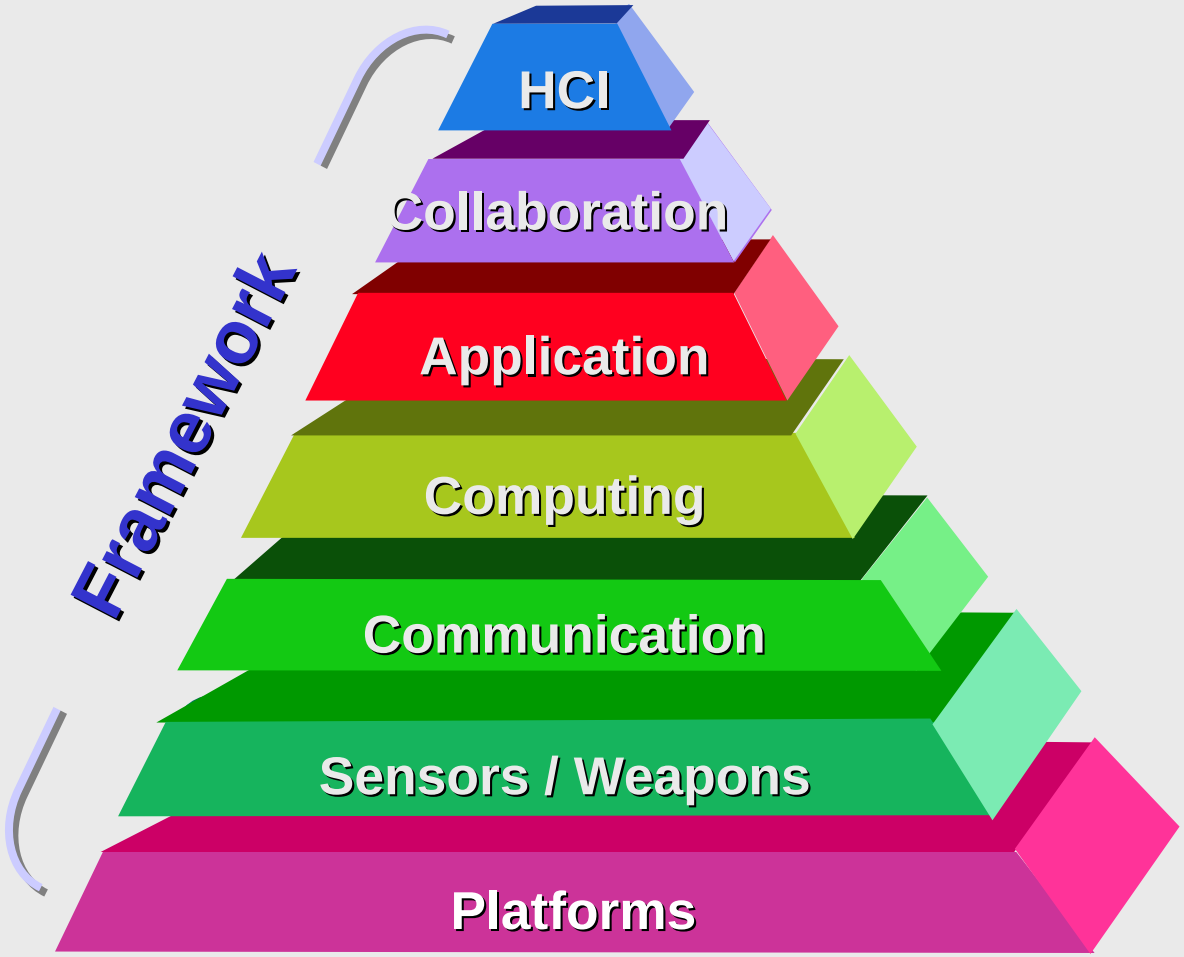
The *Naval* component of the Global Information Grid



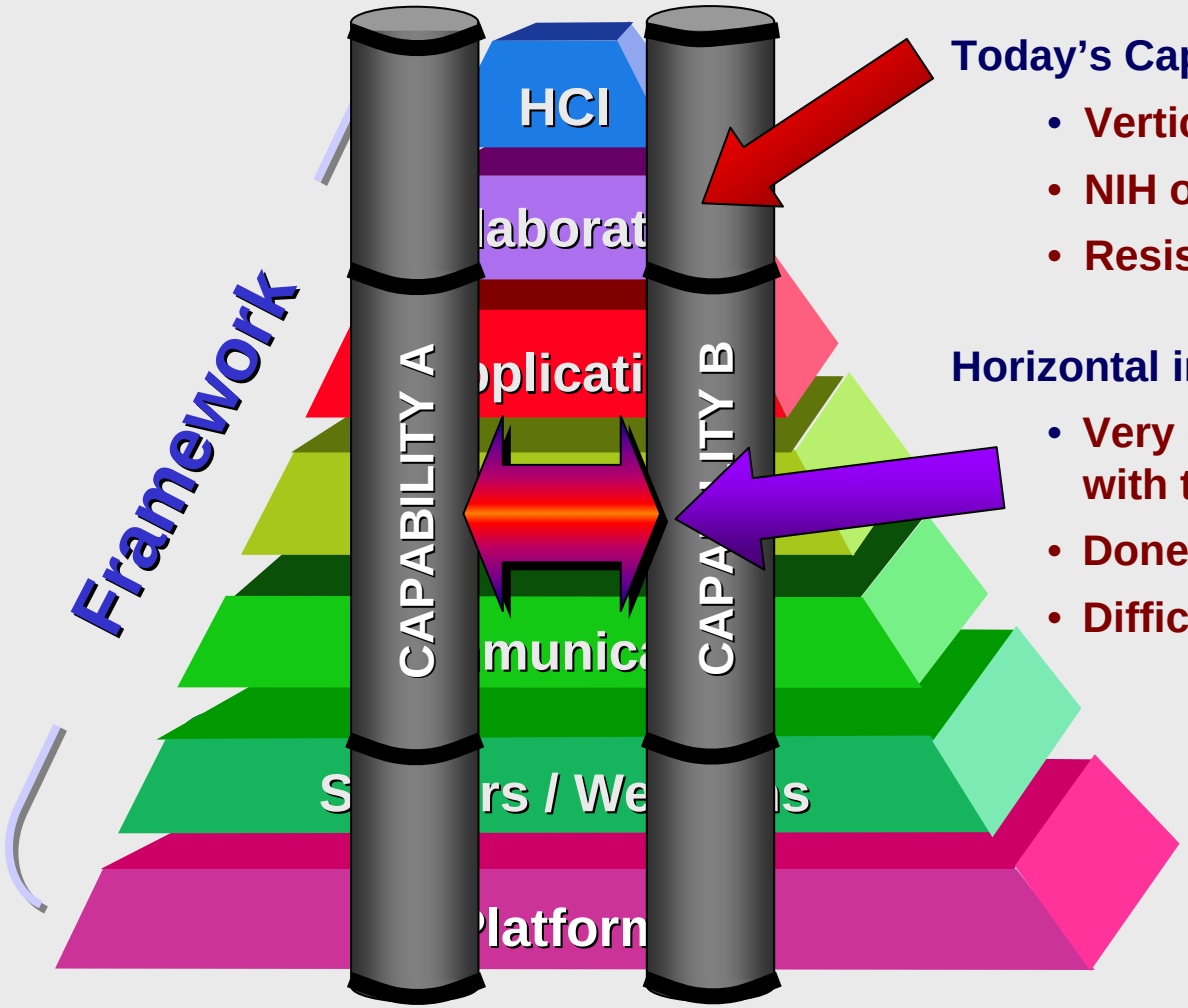
FORCEnet means:

- A warfighter, or organization, can collaborate with anyone, anywhere, anytime
- Warfighters can allocate bandwidth and priorities for applications and individuals and define their own QOS
- Warfighters can get sensor coverage when and where they need it
- Warfighters can tailor their information requirements and presentations to support their missions
- Warfighters can put the right weapon on the right target

Technology Building Blocks of FORCEnet



FORCEnet Capabilities Are "Composed" of Technologies



Today's Capabilities:

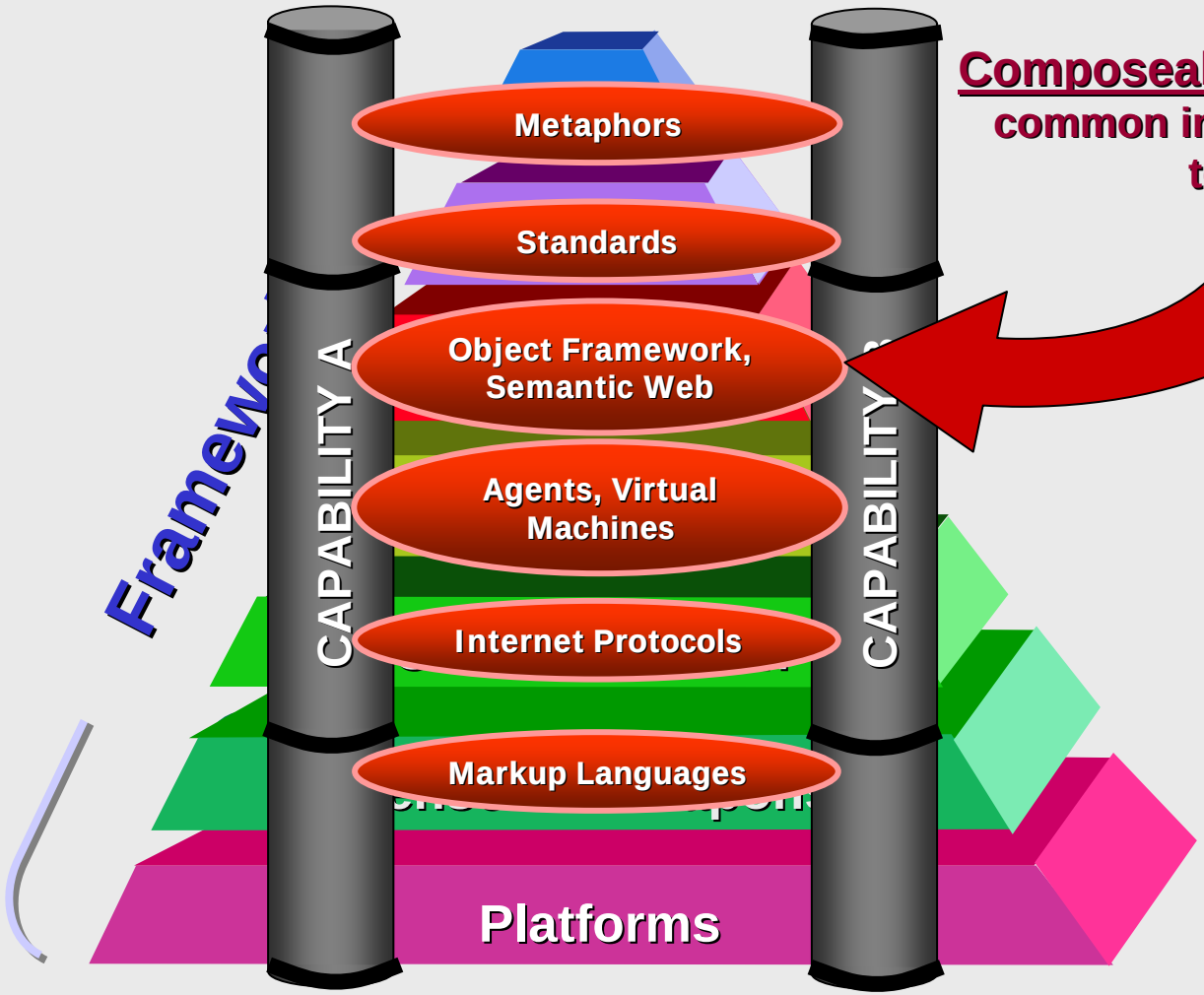
- Vertically Integrated Stovepipes
- NIH often suboptimizes capability
- Resistant to new technology

Horizontal integration is:

- Very costly, increases exponentially with the number of systems
- Done case by case by experts
- Difficult, at best, to sustain

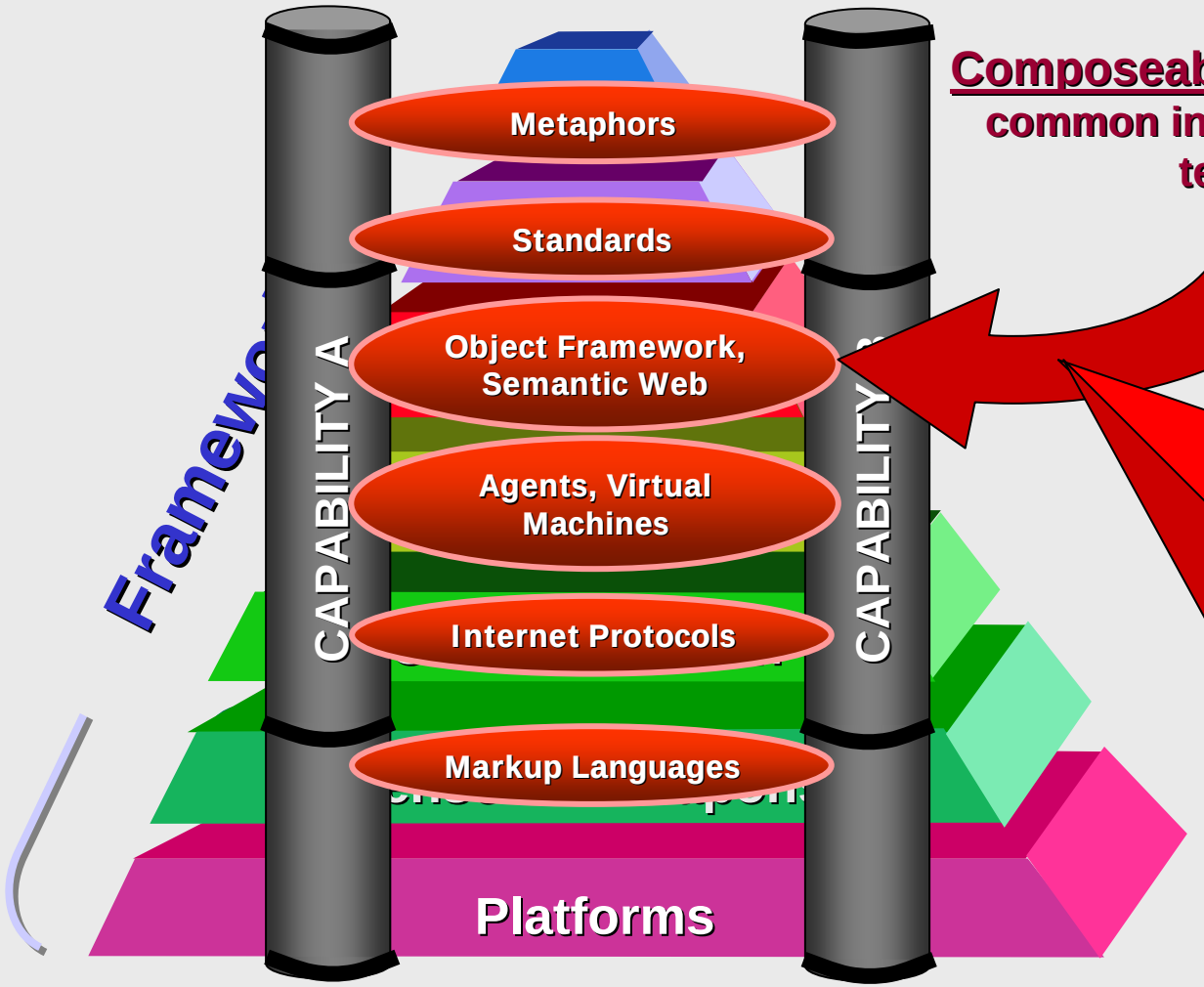
Systems-of-Systems increase non-interoperability over time

Interoperability and Access Through Composeablity



Composeable Web Services provide common interfaces across uncommon technical solutions

Interoperability and Access Through Composeablity



Composeable Web Services provide common interfaces across uncommon technical solutions

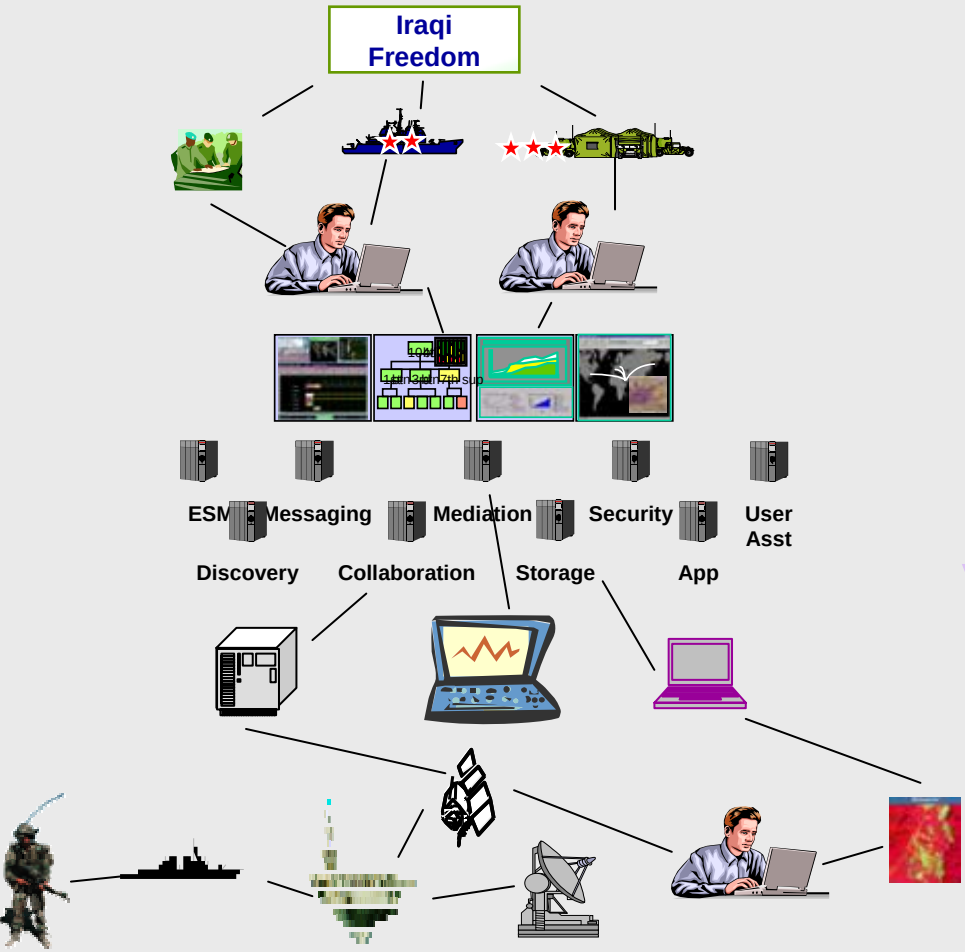
You use this approach at home and at the office every day

Composeable FORCEnet

Services-oriented Information Architecture

(residing on the GIG network)

Transformational Operations – Transformational Acquisition



Mission Requirements

Composeable Doctrine

Composeable Organizations

Composeable COIs

Composeable Pictures

Composeable Services

Composeable Hardware

Composeable Sources

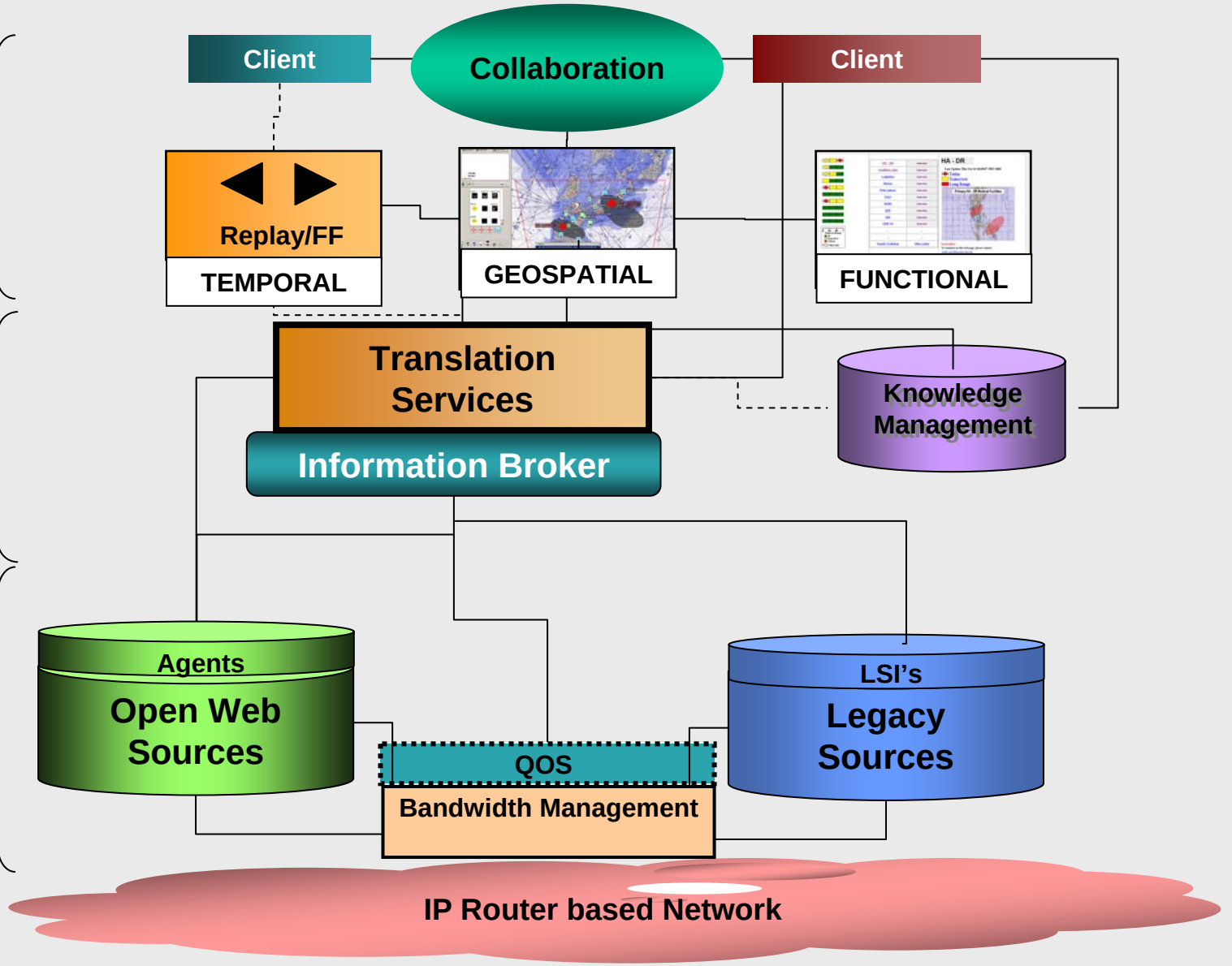
Technical Capabilities

Mandated Services-Oriented Architecture Implies a Mandate for Composeability

- **DoD Integrated Interoperability Plan**
  - ASD (NII), JFCOM, DISA and Services will each submit guidance, plans, and migration strategies to complete transition to the JC2/UDOP NCES architecture.
- **USJFCOM Joint Transformation Roadmap**
  - USJFCOM provides direction and guidance and oversight in development of operational and tactical level C2 capabilities.
- **Chief of Naval Operations: FORCEnet Requirements/Capabilities and Compliance Policy CNO/N6N7 3170 27 MAY 05**
  - Director for Net-Centric Warfare (N71) is responsible for the oversight and maintenance of this policy.
- **Naval Network Warfare Command (NETWARCOM)**
  - Serves as the FORCEnet Operational Agent who, in coordination with MCCDC, is developing both the FORCEnet Integrated Architecture.

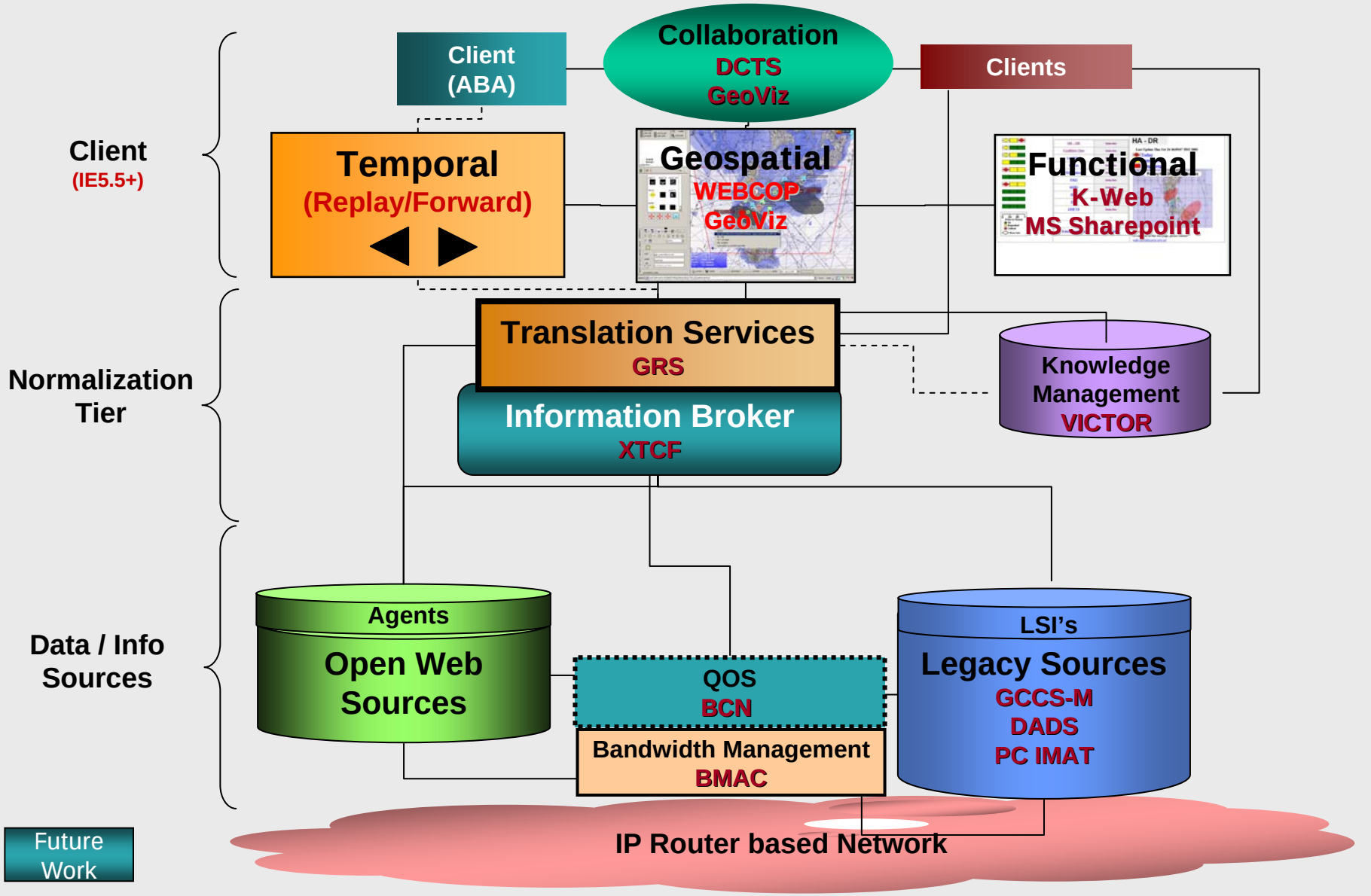
Demonstration Architecture

Built Around a Geospatial Hub



Demonstration Components

It's about Composeable Functionality – Not the Specific Components



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Sample Display: GeoViz

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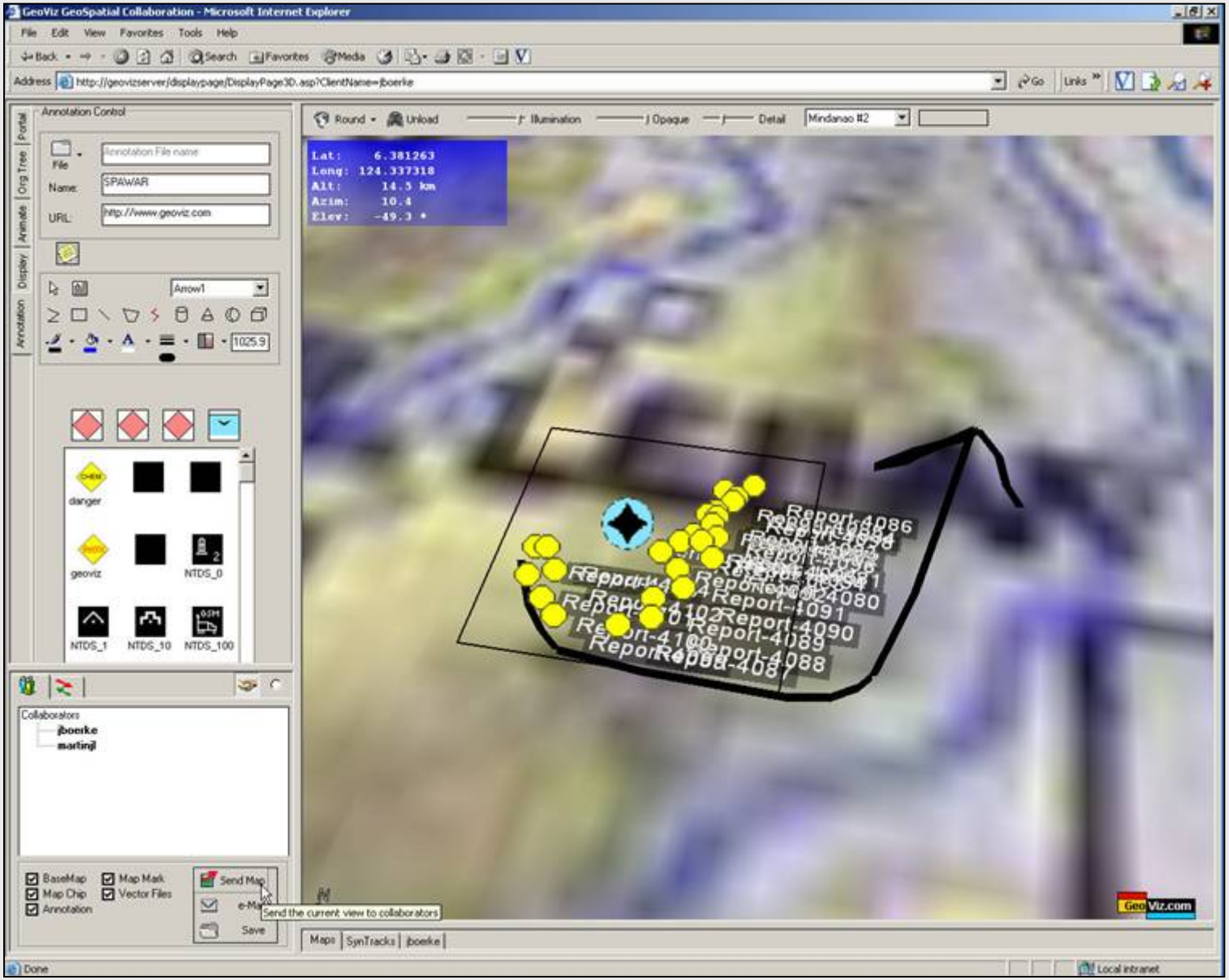
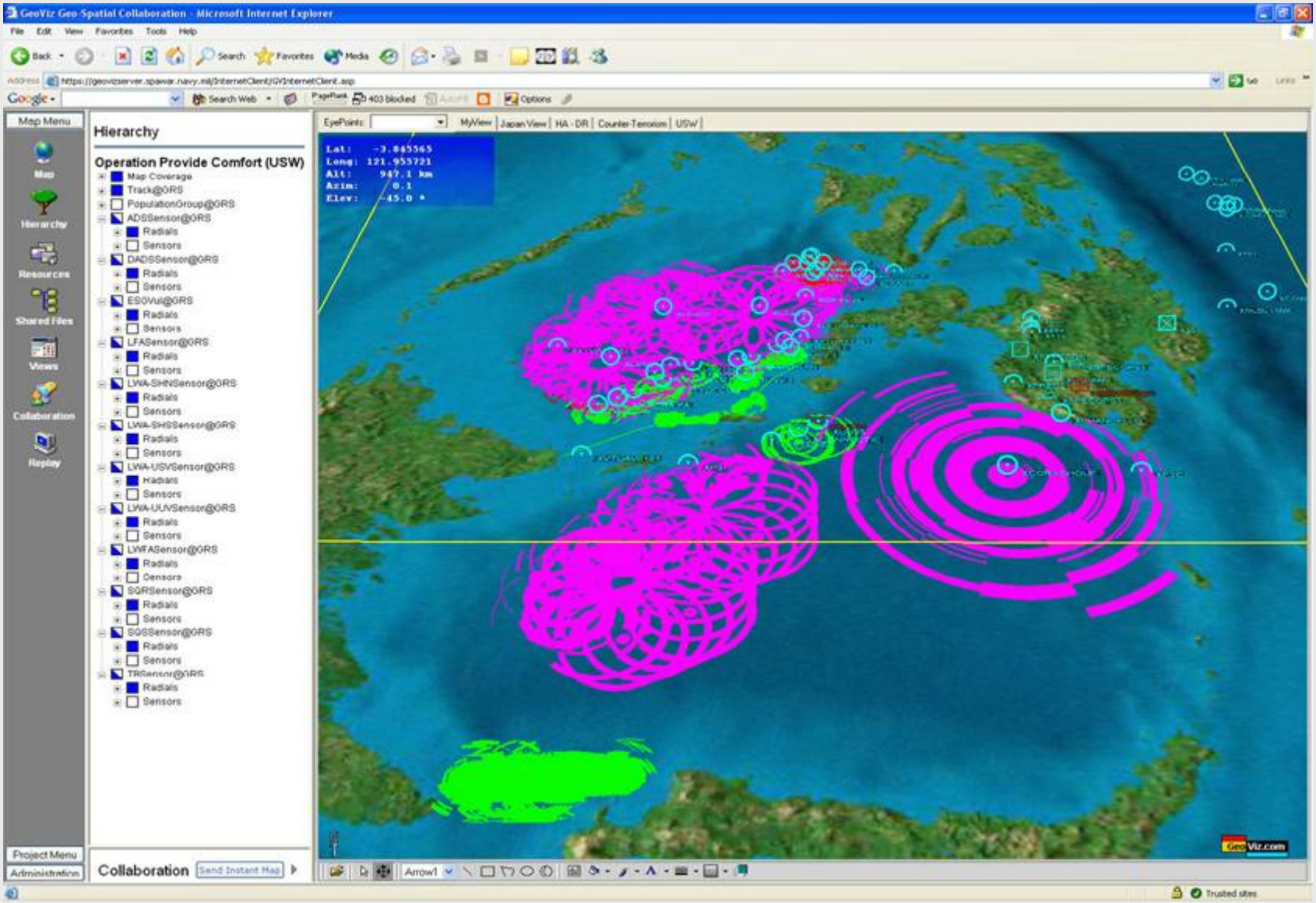
Sample Display

GeoViz subscribes to UGS data that was published to the GRS

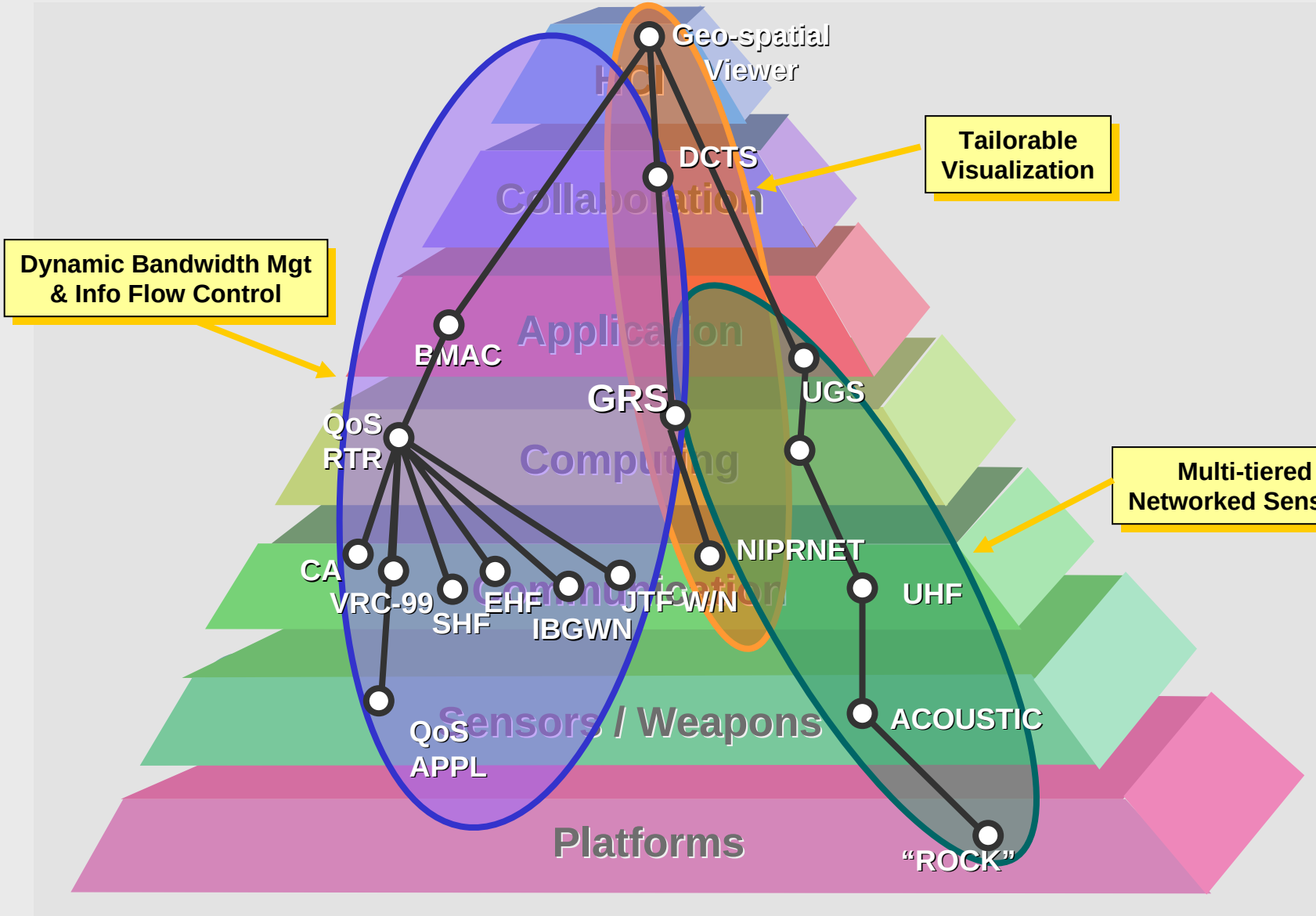


Sample Display

GeoViz subscribes to PC IMAT predictions



The Goal
Composed Capabilities



Composeable FORCEnet Through Systematic Experimentation

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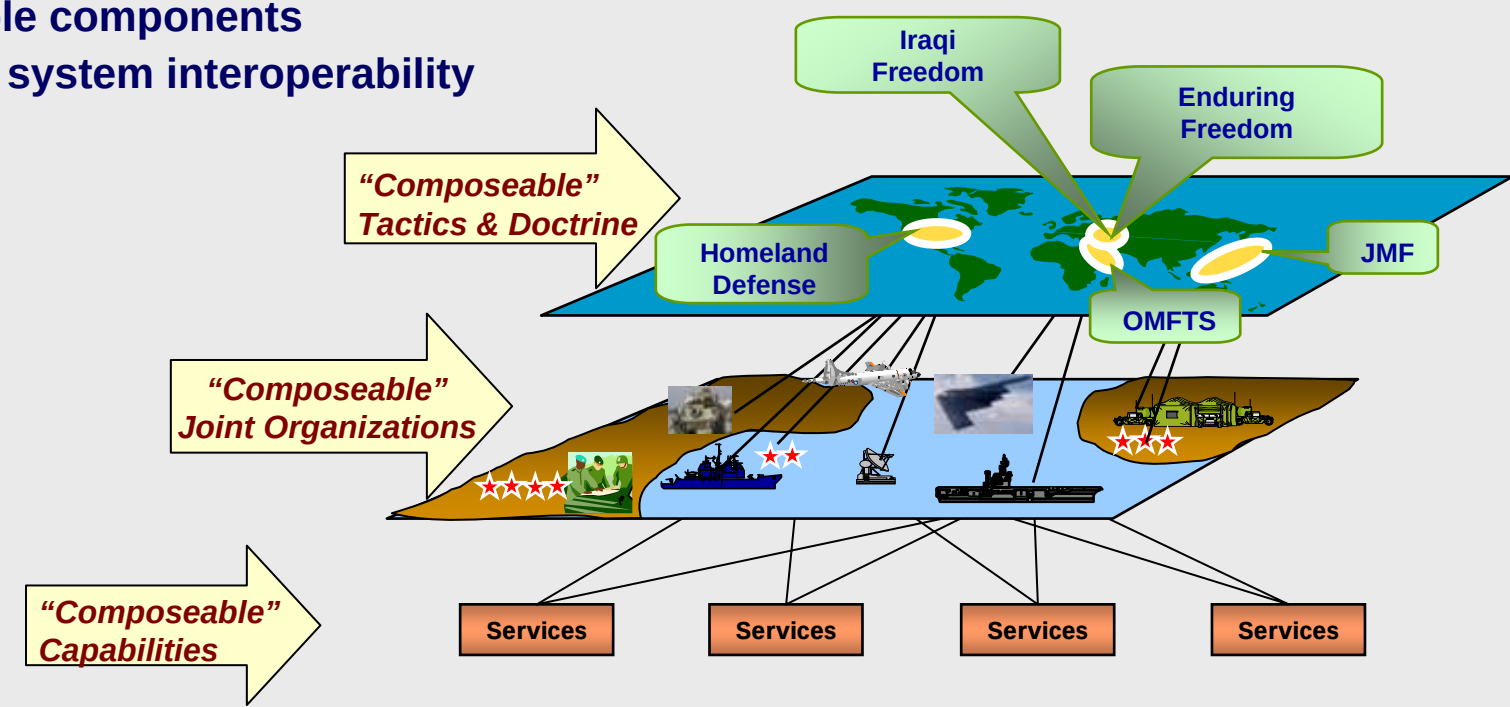
Transform Operations

- Assemble components on the fly
- Joint - Agile - Tailorable
- Geospatial –based shared collaboration
- Intuitive linkage to information

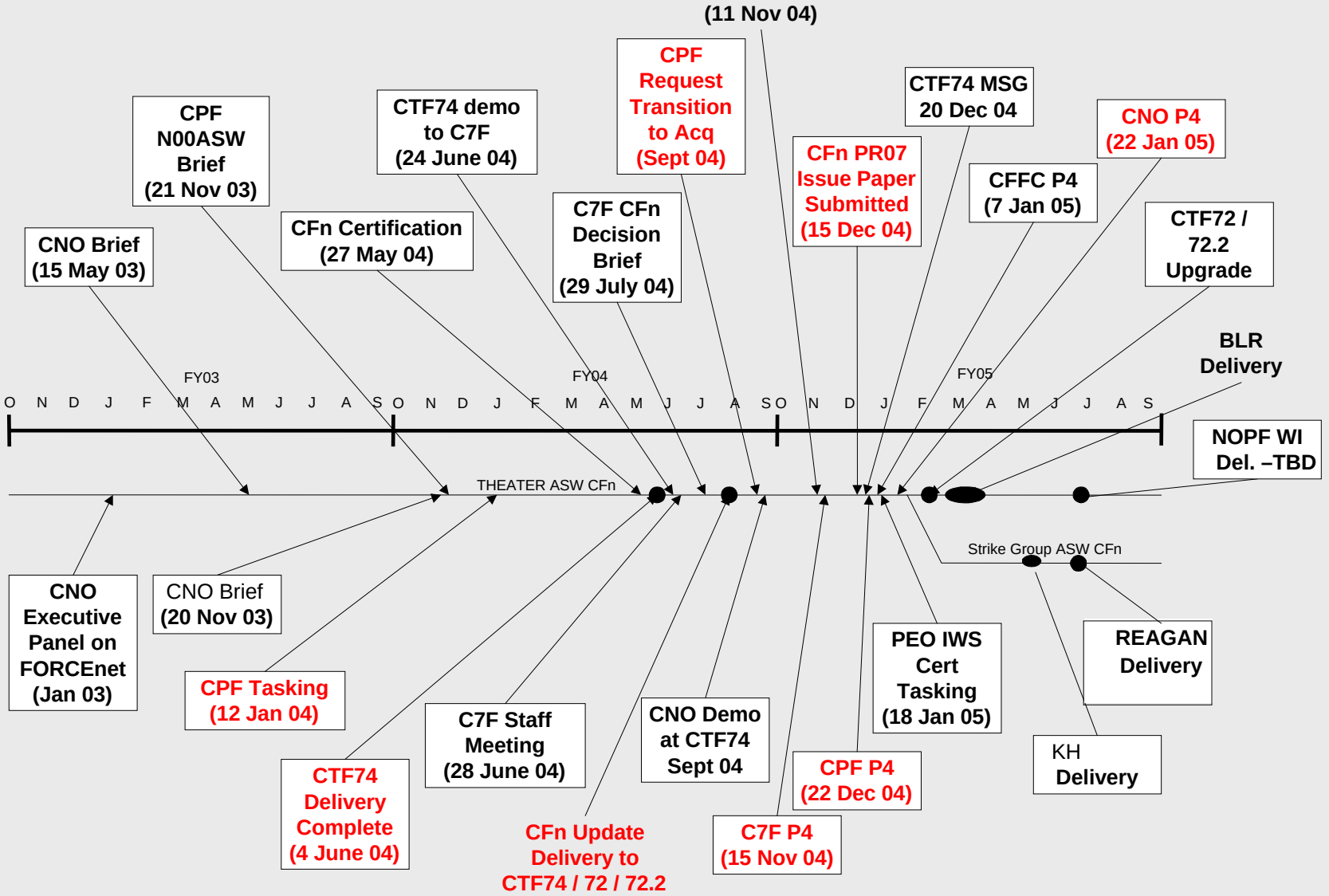
Transform Acquisition

- Increase Speed-to-Capability
- Reusable components
- Legacy system interoperability

Plug-n-Fight!



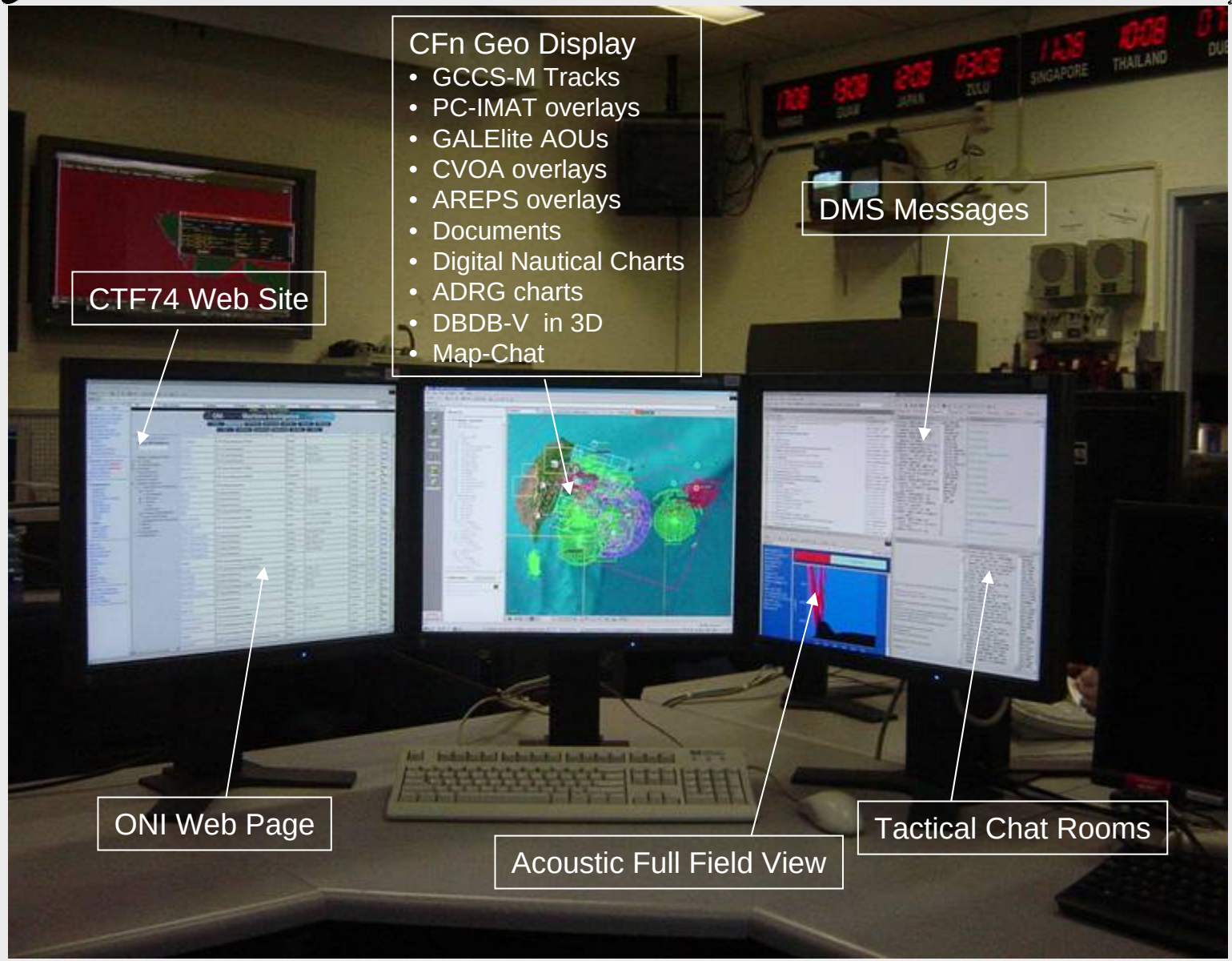
CFn History to Date



Where CFn is Currently Deployed

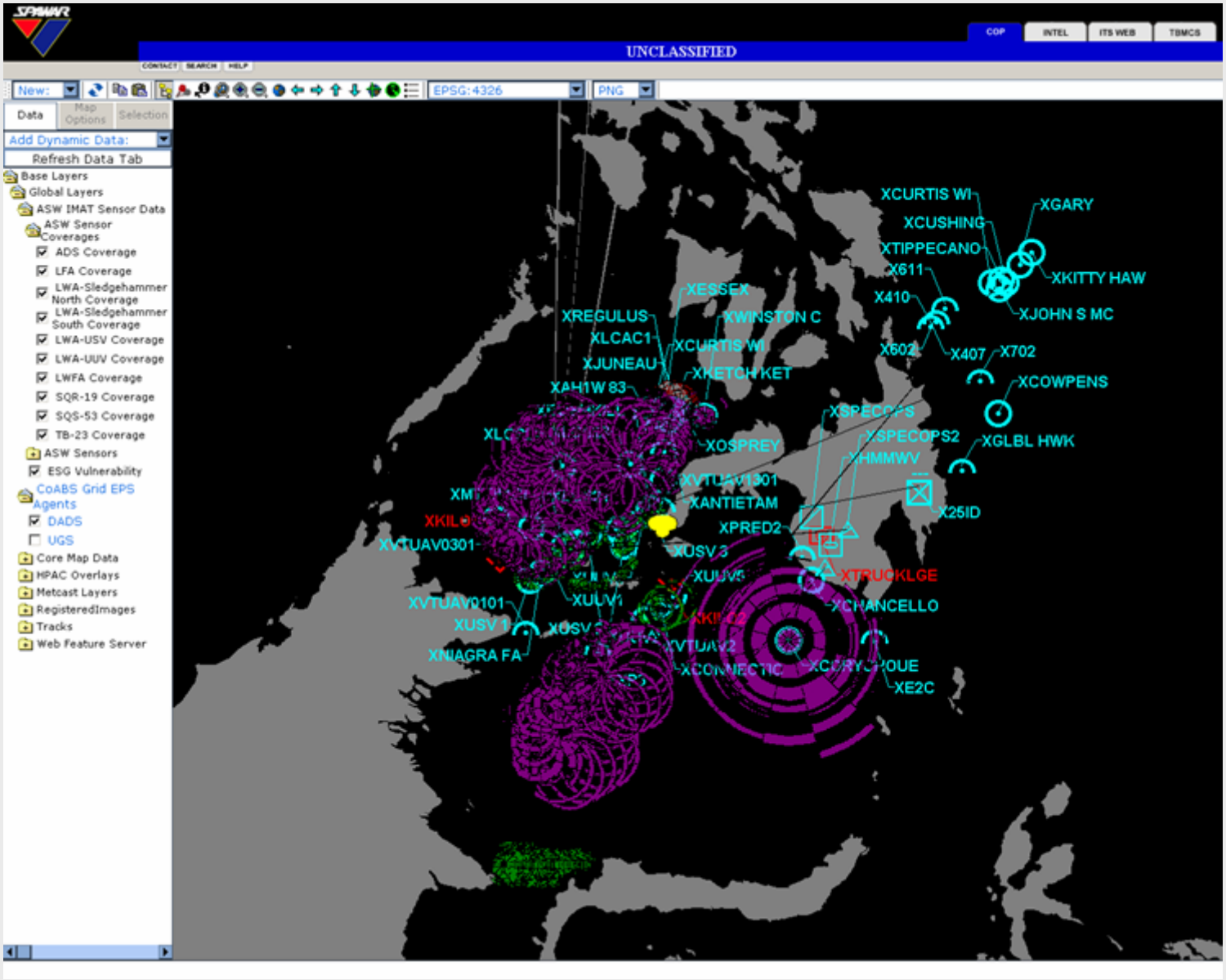
- CTF74
  - Software update to Build 3 level
- CTF72
  - Hardware upgrade to full suite (two servers)
  - Software update to Build 3 level
- CTF72.2
  - Hardware upgrade to full suite (two servers)
  - Software update to Build 3 level
- USS BLUE RIDGE
  - Hardware installation of a full suite (2 servers/6 clients)
  - Software update to Build 3 level
- USS KITTY HAWK
  - Hardware installation of a full suite (2 servers/9 clients)
  - Software update to Build 3 level
- Kunia Regional Security Operations Center

TASW CFn Battle Watch Captain Display at CTF 74

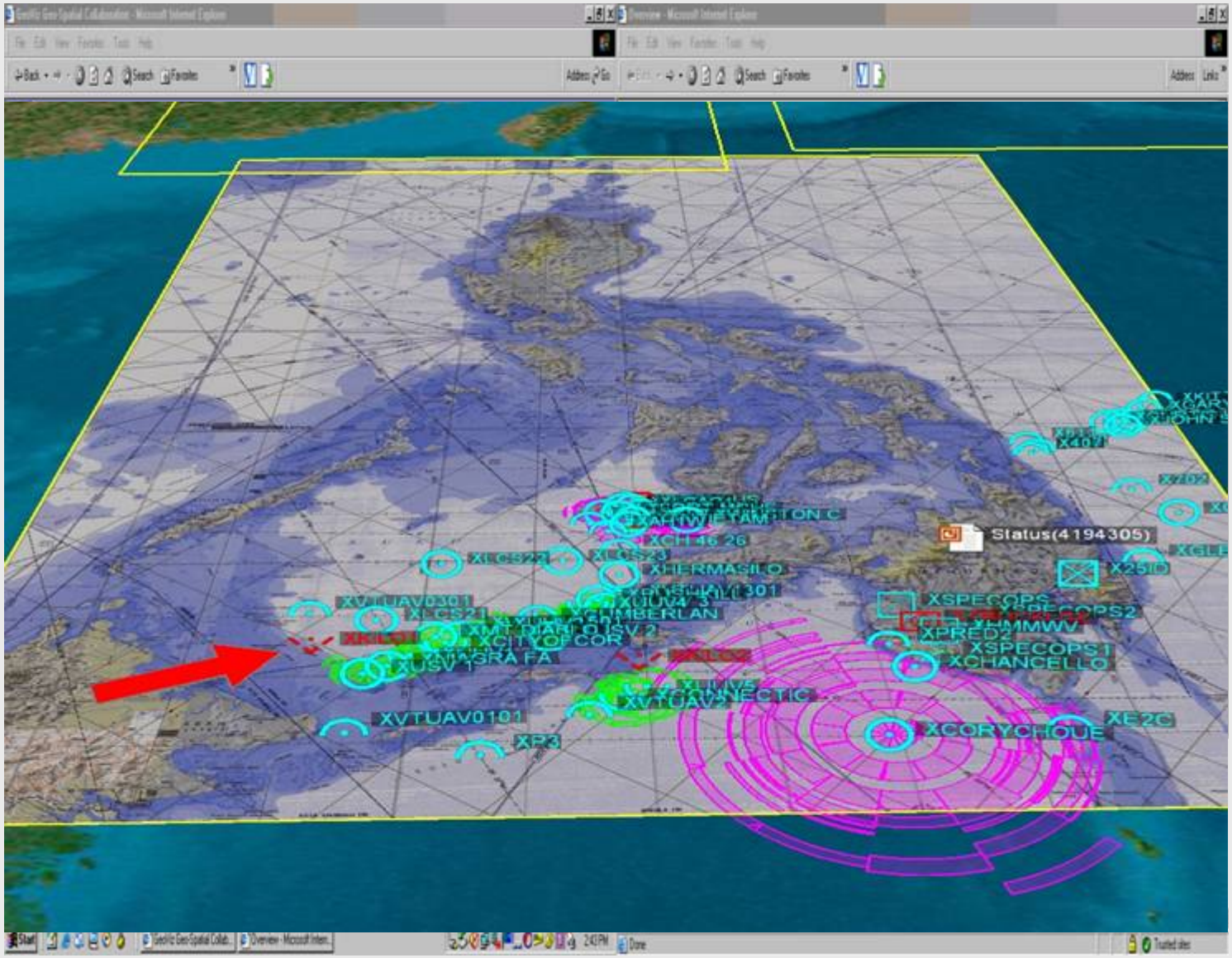


CFn Web based C2 provides improved understanding

What CFn looks like on WebCOPat CTF74



What CFn looks like from the Geospatial Collaboration Service at CTF74



Summary

- Composeability
  - Components rather than systems of systems
- Composeable FORCEnet
  - Better Decisions, Faster, with Fewer People
- Composeable FORCEnet demonstrates the tactical and operational advantages of enabling joint warfighting

Summary

- Ultimately, the naval and Joint warfighter – and not the engineers - will use the capabilities needed for the immediate operational and tactical problem.
- Warfighters operating in a Composeable FORCEnet-enabled environment will soon be able to *compose* the C4ISR components developed by the engineering community to ensure superior decision-making.
- This capability has the potential to enable the Joint Force Commander to achieve the maximum degree of operational effectiveness across the spectrum of warfighting and to do it faster than ever before.

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Backups

Capability Stepping Stones to FORCEnet

Full IT21
"Online"

- IP Reach Back
- Local Area Networks
- Wideband Receive
- RF Management
- Survivable comms

Level 0

Today

Net Connected
"Improved decision making"

- Web-based services
- Improved network reliability and performance
- Increased bandwidth
- Improved coalition operations and data sharing
- Tailorable situational awareness tools
- Standardized data exchange between domains
- Defense in depth

Level 1

FY07

Net Enabled
"Network based command and control"

- Multi-path and improved transport reliability
- Dynamic bandwidth mgmt
- Customized applications and data sources
- Common infrastructure and data exchange standards
- Improved data exchange across domains
- Enterprise management for asset analysis and repair
- Initial knowledge management and automated decision aids
- Assured sharing
- Distributed command and control operations
- Modular and open architecture

Level 2

FY10

Fully Net Ready
"Decision-making under undesirable conditions"

- Robust, reliable communication to all nodes
- Reliable, accurate and timely information on friendly, environmental, neutral and hostile units
- Storage and retrieval of authoritative data sources
- Robust knowledge management capability with direct access ability to raw data
- User-defined and shareable SA
- Distributed and collaborative command and control
- Automated decision aids to enhance decision making
- Information assurance
- Seamless cross-domain access and data exchange.
- Interoperability across all domains and agencies
- Autonomous and disconnected operations
- Automatic and adaptive diagnostic and repair
- Modular architecture to expedite new capabilities

Level 3

FY14

What is Currently Being Delivered

- Hardware
  - DL380 servers to host the CFn services (two servers per site)
  - Video boards to drive multi-headed displays (at key locations per site)
  - LCD flat panel displays (two or three per key location)
- Software
  - Geospatial Replication Service (GRS)
    - Subscribes to information from GCCS-M, AREPS, PC-IMAT, GALElite
    - Subscribes to information off site as well as on site
  - WebCOP Service
    - Provides CFn 2D COP displays via a browser
    - Available at any SIPRnet workstation with a browser
  - Geospatial Collaboration Service (GCS)
    - Provides CFn 3D COP displays via browser with a plug-in
    - Provides map-chat collaboration services
    - Provides information tailoring through operations and views
  - Advanced Refractive Effectives Prediction System (AREPS)
    - Provides radar and radio propagation prediction for air and surface units
  - CFn Toolkit
    - Prepares maps and imagery for publication into CFn services

Planned Installations

- NOPF Whidbey Island
  - Hardware installation to full suite (two servers)
  - Software update to Build 3 level
- USS RONALD REAGAN
  - Hardware installation to one full suite (two servers)
    - One full suite tied to GCCS-M (CTF centric use)
    - Interfaces with CV-TSC and USW-DSS
  - Software update to Build 3 level