

# Net-Centric Operations Concepts and Interagency Test Bed Environment Collaboration

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## Exploring Interagency Information Sharing: an Action-Based Partnership (Discussion)

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# Fundamental NCO Principles

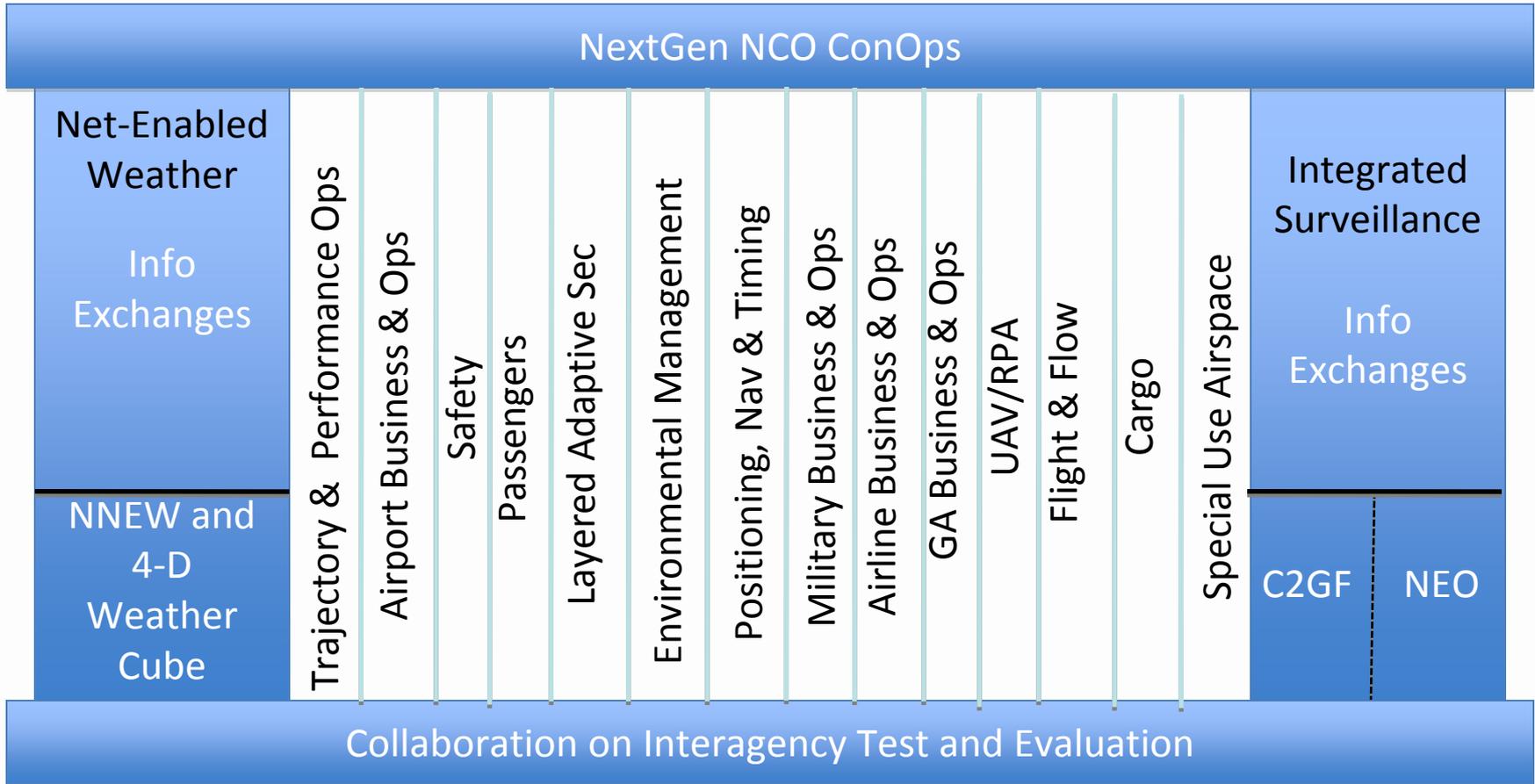
- Information is dynamic, not static
  - Data with context
  - Measurement of the world around us for the purposes of decision making
  - The world around us is dynamic; it's representation must be dynamic, too.
  - It can be located at different places but needs to carry its lineage with it
  - Information is better quality if it is closer to the measurement
  - Information sources should be re-used rather than duplicated
- Semantic systems require enterprise vocabularies
  - Machine usable data, dynamically created
  - Vocabulary represents concepts; communications requires agreement on vocabulary
- Discovery is essential to re-use of information
- Information Sources should be shared to every decision-maker
  - Unless they are NOT authorized to access that information
  - Make decisions on the same data so decisions are consistent
- Fast moving decision making requires collaboration
  - Create a shared situational awareness to ensure consistency and common understanding
- Control of access to data must be at information level, not system
  - Movement
  - Re-publication

# Net-Centric Operations Key Work Elements

Decision-Maker Users



NextGen NCO ConOps



Collaboration on Interagency Test and Evaluation



# NextGen Actors

What decisions do they make?  
What info do they need?

- Passengers
- Passenger-related users
- Cockpit Flight Crews
- Cabin Air Crews
- Air Traffic Controllers
- Air Traffic Planners
- Air Marshals
- Ramp Crew (refuel, bags)
- Baggage Handlers
- Gate Agents
- Ticket Agents
- Airport Security
- Airport Concessionaires
- Airport Ground Transportation
- FEMA Planners
- Weather Forecasters
- First Responders
- AMOC Operators
- AMOC Supervisors
- AMOC Intel Analysts
- TSA screeners
- TSA Intel Analysts
- CBP arrival inspectors
- CBP Intel Analysts
- Shippers
- Freight Forwarders
- NORAD Analysts
- USAF/USA/USN Controllers
- Airport Owners
- Air-taxi Operators
- IT System Developers
- IT Infrastructure Ops
- Avionics Developers
- FAA Certification Ops
- Safety Review
- Aircraft Maintenance
- Air Rework Facilities
- Manufacturers
- NTSB Investigators
- Insurance Investigators
- Airline incident analysts
- Union Representatives
- Union Management
- Airline Management
- Flight Instructors
- GA Pilots
- Airport Ops Managers
- Criminals
- Terrorists
- Drug Dealers
- Smugglers

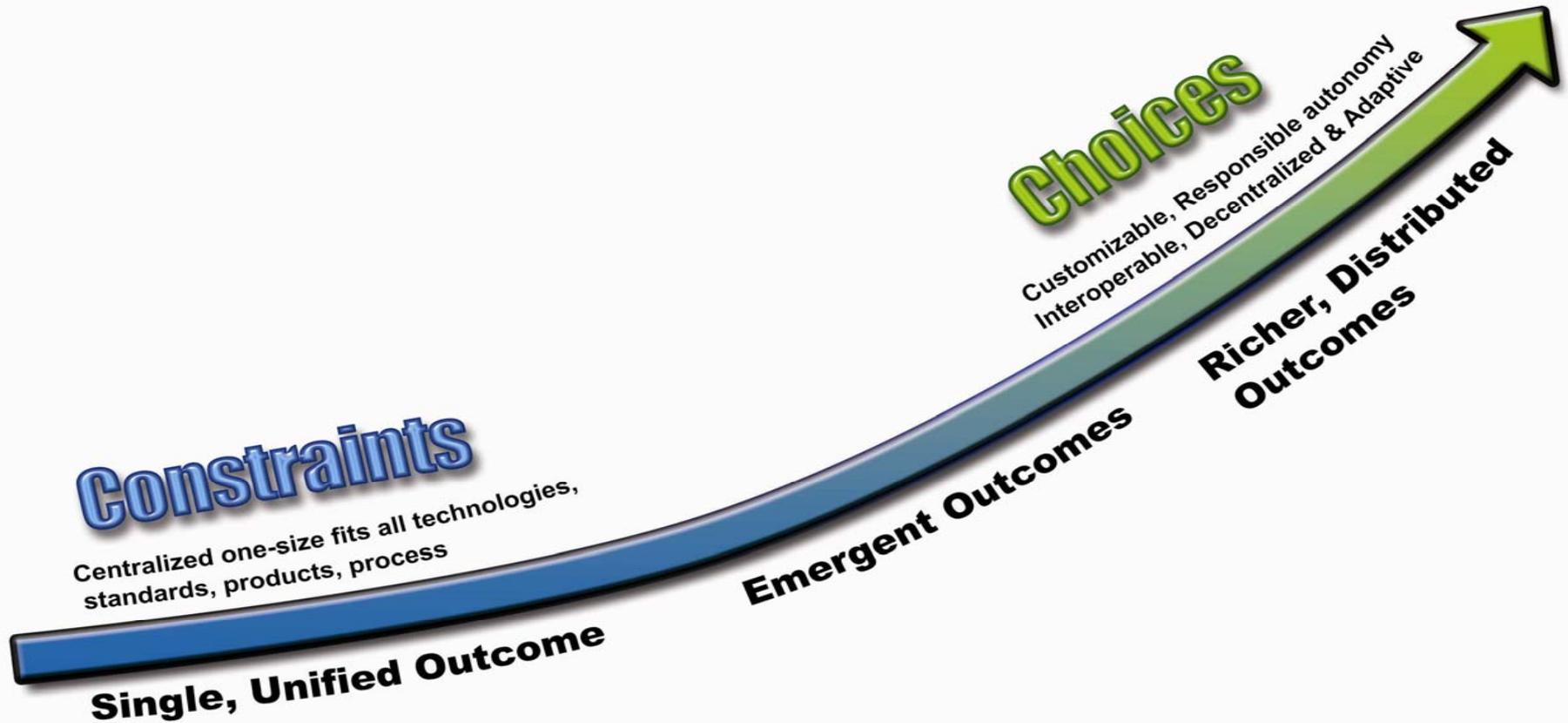
## Needed:

# Federated Architectures through New Information-Sharing Partnerships

- Community-driven
- More Involvement from private sector
- Autonomous stakeholders
- Adaptive, agile processes
- Still resource-constrained
- Decentralized solutions
- Emergent outcomes from tests, demos, and experiments



# Wider Perspectives: Design Architectures to Balance Constraints and Choice to Maximize Outcomes



# So What is Government's Role in Information Sharing?

- Enabler for Private Industry as Lead?
  - (Just get out of the way?)
- Advocate ***and*** Regulator?
  - Provide check and balances on Industry-led transformation for Safety and Security
  - Serve as “breeder reactor” for small industry for Net-Centric applications development
  - UCORE, NIEM, ISE?
- Is “Government Innovation” an Oxymoron Today?

# NCO Needs Practical Fusion of: EA/Engineering/Governance/Policy

We Can Work Together to Share:

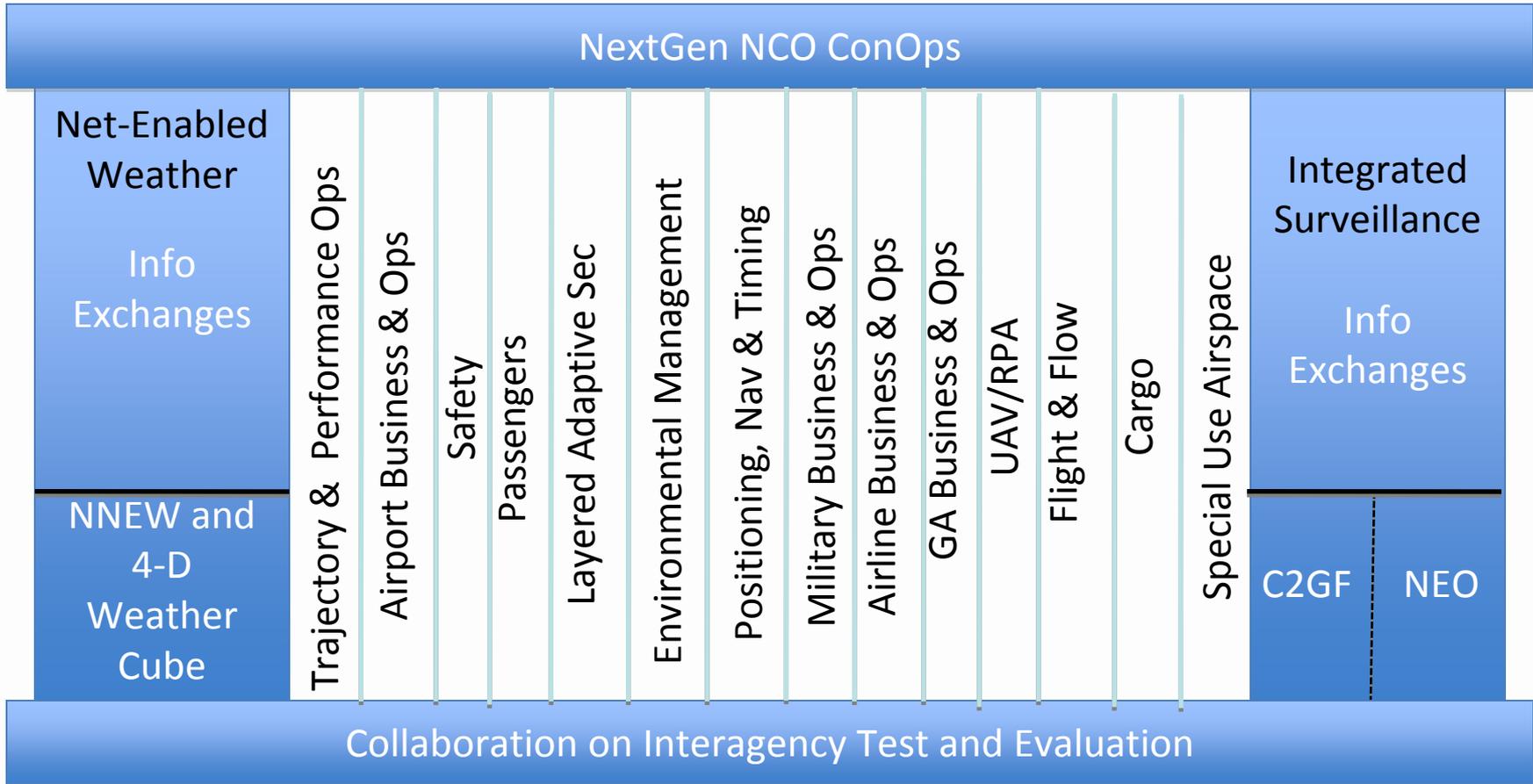
- Collections of information,
- Common data and information architectures, (SOA Services)
- A common risk assessment methodology/rating system,
- Systemic risk profiling,
- Coordination, communication, and collaboration/data exchange between primary stakeholders,
- Governance, transparency, and collaboration,
- Integrated information sharing,
- Exchange of timely and actionable information; and
- **Testing of Supporting Technologies, Standards and Policies**

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# Inter-Organizational Testing

- Interagency Test Bed (IATB) is an element of JPDO NextGen NCO Test and Evaluation Master Plan
  - A collaboration between Government Agencies and Industry Partners
  - Supplements internal info provider test programs by evaluating information exposure among Federal Agencies
  - Advance FAA Certification Decision Process by having knowledgeable FAA involvement in testing non-FAA information exchanges
  - Experiment with alternative architectures, ConOps, Governance, technologies to feed architecture and accelerate development
- Objectives
  - Inter-organizational
    - Provide a means for evaluating inter-organizational access and utility of NextGen Information Exchange Services
  - Client Prototyping and Development
    - Support early development of client tools and components for use in presenting information
- Leverage past work at FAA, USAF, DHS, NWS
  - FAA NEO Spiral 1, 1+,2
  - DoD/DHS C2 Gapfiller JCTD
  - FAA/NWS 4D Weather Cube

# Responsibilities for Testing NextGen NCO Info-Exchange Services

- Information Providers: develop, deploy, and support
  - Comply with Parent Organization's policies and requirements
  - Meet Inter-agency agreements for service provision by conforming to JPDO NextGen NCO approved standards
  - Internal testing, review and Authorization to Operate
  - Operations and Maintenance of Operational Capabilities
- Infrastructure/Security Management: Support Mission Objectives
  - Support mission objectives while providing approved access and capacity
- JPDO: Inter-Organizational Interoperability
  - Identify/clarify system interfaces for all users in NextGen NAS
    - Federal, State, Local Governments, and Industry components
  - Verify compliance during development/deployment
  - Develop approach for ongoing compliance during ops
  - Evaluate usability/accessibility by external organizations
  - Publish authoritative source designations
  - Establish means for monitoring Service Level Agreement compliance

# Value of an Interagency Test Bed

- Early start to collaboration
  - NextGen SOA schedule is not yet time critical
  - Most NextGen SOA design can still be influenced by lessons learned
  - Pre-existing investment is small
  - Federal-wide acquisitions save money and time compared to local
  - Accelerate learning curve among later service providers
- Permit Agencies to focus on internal processes without losing sight of inter-organizational coordination
  - Consistent approach to inter-organizational testing across Info Exchange Services
  - Evaluate the value of individual standards across organizations
    - Identify extent of applicability of most/least mature standards
  - Improve effectiveness of application provider design, development and testing efforts to meet NextGen needs
- Preview technical characteristics of services to developers to accelerate deployment of info sharing consumer applications
- Create an environment for cultural change
  - Developers, info owners, decision-makers

# Building an Interagency Test Bed

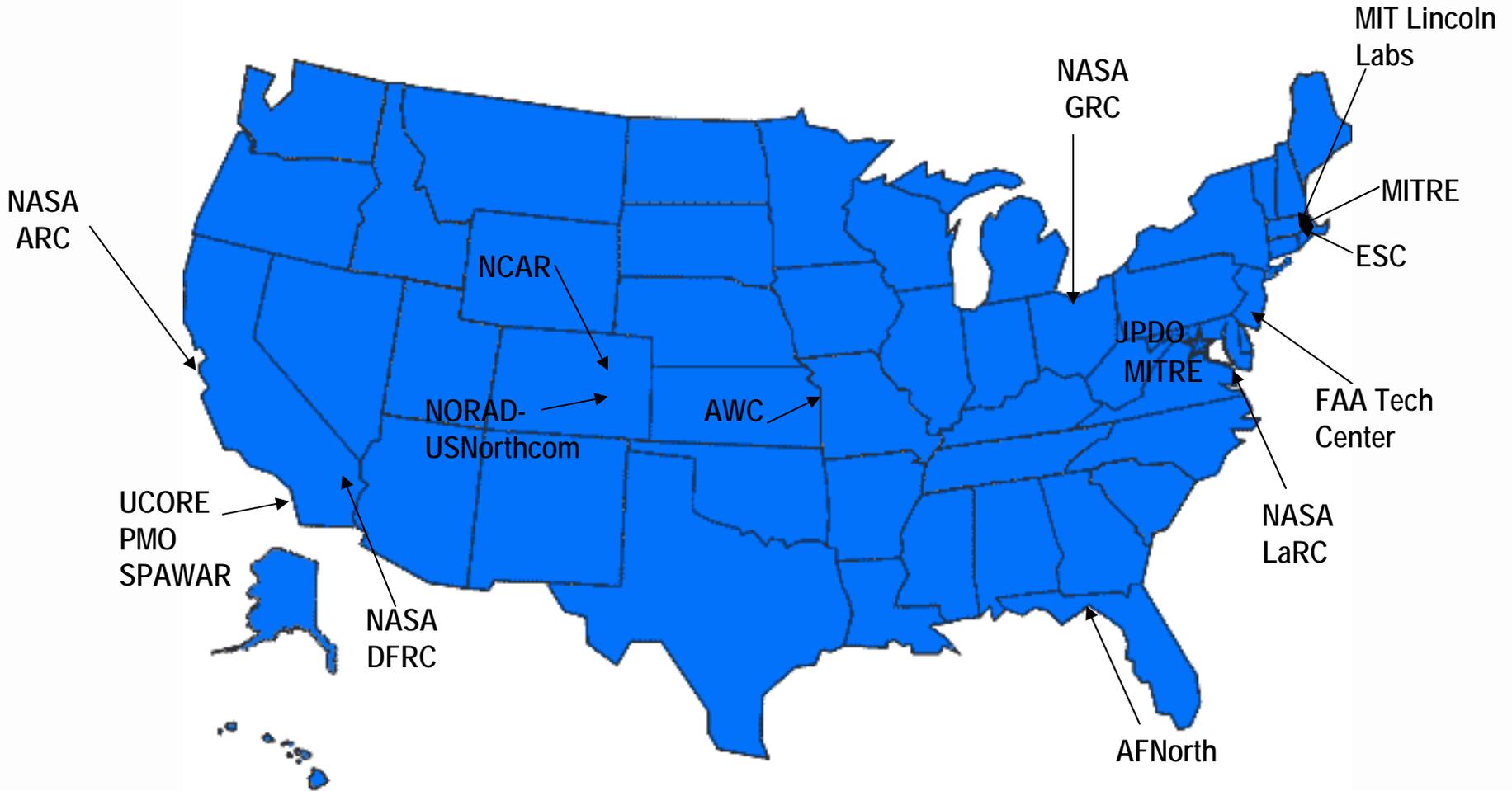
- Form a small skunk works to prove we can succeed
  - Form a Working Group and agree on how to collaborate
    - Lincoln Labs, FAA Tech Center, NASA LaRC ASDC
  - Each site develop a well-defined service to understand SOA service functions
    - Service Registry, Delivery, Testing
  - Share client tools to use in testing characteristics of other's services
  - Conduct initial inter-organizational testing
  - Formalize Relationship through MOU or TOR under JPDO Governance
    - Technical Working Group to schedule testing and exchange information
- Graduate beyond skunk works based on success, not speculation
- Obtain Additional Resources based on track record
  - Coordinate Agency efforts, not dictate them
  - Demonstrate value of inter-organization coordination
- Grow Slowly to evaluate scalability
  - Add other organizations to the IATB
    - MITRE Labs, ESC and USAF Gunter AFB 350<sup>th</sup> Test Wing, NASA ARC, AFWA, SWIM Programs
    - Private sector components (airlines, airports, manufacturers)
  - Test interagency service delivery from closed networks



# Where are We?

- Currently in place
  - Informal agreements with NASA Langley, FAA Tech Center and USAF ESC
  - Agency Supplied Information Services: Weather and Integrated Surveillance
    - FAA/NWS 4D Weather Cube and NNEW
    - DoD/DHS C2 Gapfiller Joint Capabilities Technology Demonstration
    - FAA EDX Demonstration
- Planned
  - Establish Agreements for Participation by all the Partners
    - NextGen Information Exposure Service Providers
    - NextGen Information Users and Developers
    - Existing Agency Testbeds and Demonstration environments
  - Data Communications Pathway
    - Initially, Internet Connectivity
    - Subsequently, testing in closed networks similar to operational networks
  - Organizational Structure based on JPDO Governance
    - Management by FAA JWHTC
    - Sponsorship by JPDO/NCOD Test Manager
    - Working Committee of participants for day-to-day coordination

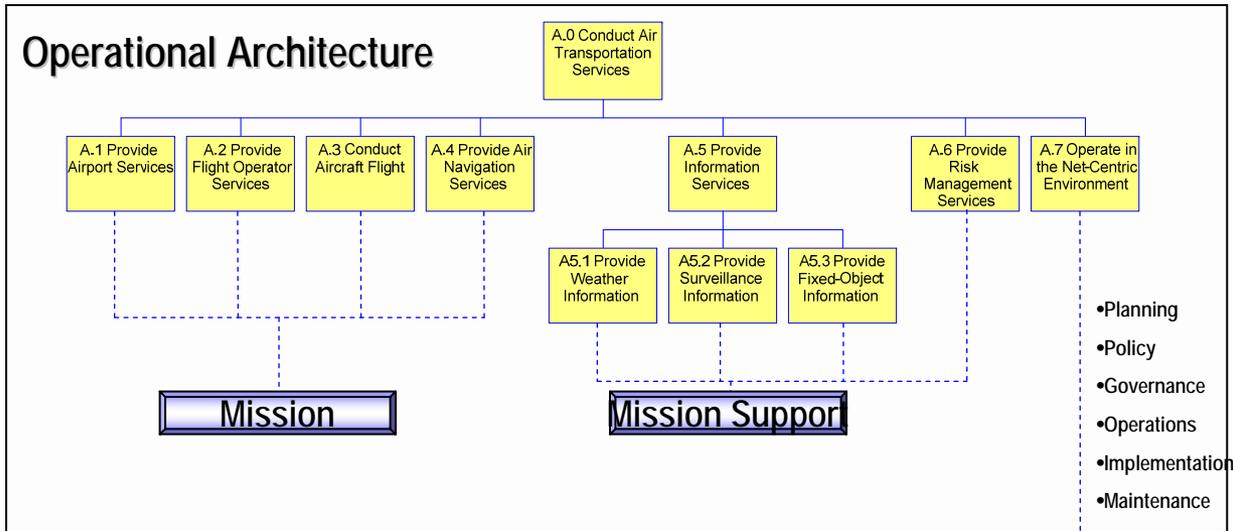
# IATB Participant Locations



# A Phased Approach

- Phase 0: 4-6 weeks
  - Prove that a minimal service can be shared from LaRC to ESC and JWHTC
- Phase 1: 5-6 months
  - Evaluate the interagency sharing of initial information from the 4D Weather Cube, C2Gapfiller and other services already exposed
  - Exercise scenarios, use cases vignettes, and other models
- Phase 2: 1 year
  - Add key collaboration sites
  - Add Exposure Services of Opportunity
- Phase 3
  - Demonstrate candidate C2 Gap Filler disadvantaged client, if available
  - Implement Sustaining Business Model

# NextGen EA Net-Centric Focus



## Information Architecture

Architectural descriptions of the conceptual, logical and physical NextGen Data Model, including the business rules for data exchange, message formats, file structures, and schemas.

## System / Service Architecture

Architectural descriptions of the systems and services, their functionality, the interfaces and interconnections, the resources being exchanged, the metrics, and how they will be implemented over time.

## Infrastructure / Technology Architecture

Architectural descriptions of the standards that apply to NextGen Net-centric Operations, as well as emerging standards and their potential impact.

**Infrastructure**



# What We Need from Each Other:

- Use Cases and Scenarios for research and rapid transitioning to prototypes that IATB test, evaluate and recommend for further development and use
- Forum providers for discussion, vetting, and agreement on policies, governance and technologies
- Private Sector Leader-partners
- Advocates for funding of the Inter-Agency “White Space”
- Information Exchange Models and Architectures
- Information Exchange Standards
- Descriptions of Service-Oriented Environments
- End-to-end cyber-security models

# Agile EA with IATB: Next Steps

- Collaborate in interagency architecture and testing to address the challenges of national aviation transformation
- Agencies' Participation to:
  - Discover Interdependencies and Interoperability needs
  - Manage key resources across agencies
- Who's missing from this discussion?
- IATB collaboration key to linking partner architectures to grow cutting-edge information-sharing
- NextGen is a big environment; Risk of not testing is that more bits and pieces remain untested until very late phases

# Next Steps

- NCO Work Group membership Drive. Sign up!
- IATB Work Plan/Schedule to come
- Who's Missing from the Table? Submit suggestions for Federal and Private Sector
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