

Data Communications Program

Integration and Test of Complex Systems

Presented to: V & V Summit

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Federal Aviation
Administration



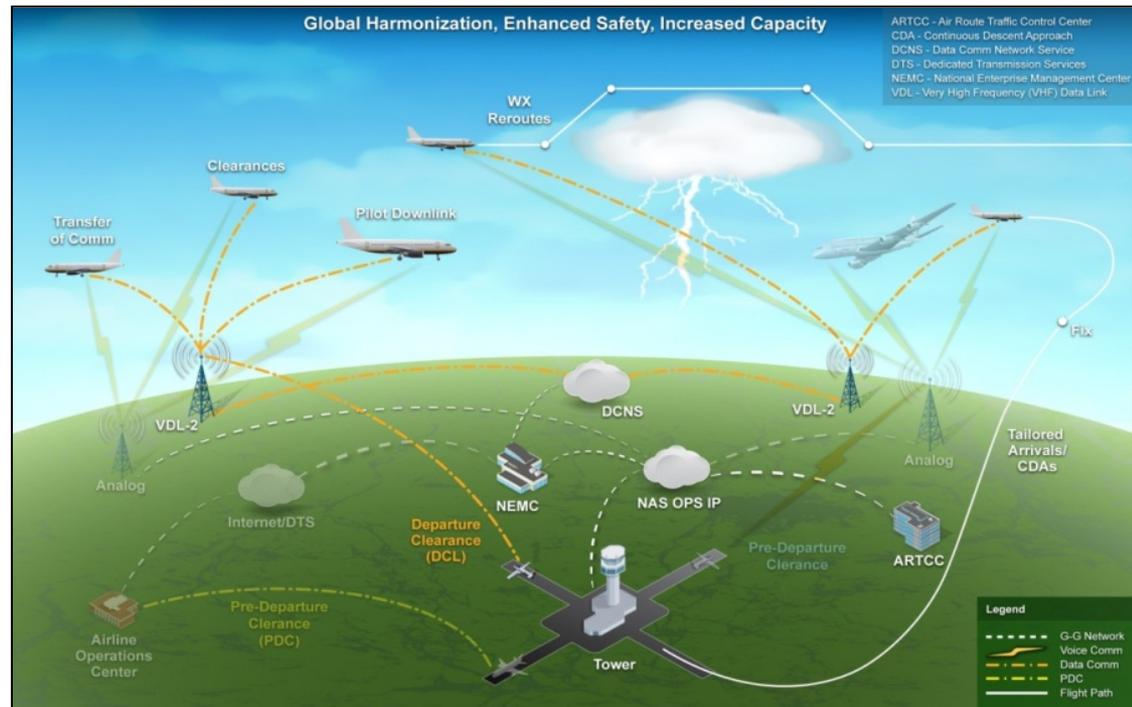
Agenda

- **Data Comm Program Overview**
- **V & V Complexities for Data Communications Services**
- **Implications for Testing of NextGen Portfolio Capabilities**
- **Summary and Take Aways**



Program Overview

- **Provides data communications between the cockpit and controllers to replace some current voice communications**
 - Safety-of-flight air traffic control (ATC) clearances, instructions, traffic flow management, flight crew requests and reports
 - Provides direct link between ground automation and flight deck avionics
- **Transformational program critical to the success of NextGen operations**
 - Provides infrastructure supporting other NextGen programs and operational improvements
 - Enables efficiencies not possible using current voice system



The Data Comm Stakeholder Cloud

Trade Associations

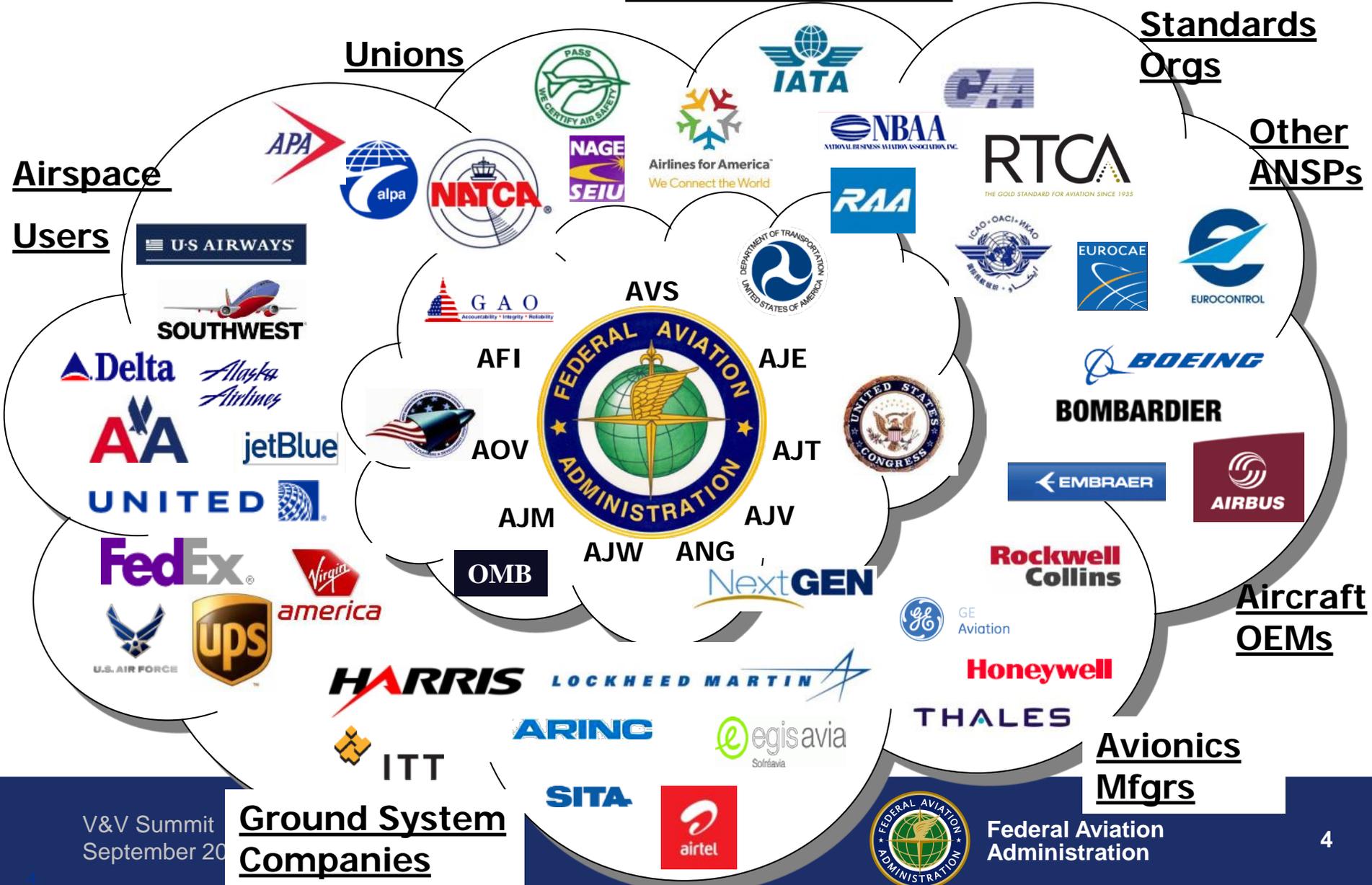
Standards Orgs

Other ANSPs

Unions

Airspace Users

Users



V&V Summit
September 20

Ground System Companies

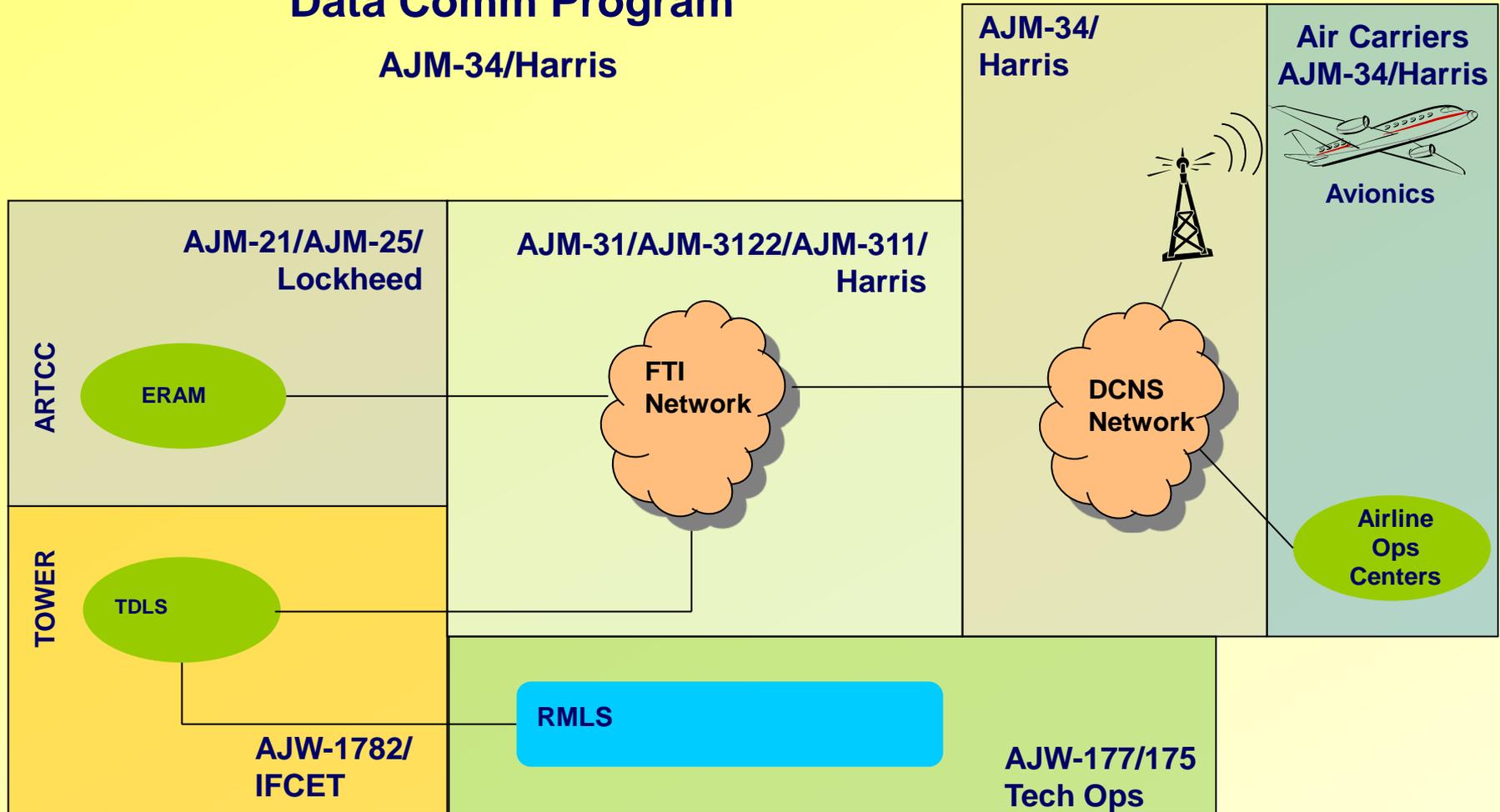


Federal Aviation Administration

Data Comm Roles and Responsibilities

Data Comm Program

AJM-34/Harris

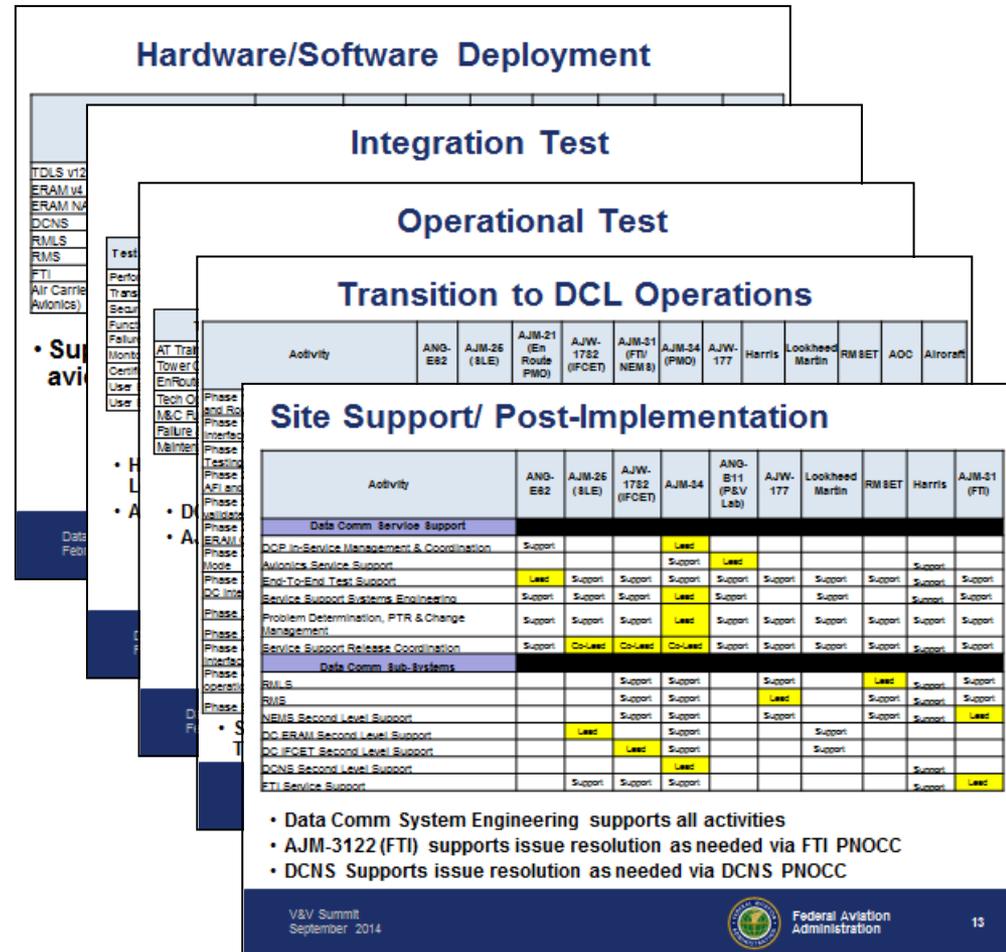


Data Comm Program Complexities

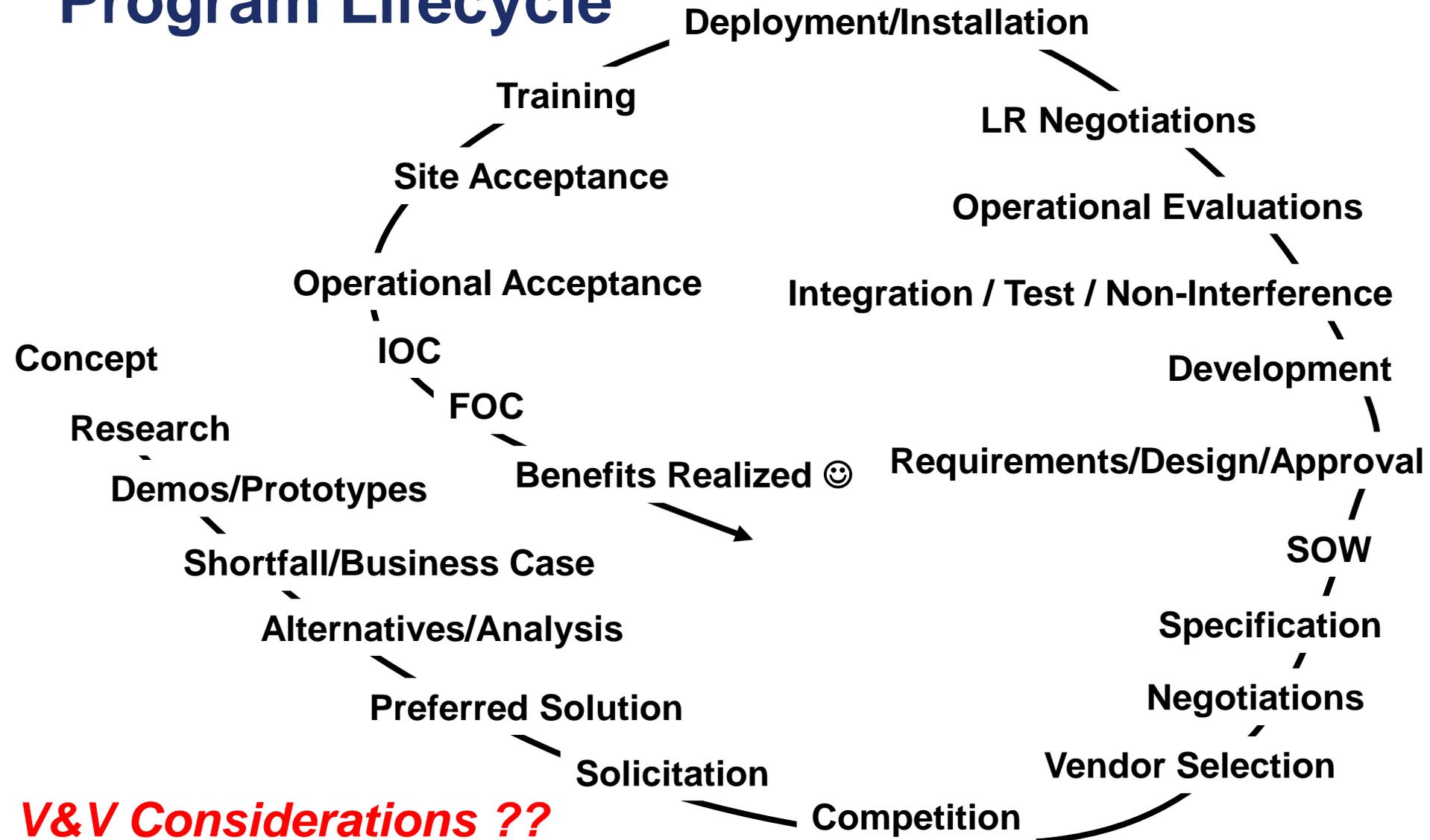
- **Data Comm presents significant challenges for integration, test, deployment, and support**
- **Multiple FAA organizations and contractors support the program**
- **Not buying a Data Comm system from a contractor**
- **The FAA has the responsibility for integration test deployment and support**
- **The Tech Center has unique capabilities and the necessary lab infrastructure to integrate, test, deploy, and support a system of systems acquisition program**
- **The program requires a paradigm shift from stand alone test and deployment to a service level integration support and deployment model**
- **This requires organizations and personnel at the WJHTC to collaboratively work together to deploy Data Comm**
- **This framework established for Data Comm will lay the foundation for the introduction of future NextGen capabilities into the NAS**

Roles and Responsibilities

- Program Office and ANG-E bring together FAA and contractor personnel from the various subsystems to integrate and test the Data Comm services
- Each subsystem organization provides a leadership role and expertise on their programs in the successful completion of these activities
- No individual piece of the Data Comm Program is more important than the other



Program Lifecycle



V&V Considerations ??



Program Lifecycle AMS

Average Durations (in weeks)

AMS Phase	Milestone	Description	FAA WBS
Mission analysis (Svc Anal & CRD)	S1	Readiness for concept and requirements definition decision	WBS 1 Mission Analysis
...			
Investment Analysis (Initial)	S6	Preliminary Exhibit 300 program baseline attachment 2: business case analysis report (BCAR) approved	WBS 2.1.2 : Initial Investment Decision - Analysis
...			
Investment Analysis (Final)	S10	System contract specification approved	WBS 2.2.2 : Final Investment Decision - Analysis
...			
Solution Implementation	S20	Contract Award	WBS 3.1.2 : Contract and Grant Management
...			
Solution Implementation	S24	Critical design review (CDR) completed	WBS 3.2.3 : Solution Development - Analysis, Design, and Integration
...			
Solution Implementation	S31	Operational test & evaluation ((OT&E) completed	WBS 3.5.1: System Development Test and Evaluation
...			
Solution Implementation	S43	In-Service Decision	WBS 4.1.1 : Program Planning, Authorization, Management and Control
...			
Solution Implementation	S47	First-site Commissioning	WBS 4.7 : Joint Acceptance Inspection/Commissioning/Closeout
...			
In-Service Management	S53	Last-site commissioning	WBS 4.7 : Joint Acceptance Inspection/Commissioning/Closeout

34

41

32

211 to 315+

104* to 208+ (Varies by Program)

- Corporate Mission Analysis
- Service Analysis
- Concept & Requirements Definition Readiness Decision
- Concept & Requirements Definition
- Investment Analysis Readiness Decision
- Investment Analysis
- Investment Decision
- Solution Implementation
- In-Service Decision
- In-Service Management

* Assumes Contract Award is sole source, rather than by competitive selection.



Challenges

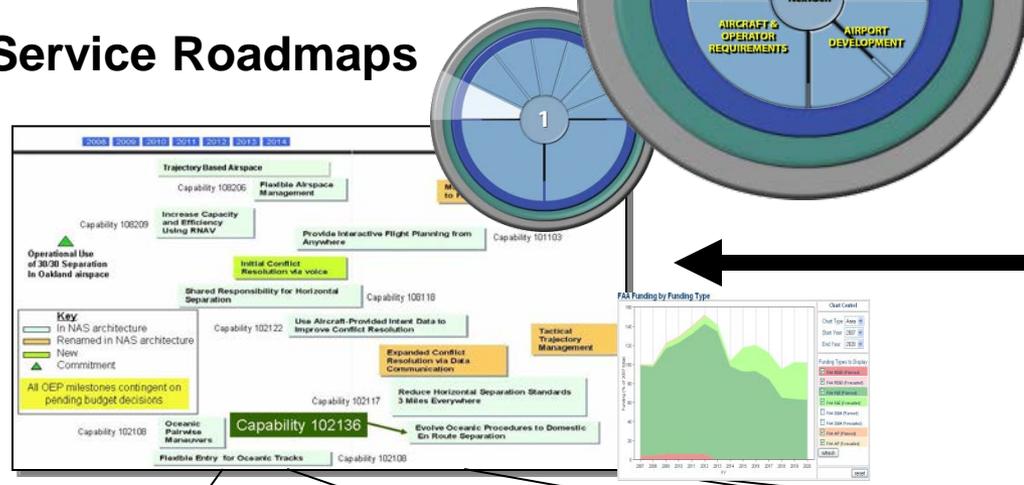
- **Previous charts identify complexities for a single investment...**
- **Now, add multiple programs together into a portfolio (or set of portfolios)...**
- **Movement towards enhanced interoperability between the flight deck and the ground systems...and external customers/Agencies...**
- **Throw in a push towards Service Oriented Architectures, Common Services, Net-Centricity...(future – cloud computing, etc...)**
- **Analyze the ISS and Safety Issues...**
- **Now we have some real challenges for V&V...**

NextGen Key Capabilities

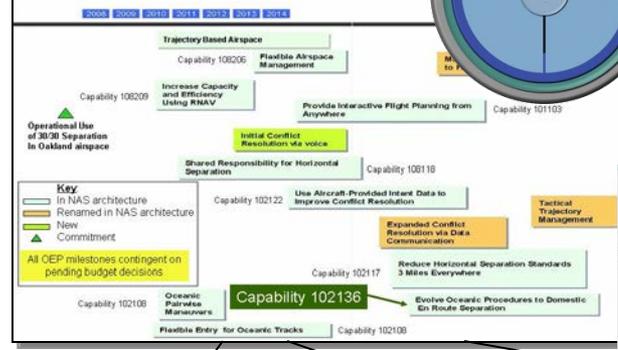
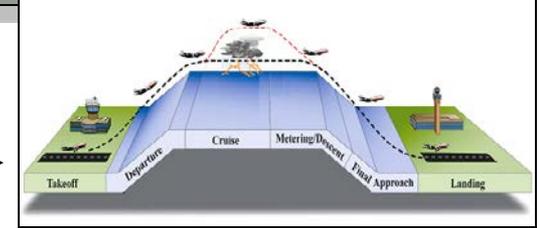
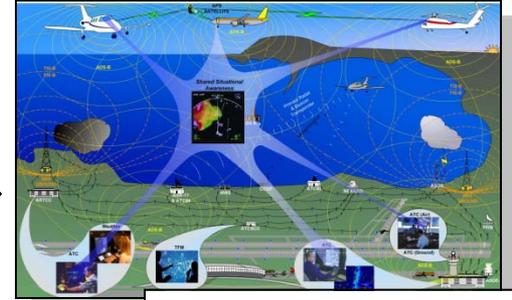


NextGen Portfolios address and deliver **Capacity, Efficiency, Safety and Security** benefits for air transportation operations

Service Roadmaps



NASEA

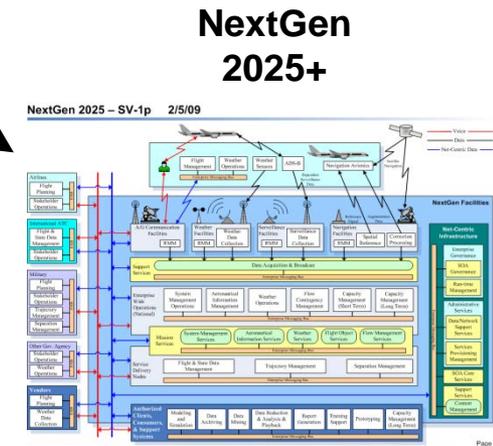
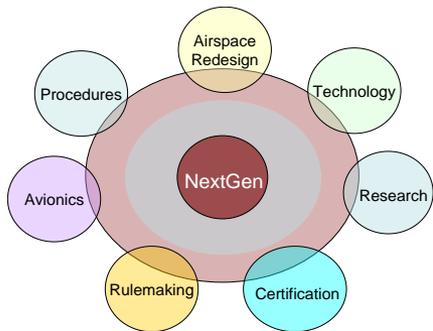
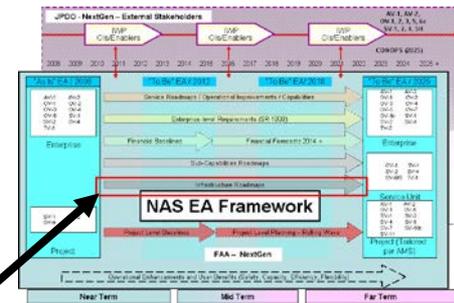
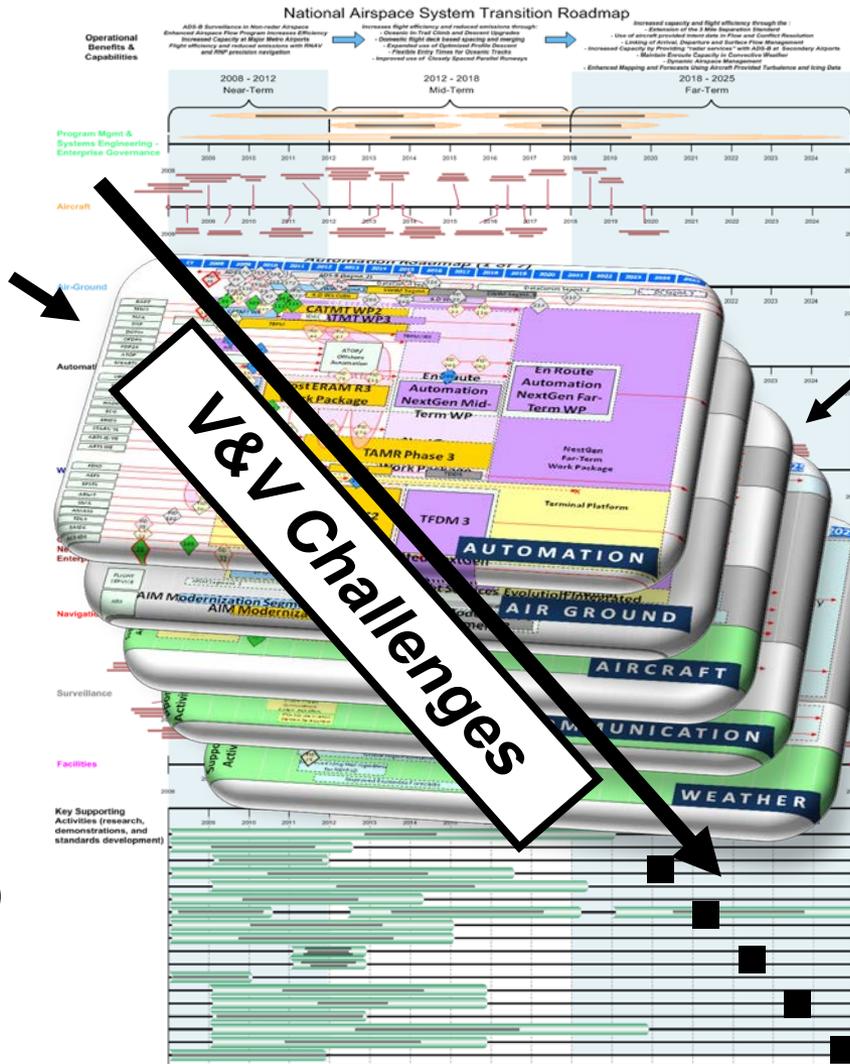
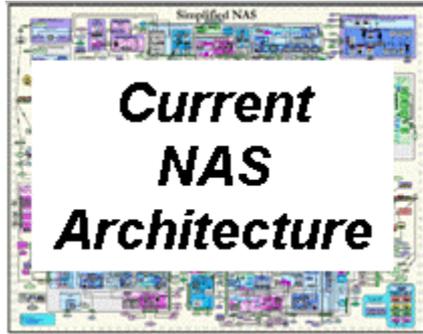


Programs

En Route Automation Modernization (ERAM)	NextGen Collision Avoidance System	NextGen Traffic Flow Management	SWIM	Aeronautical Data Link
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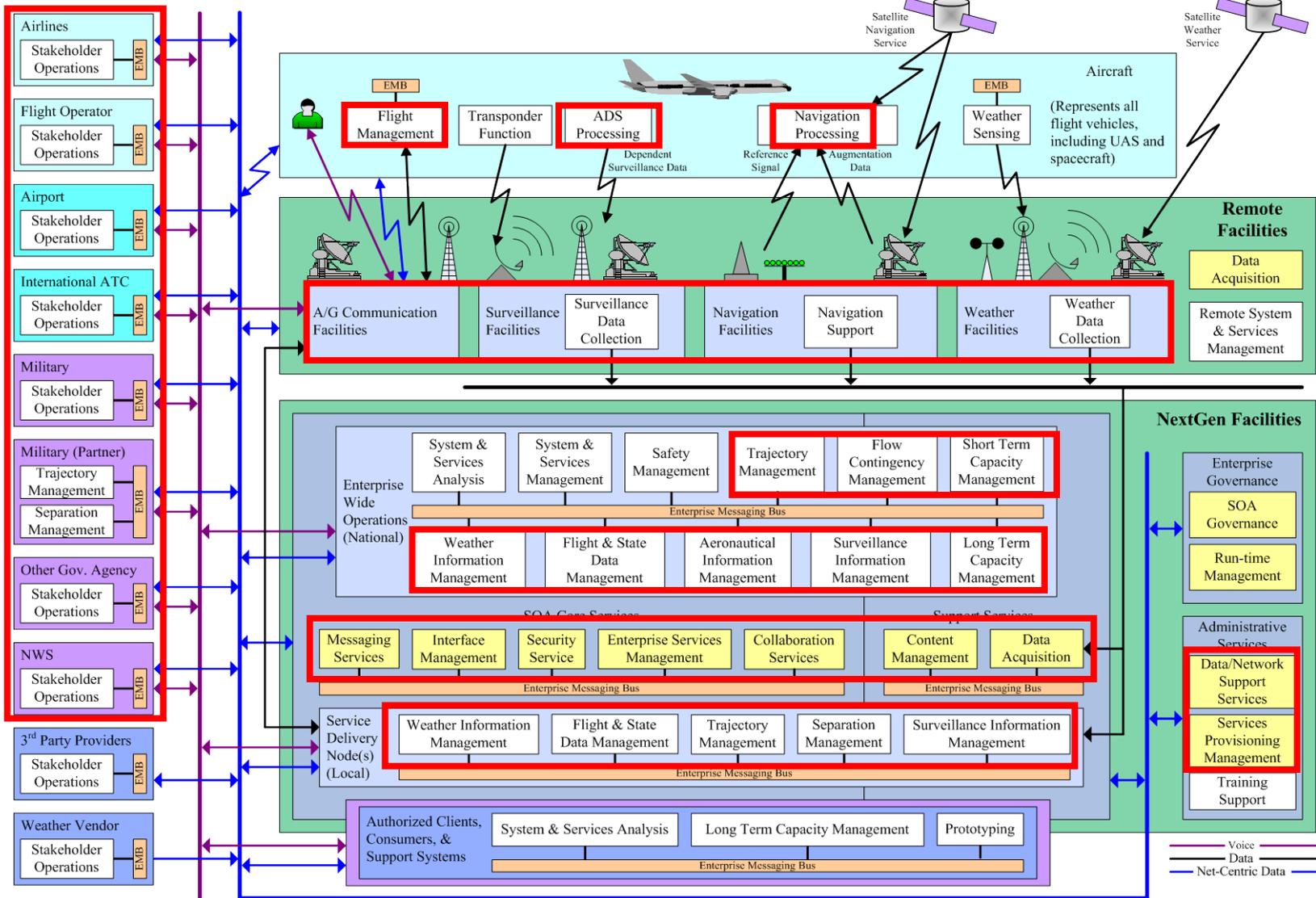
NAS EA Roadmaps Capture the Evolution Strategy

Current
2009



NextGen System Context Diagram (SV-1) for 2025

TBO



Complexities

- **Simultaneous investments working their way through AMS will cause strain on V&V resources**
- **Will need to be diligent in managing interfaces and associated complexities during testing – no longer simply V&V of stand alone system functions, IRDs & ICDs...**
- **Non-interference testing and focus on ISS, safety issues (i.e., failure modes, etc.), human factors, etc... will be even more important**
- **Need mechanisms to evaluate system threads and associated testing while systems are being developed to reduce downstream V&V risks**

Summary

- **Can we test cross cutting benefits using the same methods used in the past for individual system replacements/enhancements? What does a PIR strategy look like for this approach?**
- **How do you test a NextGen Operational Improvement?**
- **How can FAA lab and test resources support NextGen testing?**
- **How do we test SWIM, Datacomm, ADS-B, the Automation programs, etc... together to validate NextGen benefits?**
- **Considerations for field deployment and testing; what can the field handle from a test and training perspective?**

Take Aways....

- **Need to think about V&V in an evolved way to support NextGen**
- **Address any existing organizational barriers that limit our ability to V&V benefits across the NAS to support NextGen – *when you do work think about not just your piece of the NAS, but what's good for the entire system...***
- **Leverage lessons learned / best practices from across Industry and Government for V&V strategies of enterprise solutions, net-centric technologies, and for ensuring interoperability**