

FAA NAS Enterprise Architecture

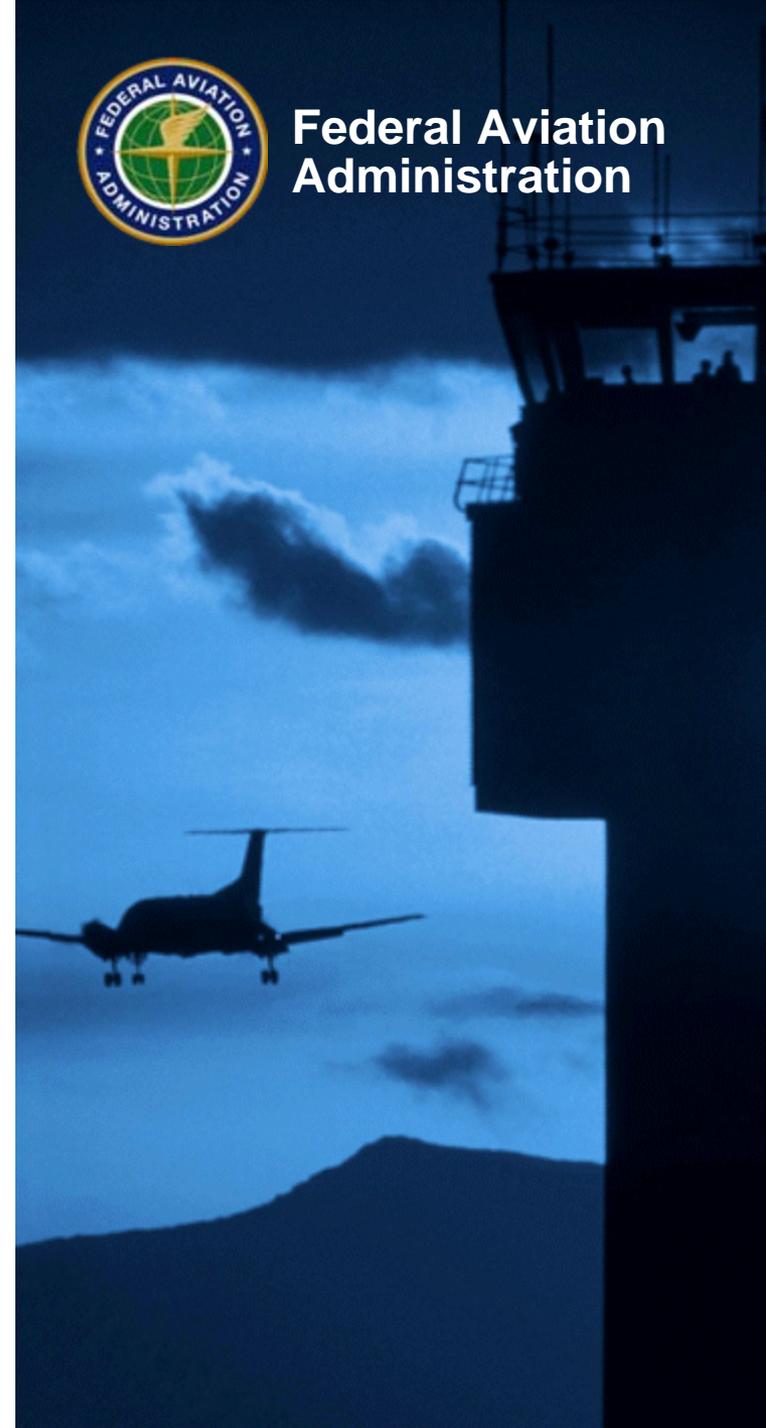


Federal Aviation
Administration

Presented to: **Mtg of Agency Chief Architects**

By: **Jesse Wijntjes / NAS Chief Architect**

Date: **April 28, 2010**



Outline

- **NAS EA Background**
- **NAS EA Framework**
- **NAS EA Views**
- **NAS EA Roadmaps**
- **NAS EA Alignment and Integration**
- **NAS EA Portal**
- **Summary**



Why EA at the FAA?

People

Process

Technology

Business Rules

- Improve the **alignment** of systems and technologies with the mission/business needs of the operators and the organization
- **Identify** duplication of effort in mission and IT expenditures and facilitate the reduction of investments where applicable
- **Address the need for increased efficiency in information exchange and interoperability**
- **Provide** a common language to facilitate linkages and communications between complex architectures & organizations
- Provide a unifying approach to minimize the burden for the collection, storage, and access to data
- **Facilitate** efficient identification of necessary changes and change implementation
- Helps provide a framework for managing change during spiral and evolutionary development
- And, because it is a requirement from the OMB and GAO

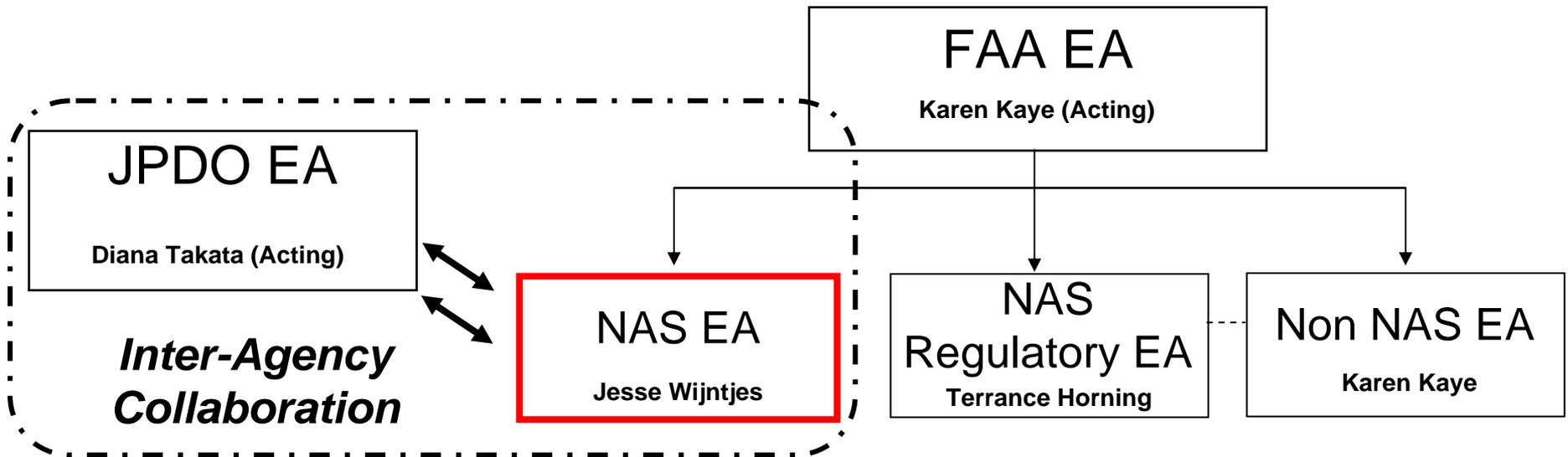


Enterprise Architecture – Aligning the Mission, Benefits, and Capabilities with Investments

- The FAA has developed and is using an EA to manage the portfolio of investments
- The FAA's EA aligns with the DoT EA and FEA
- The EA contains architecture products and views which describe the current NAS portfolio and the target architecture including the definition of the mid term
- The EA also contains roadmaps to describe the transition from the current portfolio to the target architecture
- The EA is aligned with the Agency's goals and strategic objectives as well as the budget



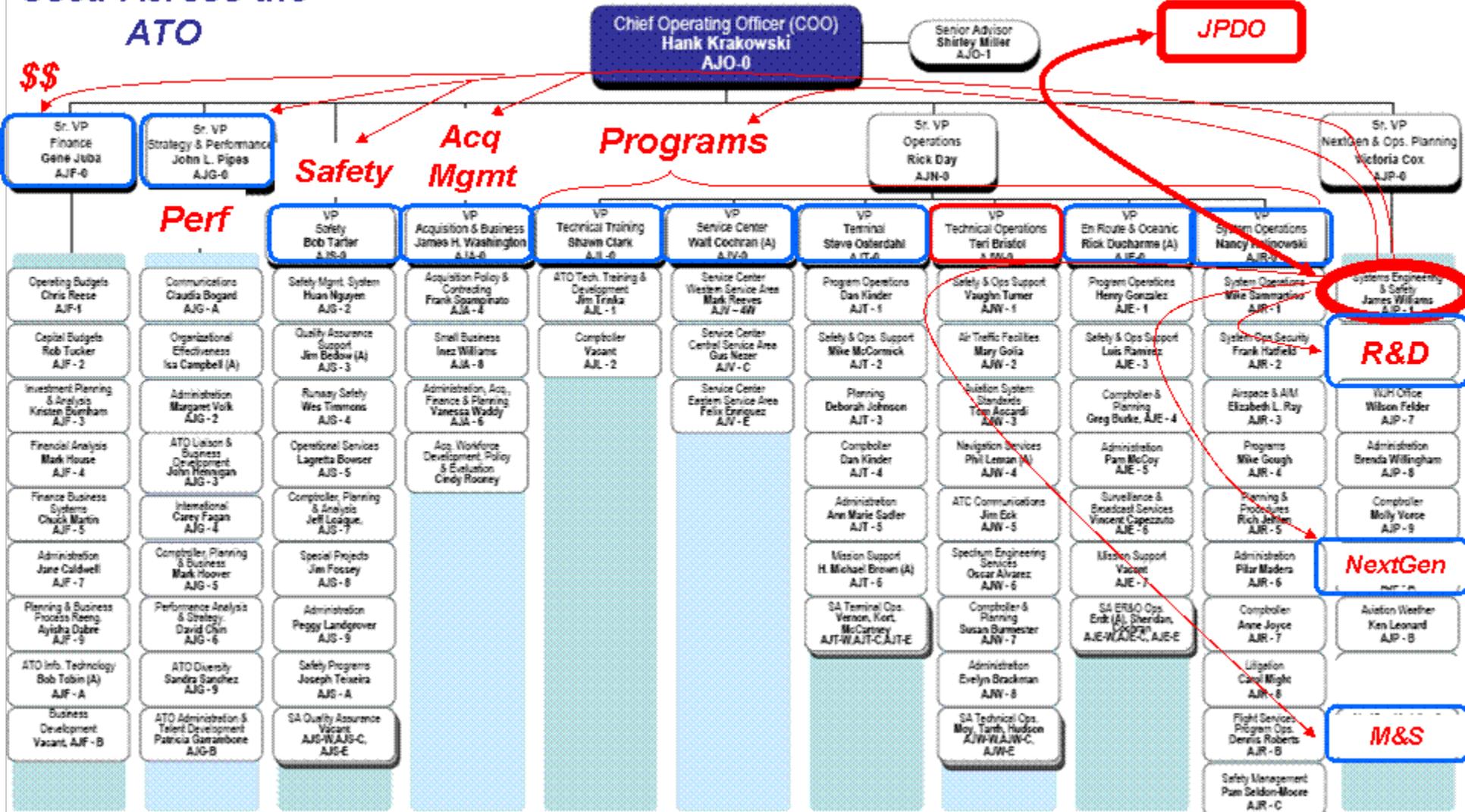
Overview - FAA Enterprise Architecture

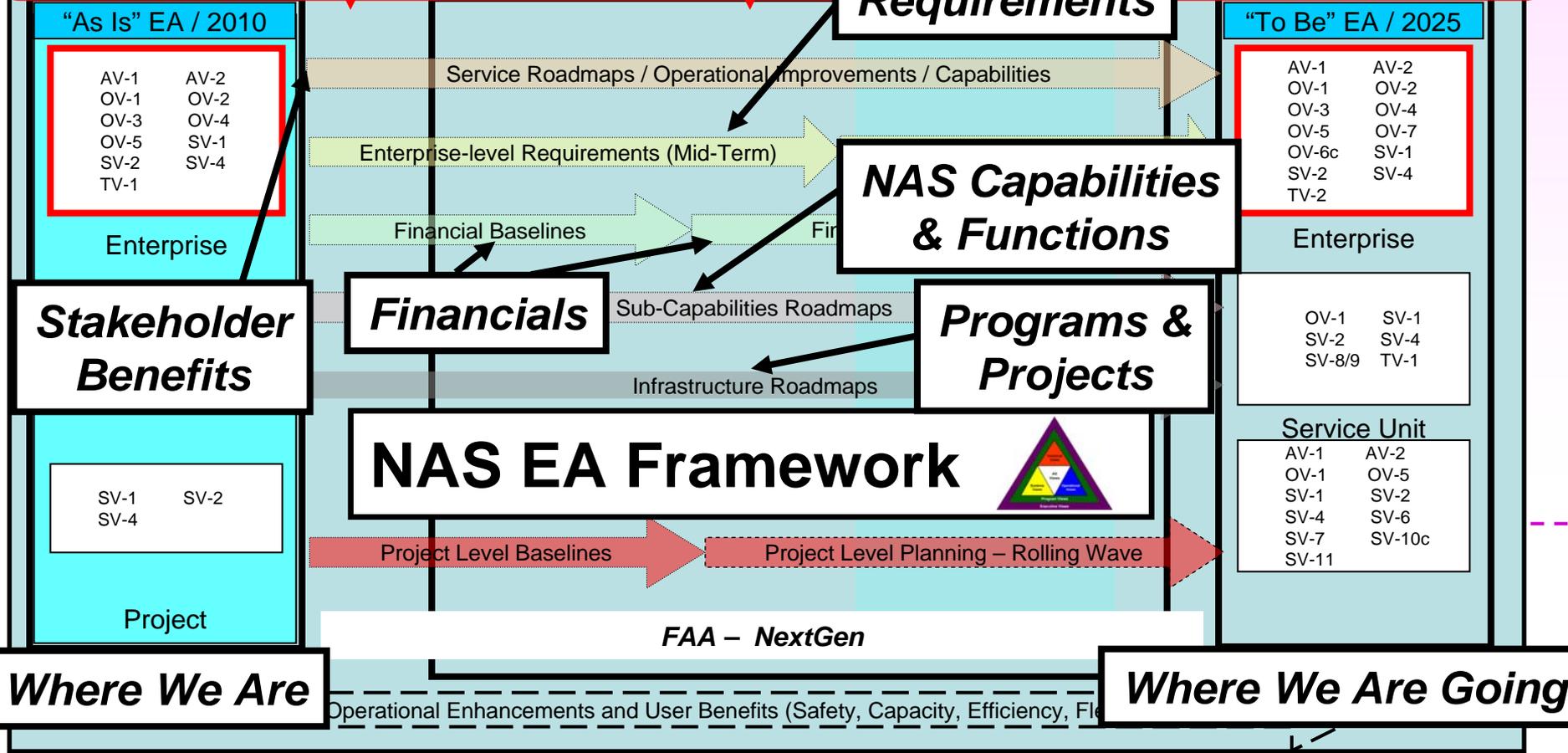
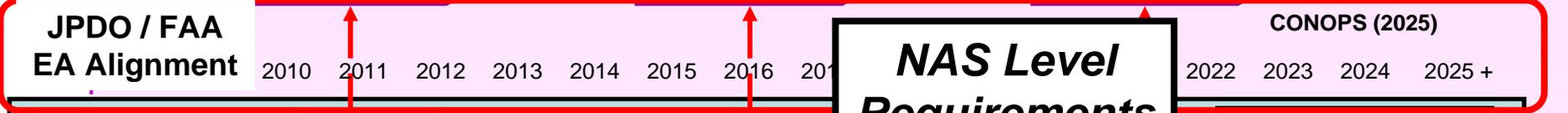


- FAA Enterprise Architecture (EA) has three parts
- FAA CIO has responsibility for entire FAA EA - Delegates responsibility to develop and implement NAS EA to ATO COO

The NAS EA Is Used Across the AIR TRAFFIC ORGANIZATION

Note: May not be 100% Up to Date





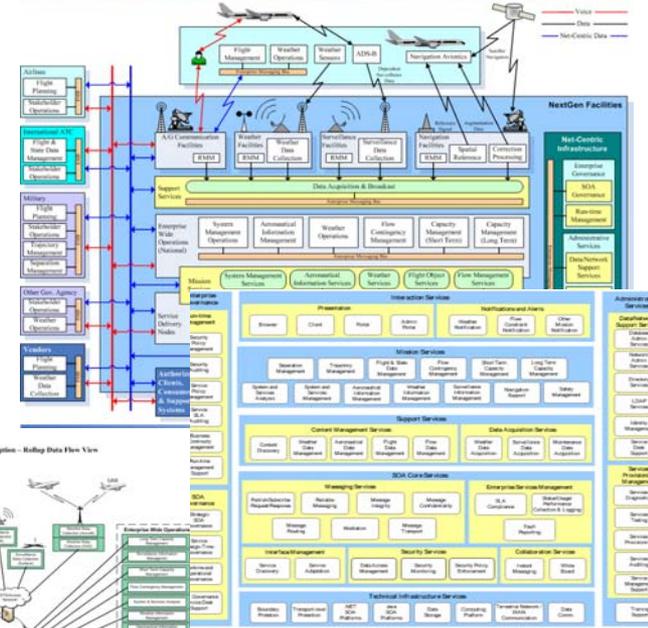
"To Be" NAS Architecture Views

NextGen
2025+

Executive
Views



System
Architecture
NextGen 2025 - SV-1p 2/5/09



"To Be" EA / 2025+

AV-1	AV-2
OV-1	OV-2
OV-3	OV-4
OV-5	OV-7
OV-6c	SV-1
SV-2	SV-4
TV-2	

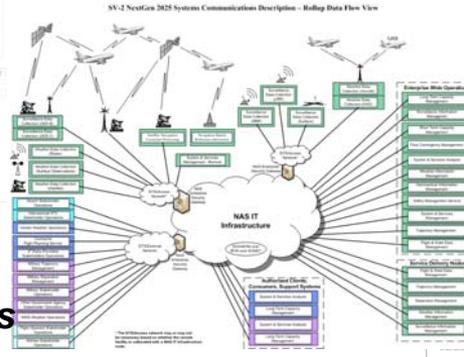
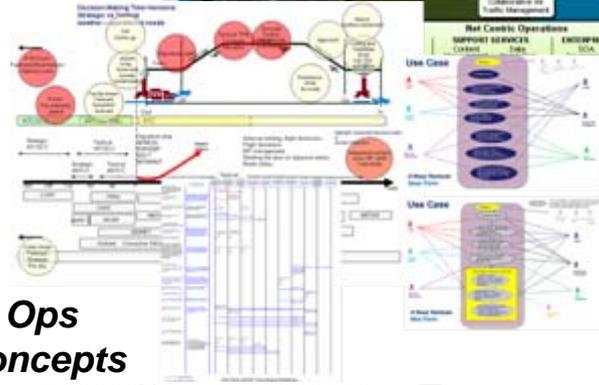
Enterprise

OV-1	SV-1
SV-2	SV-4
SV-6/8/9	TV-1

Service Unit

AV-1	AV-2
OV-1	OV-5
SV-1	SV-2
SV-4	SV-6
SV-7	SV-10c
SV-11	

Project (Tailored per AMS)

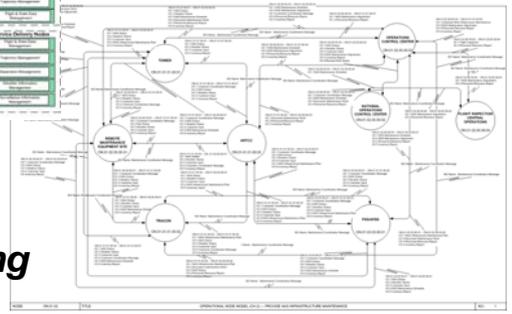


Ops
Concepts

Transport
Mechanisms

EA
Modeling

Data
Architecture



"To Be" NAS Architecture Views

NextGen 2025 – SV-1p 2/5/09

NextGen 2025+

"To Be" EA / 2025+

- AV-1 AV-2
- OV-1 OV-2
- OV-3 OV-4
- OV-5 OV-7
- OV-6c SV-1
- SV-2 SV-4
- TV-2

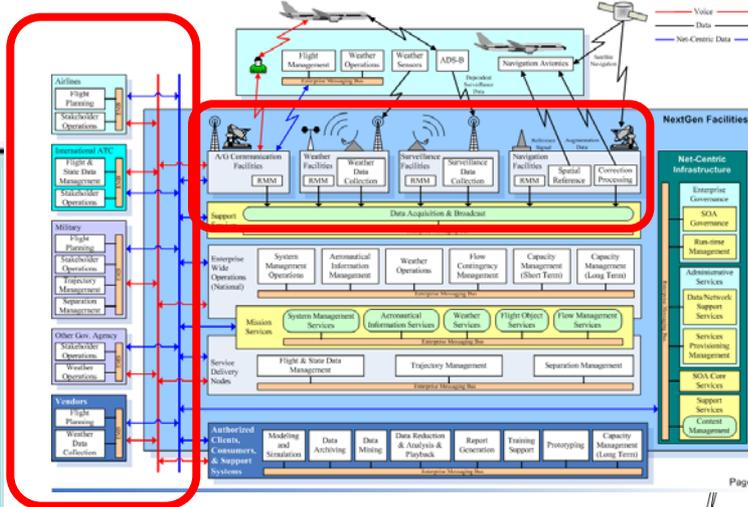
Enterprise

- OV-1 SV-1
- SV-2 SV-4
- SV-6/8/9 TV-1

Service Unit

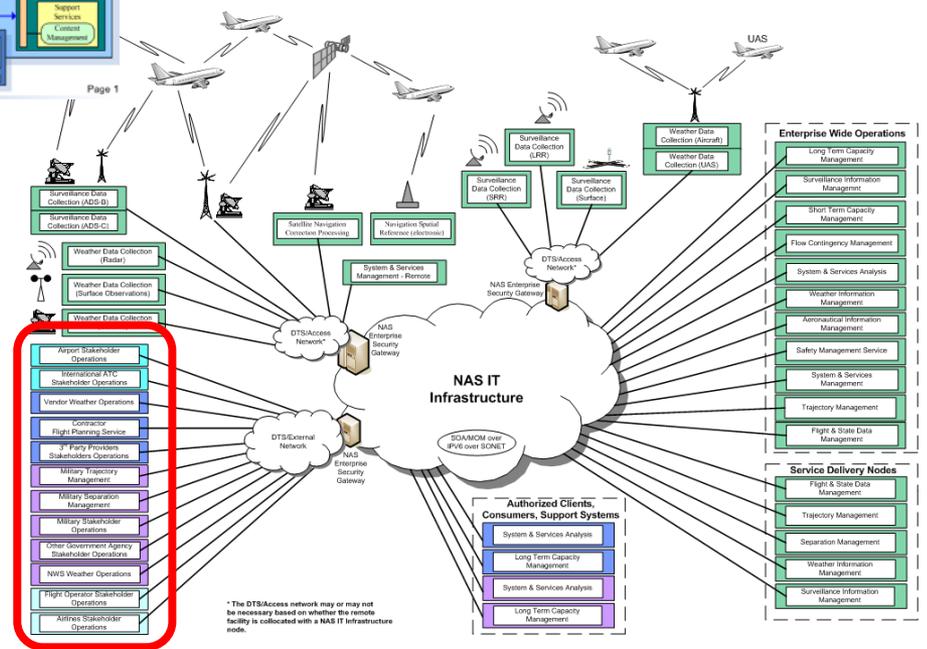
- AV-1 AV-2
- OV-1 OV-5
- SV-1 SV-2
- SV-4 SV-6
- SV-7 SV-10c
- SV-11

Project (Tailored per AMS)



SV-2 NextGen 2025 Systems Communications Description – Rollup Data Flow View

Transport Mechanisms



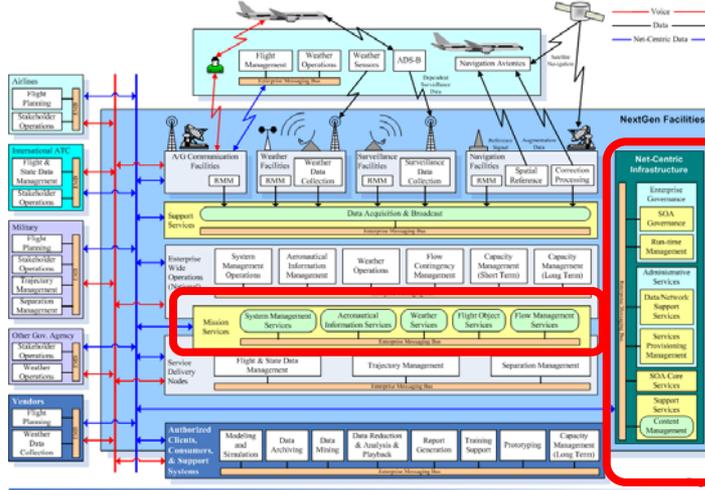
Interoperability



"To Be" NAS Architecture Views

NextGen 2025 – SV-1p 2/5/09

NextGen 2025+



System Architecture

"To Be" EA / 2025+

- AV-1 AV-2
- OV-1 OV-2
- OV-3 OV-4
- OV-5 OV-7
- OV-6c SV-1
- SV-2 SV-4
- TV-2

Enterprise

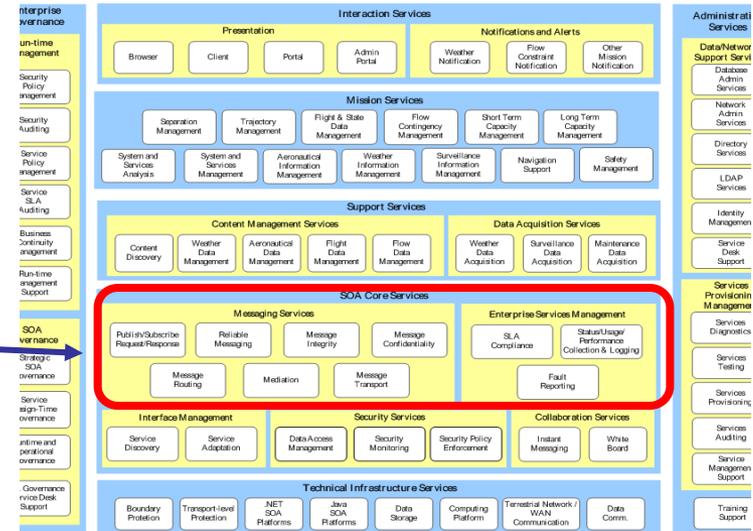
- OV-1 SV-1
- OV-2 SV-4
- SV-6/8 TV-1

Service Unit

- AV-1 AV-2
- OV-1 OV-5
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- SV-4 SV-6
- SV-7 SV-10c
- SV-11

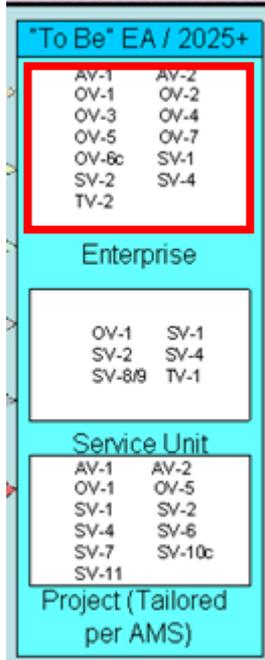
Project (Tailored per AMS)

Common Services

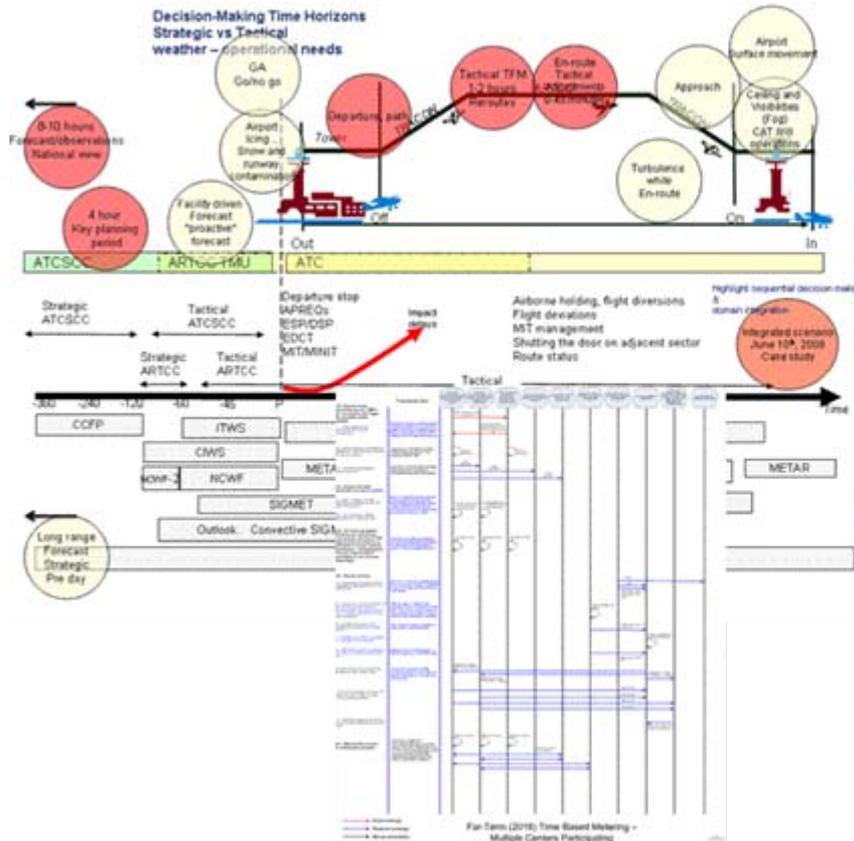


"To Be" NAS Architecture Views

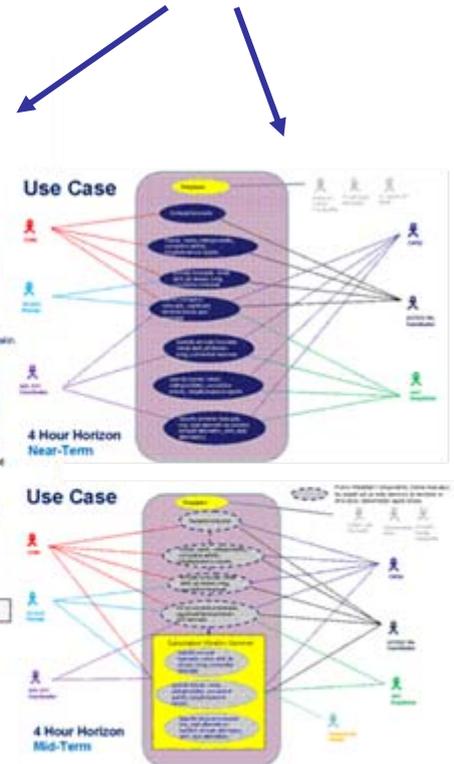
NextGen
2025+



Ops Concepts



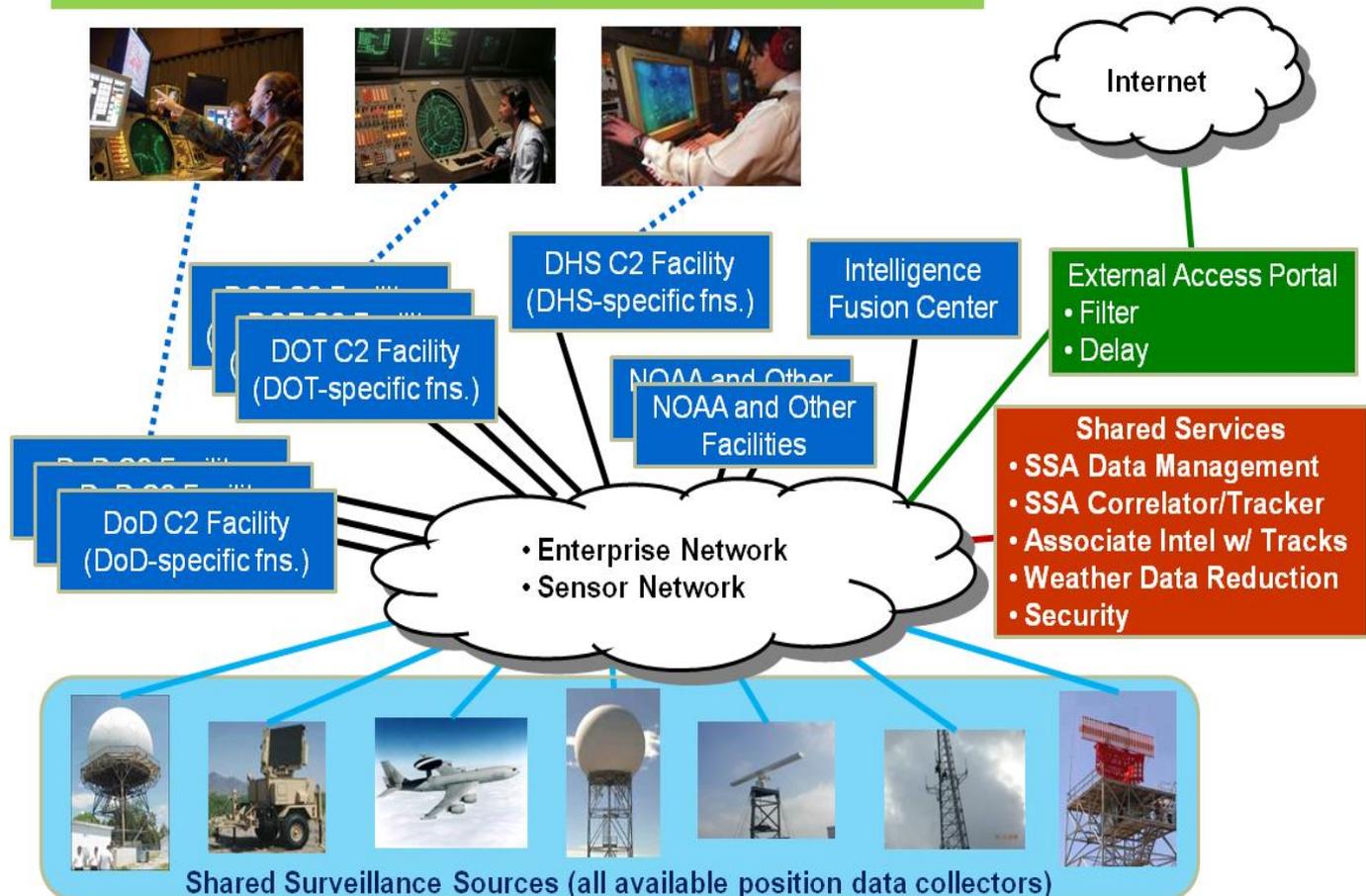
Actors and Activities



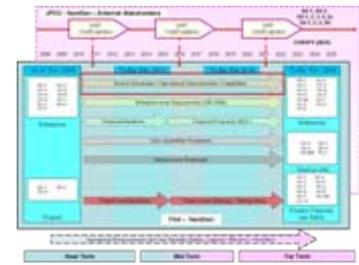
Possible Collaboration Results...?

Interagency shared situation awareness (SSA) enabled by network access to shared services and collaborative capabilities built into C2 systems

From the JPDO
IS CONOPS dtd
May 4, 2009



Service Road Map Structure



2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Initiate Trajectory Based Operations

Increase Arrivals/Departures at High Density Airports

Increase Flexibility in the Terminal Environment

Improve Collaborative ATM

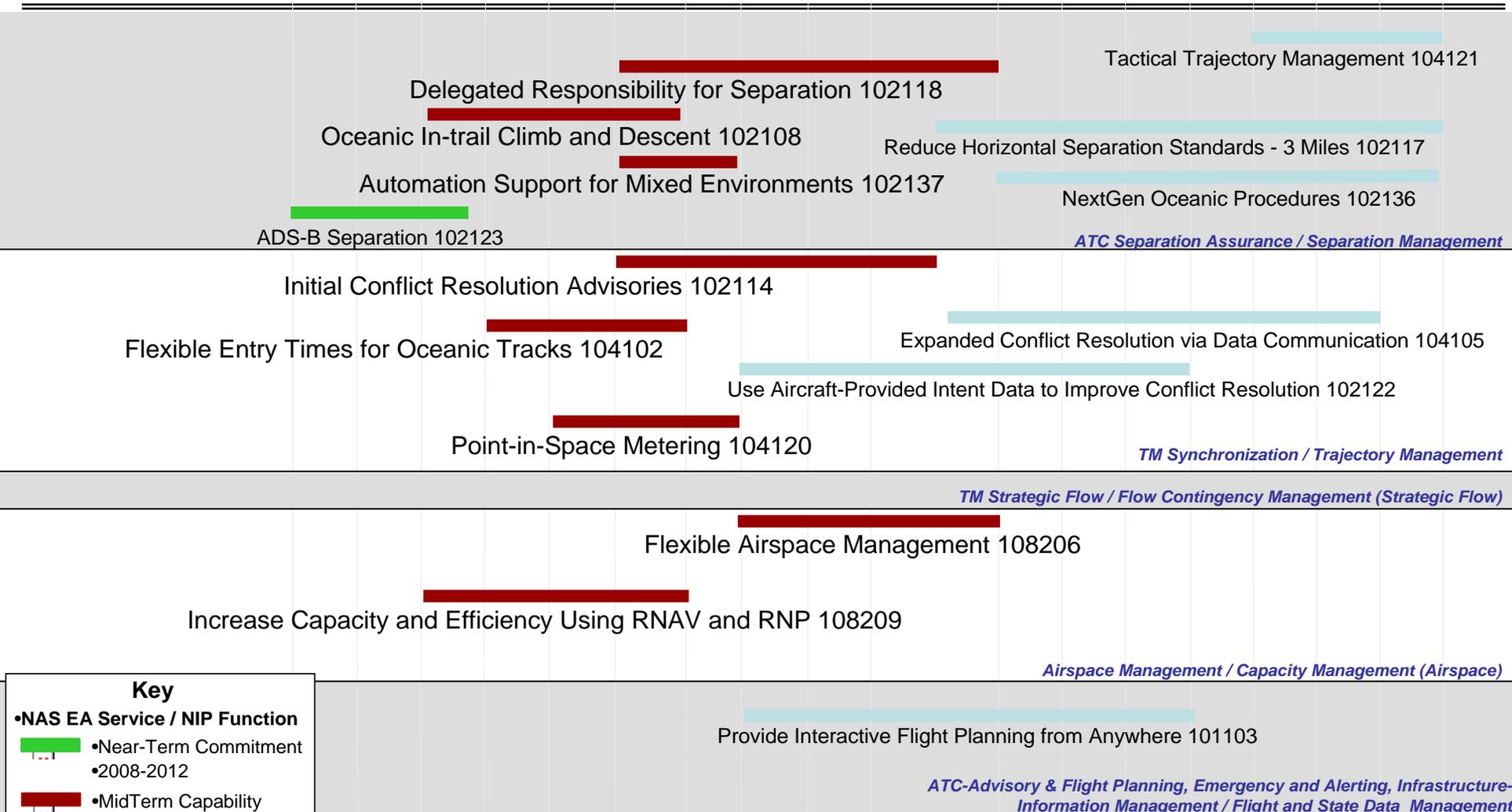
Reduce Weather Impact

Transform Facilities

Increase Safety, Security, and Environmental Performance

Initiate Trajectory-Based Operations

FY 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



Key

•NAS EA Service / NIP Function

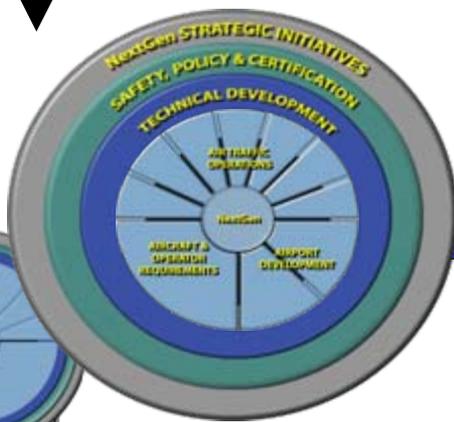
- Near-Term Commitment
2008-2012
- Mid-Term Capability
2012-2018
- Far Term Capability

•(Initial Operating Capability targeted within the box)

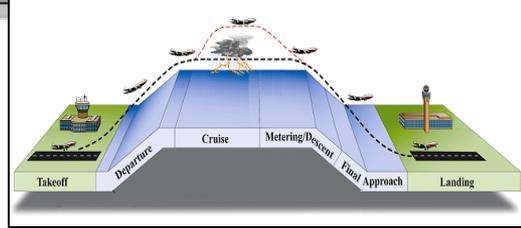
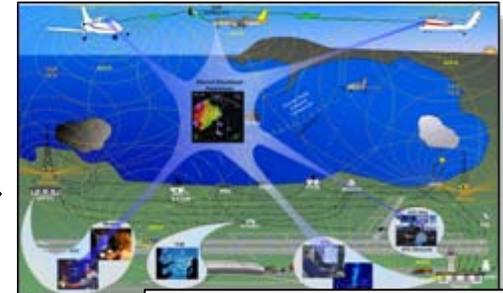


NextGen Key Capabilities

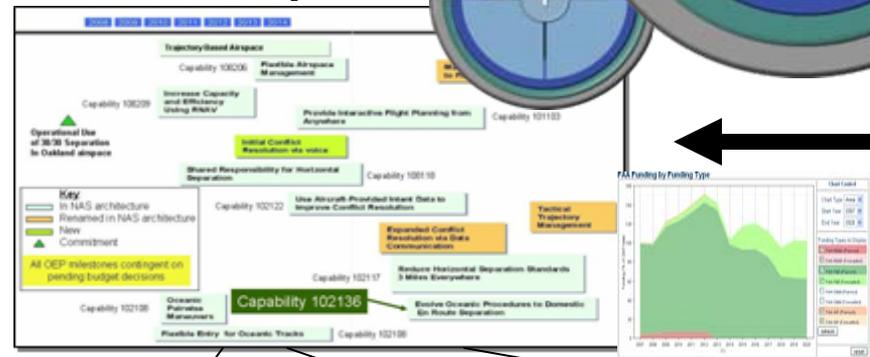
Seven (7) Solution Sets address and deliver *Capacity, Efficiency, Safety and Security* benefits for air transportation operations



NASEA



Roadmap

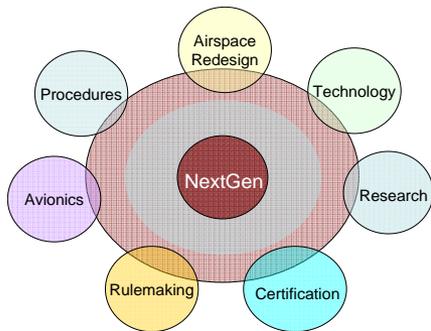
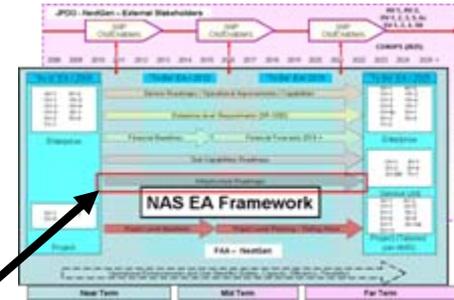
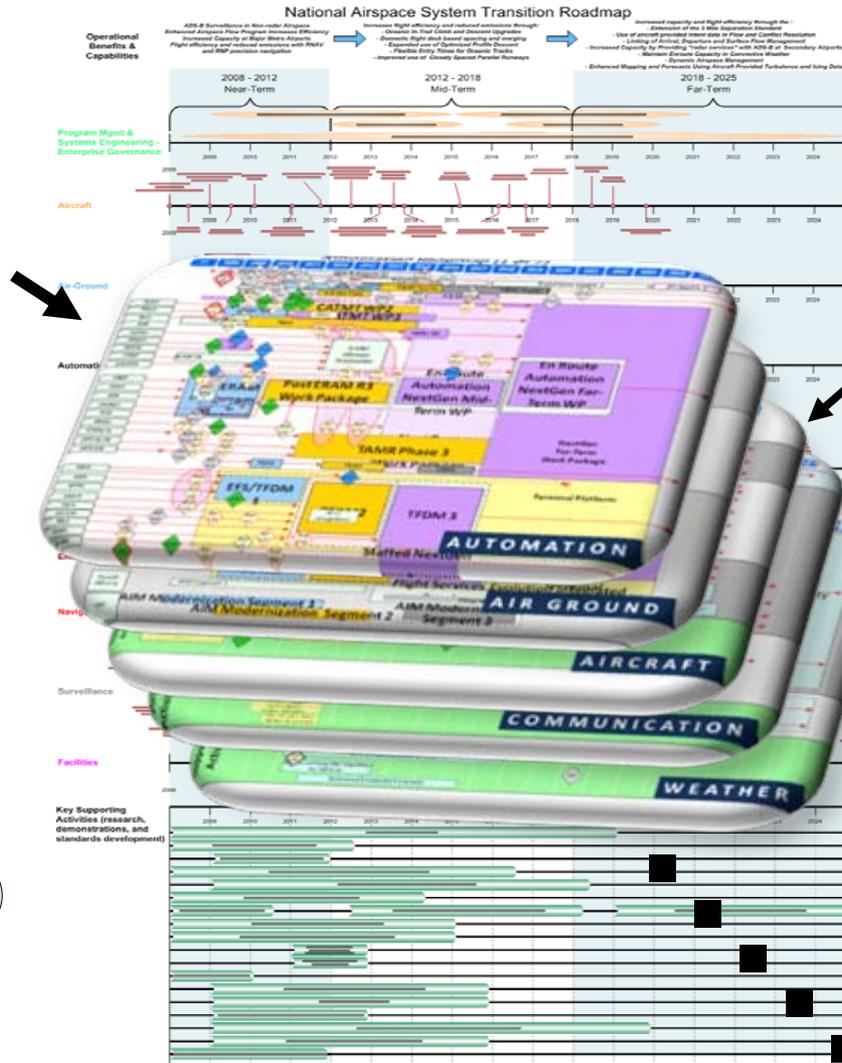
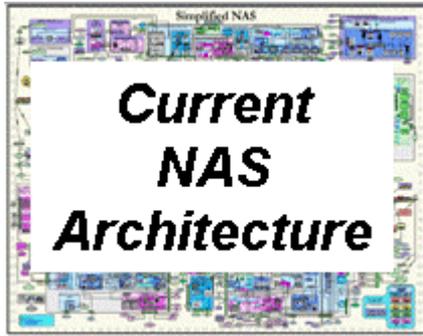


Programs

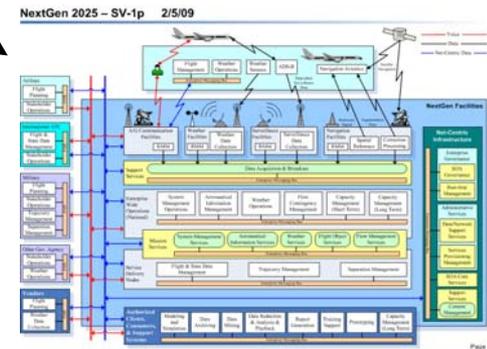
En Route Automation Modernization (ERAM)	Terminal Automation Modernization	NextGen Traffic Flow Management	SWIM	Aeronautical Data Link
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NAS EA Roadmaps Capture the Evolution Strategy

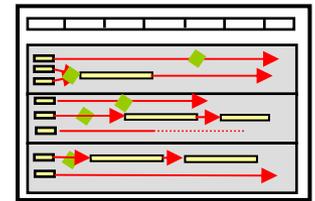
Current
2009



NextGen
2025+

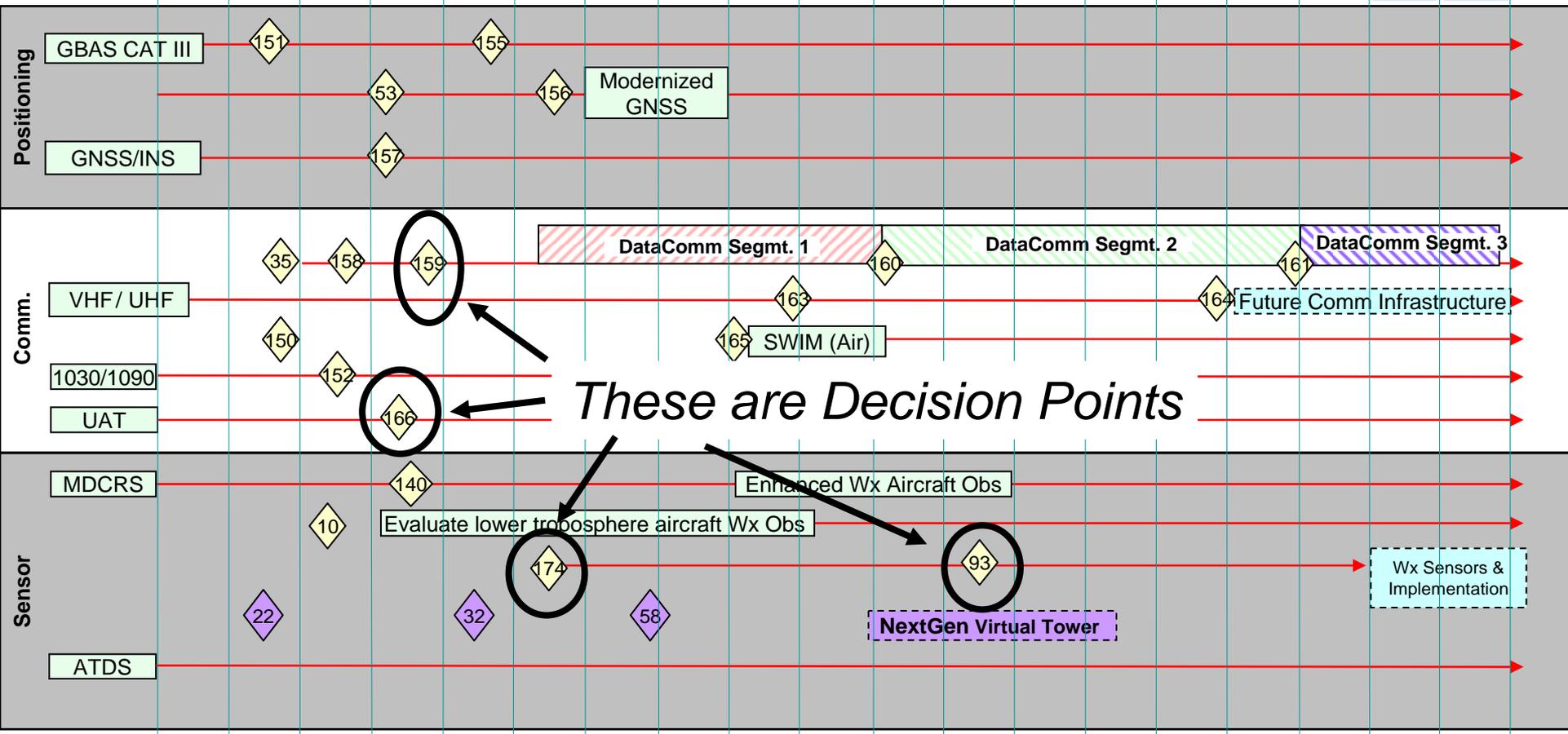


Infrastructure Roadmaps



- **Infrastructure Roadmaps are...**
 - Used to define the FAA’s plan for enterprise level system, sub-capabilities, and project evolution over time – they are updated annually
 - It provides the integrated decisions and synchronized investments needed to deliver NextGen and evolve the NAS (technology, policy, strategy, training, procedures, research, etc.)
- **Roadmaps for this year’s update are:**
 - **Aircraft, Automation, Air-to-Ground, Airspace & Procedures, Communications, Facilities, Navigation, Surveillance, Weather, Enterprise Services, Human Systems Integration, Security, Safety** (new for 2009), **Airports** (new for 2009)
 - Roadmaps capture decision points (and major milestones), assumptions, and dependencies
 - Infrastructure Roadmaps mapped to sub-capabilities and to the NextGen Solution Set OIs for this year’s update
 - The EA Roadmaps capture contributions from ATO service units, AVS, etc. – all stakeholders are involved

*Opportunities
for
Collaboration*

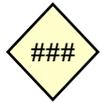


These are Decision Points

R,E&D Activities with Technology Readiness Levels
 Demonstrations and Prototypes
 International Efforts: e.g., ICAO, SESAR Linkages
Interoperability Requirements, Demonstrations, Tech Transfer
 Other Risk Reduction Activities



Decision Point Attribute/Coding



Decision Point (DP)/Commit



Planning DP



Higher Priority Decision Point



Completed

Border colored red if also a critical DP



AMS Decision Points (IARD, IID, FID, BCD, ISD)



Policy



Strategy



Executive Level

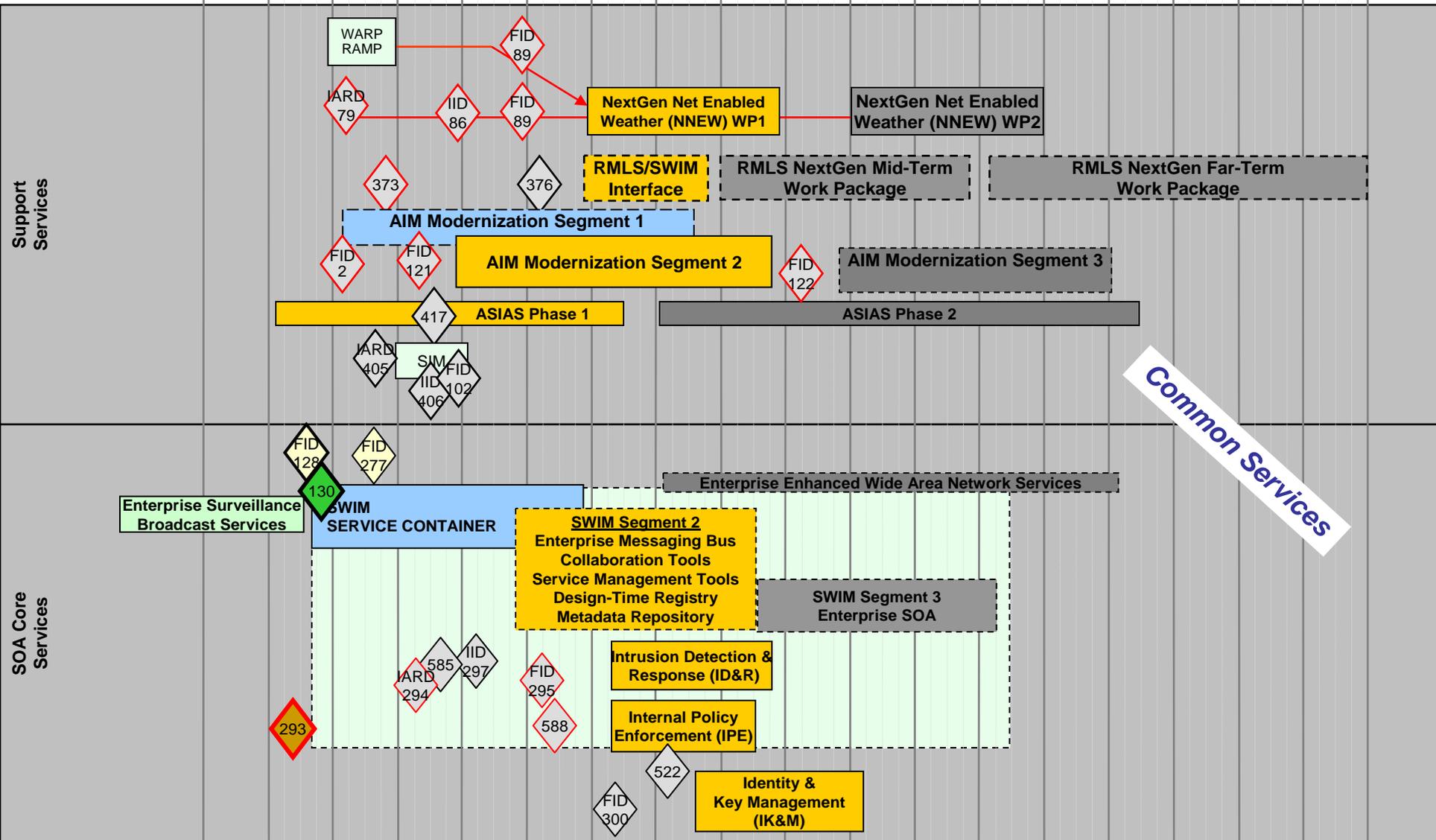


DP Owned by Another Roadmap

Enterprise Services Roadmap (2 of 7)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

SWIM Segmt. 1 SWIM Segmt. 2 SWIM Segmt. 3



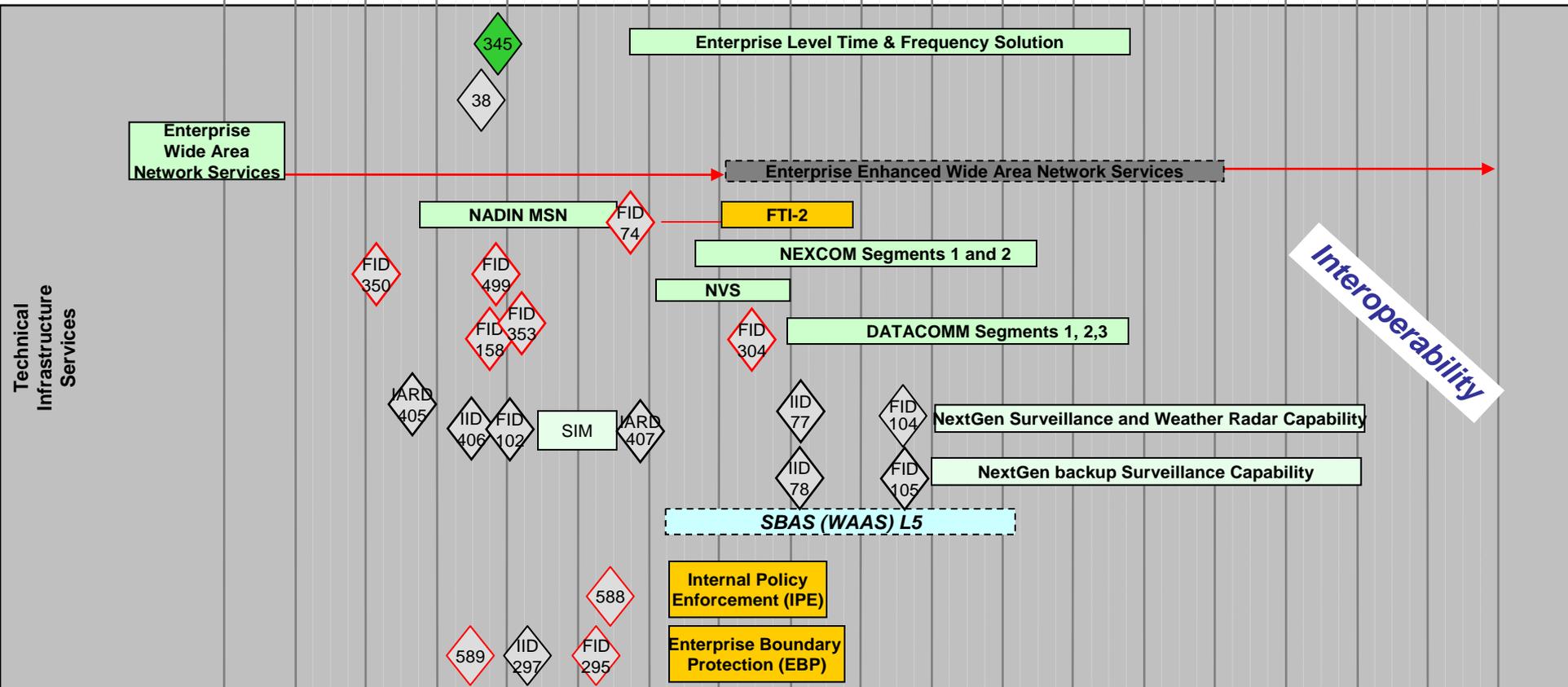
Common Services



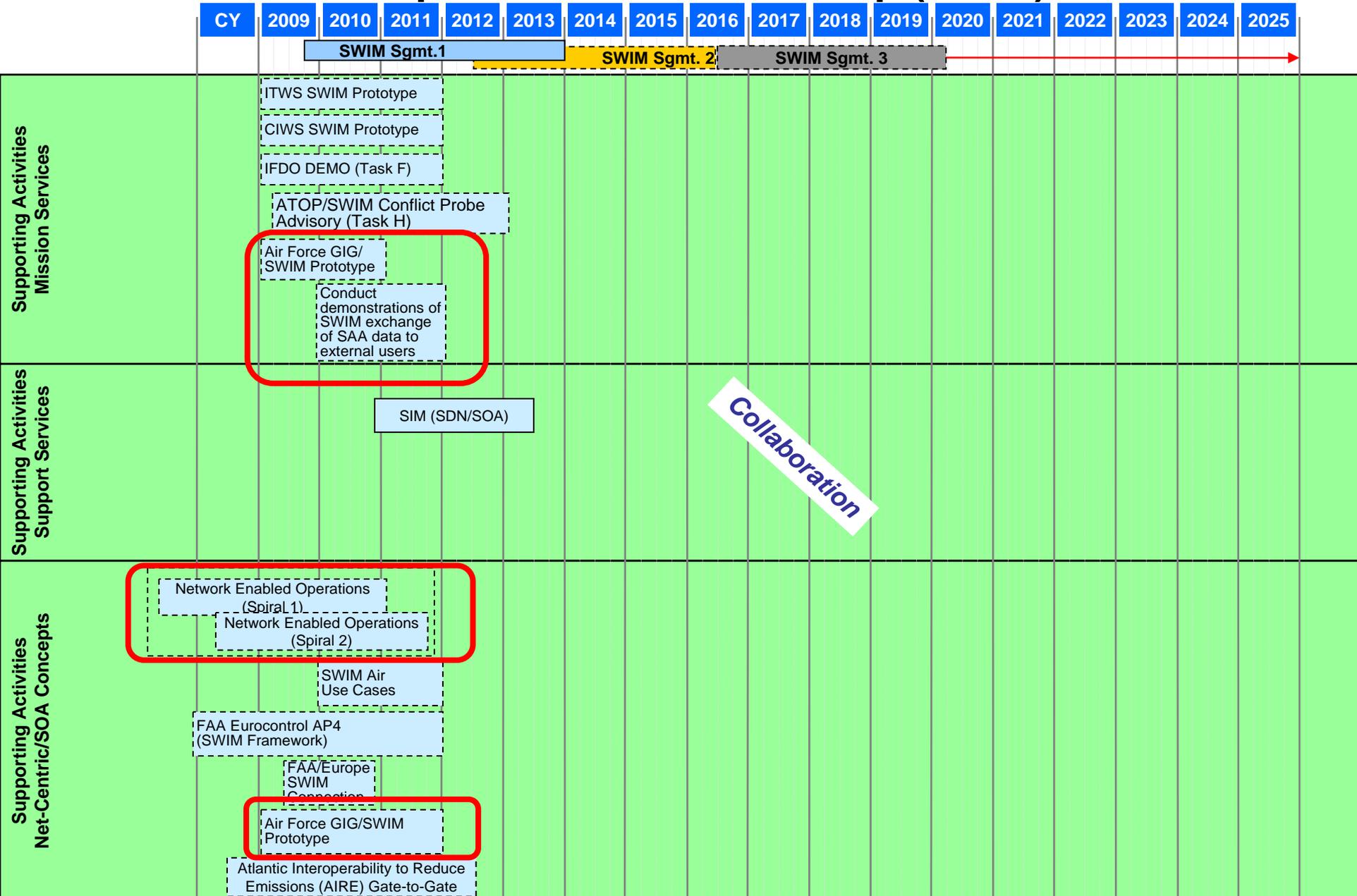
Enterprise Services Roadmap (3 of 7)

CY 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

SWIM Segmt. 1 SWIM Segmt. 2 SWIM Segmt. 3



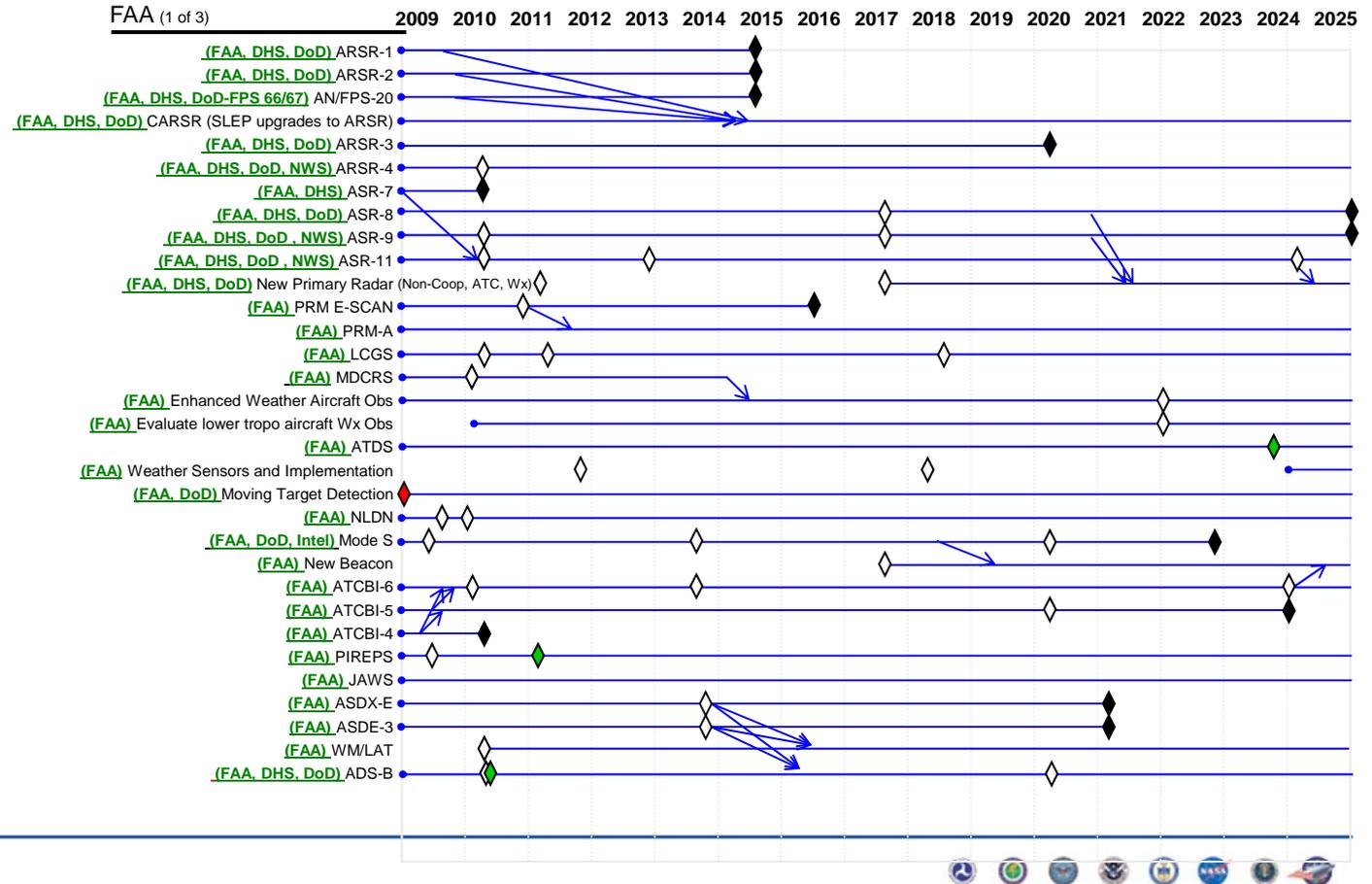
Enterprise Services Roadmap (6 of 7)



Possible Collaboration Results...?

Next Generation Air Transportation System
Joint Planning and Development Office

Executive Roadmap – Organization

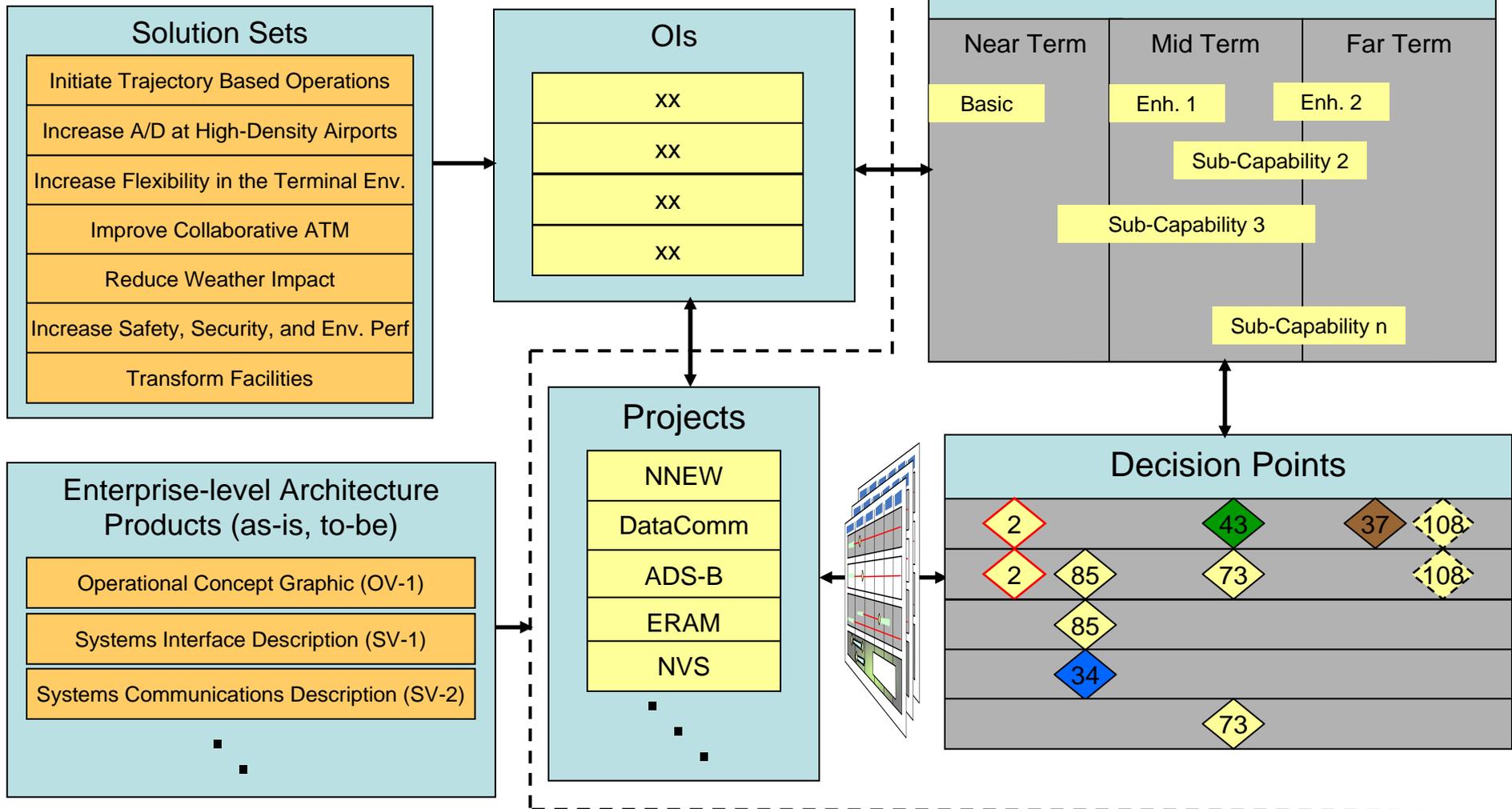


From the JPDO IS
Roadmap Analysis
Report dtd
Oct 5, 2009



Alignment

To JPDO EA



Sample OI/Capability to Sub-capability to Infrastructure Roadmaps Mapping

2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026

Solution Set Capabilities / OIs

Initiate Trajectory Based Operations

- Separation reduction - 50 longitudinal miles in Anchorage Oceanic airspace
- 50 nmi Lateral Separation in WATRS
- ADS-B in Gulf Of Mexico

OI [102118] Delegated Responsibility for Separation

Tactical Trajectory Management

OI [102108] Oceanic In-Trail Climb and Descent

Reduce Horizontal Sep **Ops Benefits**

Etc. Etc. Etc.

NextGen Oceanic Procedures

Separation Management

Sub-Capabilities

Tactical Trajectory Management Capability

Functions

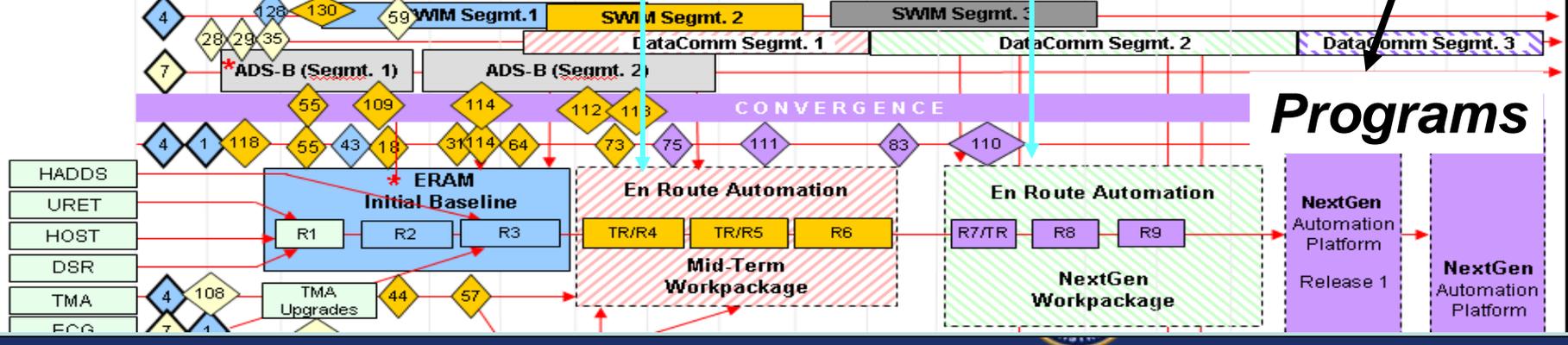
Reduced Oceanic Separation-3miles

Etc. Etc. Etc.

Infrastructure Roadmap

Automation Roadmap (1 of 2)

2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025



Alignment Matrices

Solution Set:

Initiate Trajectory-based Operations (TBO)

Capability:

102114 – Initial Conflict Resolution Advisories

First Initial Operational Capability:

2013–2017

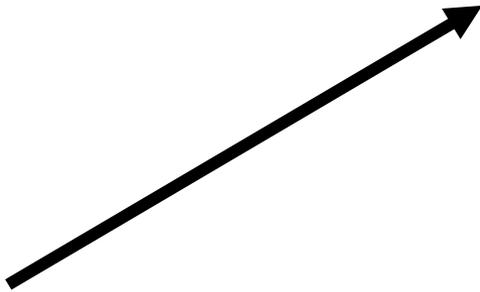
Description:

The ANSP conflict probe is enhanced not only to recognize conflicts but to provide rank-ordered resolution advisories to the provider. The provider may select one of the resolutions to issue to the aircraft. Automation enables ANSP to better accommodate pilot requests for trajectory changes by providing conflict detection, trial flight planning, and development of resolutions, as well as an optimal ranking of resolutions.

Roadmap	System/ Program	Supporting Activities	Sub-Capabilities (Functions)	Roadmap Date Range	Decision Points	Issues/Risks/Comments
Aircraft	Voice Comm.	7839 (RTCA 214 Stds)	<ul style="list-style-type: none"> 7-004 Enhance Aircraft/ANSP Information Exchange—Negotiate 	2012-2025		Note: OI 102114 near/mid term and allows use of voice for Initial CRA.
Aircraft	Voice Comm.	7839 (RTCA 214 Stds)	<ul style="list-style-type: none"> 7-005 Enhance Aircraft/ANSP Information Exchange—Contract 	2012-2025		
Aircraft	Voice Comm.	7839 (RTCA 214 Stds)	<ul style="list-style-type: none"> 7-006 Enhance Aircraft/ANSP Information Exchange—Execute 	2012-2025		
Air/Ground			<ul style="list-style-type: none"> 			
Airport Operations	N/A		<ul style="list-style-type: none"> 			
Automation	ERAM Initial Baseline	7823 (Trajectory model upgrades to support RNP)	<ul style="list-style-type: none"> Initial conflict resolution advisory altitude/speed 	2009-2010		Update roadmap, concern about NextGen funding the implementation of this capability, process.
Automation	Post ERAM R3 WP	7823 (Trajectory model upgrades to support RNP)	<ul style="list-style-type: none"> Conflict resolution advisory via voice. 	2011-2015	31	Automation to take convection/turbulence into account in conflict resolution if this is determined to be suitable role of Automation.
Automation	ERAM Midterm WP	7823 (Trajectory model upgrades to support RNP)	<ul style="list-style-type: none"> Conflict resolution advisory via DataComm. 	2015-2019	75	Assume DataComm shows linkage to this capability in this timeframe.
Weather	NWS Modeling capability	Higher resolution model forecast output	<ul style="list-style-type: none"> Enhanced Forecasts - Winds, Convection & Turbulence 			More accurate, higher-resolution longer range forecasts facilitate conflict resolution
Weather	WARP		<ul style="list-style-type: none"> Initially provides dissemination of enhanced products/forecasts of Convection, Turbulence & in-flight icing to DSTs 	2012-2014	210	Provides enhanced forecast data until NWP WP1 subsumes functionality
Weather	4D Wx Cube/SAS		<ul style="list-style-type: none"> Provides wider access to ANSP and Users of higher resolution model data 	2012-2017	86, 89, 209	4D Wx SAS enhances access & situational awareness of impacting Wx
Weather	NWP WP1		<ul style="list-style-type: none"> Subsumes WARP functionality and coupled with NNEW affords quicker/wider access to improved forecast weather information 	2014-2017	86, 89, 209	NextGen Wx Processor WP1
Communication	DataComm Seg 1		<ul style="list-style-type: none"> CPDLC Messaging over A/G Datalink – ARTCC & ATCT 	2012 – 2017	158, 353	Initially voice communications will be used for exchanging trajectory information but with a planned migration to data communications.
Communication	Legacy A/G Voice communications		<ul style="list-style-type: none"> Analog A/G Voice over 25 kHz VHF channels 	Legacy		



NAS EA Portal



<http://nasea.faa.gov>



Challenges...

- **Getting People to Use the Architecture**
- **Internal Collaboration**
- **Shortfall Definition, Business Case Development, Portfolios**
- **Bridging the Gap Between Benefits and Investments**
- **Planning vs. Implementation**
- **Service Orientation in the Architecture – Shared Services vs. Stovepipes**
- **External Collaboration**
- **Priorities....Internal over External**