Delivering NextGen

Next Generation Air Transportation System

Federal Aviation Administration

Mid Term Architecture and NextGen Implementation

NAS Enterprise Architecture Conference

Presented by:

Dr. Michael Romanowski, Director, NextGen Integration and Implementation

June 23, 2009

Agenda

I. NextGen Overview — 2018 System

II. FAA Enterprise Architecture (EA)

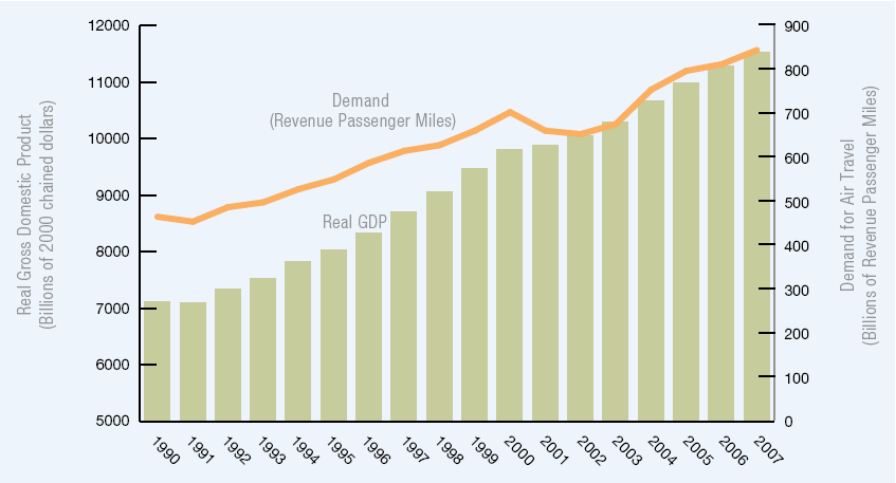
III. Implementing NextGen

Attachment:

- Sample NextGen Solution Set Plan

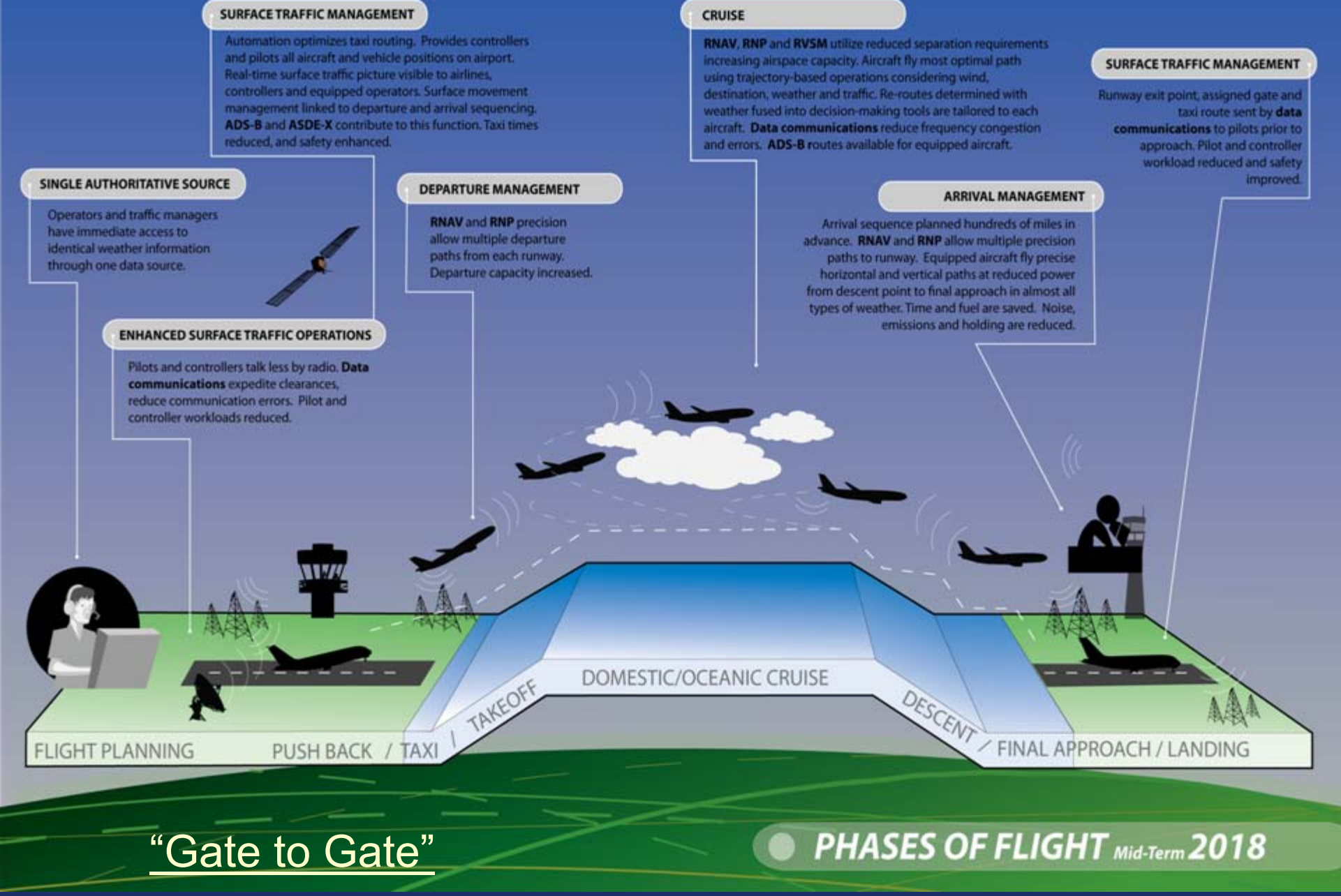
I.
NextGen Overview — 2018 System

Aviation's Impact on the U.S. Economy Drives the Importance of NextGen



The growth of the U.S. economy and civil aviation are vastly interrelated

- **Aviation represents a vital economic link**
- **For 2006:**
  - 11 million aviation-related jobs
  - $1.2 trillion in economic activity
  - 5.6 percent of Gross Domestic Product
- **The current system is not adequate:**
  - Congestion continues, despite decreased traffic
  - Environmental concerns need to be addressed

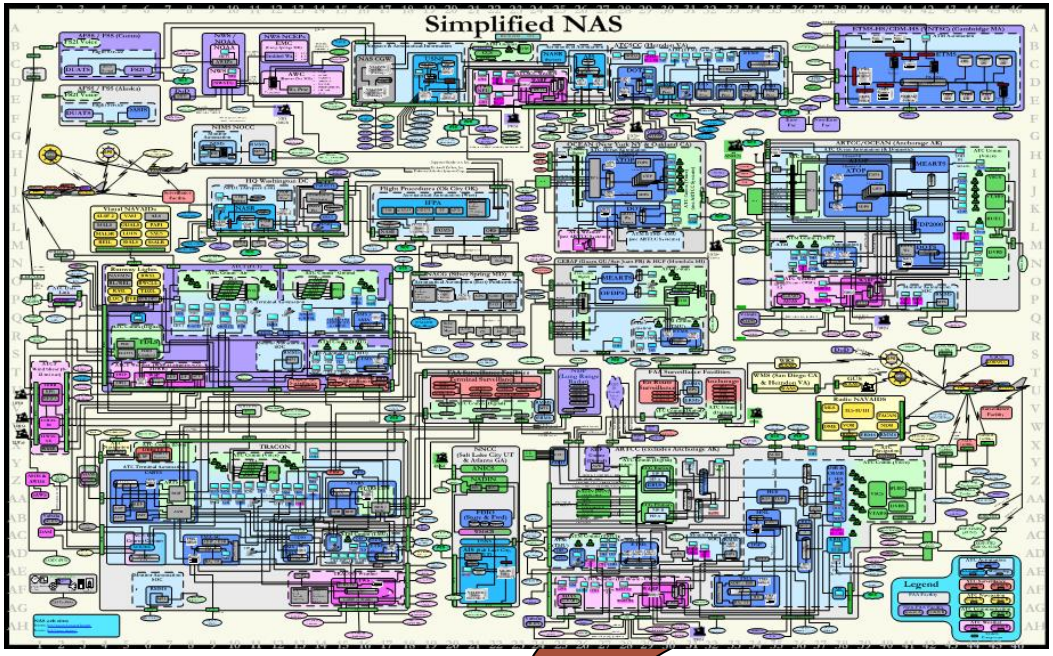

SURFACE TRAFFIC MANAGEMENT
Automation optimizes taxi routing. Provides controllers and pilots all aircraft and vehicle positions on airport. Real-time surface traffic picture visible to airlines, controllers and equipped operators. Surface movement management linked to departure and arrival sequencing. ADS-B and ASDE-X contribute to this function. Taxi times reduced, and safety enhanced.
CRUISE
RNAV, RNP and RVSM utilize reduced separation requirements increasing airspace capacity. Aircraft fly most optimal path using trajectory-based operations considering wind, destination, weather and traffic. Re-routes determined with weather fused into decision-making tools are tailored to each aircraft. Data communications reduce frequency congestion and errors. ADS-B routes available for equipped aircraft.
SURFACE TRAFFIC MANAGEMENT
Runway exit point, assigned gate and taxi route sent by data communications to pilots prior to approach. Pilot and controller workload reduced and safety improved.
SINGLE AUTHORITATIVE SOURCE
Operators and traffic managers have immediate access to identical weather information through one data source.
DEPARTURE MANAGEMENT
RNAV and RNP precision allow multiple departure paths from each runway. Departure capacity increased.
ARRIVAL MANAGEMENT
Arrival sequence planned hundreds of miles in advance. RNAV and RNP allow multiple precision paths to runway. Equipped aircraft fly precise horizontal and vertical paths at reduced power from descent point to final approach in almost all types of weather. Time and fuel are saved. Noise, emissions and holding are reduced.
ENHANCED SURFACE TRAFFIC OPERATIONS
Pilots and controllers talk less by radio. Data communications expedite clearances, reduce communication errors. Pilot and controller workloads reduced.
DOMESTIC/OCEANIC CRUISE
TAKEOFF
DESCENT
FLIGHT PLANNING
PUSH BACK / TAXI
FINAL APPROACH / LANDING
PHASES OF FLIGHT Mid-Term 2018

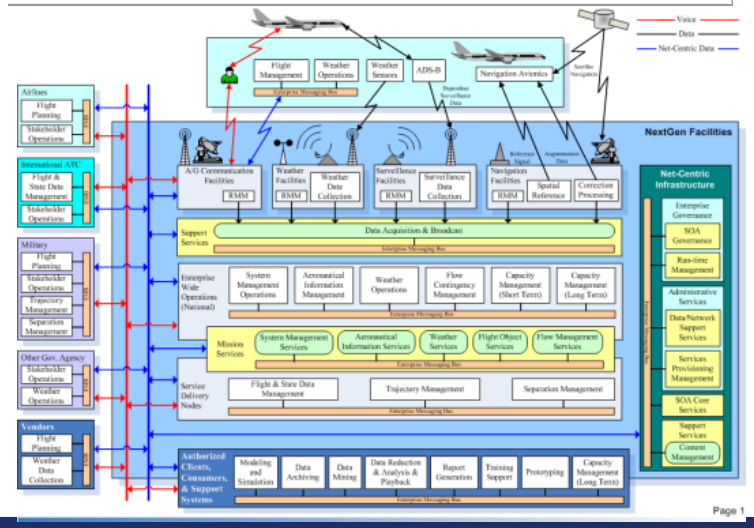
"Gate to Gate"

Achieving NextGen Capabilities

- **To ensure the FAA will deliver, the FAA has:**
  - Established an accountable office
  - Aligned research and prototyping activities
  - Developed the components of a mid term architecture
  - Developed integrated implementation plans and moving forward with execution
  - Enhanced industry engagement
    - Focus on strategies and business cases

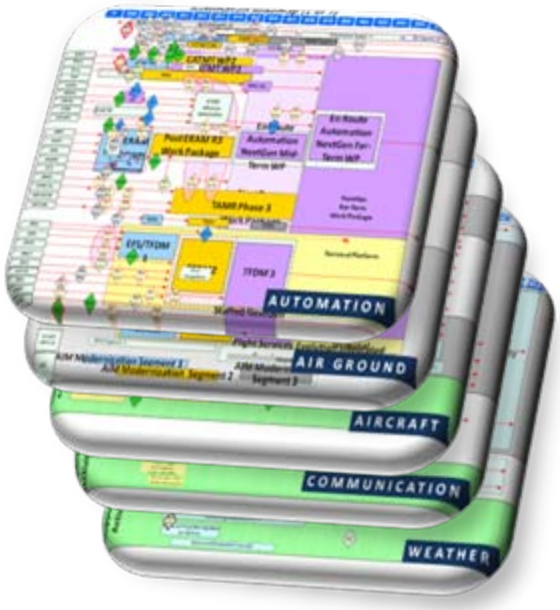
NextGen Complexity – Notional Transition to NextGen





Keys to NextGen

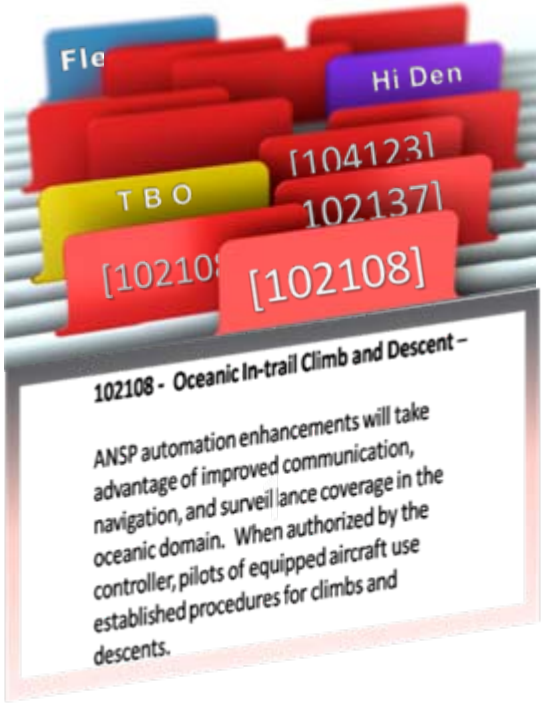
Technical Strategy (Roadmaps)



Operational Capabilities/Benefits

NEXTGEN Portfolio		Transformational Programs				
		ADS-B	SWIM	DATA-COM	NNEW	NVS
Enabling Activities	TBO	X	X	X	X	X
	HIGH DEN	X	X	X	X	X
	FLEX	X	X	X	X	X
	CATM	X	X	X	X	
	RWI	X	X	X	X	
	SSE	X	X	X	X	
	NET FAC		X	X	X	X

Integrated Management Framework



II.
FAA Enterprise Architecture (EA)

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

- **The FAA has developed and is using an EA to support the portfolio of investments**
- **The FAA's EA aligns with the DoT EA and FEA**
- **The EA has two components: Operational Systems and Regulatory/Administrative**
- **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**

$ ←→ Mission ←→ Services ←→ Infrastructure

Public Law – U.S. Code
< Title 31: Money & Finance >

President's Budget

OMB

OMB A-11

FEA
Reference Models
- Performance
- Business
- Service
- Data
- Technical

Capital Planning Guidance

OMB Exhibit 300

Agency EA Aligns with FEA

Public Law – U.S. Code
< Title 49: Transportation >

- Mission
- Appropriation

Regulations – CFR
< Title 14: Aeronautics & Space >
- FAR

ICAO Convention
- SARP
- PANS

Dept of Transportation (EA)

FAA (Enterprise Architecture)

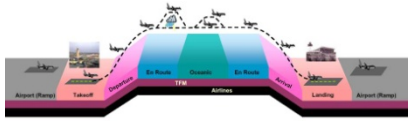
Regulatory & Admin EA

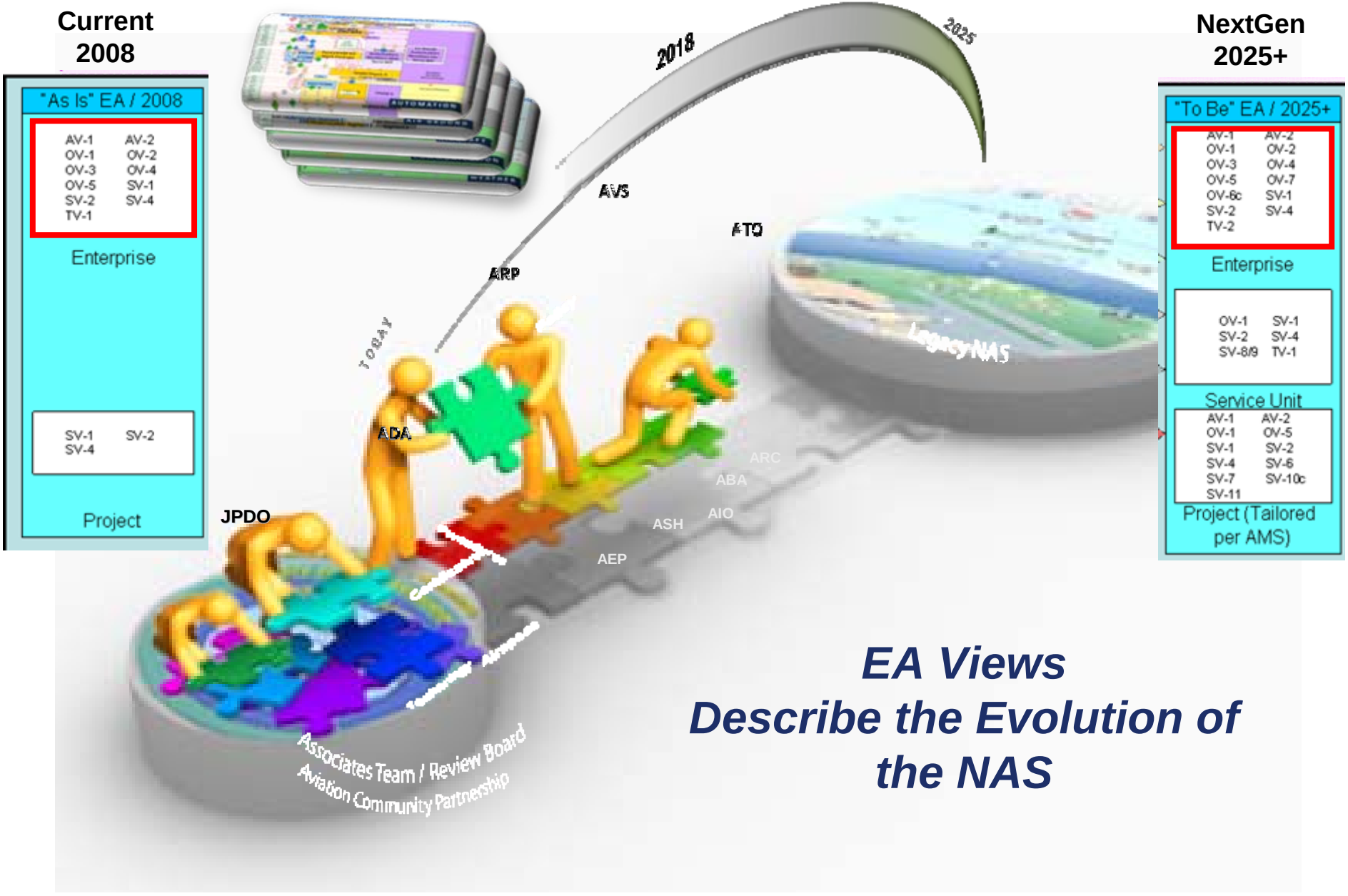
National Airspace System EA

Mission / Benefits

Services / Functions

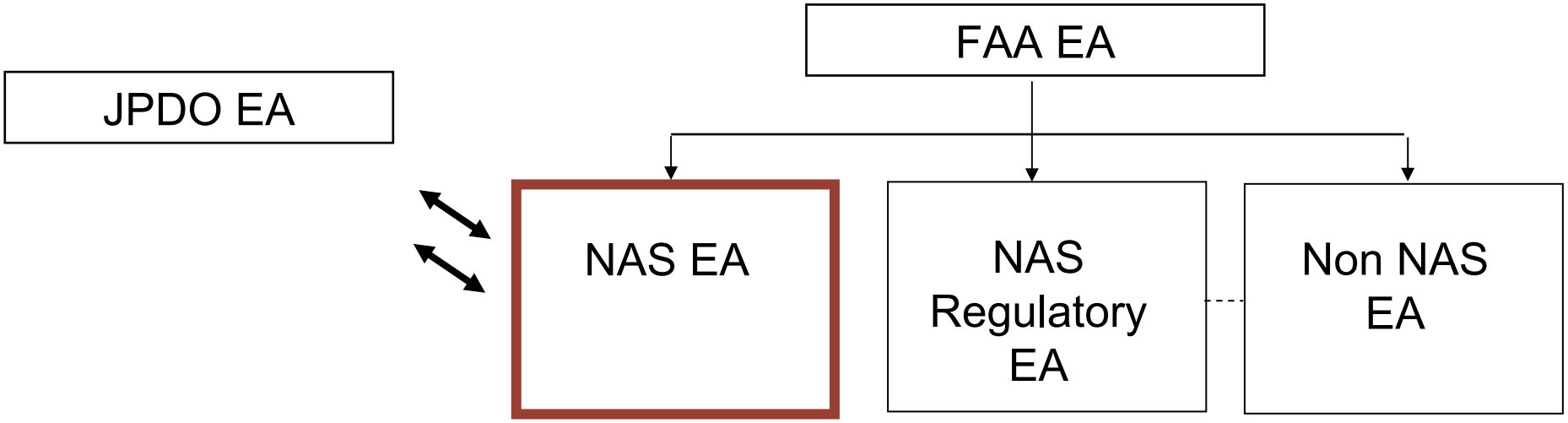
Infrastructure / Systems





EA Views Describe the Evolution of the NAS

FAA Enterprise Architecture



- FAA Enterprise Architecture (EA) has three parts
  - **NAS - Activities that support Operational Air Traffic Services**
  - Regulatory - Activities that support the FAA Mission
  - Administrative - Activities that support operation of the FAA
- FAA CIO has responsibility for entire FAA EA - Delegates responsibility to develop and implement NAS EA to ATO COO

Why EA?

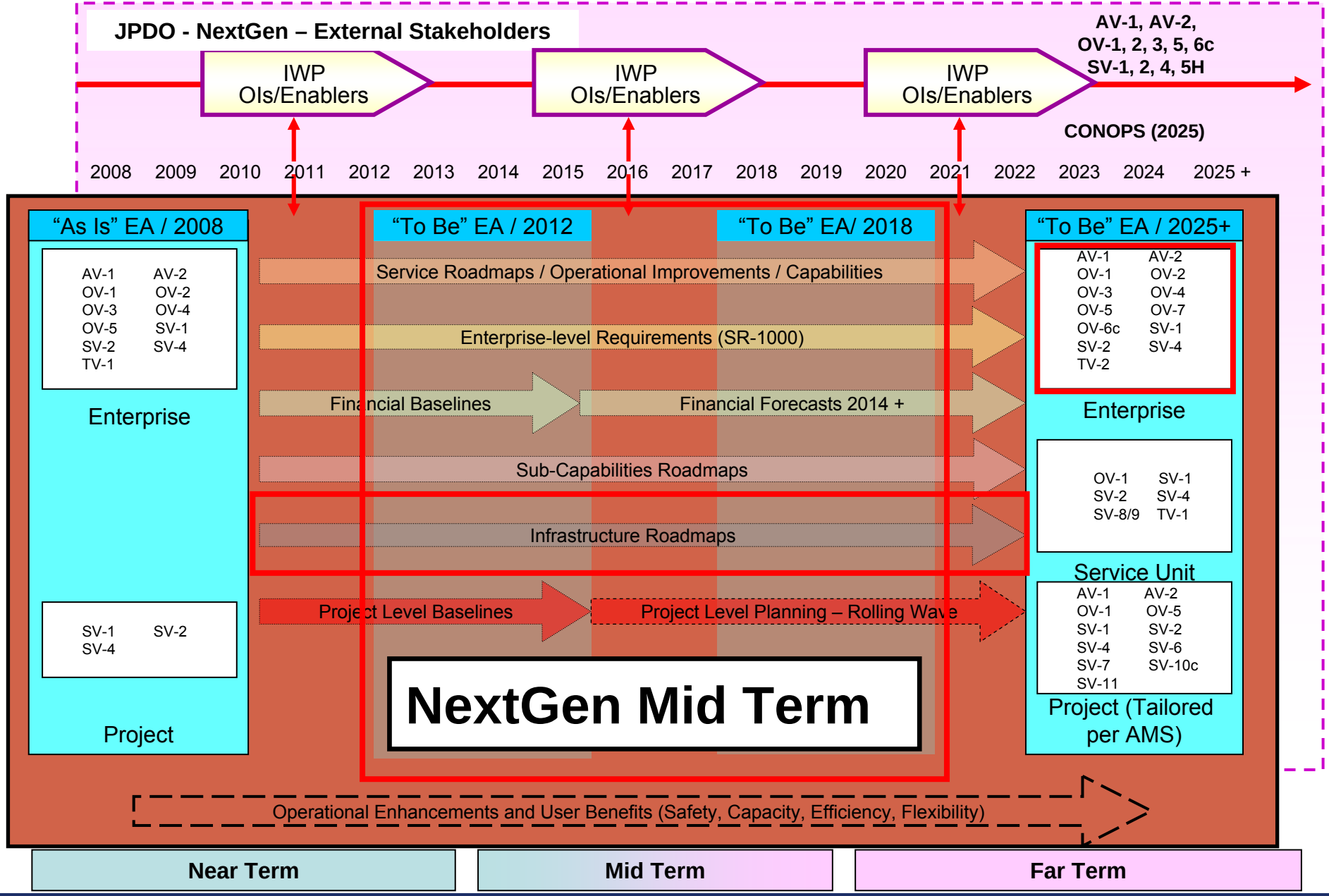
People Process Technology Business

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 – identifies reuse opportunities**

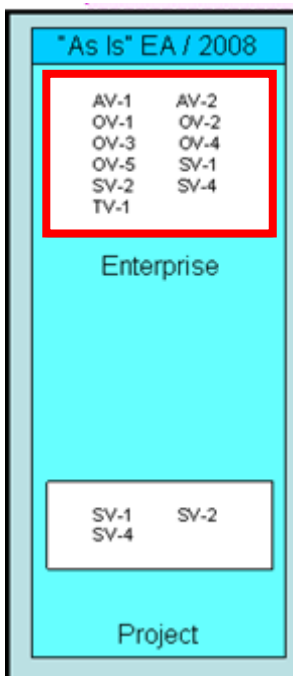
Helps provide a framework for managing change during spiral and evolutionary development

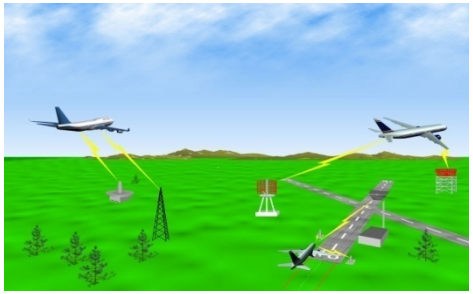
And, because it is a requirement from OMB and GAO


JPDO - NextGen – External Stakeholders
IWP OIs/Enablers
IWP OIs/Enablers
IWP OIs/Enablers
AV-1, AV-2, OV-1, 2, 3, 5, 6c SV-1, 2, 4, 5H
CONOPS (2025)
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 +
"As Is" EA / 2008
AV-1 AV-2 OV-1 OV-2 OV-3 OV-4 OV-5 SV-1 SV-2 SV-4 TV-1
Enterprise
SV-1 SV-2 SV-4
Project
"To Be" EA / 2012
"To Be" EA/ 2018
Service Roadmaps / Operational Improvements / Capabilities
Enterprise-level Requirements (SR-1000)
Financial Baselines
Financial Forecasts 2014 +
Sub-Capabilities Roadmaps
Infrastructure Roadmaps
Project Level Baselines
Project Level Planning – Rolling Wave
NextGen Mid Term
"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-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)
Operational Enhancements and User Benefits (Safety, Capacity, Efficiency, Flexibility)
Near Term
Mid Term
Far Term

Architecture Views Frame the Evolution of the NAS

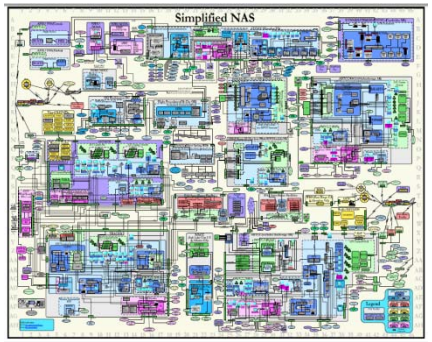
Current 2008





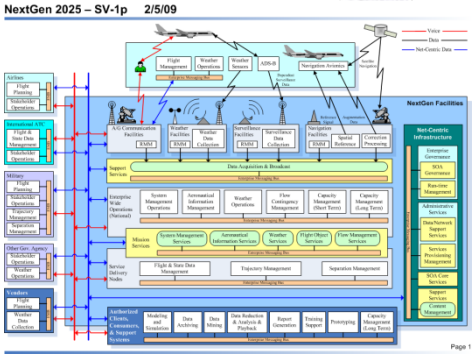
Ops Concepts

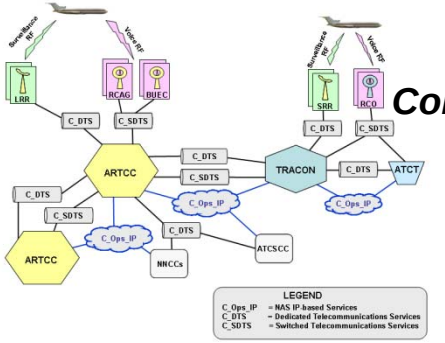
OV-1



System Architecture

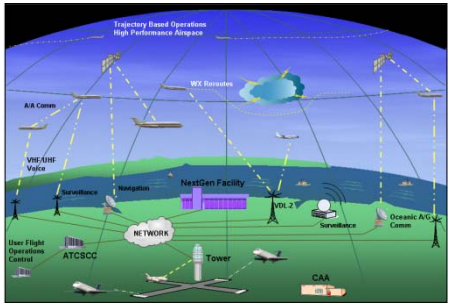
SV-1





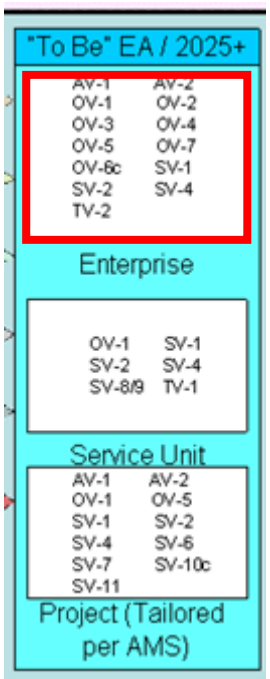
Communications Systems

SV-2



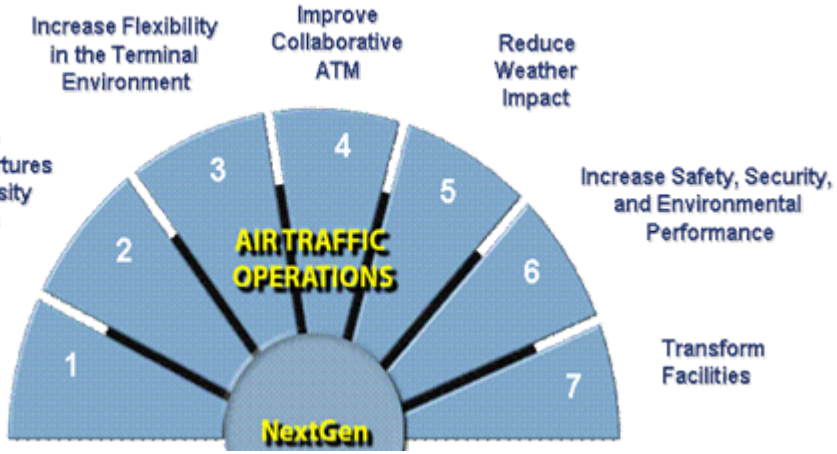
other EA views too…

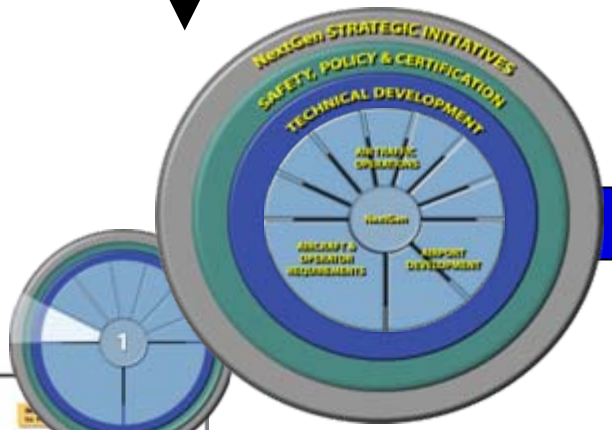
NextGen 2025+



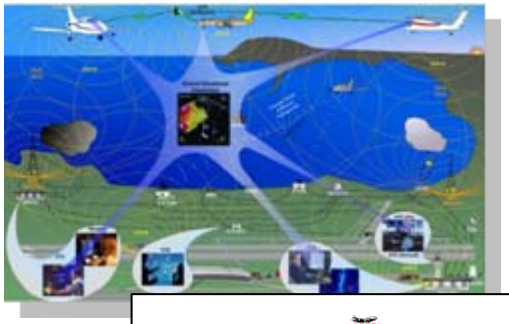
NextGen Key Capabilities

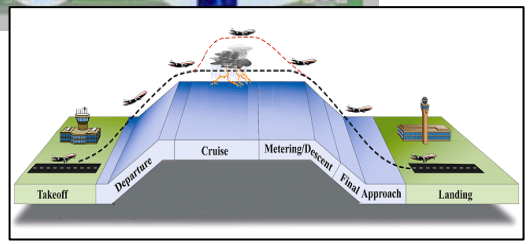
Seven (7) Solution Sets address and deliver *Capacity, Efficiency, Safety and Security* benefits for air transportation operations



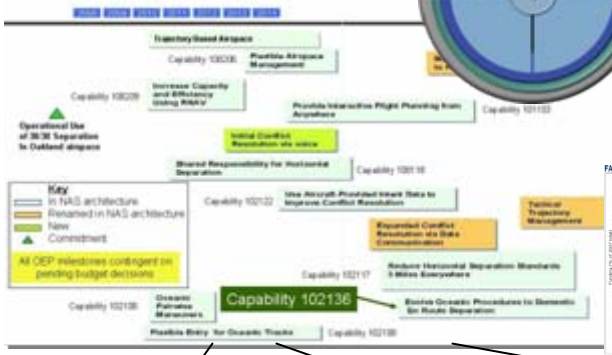


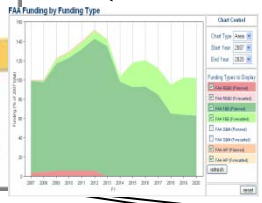
NASEA





Roadmap



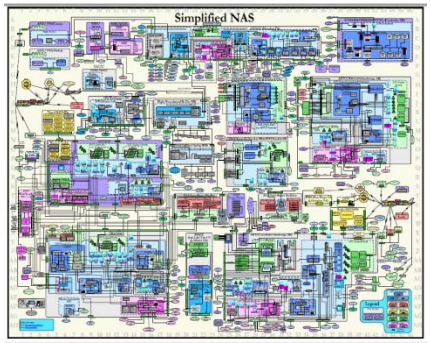


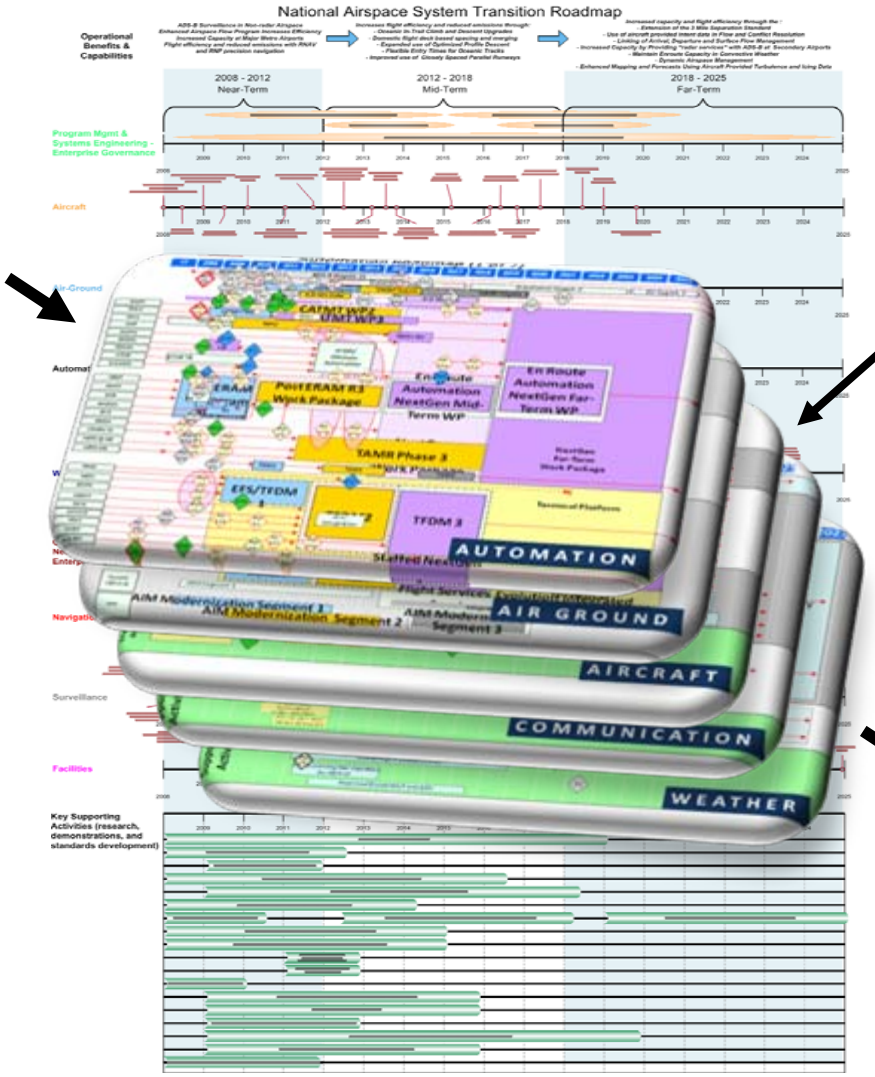
Programs

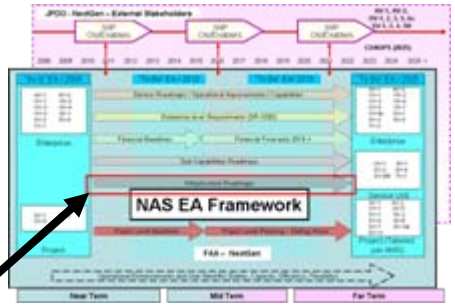
En Route Automation Modernization (ERAM)	*NextGen Collision Avoidance System*	*NextGen Traffic Flow Management*	*SWIM*	*Aeronautical Data Link*

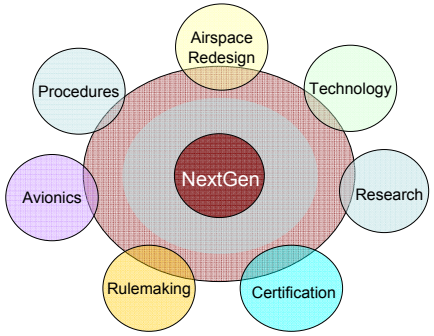
NAS EA Roadmaps Capture the Evolution Strategy

Current 2008

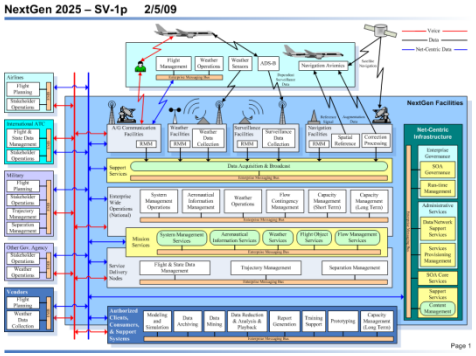






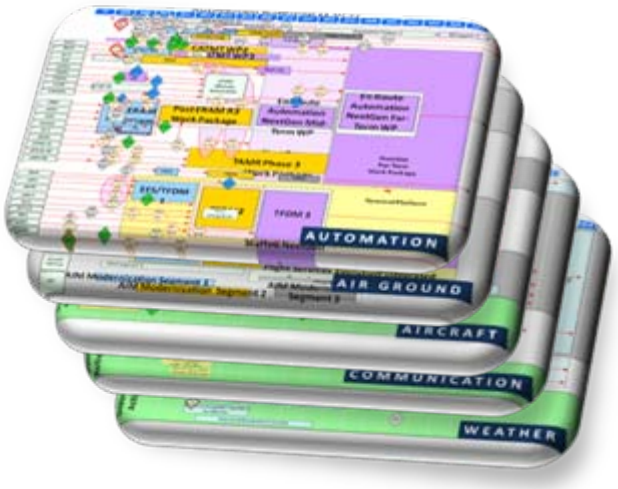


NextGen 2025+

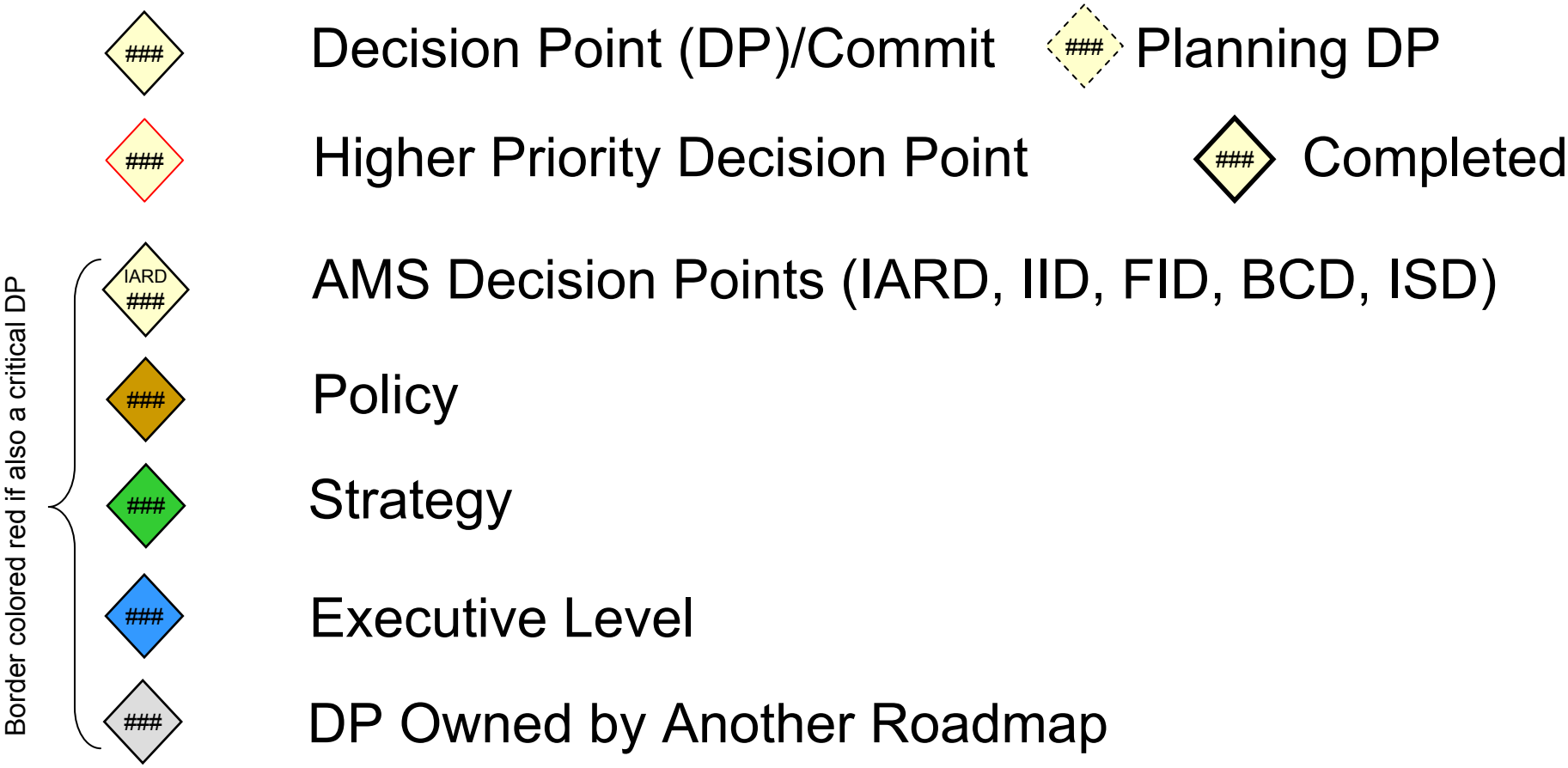


Infrastructure Roadmaps – Jan 2009

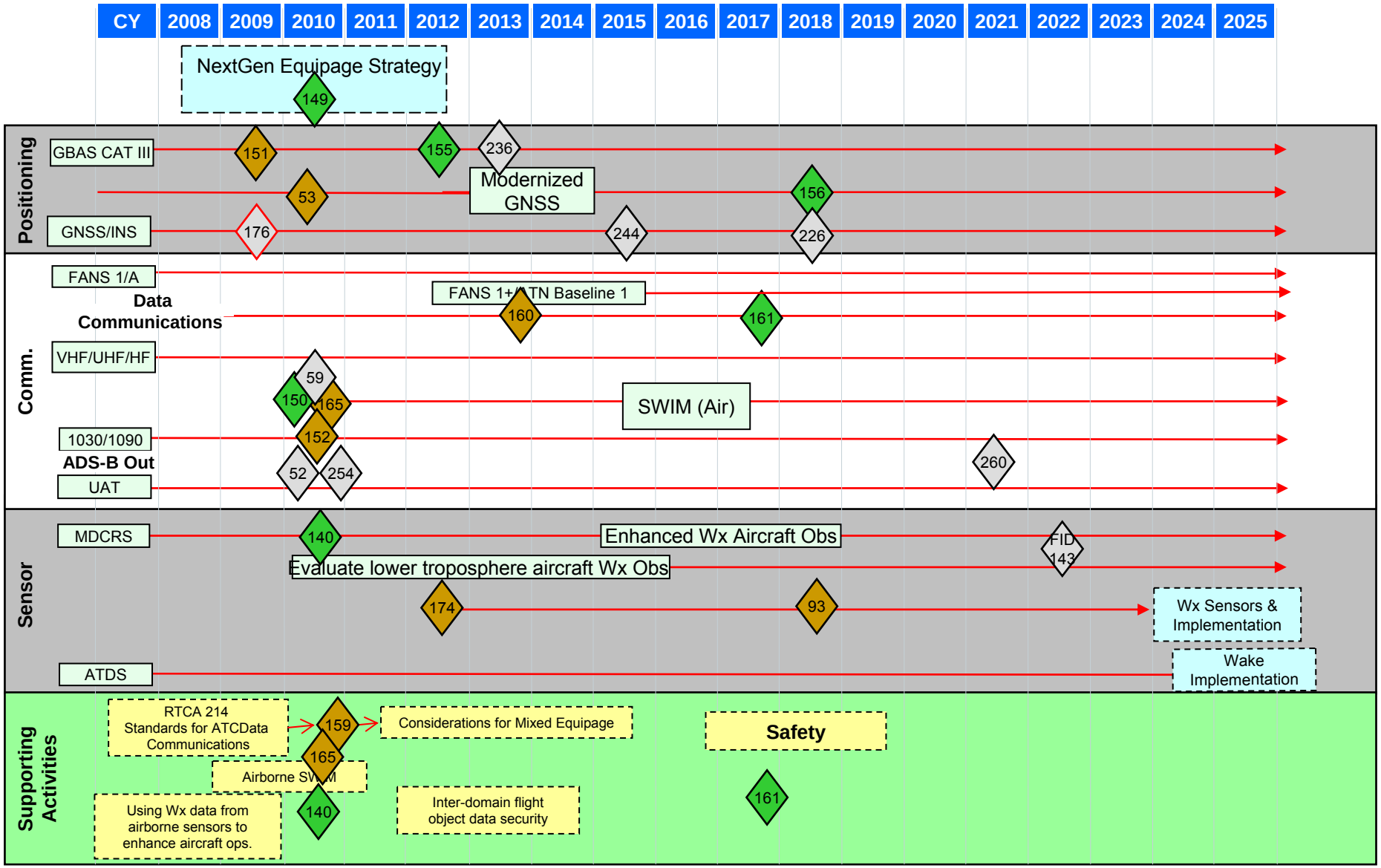
- Aircraft
- Automation
- Air-to-Ground **(new)**
- Airspace & Procedures **(new)**
- Communications
- Facilities
- Navigation
- Surveillance
- Weather
- Enterprise Services **(new)**
- Human Systems Integration **(new)**
- Security **(new)**



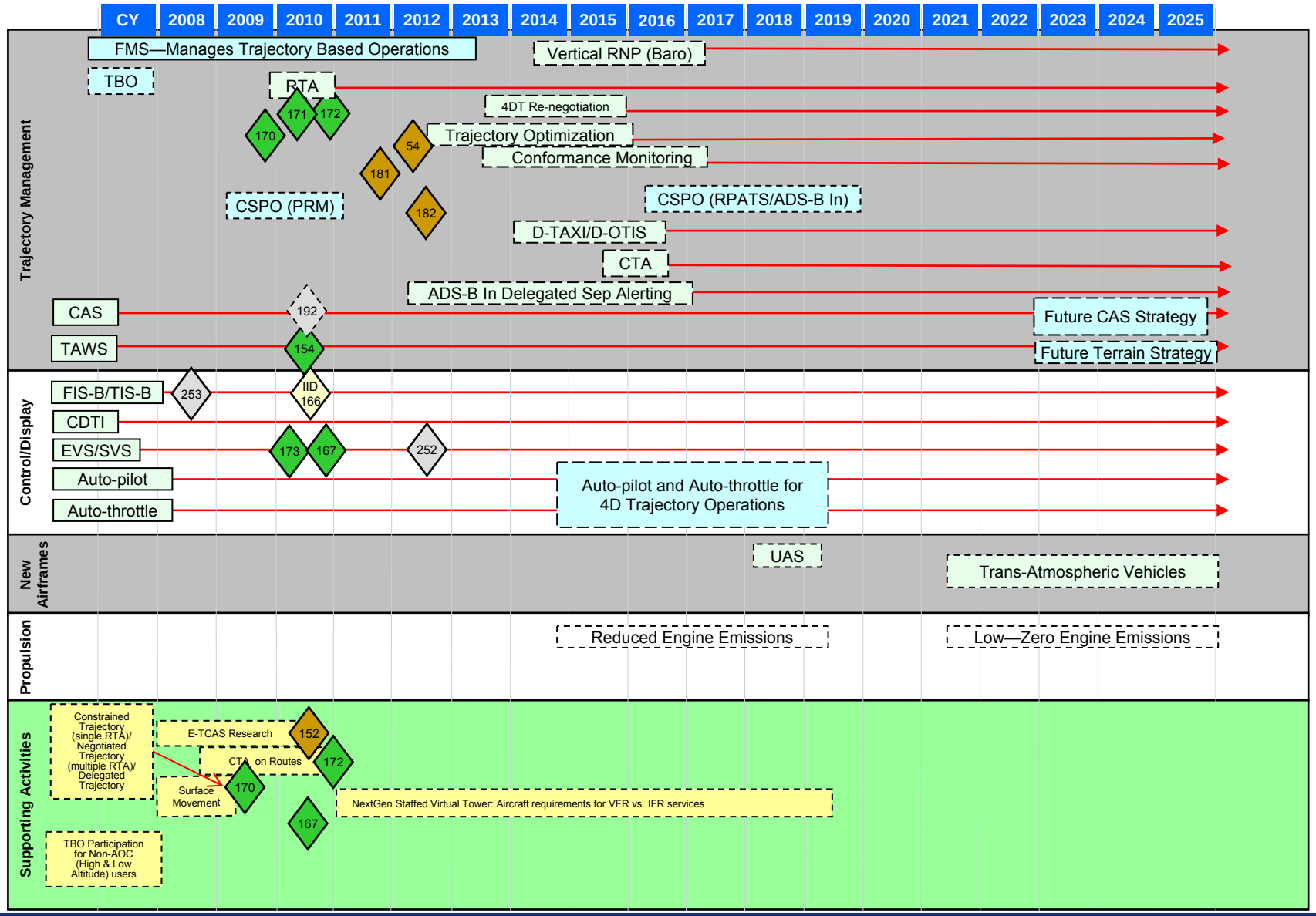
Decision Point Attribute/Coding



Aircraft Roadmap (1 of 2)



Aircraft Roadmap (2 of 2)



Aircraft Roadmap: Assumptions

Identifier	Description
AC-01	**The roadmap identifies four phases** **a) Conops development and R&D in required areas** **b) Standards development** **c) AVS Approval** **d) Deployment. After the standards process is complete, and manufacturers have developed, integrated, fully tested and made new avionics available, an additional 7 to 10 years is needed to achieve wide scale equipage of a new capability** 1. Different aircraft are expected to equip with different equipment. This roadmap does not currently distinguish between aircraft types.
AC-02	**This roadmap is a high level view of the JPDO AWG Avionics Roadmap** **a) Key Capabilities statements from avionics roadmap are TBO and CSPO** **b) An associated equipment matrix provides more detail than provided here.**
AC-03	**Safety research areas include ACAS, Terrain Avoidance, Wake Turbulence, Surface Movement, Flight Envelope, Heads Up, Human Factors**
AC-04	**Harmonization of Avionics EA with ground systems not complete in areas of Security, Addressing (IPv4 will not work in mobile environment, no standards work for IPv6 in aircraft environment), Training, DO-278**
AC-05	**Any air vehicle to include any UAS that participate in the NAS must operate in a way that is transparent to the ANSP.**

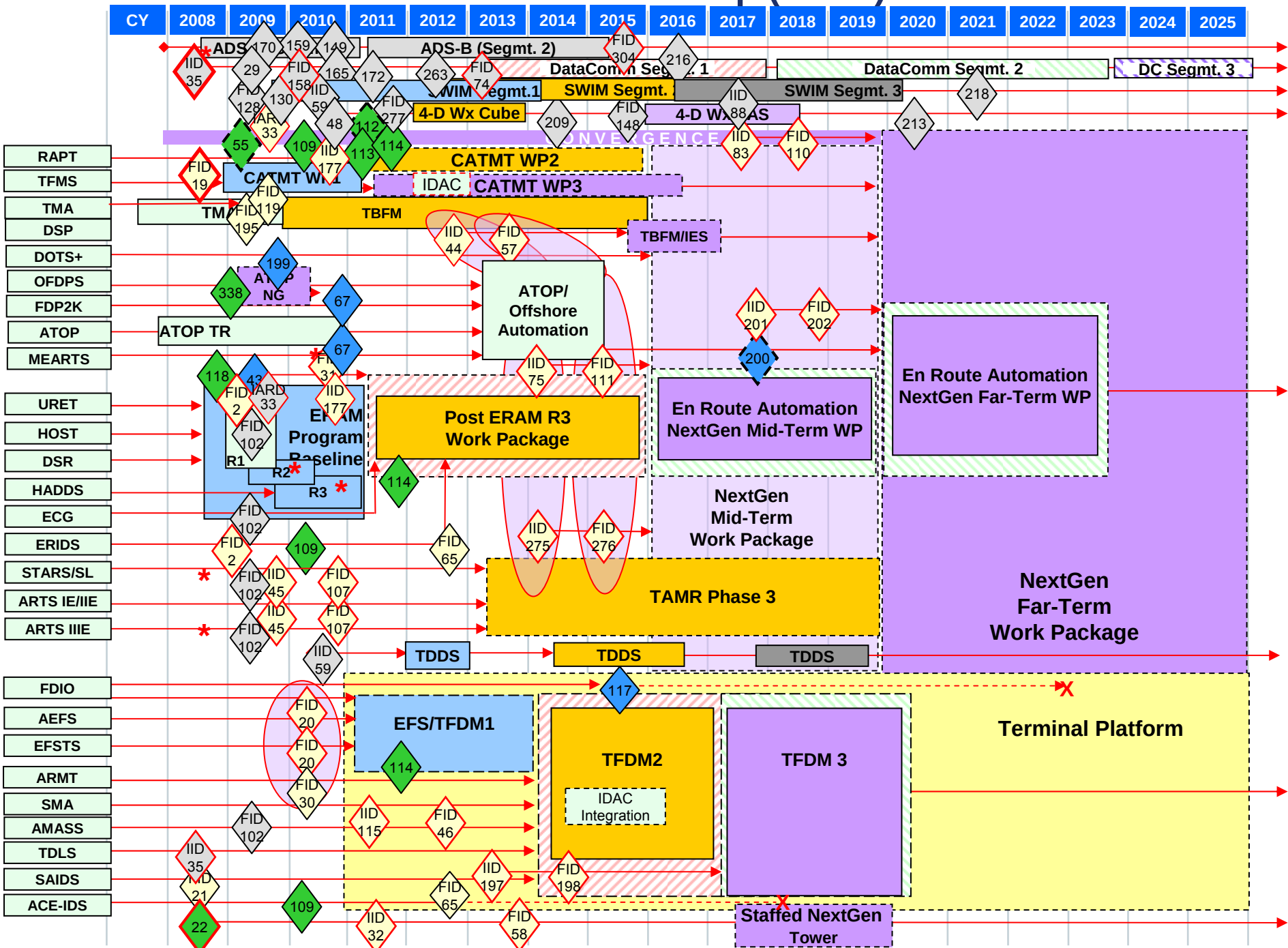
Aircraft Roadmap: Decision Points (1 of 2)

DP #	Target Date	Name
53	2010	Agency policy published on Navigation future configuration to be GNSS-based
54	2012	Decision to develop avionics policy and standards for Enhanced Aircraft Flight Management Systems to support 4D super density operations. (DP 171. DP 172 must be completed)
93	2018	Rulemaking decision for equipage of Weather Sensors and Wake Turbulence implementation
140	2010	Decision on Enhanced Weather Sensors to support enhanced Wx observations and forecasting
149	2010	NextGen Equipage Implementation Plan (not realistic for single equipage for all capabilities)
150	2010	Airborne Communications Infrastructure
151	2009 Q3	Airborne Navigation Backup (eLoran, IRU, other backup) (must complete NAV DP 23, 24 2009Q1, likely FY09Q3, New Administration)
152	2010	Cooperative Surveillance Concept (SC-218, including TCAS concept)
154	2010	Determine are TAWS algorithms sufficient for NextGen (Terrain)
155	2012	First operationally approved GBAS Cat III through proof-of-concept (non-Fed)
156	2018	Initial new GNSS capabilities expected to become operational
159	2010	Aircraft standards publication for Segment 1 linked to DataComm
160	2013	Aircraft standards publication for Segment 2 linked to DataComm
161	2017	DataComm Avionics development complete, Forward Fit begins.
165	2010	SWIM Air Policy
166	2010	Decision on enhanced FIS-B services
167	2009 Q4	Decision on Enhanced Vision System (EVS) architectures to support low and zero visibility approach and surface operations (IR signature) (SC-213 MASPS, MOPS, TSO, AC)
170	2009 Q3	Decision on implementation of required time of arrival (without full 4DT) (AVS Product?)
171	2010	Define role of aircraft vs. AOC vs ATS in trajectory optimization (defining requested trajectory)

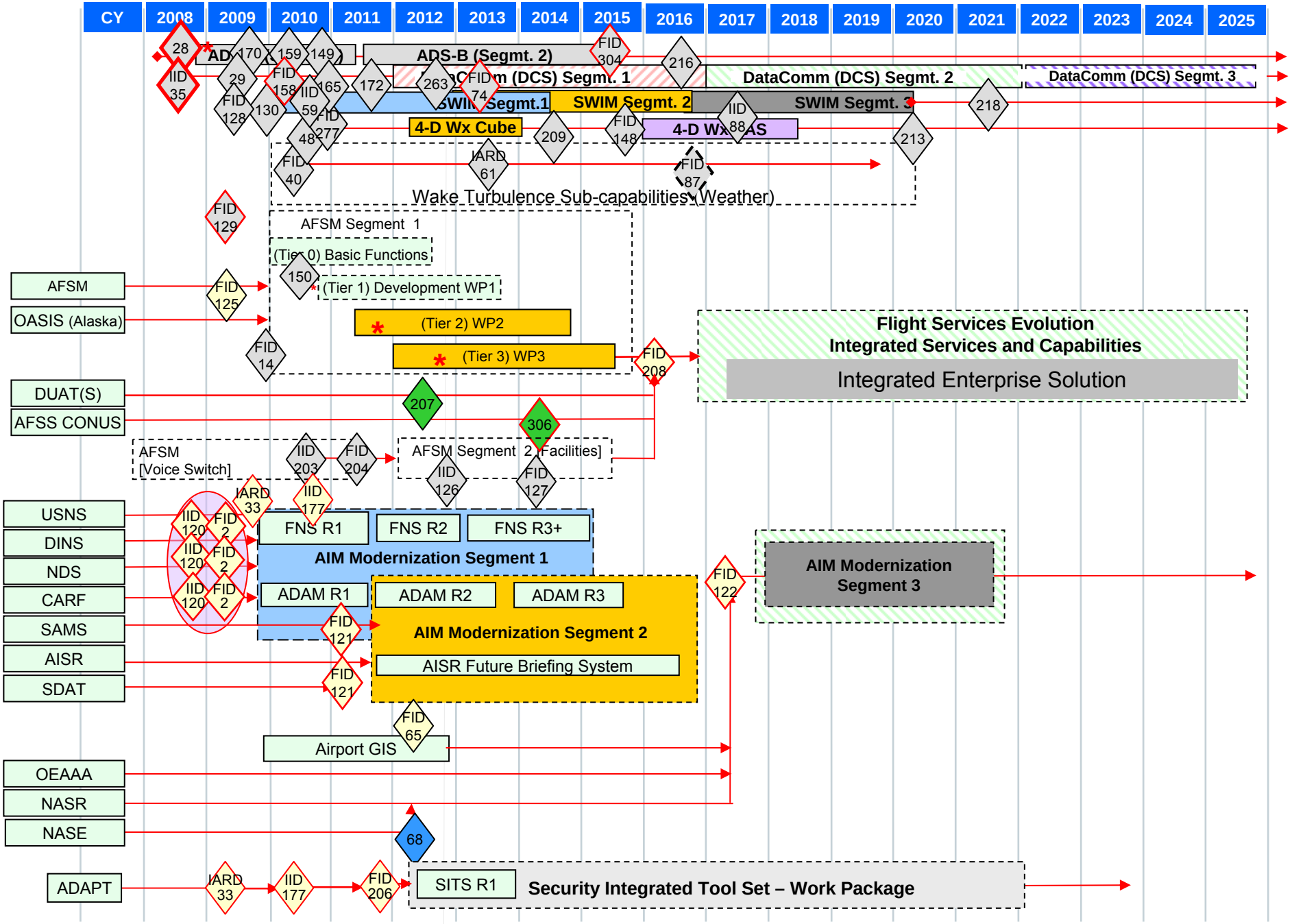
Aircraft Roadmap: Decision Points (2 of 2)

DP #	Target Date	Name
172	2011	4DT concept complete, including common definition of Flight Object path and constraints. Major agency decision on constrained trajectory, negotiated trajectory, delegated trajectory)
173	2009 Q2	Strategy for use of EFVS/SVS (Enhanced Flight Vision System/Synthetic Vision System) in future operations (90 series AC)
174	2012	Agency policy to add ABWTS (Aircraft Based WT Separation) decision support capability to the flight deck
181	2011	TBO Conformance Monitoring
182	2012	CSPO
52	2010	See Surveillance Roadmap
59	2010	See Air-Ground Roadmap
143	2022	See Weather Roadmap
176	2009 Q3	See Navigation Roadmap
192	2010	See Air-Ground Roadmap
226	2018	See Navigation Roadmap
236	2013	See Navigation Roadmap
244	2015	See Navigation Roadmap
252	2012	See Aircraft Roadmap
253	2008 Q4	See Surveillance Roadmap
254	2010	See Surveillance Roadmap
260	2020	See Surveillance Roadmap

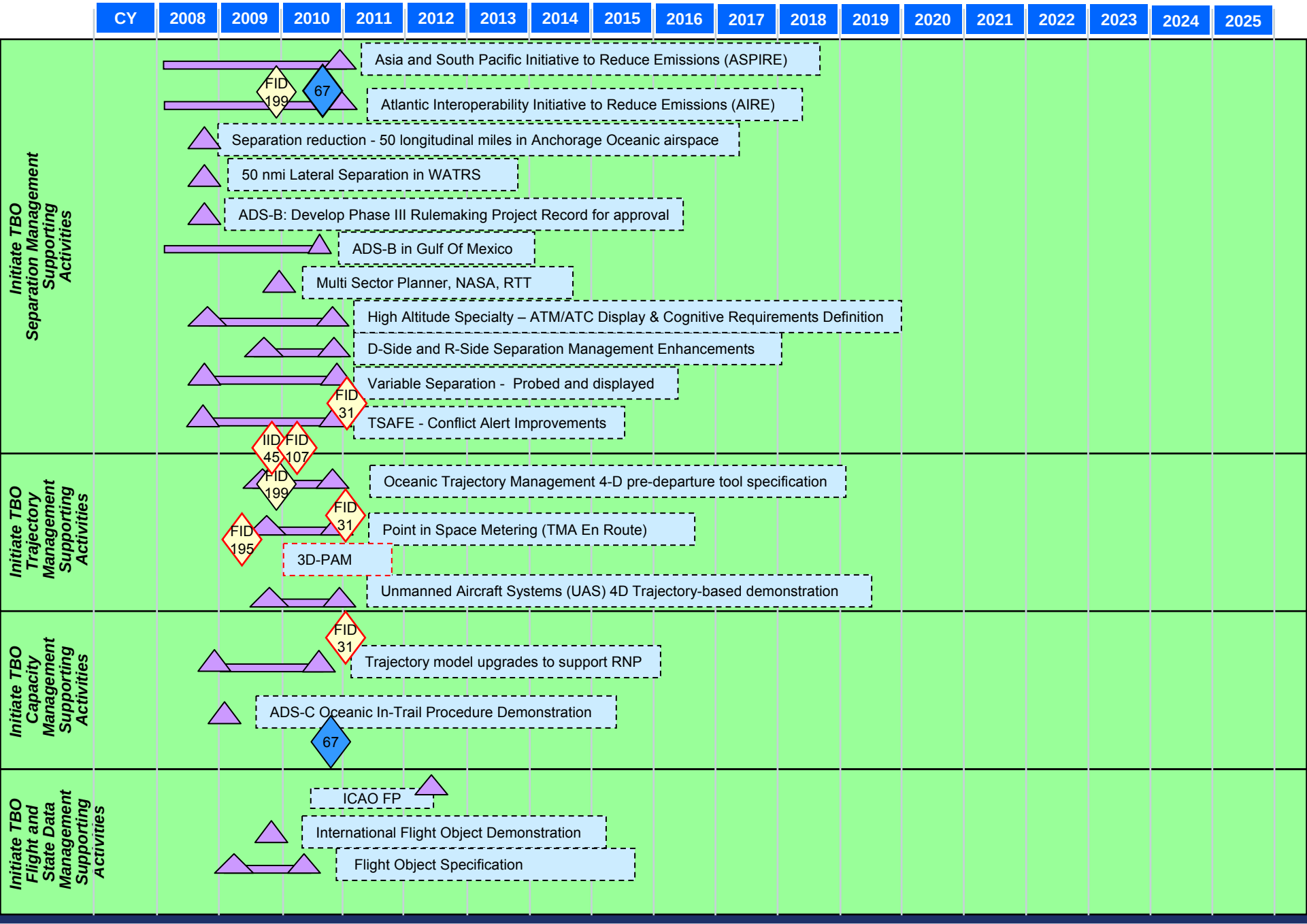
Automation Roadmap (1 of 7)



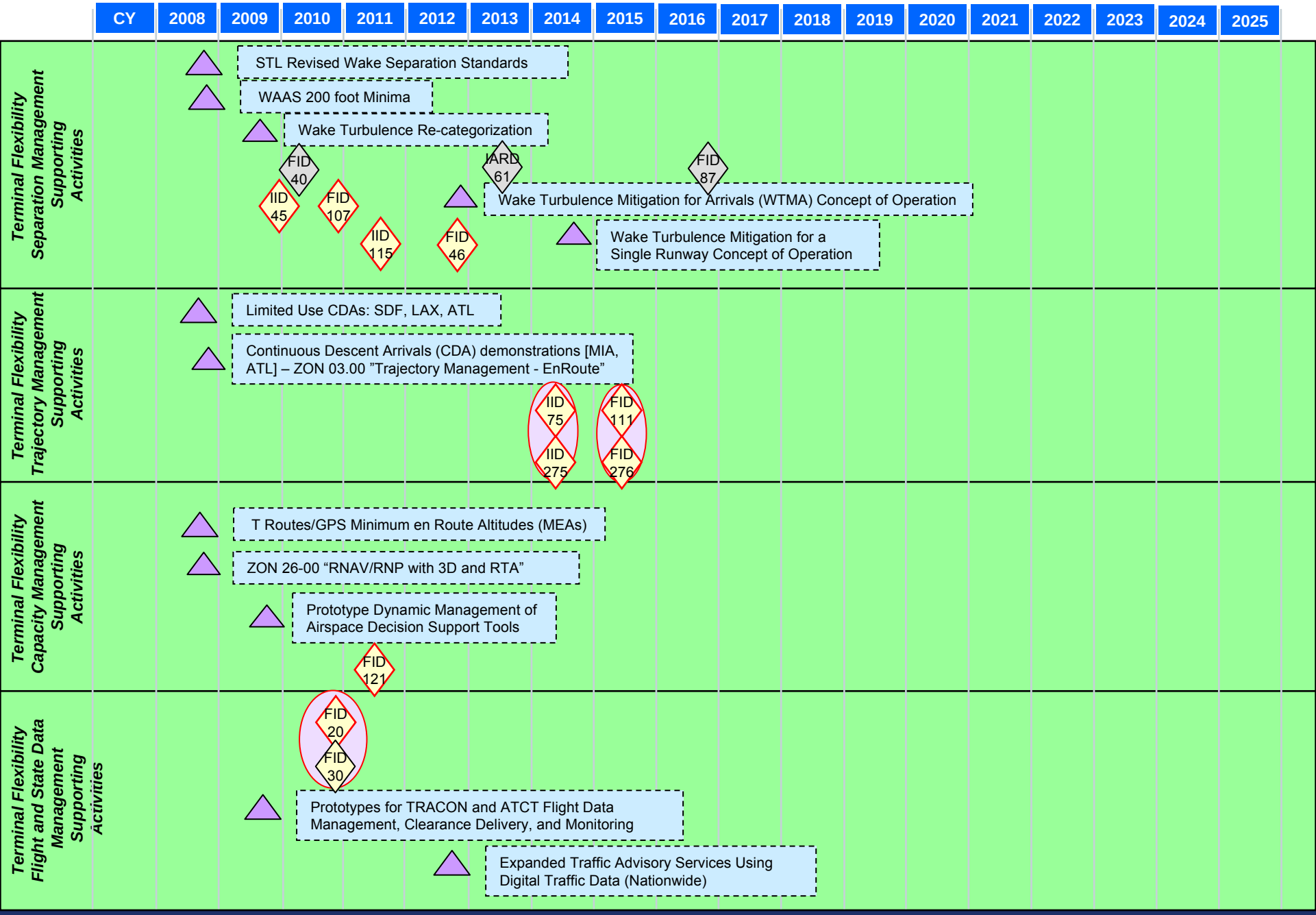
Automation Roadmap (2 of 7)



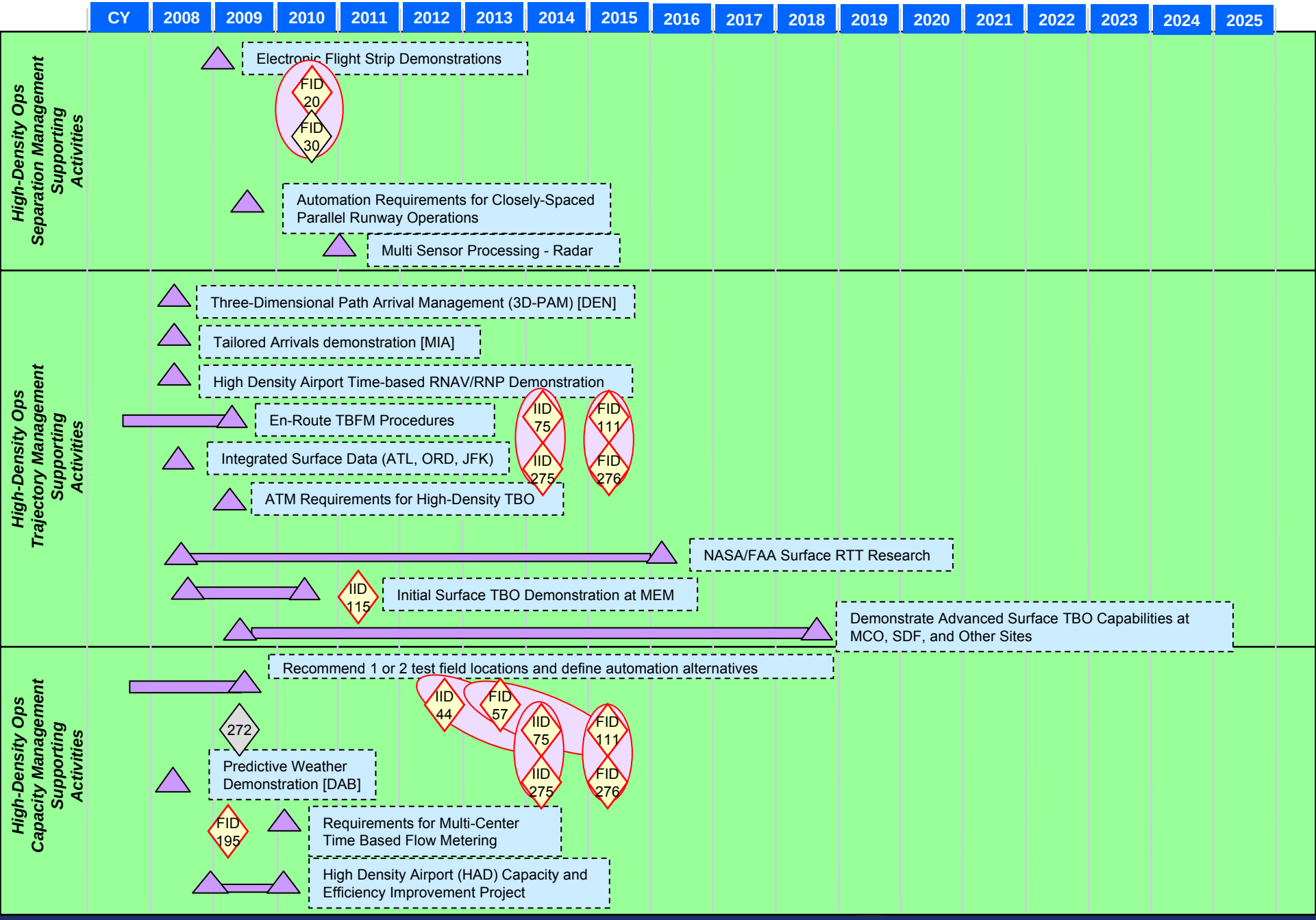
Automation Roadmap: Supporting Activities—Initiate TBO (3 of 7)



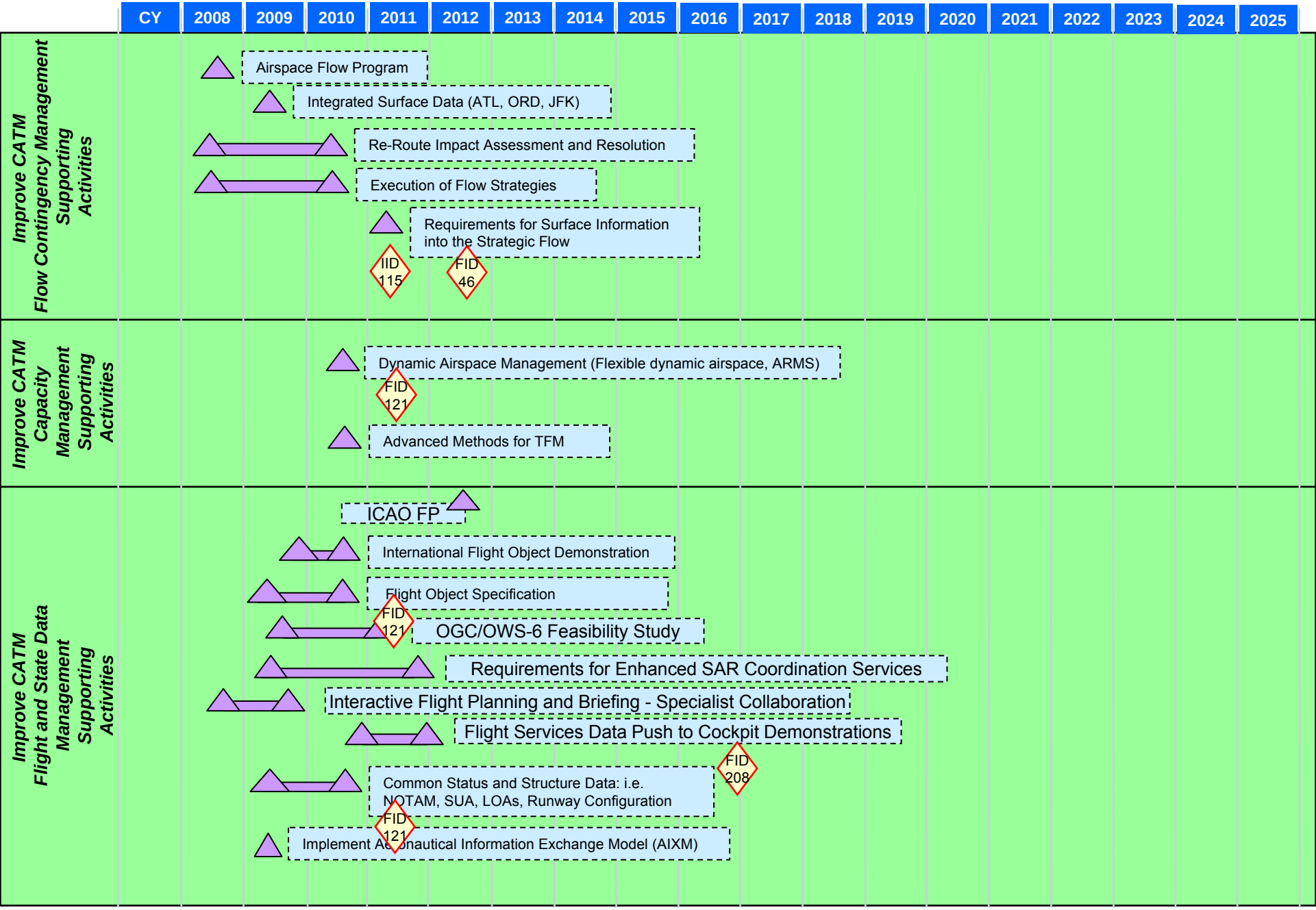
Automation Roadmap: Supporting Activities—Terminal Flexibility (4 of 7)



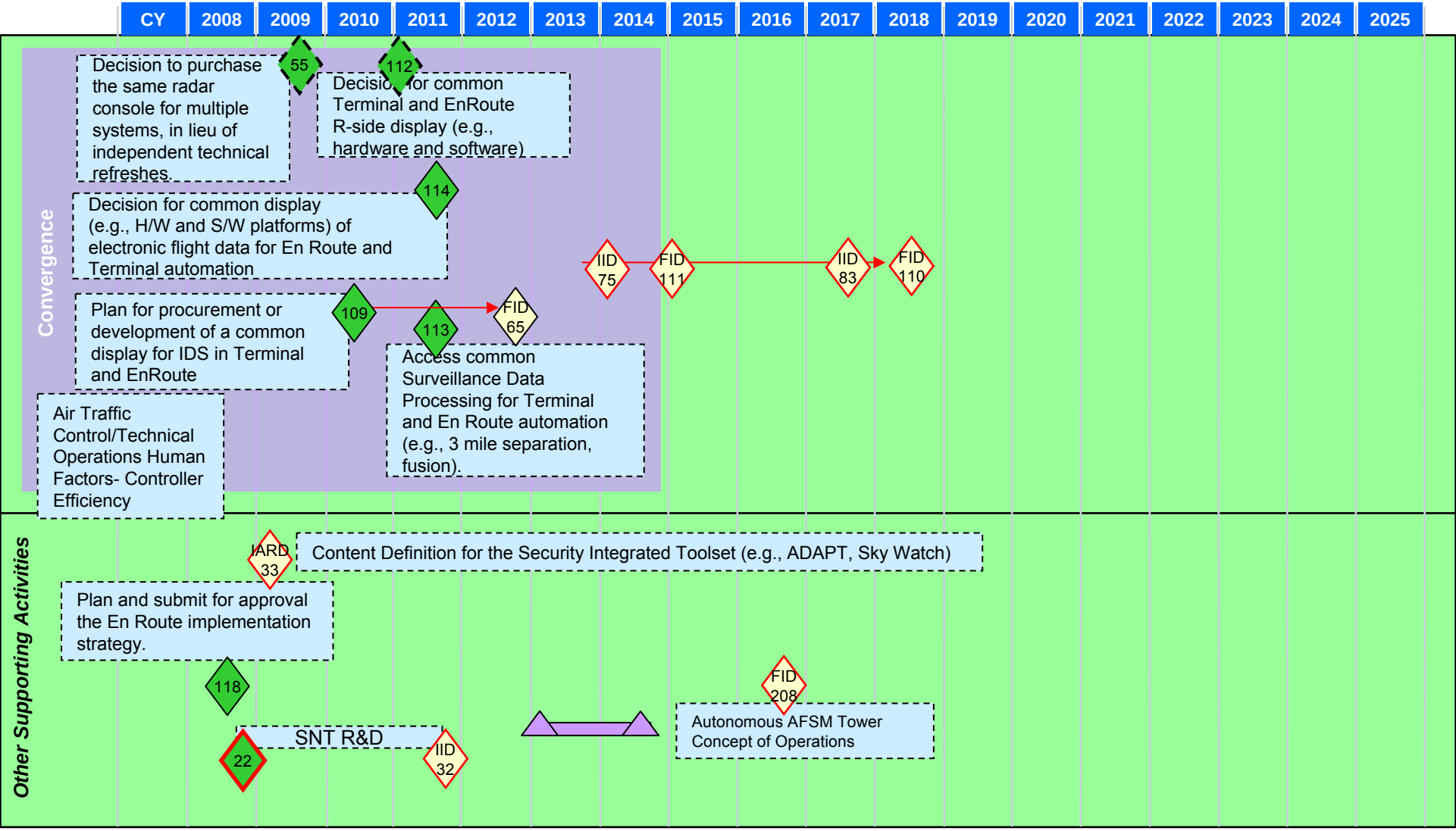
Automation Roadmap: Supporting Activities—High-Density Ops (5 of 7)



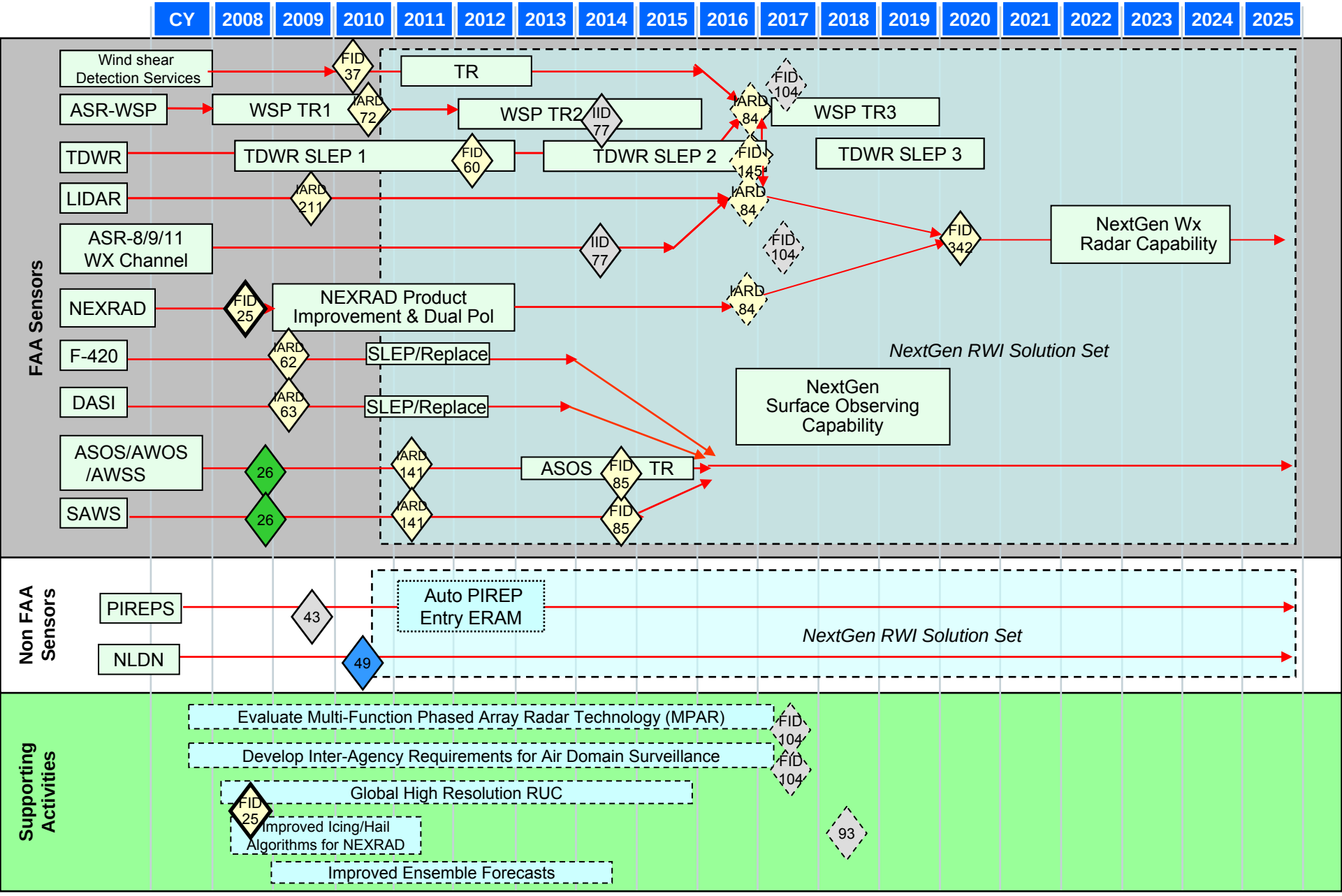
Automation Roadmap: Supporting Activities—Improve CATM (6 of 7)



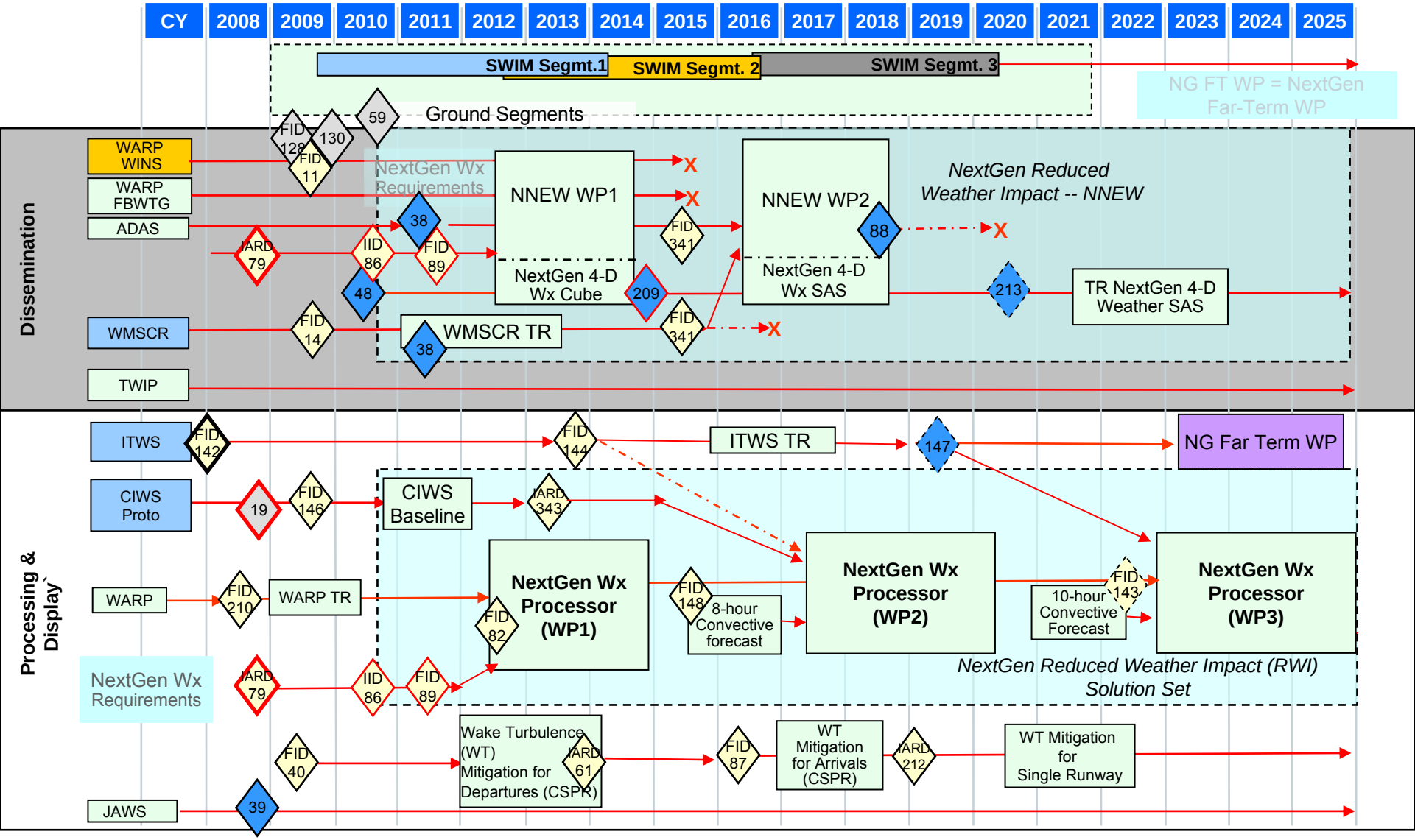
Automation Roadmap: Supporting Activities—Convergence & Other (7 of 7)



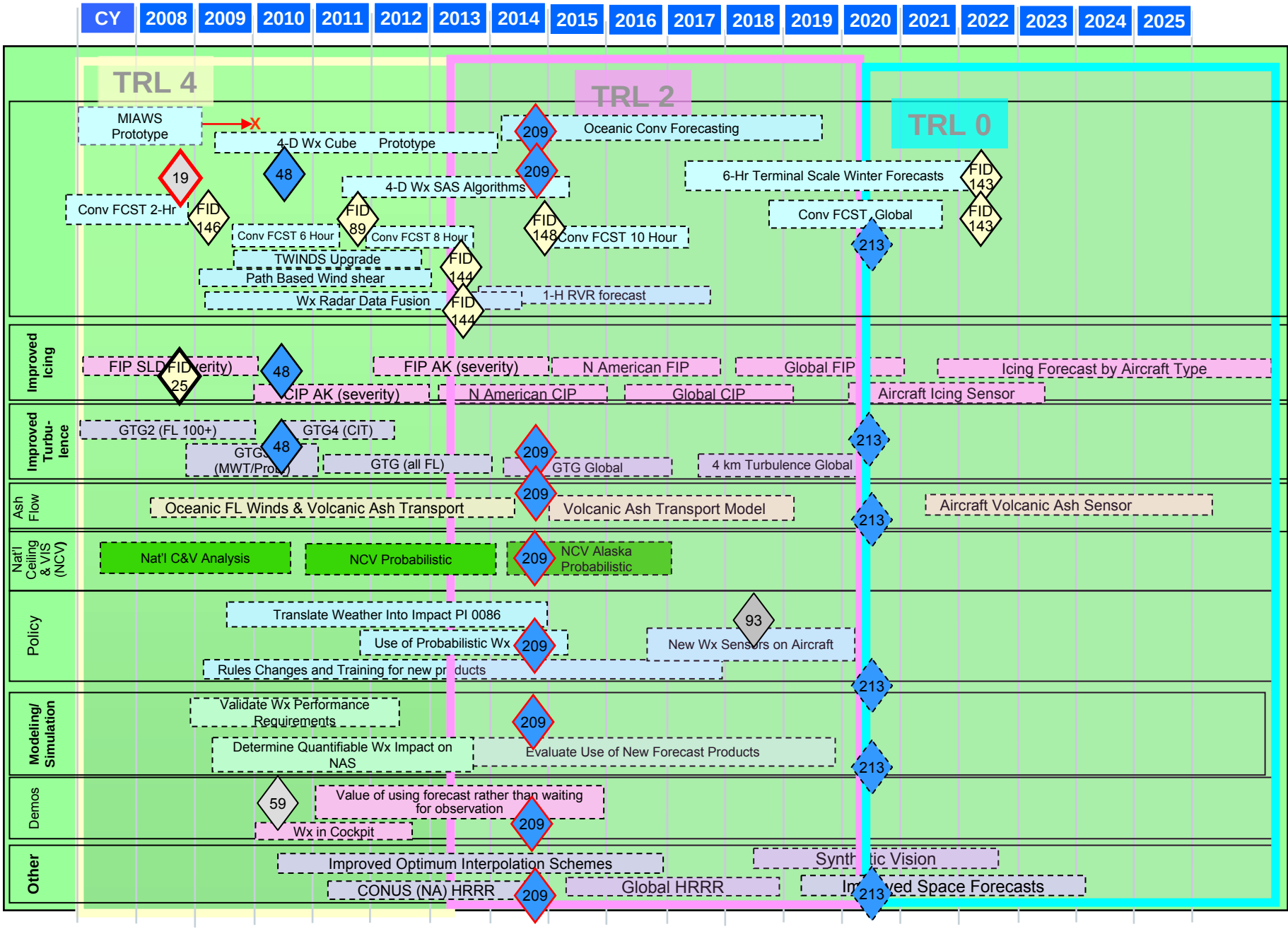
Weather Roadmap (1 of 2)



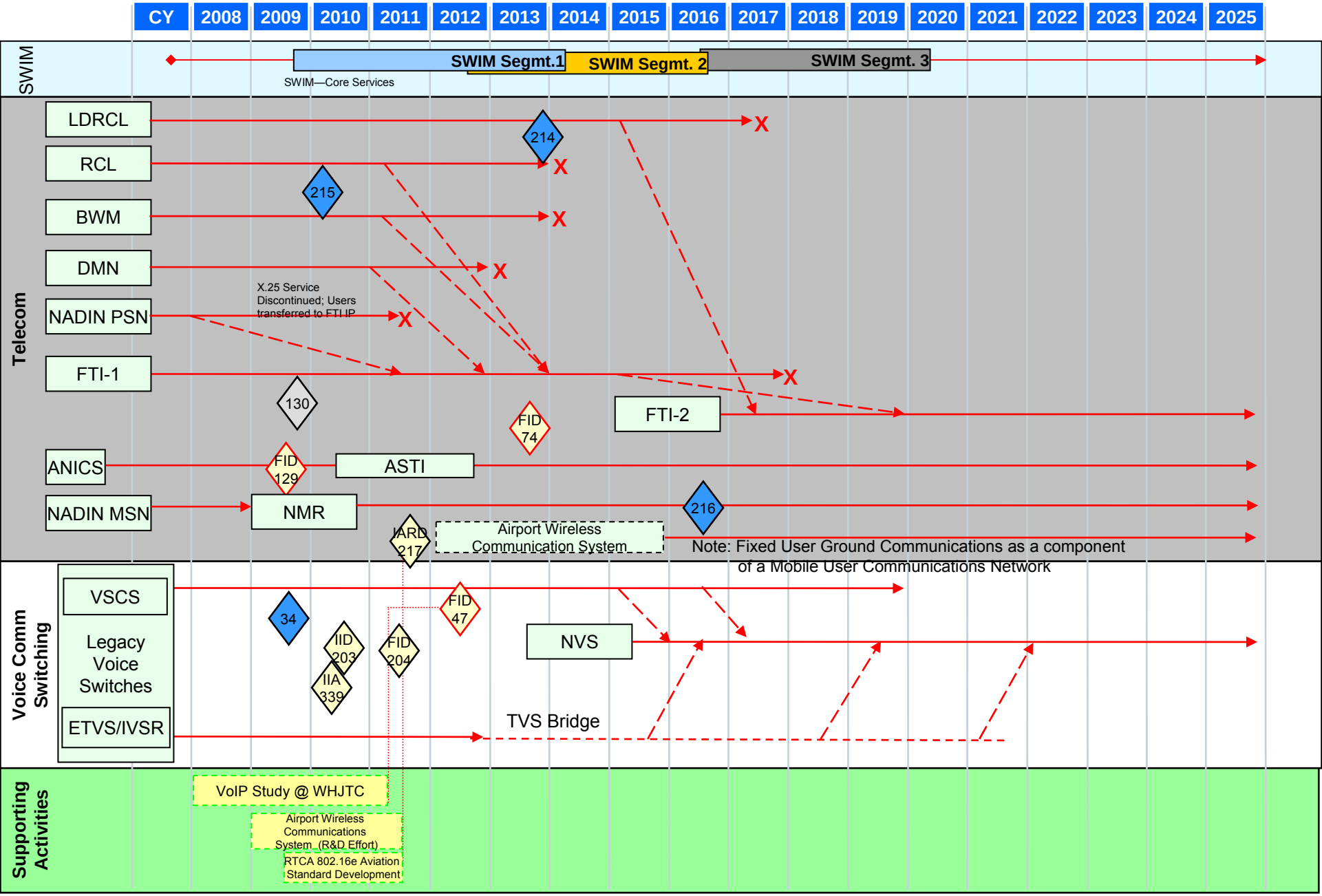
Weather Roadmap (2 of 2)



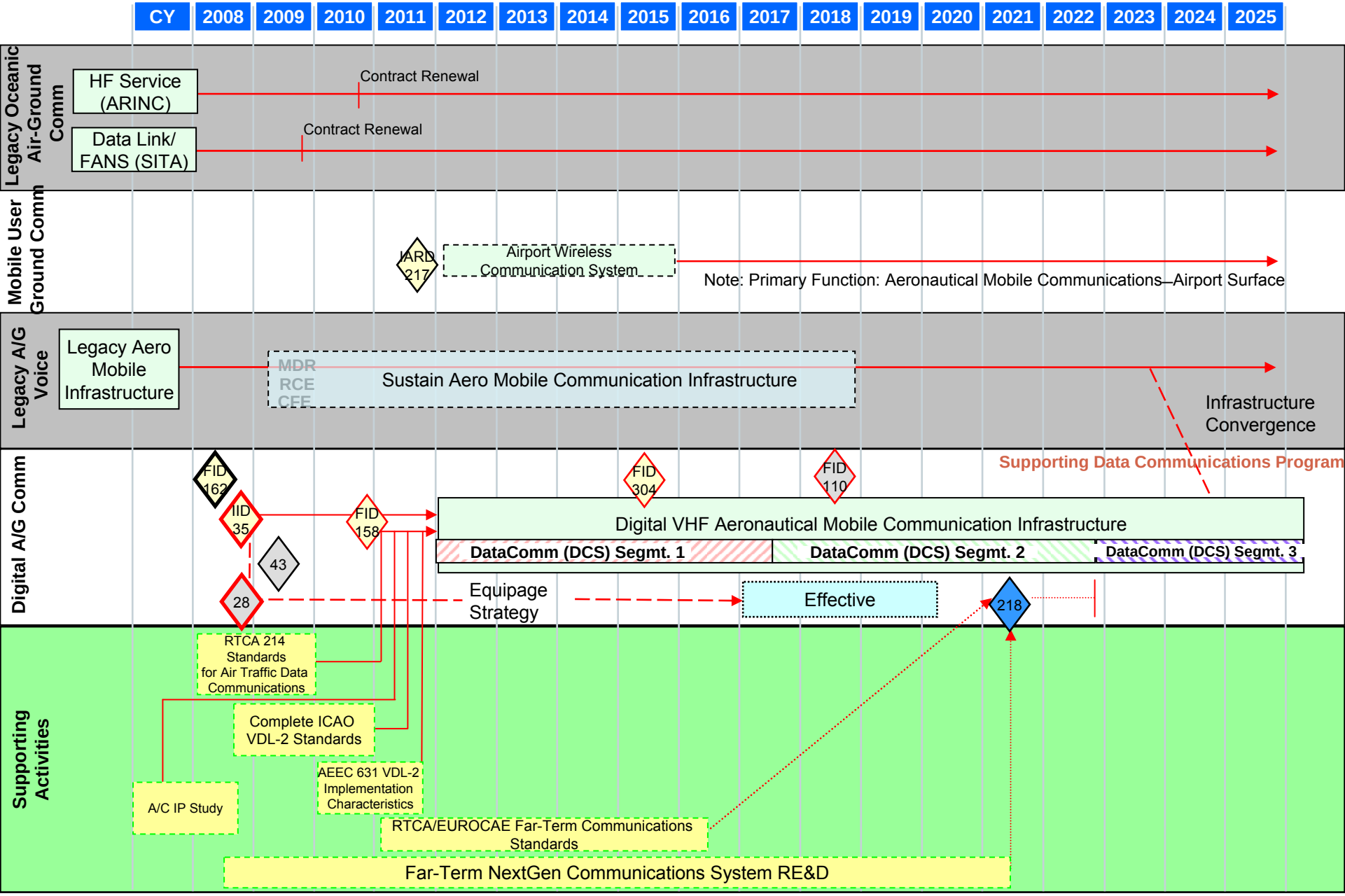
Weather Roadmap: Supporting Activities Swim Lane



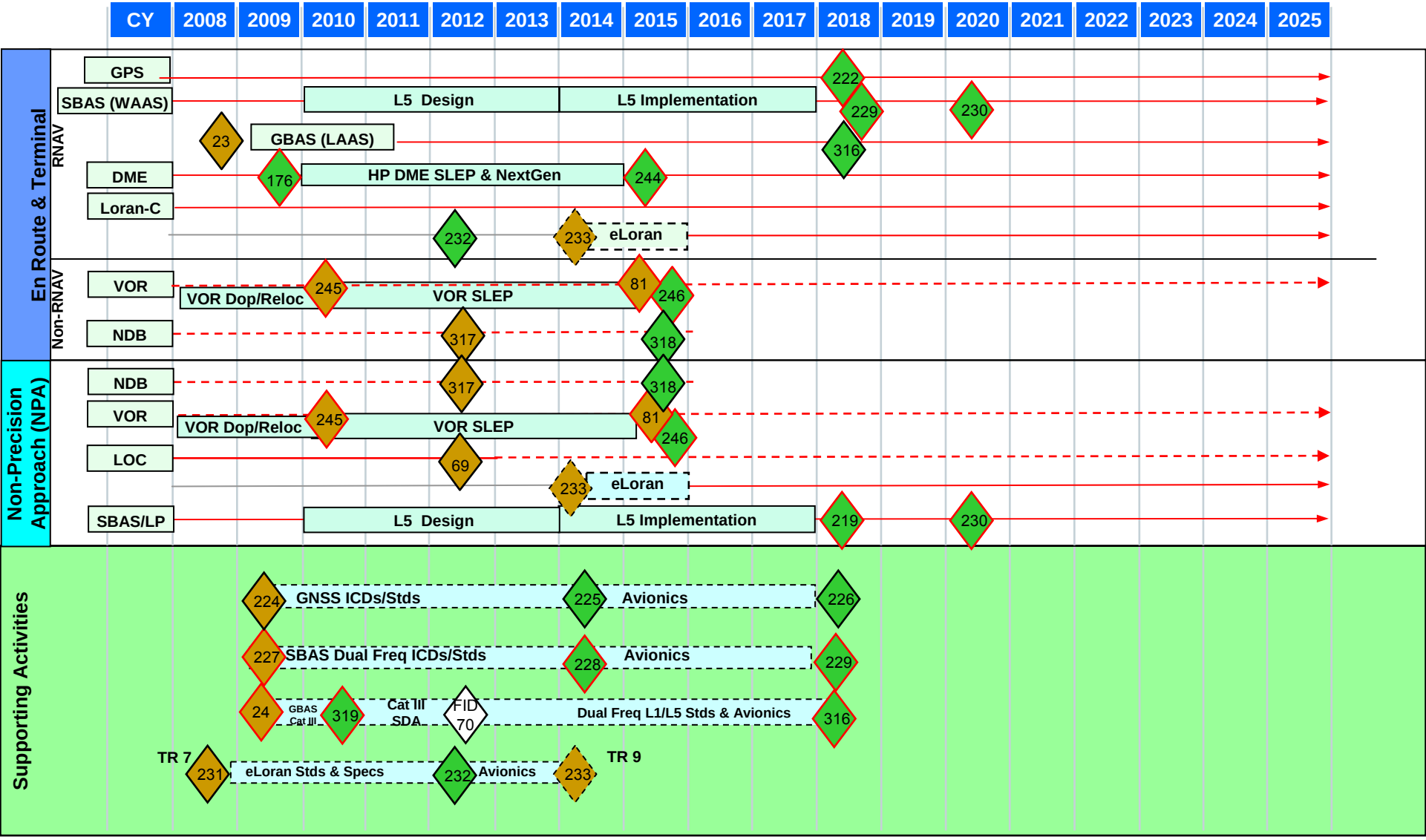
Communication Roadmap (1 of 2)



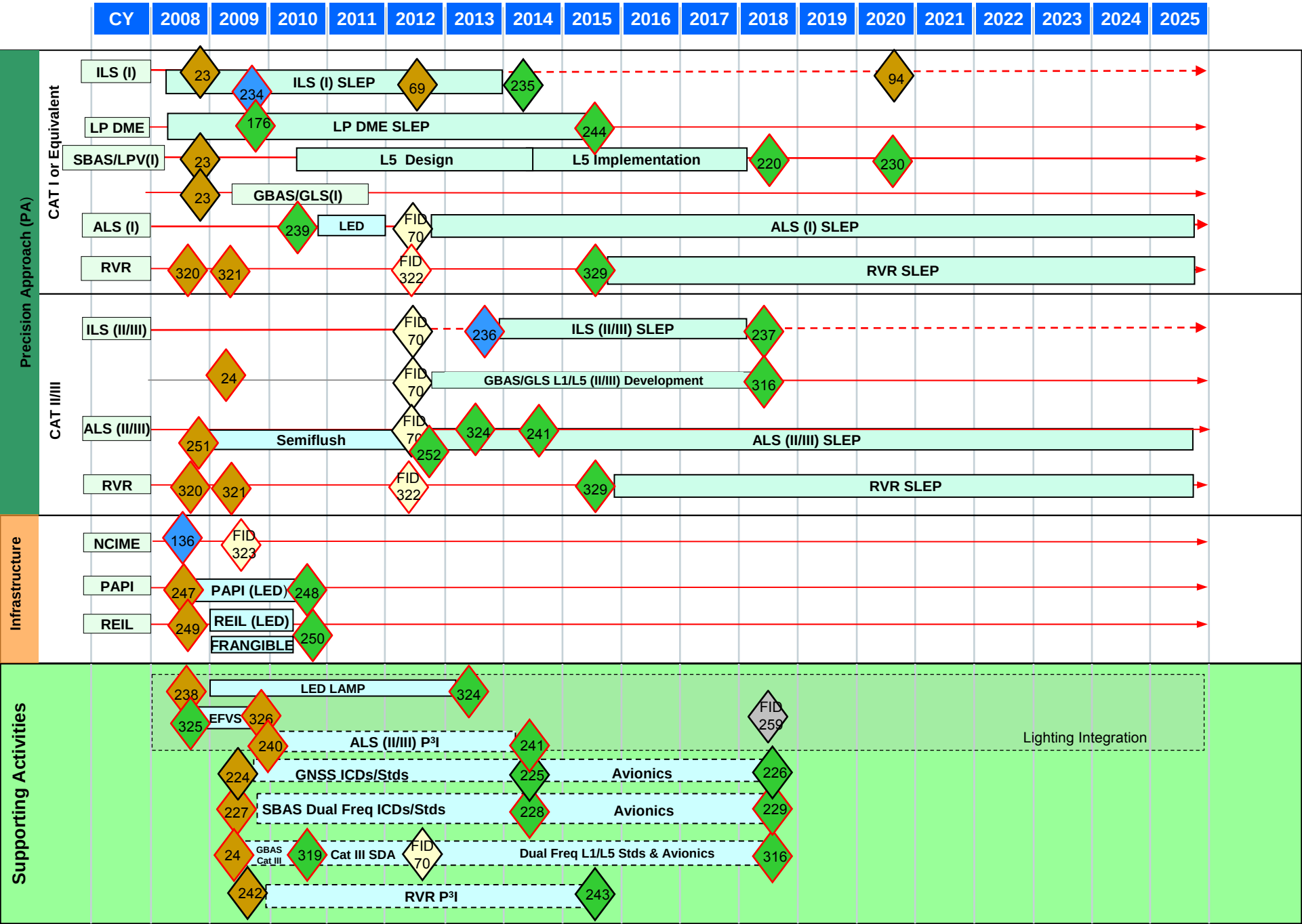
Communication Roadmap (2 of 2)



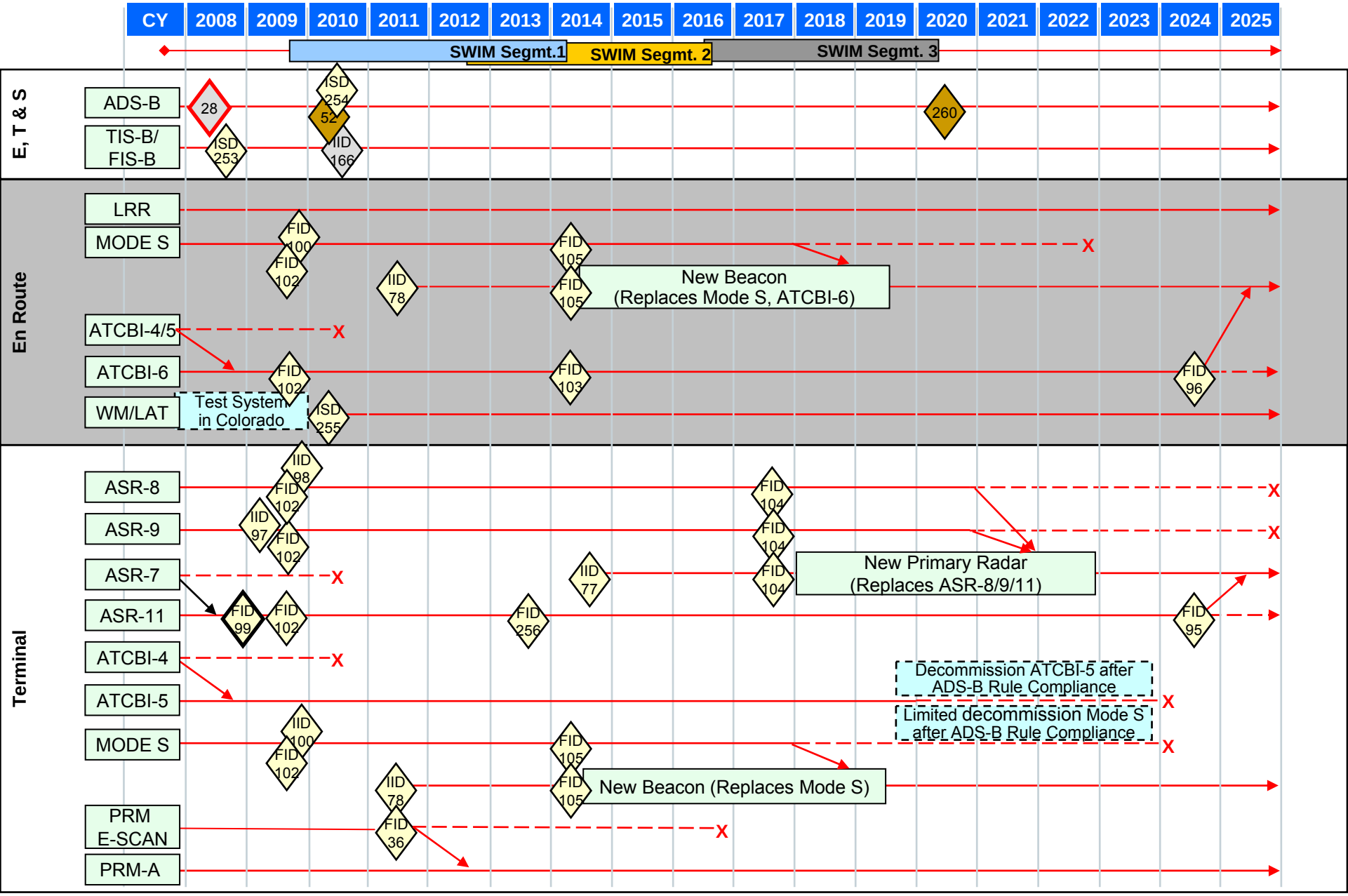
Navigation Services Roadmap (1 of 2)



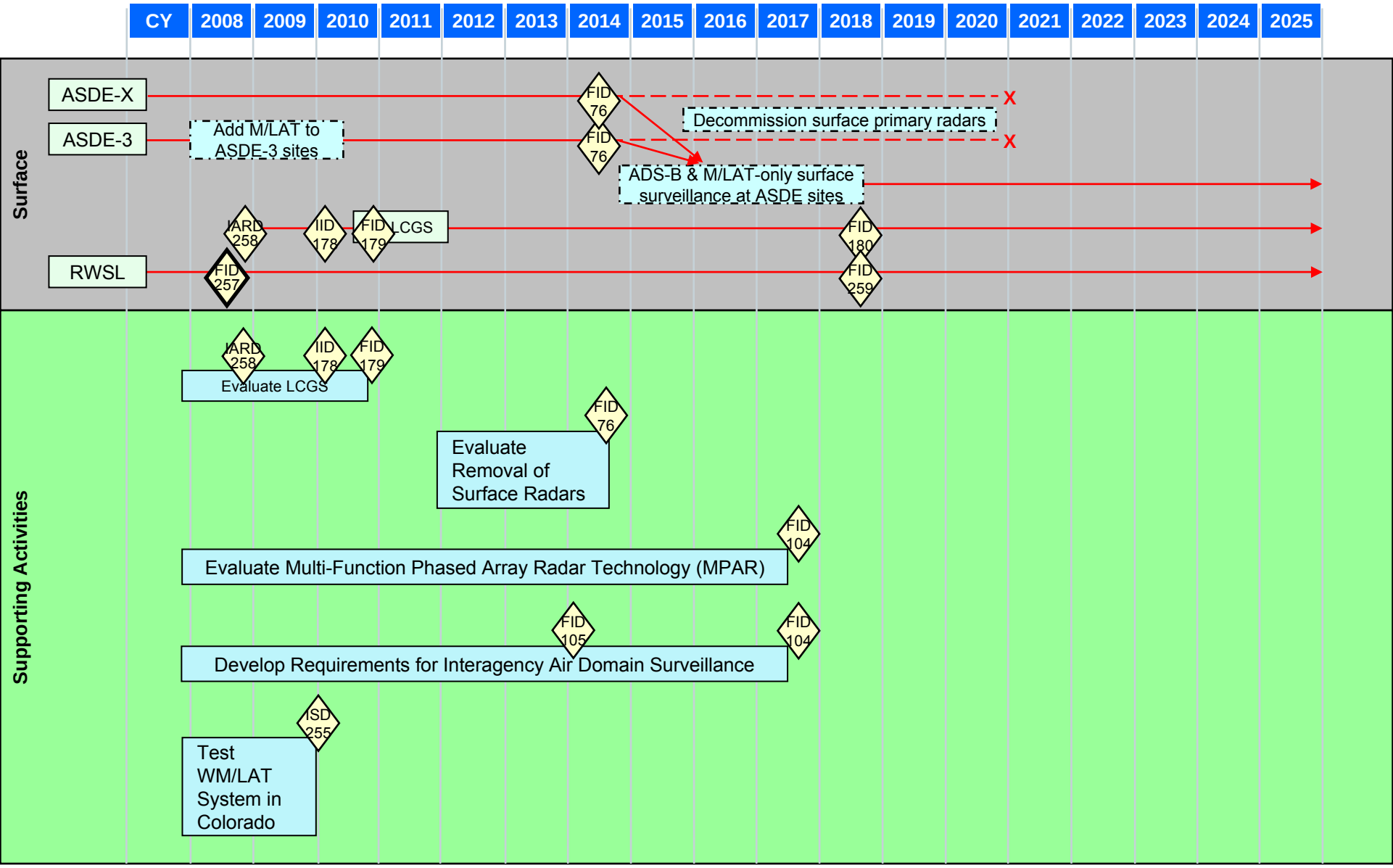
Navigation Services Roadmap (2 of 2)



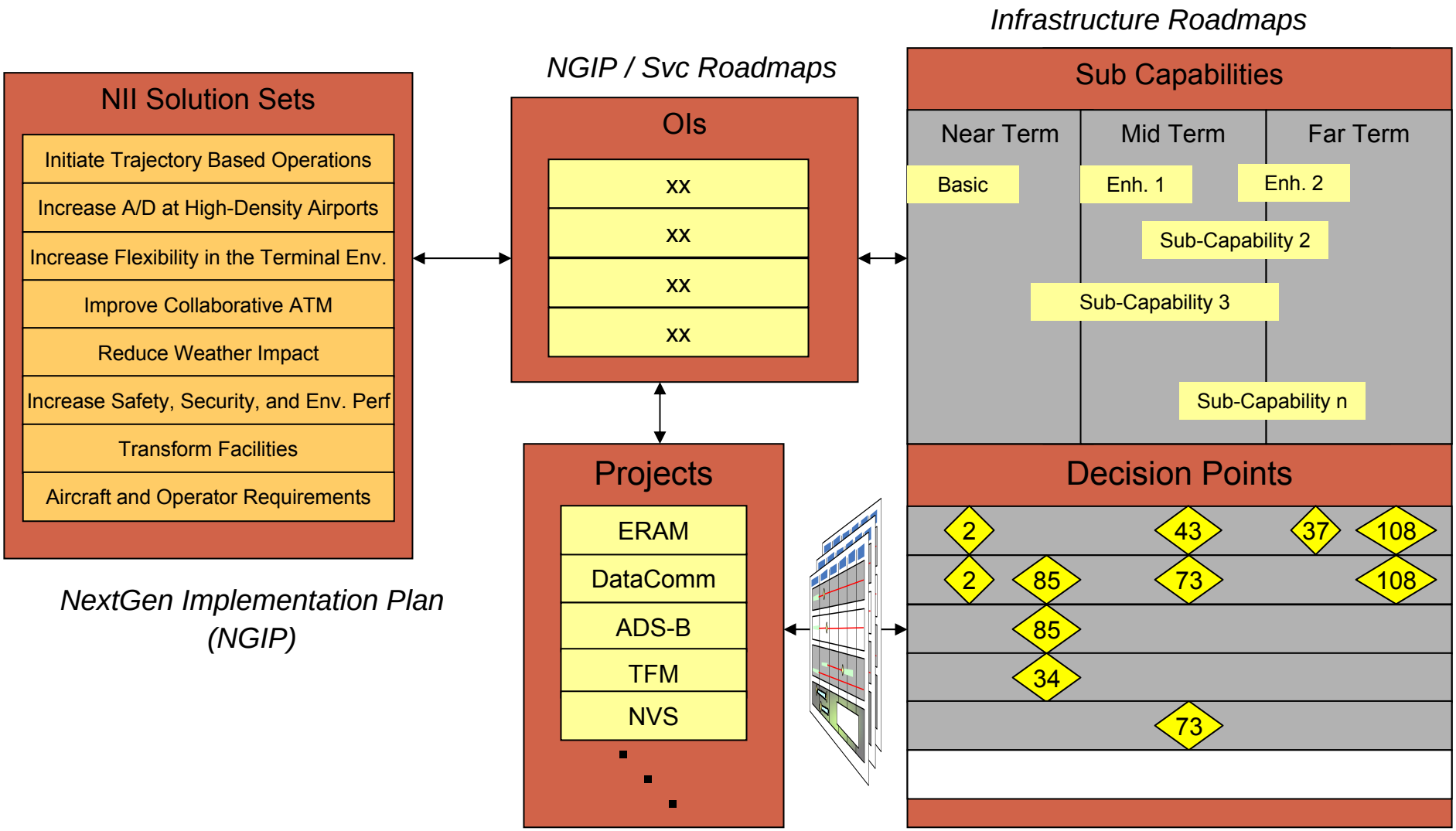
Surveillance Roadmap (1 of 2)



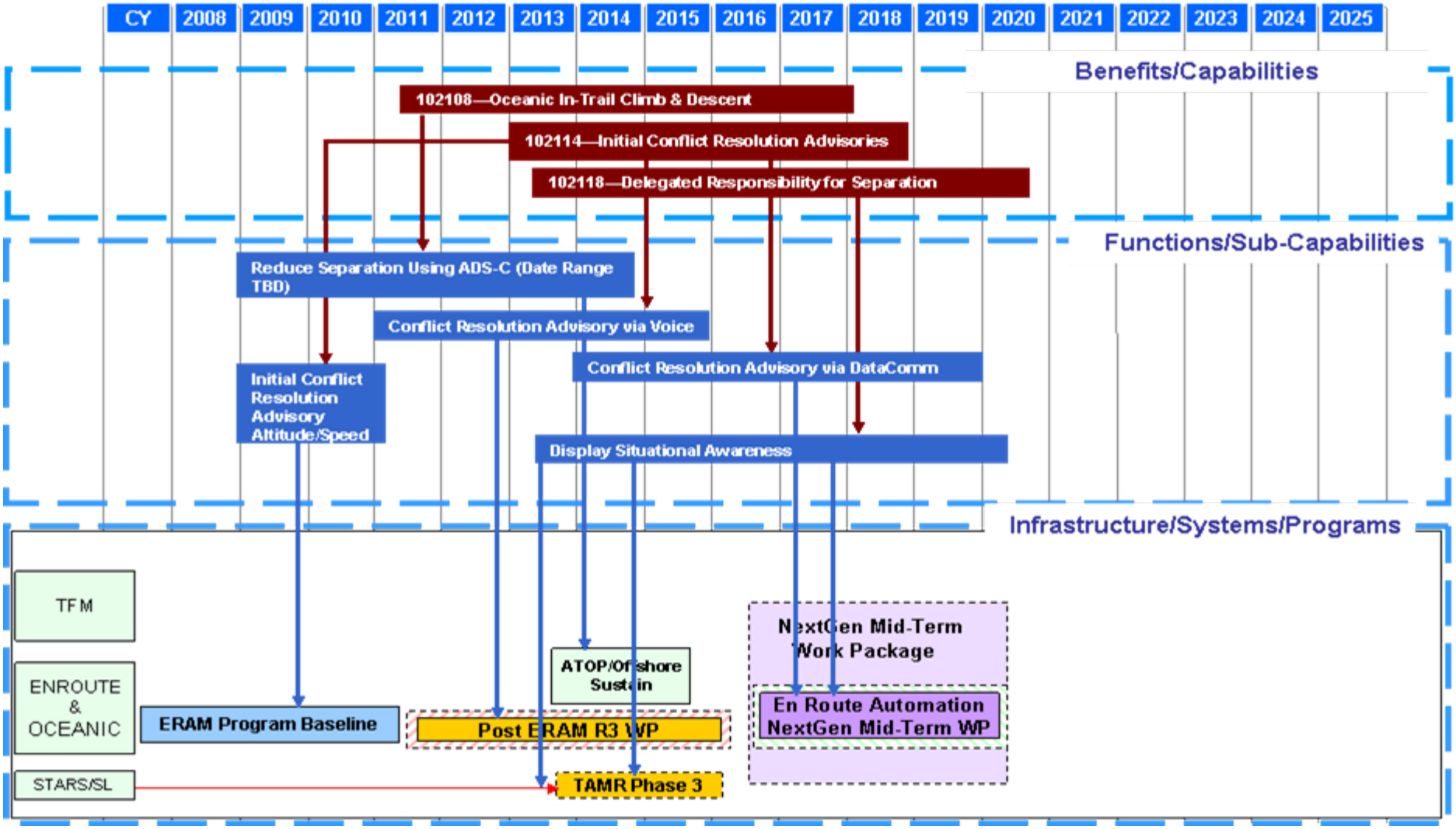
Surveillance Roadmap (2 of 2)



Integration Framework - Alignment



Benefits Aligned to Services/Functions and to Infrastructure/Systems

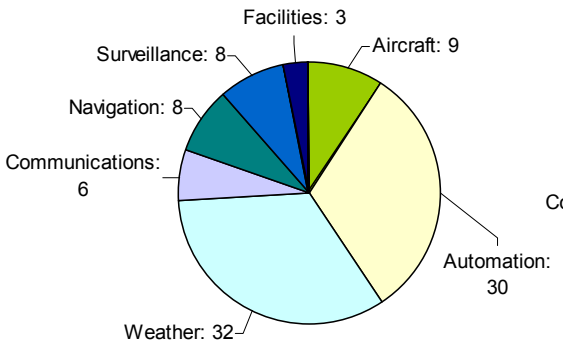


Alignment Matrices

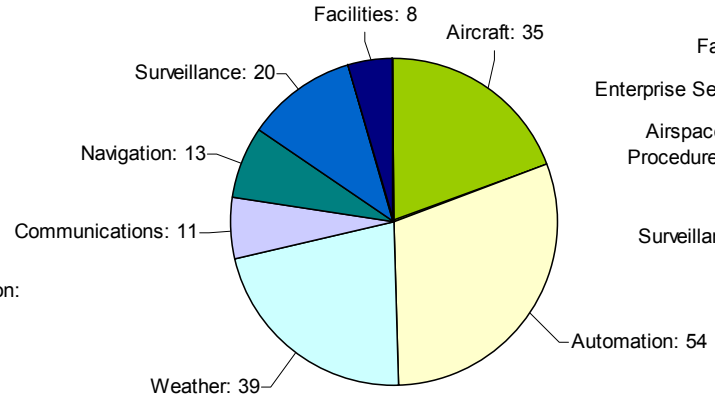
Roadmap	System/ Program	Sub-Capabilities (Functions)	Roadmap Date Range	Sol. Set Key Enabling Pgm Date Range	Decision Points	Issues/Risks/Comments
Aircraft	Voice Comm.	• 7-004 Enhance Aircraft/ANSP Information Exchange—Negotiate	2012-2025	2012-2018		Note: OI 102114 near/mid term and allows use of voice for Initial CRA.
Aircraft	Voice Comm.	• 7-005 Enhance Aircraft/ANSP Information Exchange—Contract	2012-2025	2012-2018		
Aircraft	Voice Comm.	• 7-006 Enhance Aircraft/ANSP Information Exchange—Execute	2012-2025	2012-2018		
Air/ Ground		• See Note				Note: The Air /Ground Team do not believe that this capability has any A/G applications with respect to NextGen applications. There are no Aircraft and Operator requirement in the NextGen Implementation Plan (NIP). It simply enhances existing ANSP DST's (i.e., URET) to provide rank-ordered resolutions. Current communications with the aircraft will remain the same in the Mid-Term timeframe. The Far-Term OI # 104105, "Expanded Conflict Resolution via Data Communication" will have Air/ Ground implications; Air/Ground Sub-Capabilities will be addressed in that OI.
Automation	ERAM Initial Baseline	• Initial conflict resolution advisory altitude/speed	2009-2010	2013-2017		Update roadmap, concern about NextGen funding the implementation of this capability, process.
Automation	Post ERAM R3 WP	• 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	• Conflict resolution advisory via datacomm.	2015-2019		75	Assume datacomm shows linkage to this capability in this timeframe.
Weather	WARP	• Enhanced Forecasts -Winds, Convection & Turbulence				Minimal support.

Decision Points: History

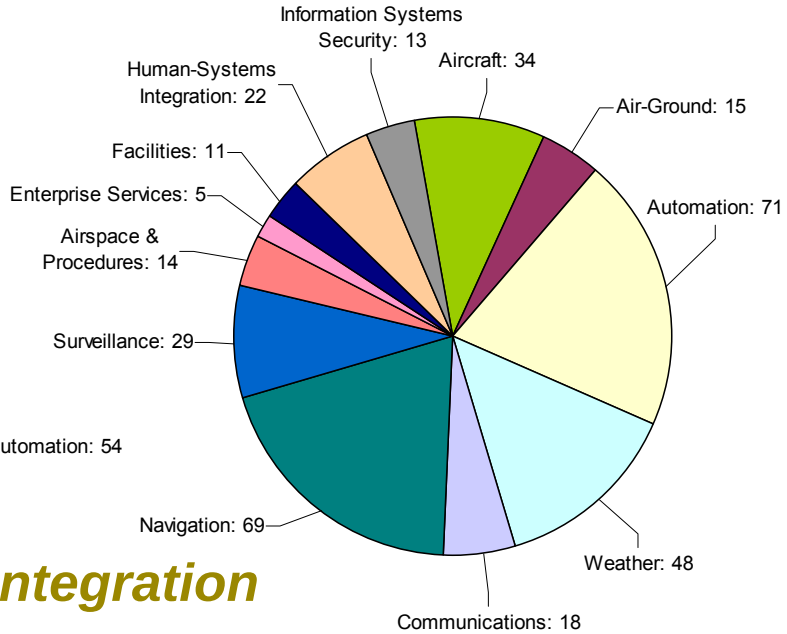
Version 1.0



Version 2.0



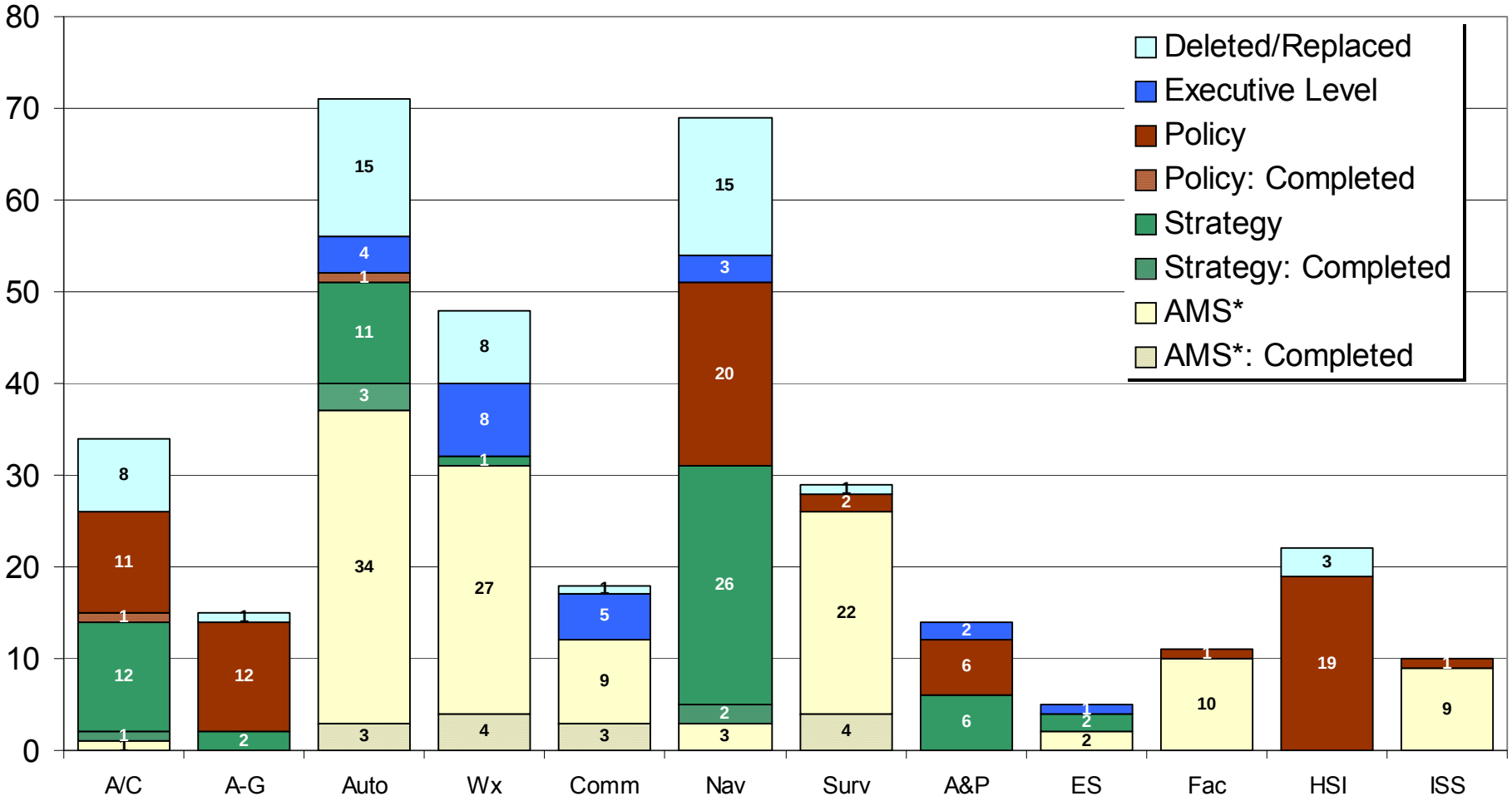
Version 3.0



Plans reflect increased detail, fidelity and integration

96 DP's	180 DP's	346 DP's
2007	***2008***	***2009***

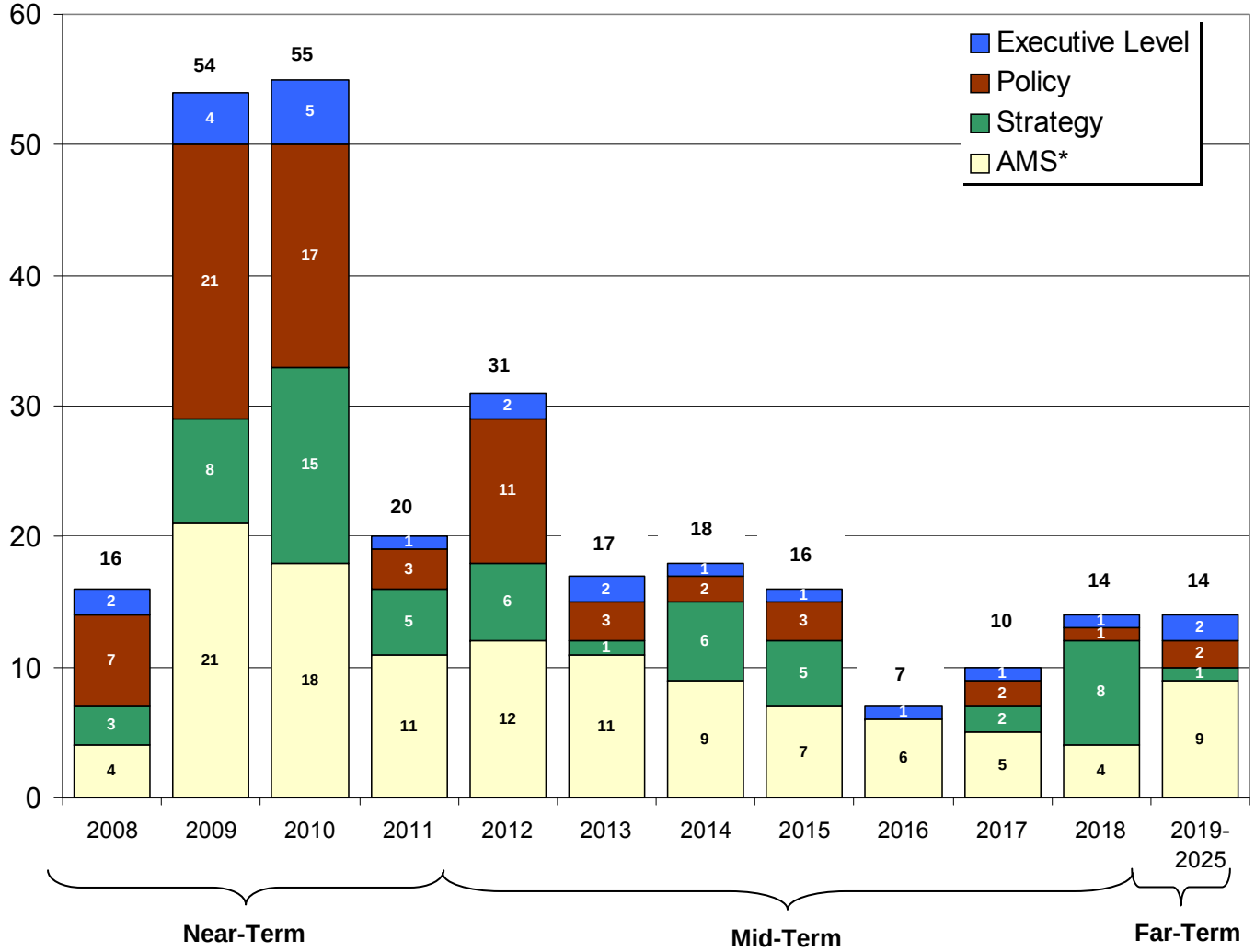
Decision Points: Version 3.0 Composition (346 DP's)



* Includes the following AMS Decisions:

- Investment Analysis Readiness Decision (IARD)
- Initial Investment Decision (IID)
- Final Investment Decision (FID)
- In-Service Decision (ISD)
- Baseline Change Decision (BCD)

Decision Points: Version 3.0 Active DP's by Time-Frame and Type (272 DPs)



* Includes the following AMS Decisions:

- Investment Analysis Readiness Decision (IARD)
- Initial Investment Decision (IID)
- Final Investment Decision (FID)
- In-Service Decision (ISD)
- Baseline Change Decision (BCD)

National Airspace System Transportation Roadmap

III.
Implementing NextGen

NextGen Integration & Implementation

- **Ensure effective and efficient application, planning, programming, budgeting and execution of FAA's NextGen portfolio**
  - Focus on near & mid-term (now – 2018) NextGen implementation
- **Manage NextGen portfolio across FAA lines of business**
  - Service-level agreements
  - Program-level agreements
  - Cross-agency decision-making processes & accountability
- **Industry partnerships key to successful NextGen implementation**

Governance Processes Are in Place

Ent Arch Board	Joint Resources Council	NextGen Mgmt Board
ARCHITECTURE	**INVESTMENT**	**IMPLEMENTATION**
• Develop and maintain enterprise architecture • Review, reconcile and approve segment architecture for the agency's core lines of business and common IT services	• Select IT initiatives to define the agency's IT investment portfolio • Control IT investments • Evaluate IT investments	• Develop and maintain segment architecture • Develop IT program management plan • Execute IT projects

← END-TO-END GOVERNANCE →

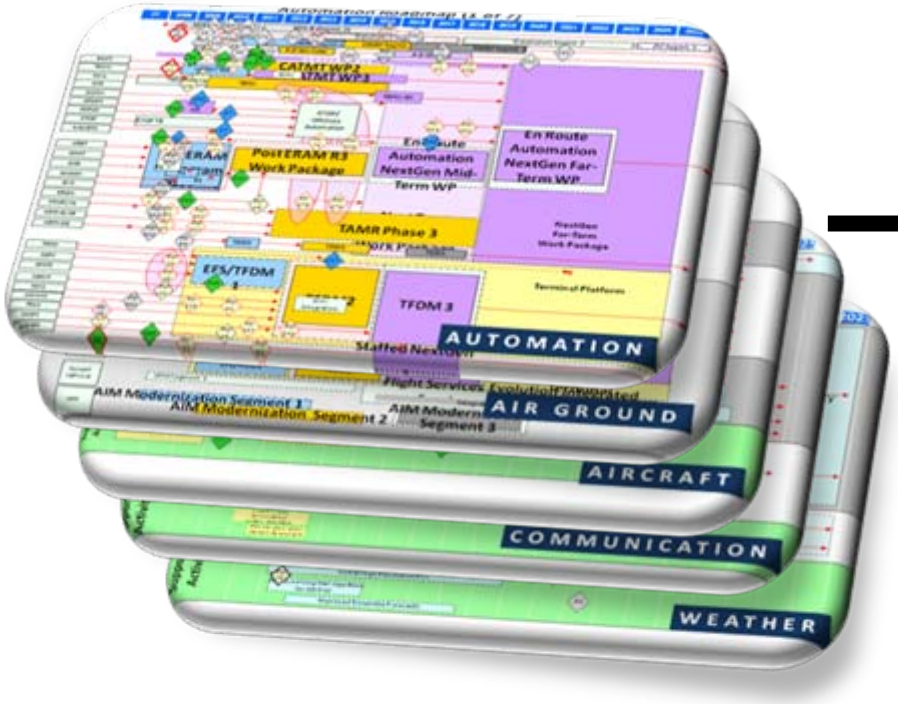
"As Is" EA / 2008

AV-1 AV-2
OV-1 OV-2
OV-3 OV-4
OV-5 SV-1
SV-2 SV-4
TV-1

Enterprise

SV-1 SV-2
SV-4

Project



"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

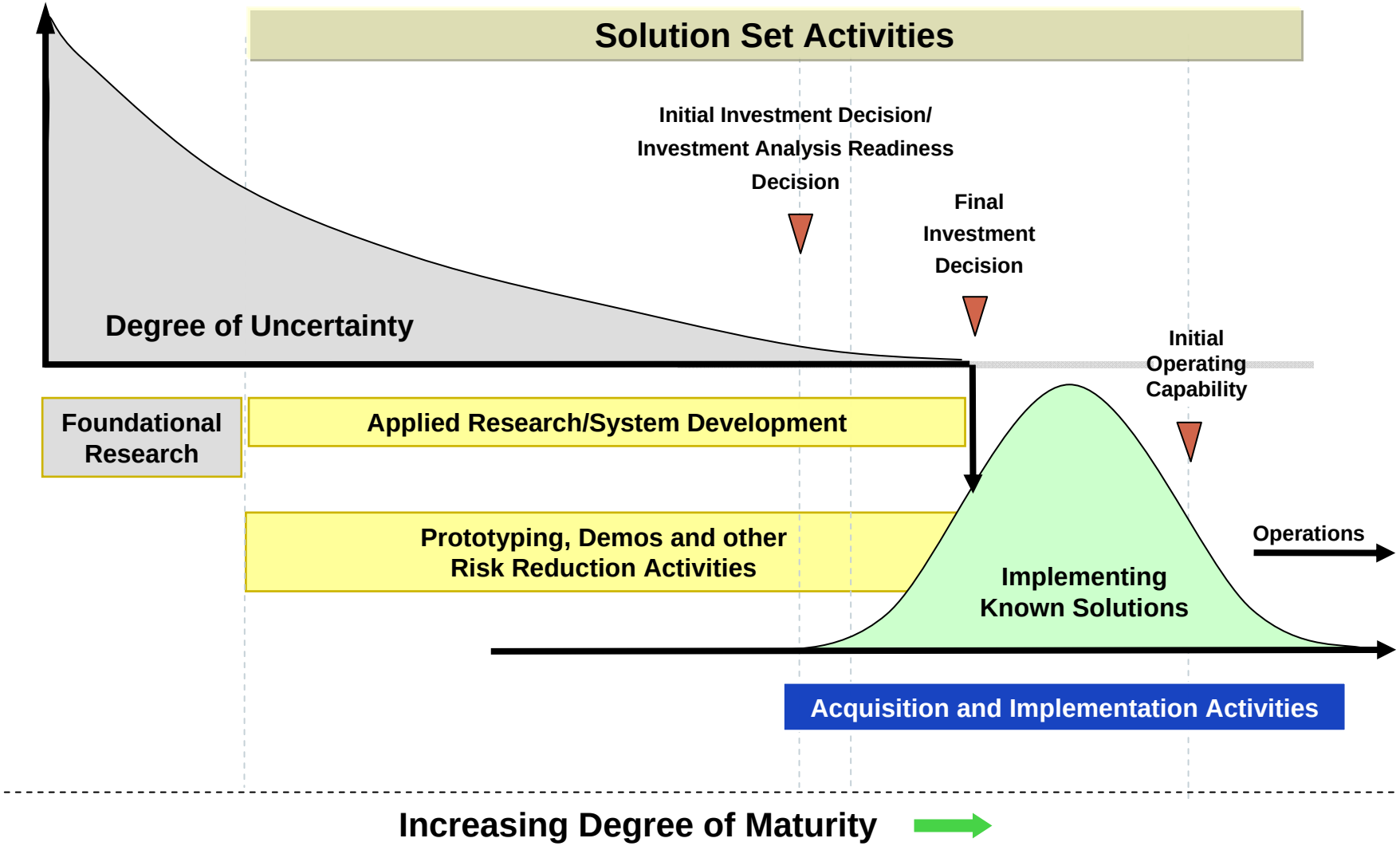
OV-1 SV-1
SV-2 SV-4
SV-8/9 TV-1

Service Unit

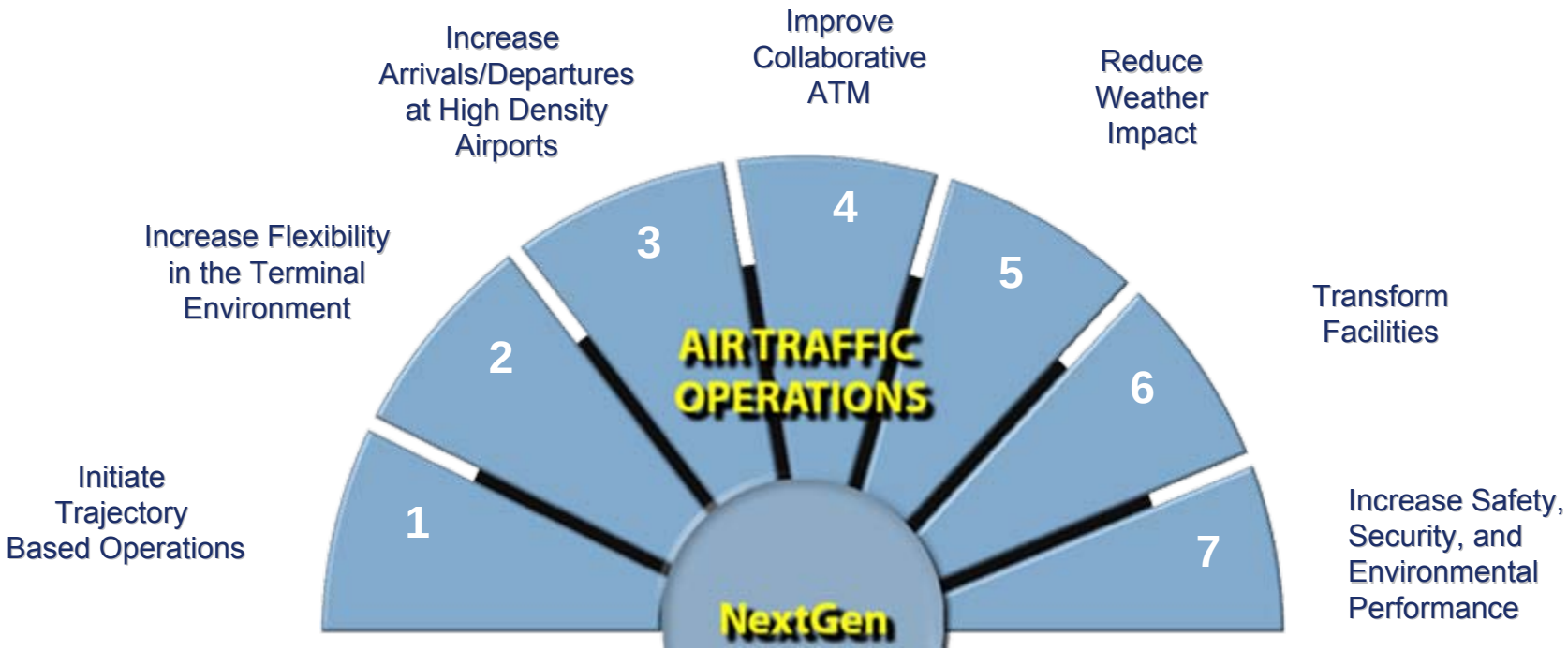
AV-1 AV-2
OV-1 OV-5
SV-1 SV-2
SV-4 SV-6
SV-7 SV-10c
SV-11

Project (Tailored per AMS)

NextGen Integration and Implementation
Spans the Full Life Cycle



NextGen Capabilities
Implemented by Solution Set Portfolios



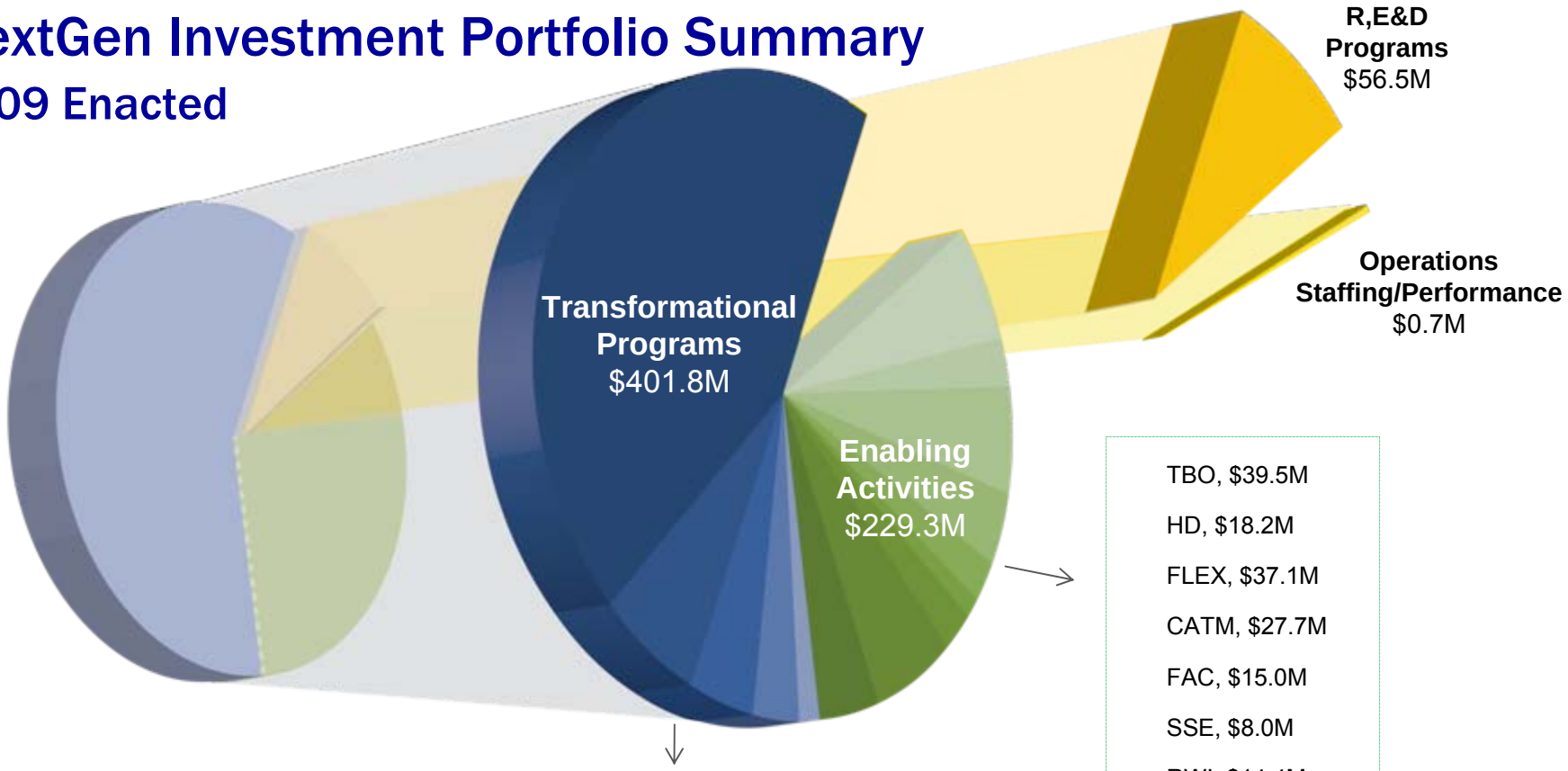
Each solution set is a portfolio of capabilities

NextGen Transformational Programs

- Automatic Dependent Surveillance – Broadcast (ADS-B)
- Data Communications (Data Comm)
- NextGen Network-Enabled Weather (NNEW)
- NAS Voice Switch (NVS)
- System-Wide Information Management (SWIM)
- CATMT-WP2 (Collaborative ATM Technologies – Work Package 2)

NextGen Investment Portfolio Summary

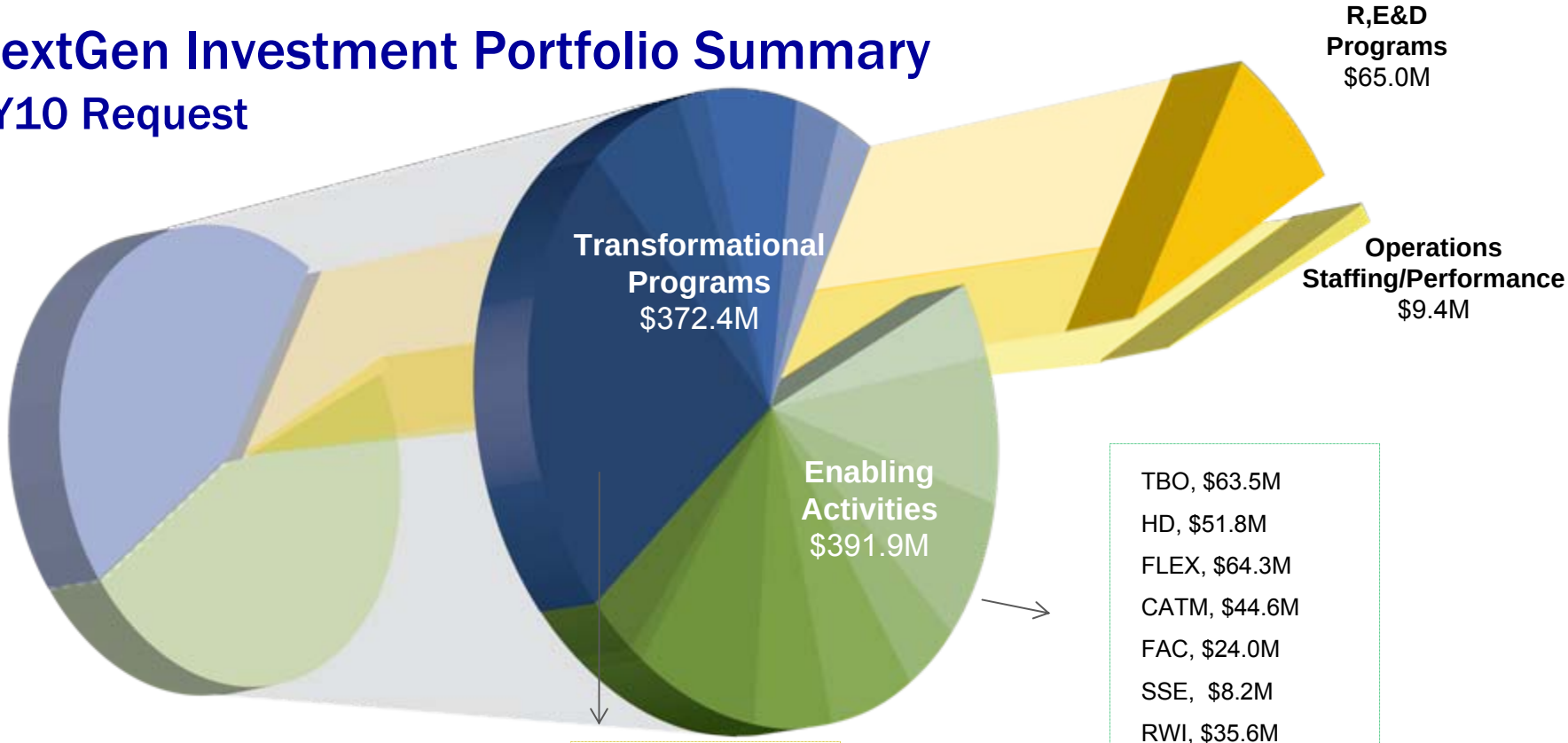
FY09 Enacted



NextGen Capital Programs	**$637.9M**
NextGen R,E&D Programs	**$56.5M**
NextGen Operations Staffing/Performance Programs	**$0.7M**
TOTAL NEXTGEN PROGRAMS	**$695.1M**

NextGen Investment Portfolio Summary

FY10 Request



NextGen Capital Programs	**$790.5M**
NextGen R,E&D Programs	**$65.0M**
NextGen Operations Staffing/Performance Programs	**$9.4M**
TOTAL NEXTGEN PROGRAMS	**$864.9M**

ADS-B, $201.4M
SWIM, $54.6M
CATMT, $18.1M
DataComm, $51.7M
NVS, $26.6M
NNEW, $20.0M

NextGen Integration Matrix

Linkage between Capabilities and Systems

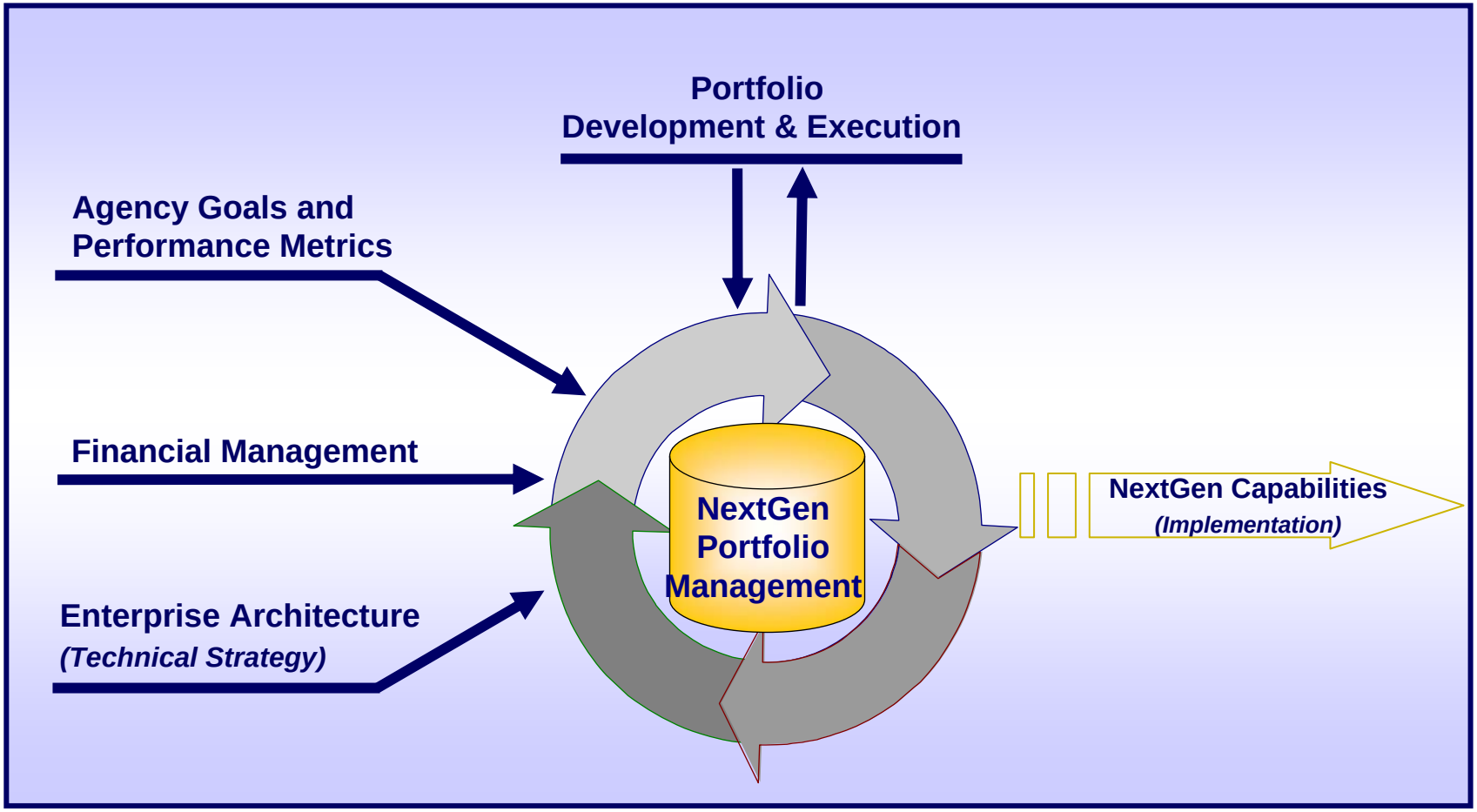
	ADS-B	DataComm	NNEW	NAS	SWIM	ERAM	TFMS	ASDE-X	LAAS	RNP	RNAV	AIM	TBFM	CATMT
TRAJECTORY BASED OPS														
MID-TERM														
Delegated Responsiblitity for Separation	X					X								
Oceanic In-Trail Climb and Descent		X								X	X			
Automation Support for Mixed Environment						X								
Initial Conflict Resolution Advisories		X				X								
Flexible Entry Times for Oceanic tracks			X											
Point in Space Metering						X	X						X	
Flexible Airpsace Management			X	X	X	X	X							
Increase Capacity and Efficiency Using RNAV and RNP						X				X	X			X
Provide Interactive Flight Planning from Anywhere		X			X	X	X					X		
High Density Airports														
MID-TERM														
Improved Operations to Closely Spaced Parallel Runways	X									X				X
Initial Surface Traffic Mangement	X	X			X		X	X					X	X
Time Based Metering Using RNAV and RNP Route Assignement		X					X			X	X		X	
Integrated Arrive/Departure Airspace Management		X				X				X	X		X	X
FLEXIBLE TERMINAL														
MID-TERM														
WTMD - Wake Turbulence Mitigating Departures			X											X
Ground-Based Automation System Precision Approach									X					
Use Optimized Profile Decent						X					X			
Provide Full Surface Situation Information	X				X			X				X		X
Enhanced Surface Traffic Operations	X	X						X						X

NextGen Integration Matrix

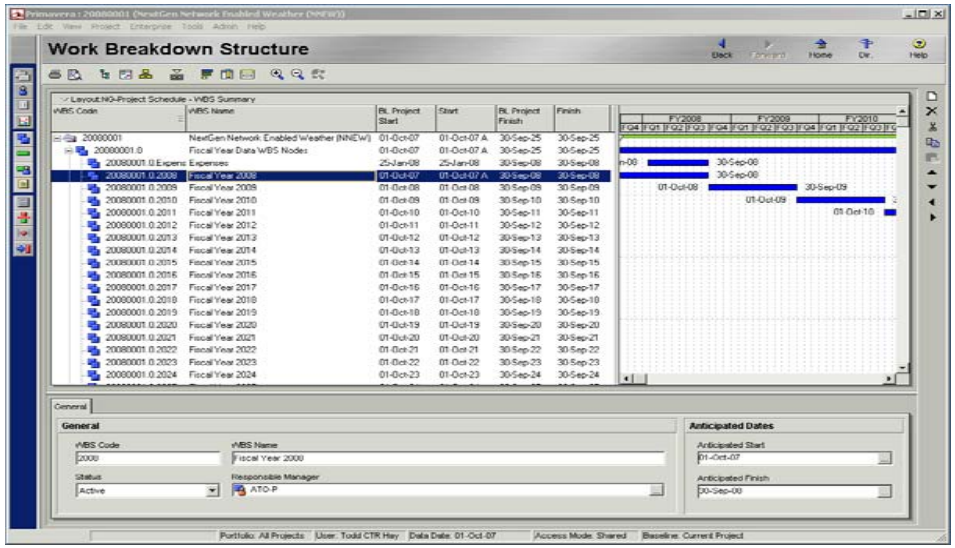
Linkage between Capabilities and Systems

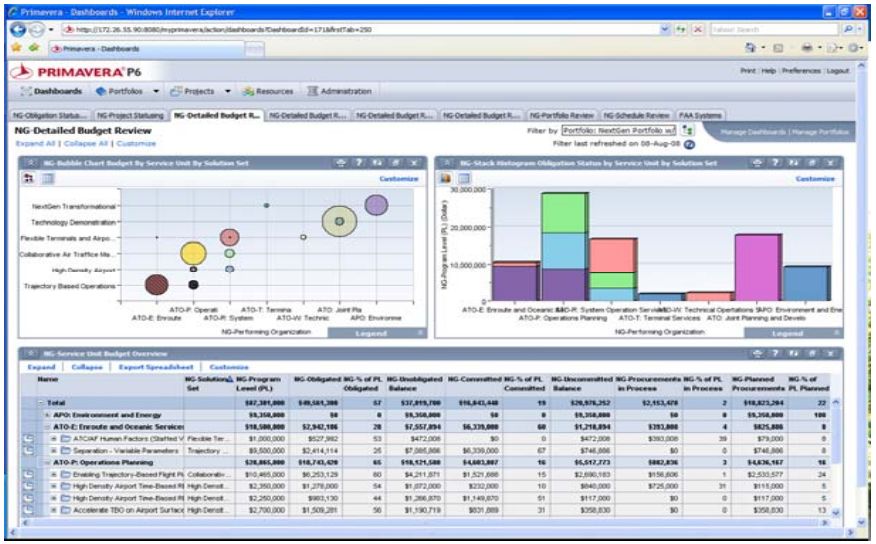
	ADS-B	DataComm	NNEW	NVS	SWIM	ERAM	TFMS	ASDE-X	LAAS	RNP	RNAV	AIM	TBFM	CATMT
CATM														
MID-TERM														
Continuous Flight Day Evaluation					X	X	X					X		
Traffic Management Initiatives with flight Specific Trajectories						X	X							
Improved Management of Airspace for Special Use					X							X		
Trajectory Flight Data Management					X	X	X					X	X	X
Provide Full Flight Plan Contraint evaluation with Feedback					X	X	X					X		
On-Demand National Airspace System Information					X	X	X					X		
REDUCE WEATHER IMPACT														
MID-TERM														
Trajectory Based Weather Impact Evaluation			X		X	X	X						X	X
Turbulance and Icing Available on Meterological Data Collection and Reporting System (MDCRS)														
Near-real time dissemination of weather information to all ground and air users	X	X	X		X									
SAFETY, SECURITY AND ENVIRONMENT														
MID-TERM														
Operational Security Capability for Threat Detection and Tracking, National Airspace System Impact Analysis and Risk Based Assessment					X	X	X					X		X

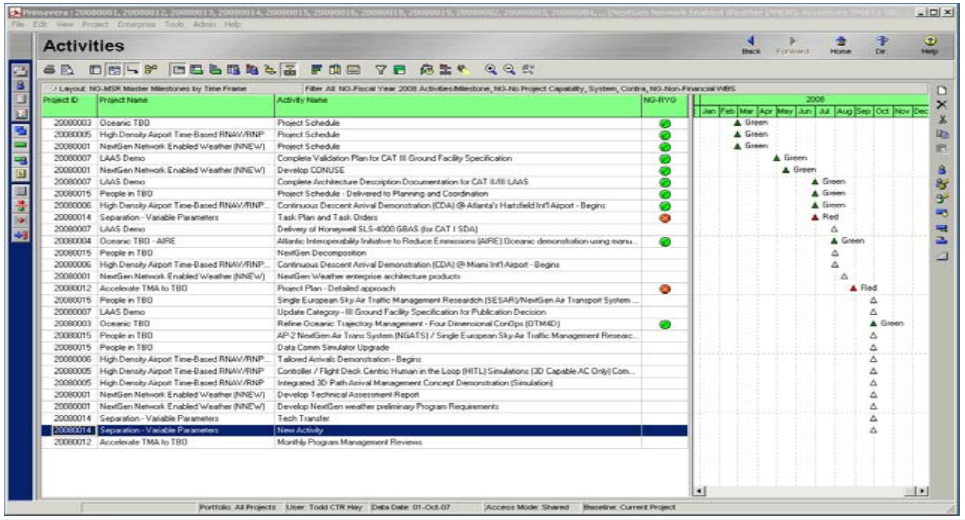
NextGen Integration ...*Portfolio Management*

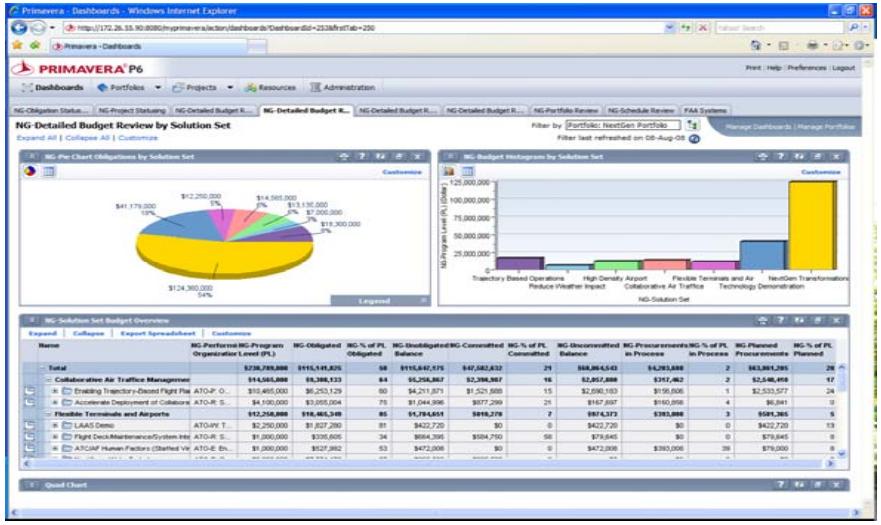


NextGen Integration…Portfolio Management

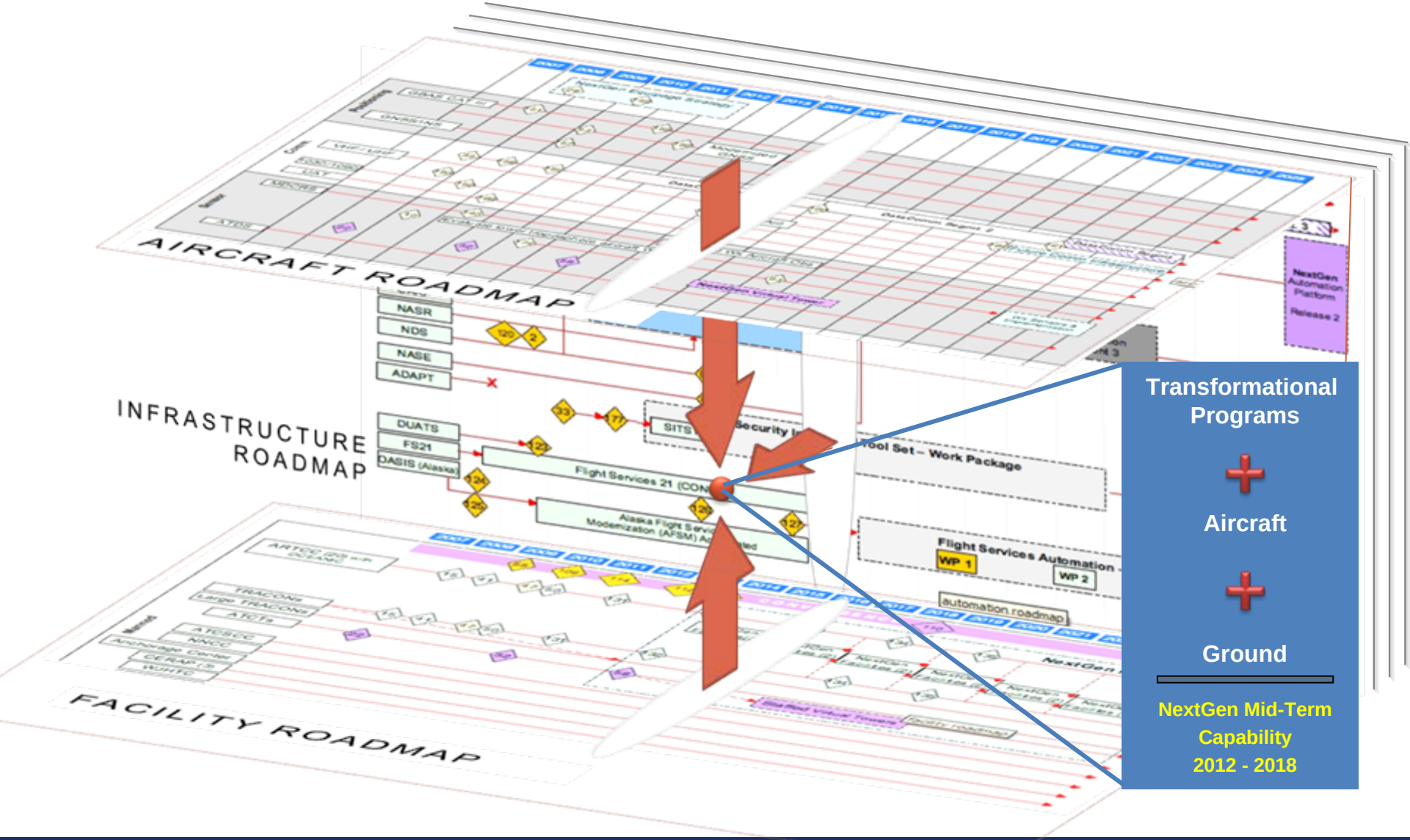








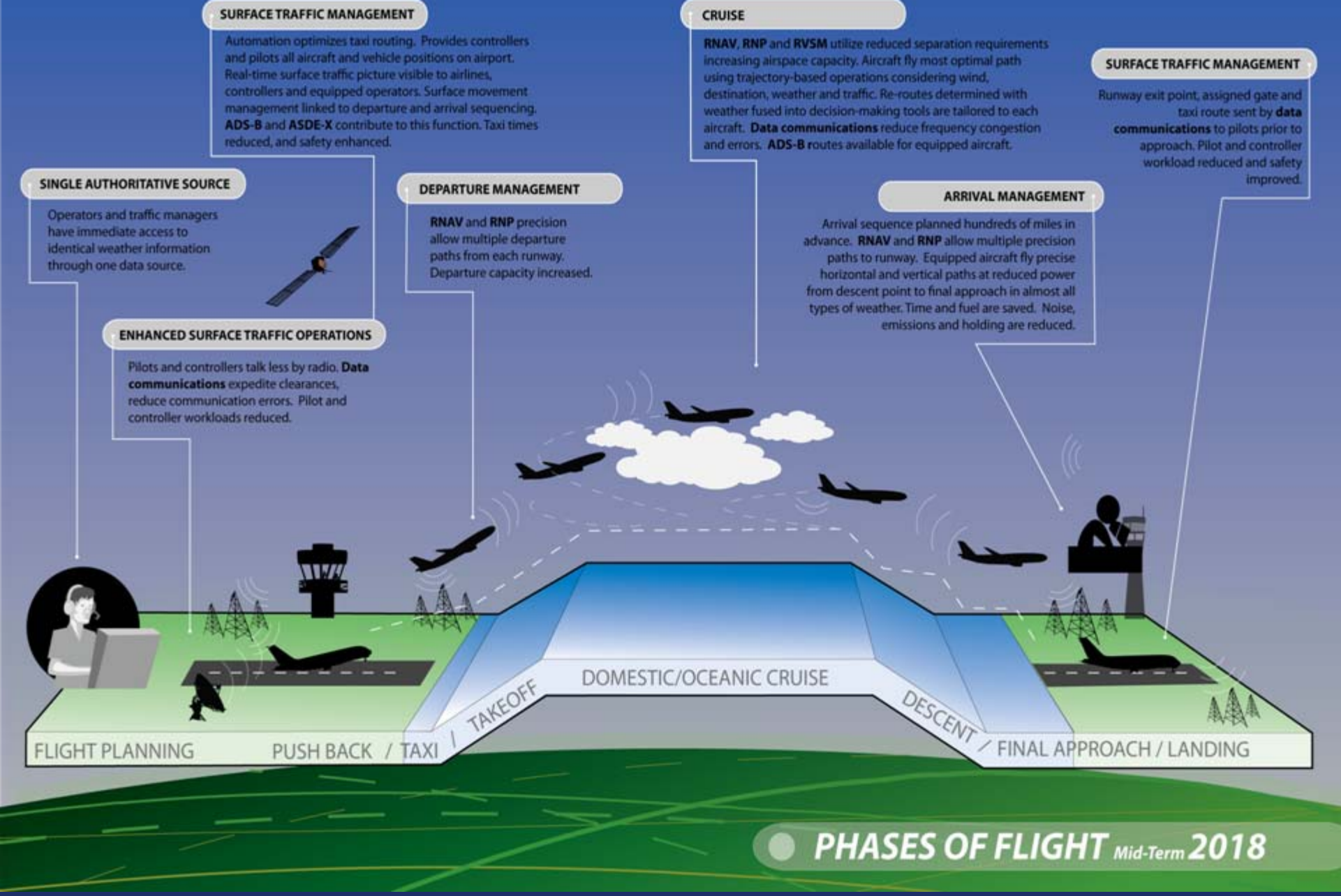
NextGen Complexity
Presents a Significant Communication Challenge



2009 NextGen Implementation Plan

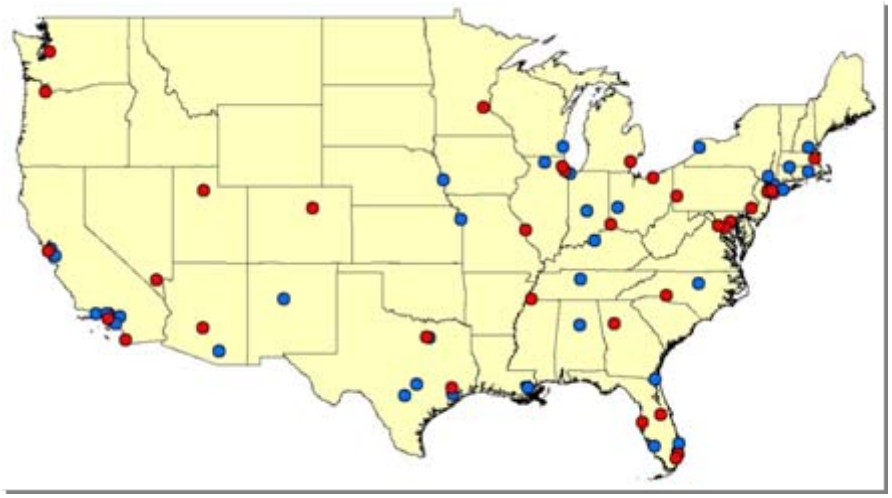
www.faa.gov/nextgen

- **Aligns with FAA budget cycle and Architecture update schedule**
- **Address key industry questions:**
  - What will the NAS look like in 2018?
  - What avionics will be required?
  - What benefits will be realized?

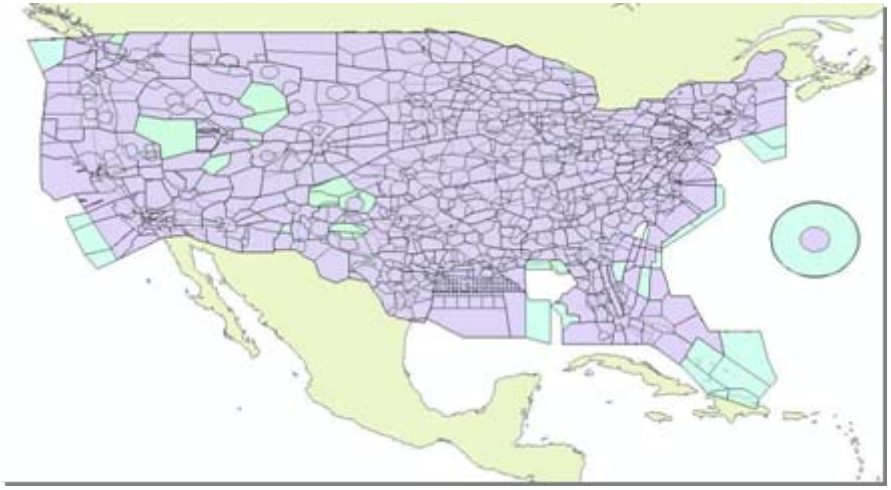

SURFACE TRAFFIC MANAGEMENT
Automation optimizes taxi routing. Provides controllers and pilots all aircraft and vehicle positions on airport. Real-time surface traffic picture visible to airlines, controllers and equipped operators. Surface movement management linked to departure and arrival sequencing. ADS-B and ASDE-X contribute to this function. Taxi times reduced, and safety enhanced.
CRUISE
RNAV, RNP and RVSM utilize reduced separation requirements increasing airspace capacity. Aircraft fly most optimal path using trajectory-based operations considering wind, destination, weather and traffic. Re-routes determined with weather fused into decision-making tools are tailored to each aircraft. Data communications reduce frequency congestion and errors. ADS-B routes available for equipped aircraft.
SURFACE TRAFFIC MANAGEMENT
Runway exit point, assigned gate and taxi route sent by data communications to pilots prior to approach. Pilot and controller workload reduced and safety improved.
SINGLE AUTHORITATIVE SOURCE
Operators and traffic managers have immediate access to identical weather information through one data source.
DEPARTURE MANAGEMENT
RNAV and RNP precision allow multiple departure paths from each runway. Departure capacity increased.
ARRIVAL MANAGEMENT
Arrival sequence planned hundreds of miles in advance. RNAV and RNP allow multiple precision paths to runway. Equipped aircraft fly precise horizontal and vertical paths at reduced power from descent point to final approach in almost all types of weather. Time and fuel are saved. Noise, emissions and holding are reduced.
ENHANCED SURFACE TRAFFIC OPERATIONS
Pilots and controllers talk less by radio. Data communications expedite clearances, reduce communication errors. Pilot and controller workloads reduced.
DOMESTIC/OCEANIC CRUISE
TAKEOFF
DESCENT
FLIGHT PLANNING
PUSH BACK / TAXI
FINAL APPROACH / LANDING
PHASES OF FLIGHT Mid-Term 2018

Understanding NextGen Benefits

Advanced performance simulation capability is required for decision-making

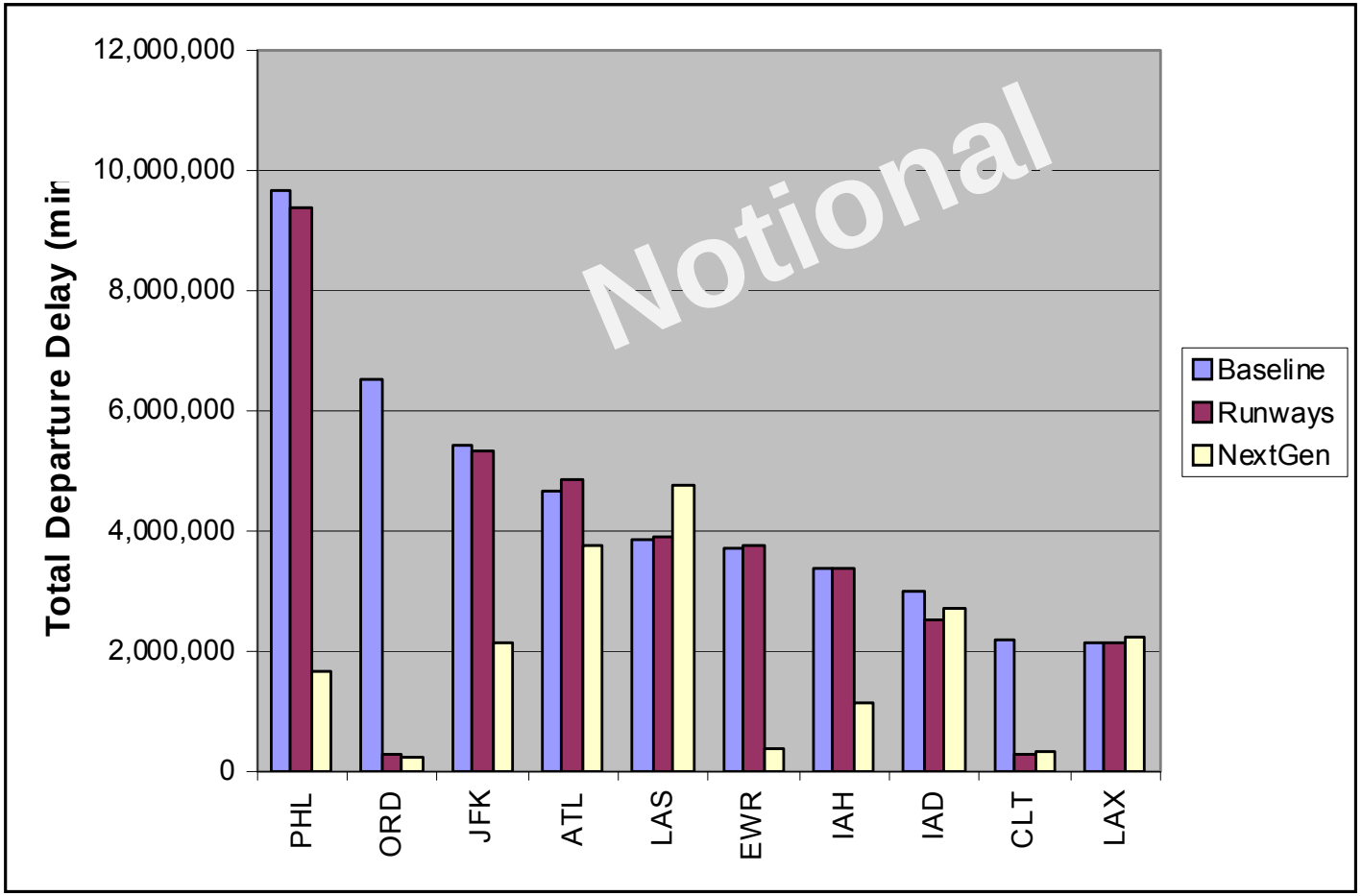


Airport Modeling



Airspace Modeling

Total Departure Delay, 2018



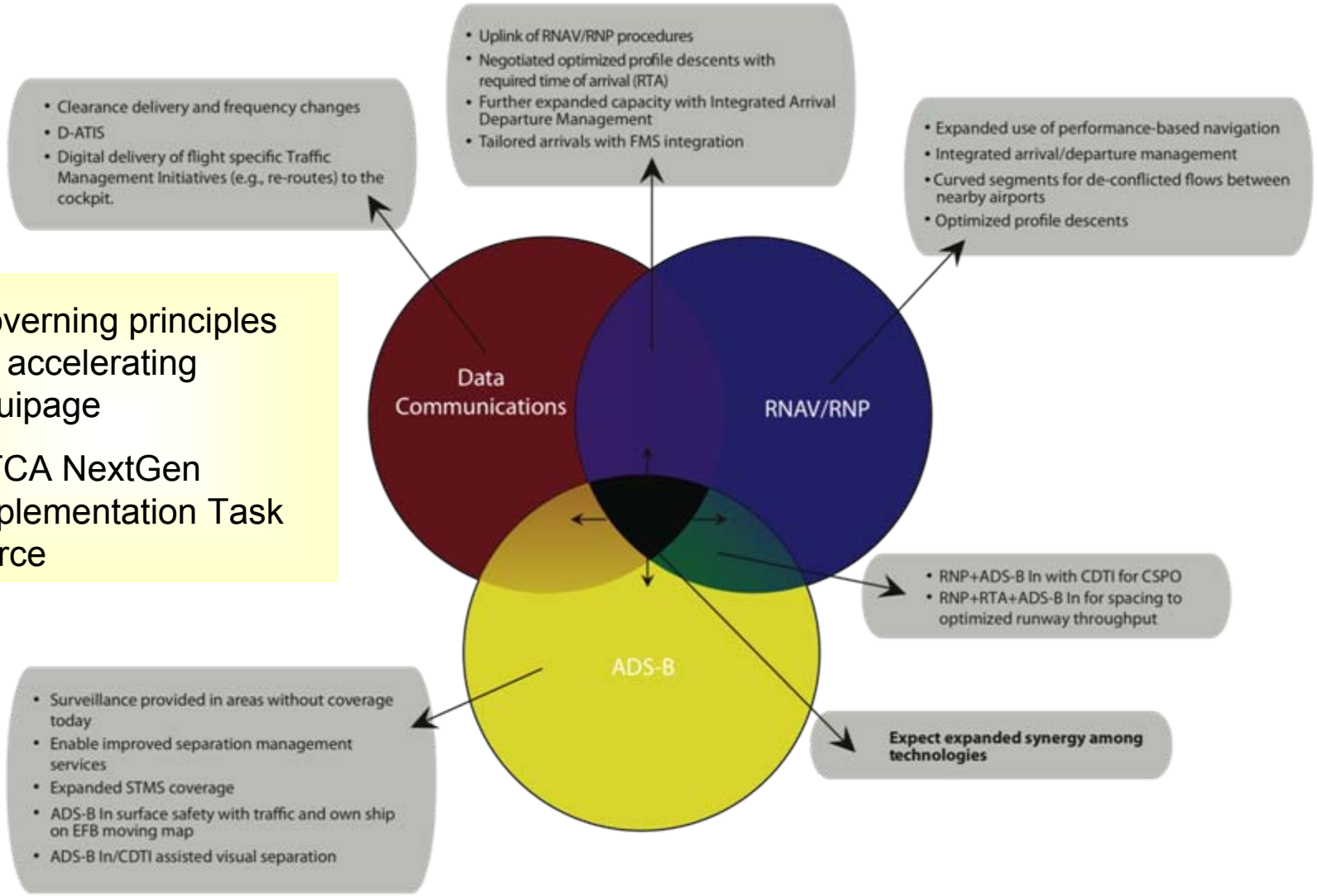
Departure Delay ≡ Simulated Taxi-Out Time - Unimpeded Taxi-Out Time

v5d

NextGen Implementation Plan

Equipage is Critical for NextGen Success

- Governing principles for accelerating equipage
- RTCA NextGen Implementation Task Force



NextGen Implementation Plan

Governing Principles for Accelerating NextGen Equipage

Governing Principles
1. Target equipage and associated capabilities to maximize operational benefits for specific locations or airspace to elevate system performance and to satisfy demand a. Leverage and maximize the benefit of existing equipage b. Take advantage of normal maintenance cycles to minimize disruptions c. Leverage operational evals & other cooperative arrangements to accelerate equipage
2. Consistent with safe and efficient operations, provide "best-equipped, best-served" priority in the NAS to early adopters
3. Minimize the business risk associated with early deployment of NextGen equipage; FAA may assume portions of that risk or otherwise incentivize operators
4. Target government-provided financial incentives for new equipment toward aircraft that will meet evolving environmental requirements
5. Harmonize operations, performance requirements and avionics solutions globally to ensure maximum benefits to operators who fly internationally

FAA Expectations for RTCA Task Force

- **Foster collaboration & consensus on critical NextGen issues – *a new level of engagement with industry***

- **Task Force focus:**
  - Maximizing NextGen benefits
  - Facilitating business case for industry investment

- **FAA needs recommendations on:**
  - Strategies & means to maximize benefits
  - Strategies to encourage equipage
  - Policies & other means to implement governing principles

Summary

- FAA moving forward with NextGen Implementation
- Solid framework for success
- 2018 system defined:
  - NextGen Implementation Plan & Architecture released January 30, 2009
  - Significant Benefits
- Avionics Equipage critical for success
  - Governing principles
  - RTCA Task Force

Attachment:
Sample NextGen Solution Set Plan

NextGen Mid-Term
Flexible Terminal Airspace

Definition

Flexible Terminal Airspace solution set covers the terminal and airport operations for all airports. The focus of FLEX is on advanced separation procedures and improves trajectory management.

Capabilities

Wind Based Wake Procedures [102140]

Ground Based Augmentation System Precision Approach [107107]

Use Optimized Profile Descent [104124]

Provide Full Surface Situation Information [102406]

Enhanced Surface Traffic Operations [104207]

Operational Objectives

Safe and Efficient Separation Management

Management of Trajectories

FY09 Activities

1A13A Wake Turbulence Research

1A13B, 1A13G Ground Based Augmentation System

1A13B, 1A13I Optimized Navigation Technology

1A13B, 1A13H Approaches, New Navigation Initiatives

1A13C RNAV/RNP with 3D and Required Time of Arrival

1A13D Surface/Tower/Terminal Systems Engineering

1A13E Avionics

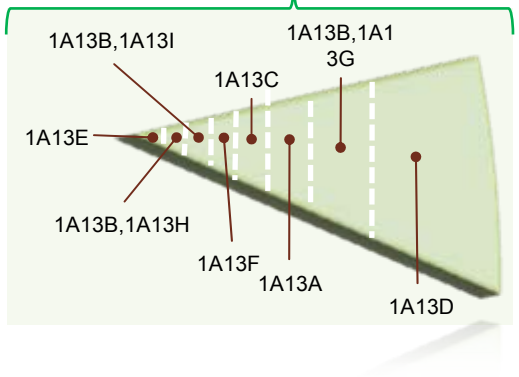
1A13F Closely Spaced Parallel Runway Operations

1A07A (Demo) Virtual Tour (Staffed and Autonomous)

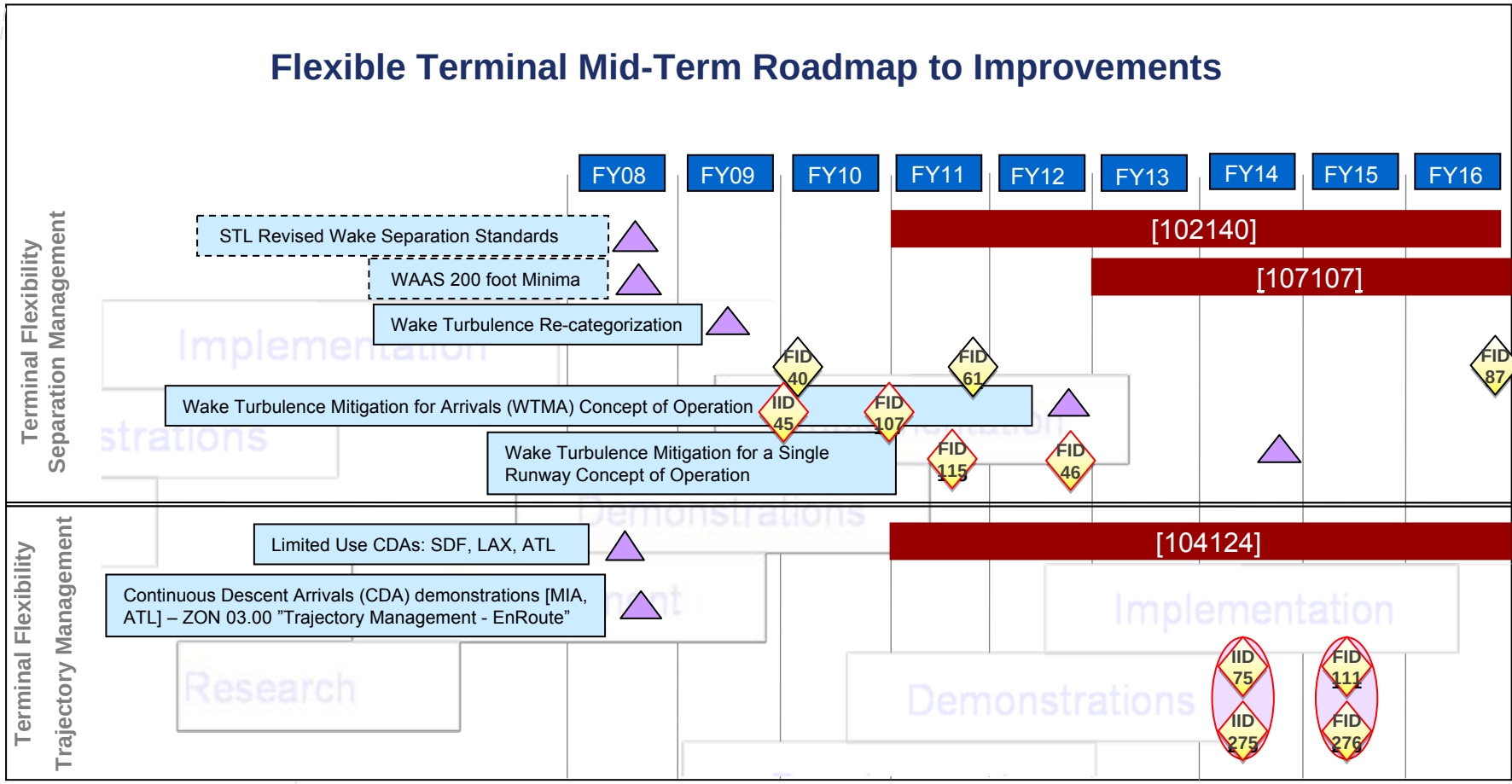
FY09 Funding

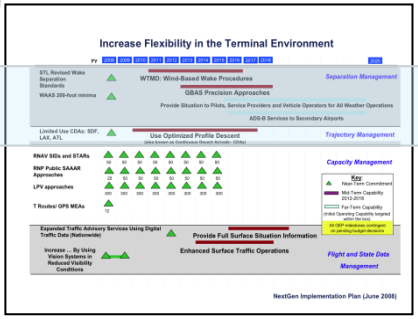
$37.1M

•(6%)



Flexible Terminal Mid-Term Roadmap to Improvements





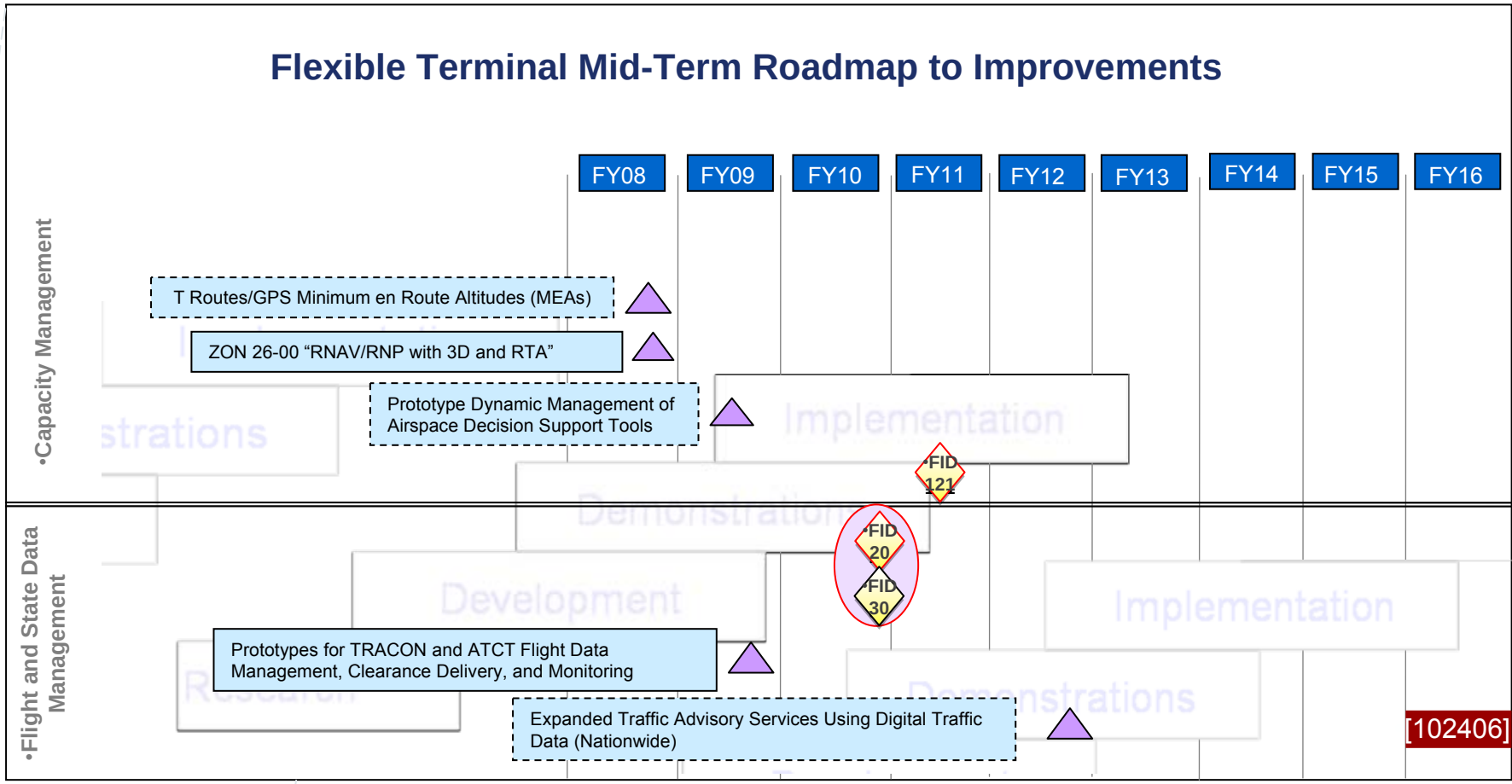
Capability Description

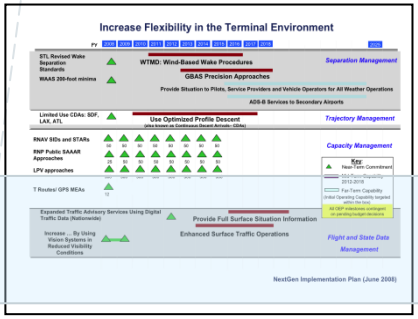
102140 - Wind Based Wake Procedures – Changes to wake rules will be implemented based on wind measurements. Procedures will allow more closely-spaced departure operations to maintain airport/runway capacity.

107107 – GBAS Precision Approach – Global Positioning System (GPS)/GBAS will support precision approaches to Category I (as a non-federal system), and eventually Category II/III minimums for properly equipped runways and aircraft. GBAS can support approach minimums at airports with fewer restrictions to surface movement and offers the potential for curved precision approaches. GBAS also can support high-integrity surface movement requirements.

104124 – Use Optimized Profile Descent – Optimized Profile Descents (OPDs) (also known as Continuous Decent Arrivals -- CDAs) will permit aircraft to remain at higher altitudes on arrival at the airport and use lower power settings during descent. OPD arrival procedures will provide for lower noise and more fuel-efficient operations. The air navigation service provider procedures and automation accommodate OPDs will be employed, when operationally advantageous.

Flexible Terminal Mid-Term Roadmap to Improvements





Capability Description

102406 – **Provide Full Surface Situation Information –** Automated broadcast of aircraft and vehicle position to ground and aircraft sensors/receivers will provide a digital display of the airport environment. Aircraft and vehicles will be identified and tracked to provide a full comprehensive picture of the surface environment to the Air Navigation Service Provider (ANSP), equipped aircraft, and Flight Operations Centers.

NextGen Mid-Term
Flexible Terminal Airspace

BLI -1A13A

Separation Management –

Wake Turbulence Mitigation for Departures

Begins the process of reducing aircraft separation during take offs on CSPR Runways to mitigate decreased airport acceptance rates (AAR) due to increased separation for trailing aircraft from large aircraft.

$6.0M

FY09 Milestones	Q1	Q2	Q3	Q4
Finalize Contract Award			■	
Complete Wake Turbulence Mitigation for Departures, FID		■		

NextGen Mid-Term
Flexible Terminal Airspace

BLI -1A13D

Flight and State Data Management–

Surface/Tower/Terminal Systems Engineering

TFDM integrates flight data management, decision support services provided by the Arrival/Departure Management Tool (A/DMT); provides clearances for surface movements and exchange of flight information between ANSP providers and users of flight information..

$14.3M

FY09 Milestones	Q1	Q2	Q3	Q4
Assure Departure Route Availability – Reduce Departure Delays				
Manage Surface Movement, Departure Queue Length and Departures Sequencing – Reduce Fuel Burn and Emissions				
Enhance Situational Awareness – Enhance Airport Safety and Efficiency				

NextGen Mid-Term
Flexible Terminal Airspace

BLI -1A13B, 1A13G

Separation Management –

Approaches, Ground Based Augmentation System (GBAS)

GBAS will support precision approaches to Category 1, and eventually Category 2 and 3 minimums for properly equipped runway and aircraft. GBAS can support approach minimums at airports with fewer restrictions to surface movement and offers the potential for curved precision approaches. GBAS also can support high-integrity surface movement requirements.

$6.5M

FY09 Milestones	Q1	Q2	Q3	Q4
Complete Project Plan and Schedule	■			
Update Category-III System Design Approval Planning Documents				■
Complete Draft Category-I Safety Risk Management Documentation			■	
Update Changes to CAT-III Ground Specification to Incorporate Validations Changes				■
Complete Draft Category-I Security Certification Authorization Package				■

Demonstrations:
Ground Based Augmentation System (GBAS)

- **Initiative:**
  Demonstrate the use of Performance Based Navigation technology to improve arrival rates at airports

- **Benefit:**
  Additional throughput to maximize airport efficiency
- Reduced fuel consumption an lower noise and emissions

- **Partners:**
  NY Port Authority, Continental

- **Status:**
- MOU Finalization and signing – Feb 09
- GBAS installation at EWR – Jun 09
- Aircraft modification – Dec 09
- Conduct evaluation – Late 2009/10

NextGen Mid-Term
Flexible Terminal Airspace

BLI - 1A13F

Separation Management –

Closely Spaced Parallel Runway Operations

Identify requirements to provide enhanced procedures including cockpit and ground improvements that enable parallel runway improvements, reduce impact to airport/runway throughput in lower visibility conditions.

$2.5M

FY09 Milestones	Q1	Q2	Q3	Q4
Complete Closely Spaced Parallel Runway Operations Project Plan and Schedule				
Establish Cross-Agency Team to Support Integration of all Related Efforts				
Coordinate Initial Project and Simulation Trial Plans				
Conduct Initial Simulator Trials of CSPO				

NextGen Mid-Term
Flexible Terminal Airspace

BLI - 1A13B, 1A13H

Separation Management –

Approaches, New Navigation Initiatives

Provide real-time data for system development and solution implementation for lower approach minima during periods of Instrument Meteorological Conditions (IMC). Support the use of Category I runways during runway visual range (RVR) conditions down to 1800 feet; allow use of DME area navigation (RNAV) down to 1000 feet AGL and enable more aircraft to achieve lower altitudes during IMC.

$1.5M

FY09 Milestones	Q1	Q2	Q3	Q4
Complete Installation of a Runway Visual Range Enhancement at One Airport Site for Validation and Data Collection to Support Implementation of Runway Visual Range Enhancements to Improve Lower Visibility Operations				
Complete Installation of Low Power Distance Measuring Equipment at One Site for Validation and Data Collection				
Conduct Engineering Analysis of Surface Navigation Improvements				

NextGen Mid-Term
Flexible Terminal Airspace

BLI - 1A13B, 1A13I

Separation Management –

Approaches, Optimize Navigation Technology

Award contract services to conduct analyses of the system design and energy efficient economic evaluation systems to improved operating efficiency.

$2.0M

FY09 Milestones	Q1	Q2	Q3	Q4
Award MALSR LED / IR Lamp Contract	■			
Complete LED MALSR LED / IR Lamp Prototypes Design			■	
Conduct Design Qualification Testing and Evaluation of the Prototypes			■	
Build and Deliver MALSAR LED / IR Lamps for One to Three Full Systems				■
Develop Procurement Plan for LED PAPI		■		
Develop Implementation Strategy and Plan for LED PAPI			■	
Develop Statement of Work Section B-J for LED PAPI				■
Issue Screening of Information Request for LED PAPI				■
Engineering Manufacturing Development of LED PAPI Prototypes				■

NextGen Mid-Term
Flexible Terminal Airspace

BLI - 1A13C

Trajectory Management – Arrivals

RNAV/RNP with Required Time of Arrival

Validate the concept, identify requirements and collect additional data to enhance efficiency and provide greater capacity and reduce fuel consumption. This increases aircraft flow and will introduce additional routes and flexibility to reduce delays and capability for enhanced surface traffic operations.

$3.0M

FY09 Milestones	Q1	Q2	Q3	Q4
Complete Project Schedule				
Complete Concept Development for Area Navigation /Required Navigation Performance 3D and Control by Required Time of Arrival				
Conduct Modeling and Simulation to Optimize Procedure Design 3D Area Navigation and Required Navigation Performance				
Complete Analysis of Alternative to AccomplishControl By Time Arrival Including RTA				

NextGen Mid-Term
Flexible Terminal Airspace

BLI - 1A13E

Flight and State Data Management –

Avionics

Identify requirements and procedures. Clearance delivery and pushback into movement or non movement areas is accomplished by voice and/or data communications to the aircraft, aided by situational awareness derived from surveillance sensors and conformance monitoring tools presented directly on the ANSP display.

$1.3M

FY09 Milestones	Q1	Q2	Q3	Q4
Concept of Operations (2D) will be Developed for Flight Deck Moving Maps that Support Taxi Instructions, Taxi Conformance Monitoring and Surface Separation				
Initial Evaluations for Performance using Prototype 2D Taxi Conformance Algorithms in a HITL Simulation				

NextGen Mid-Term
Flexible Terminal Airspace

BLI - 1A07A (Demo)

Virtual Tower

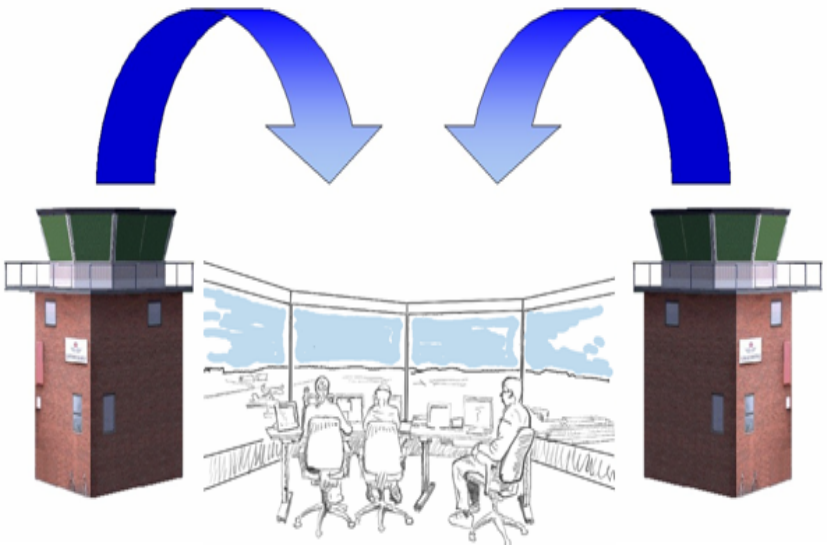
(Staffed and Autonomous)

Provide full air traffic management (ATM) services from a ground level facility to flights in and out of one or more airports.

$5.9M

FY09 Milestones	Q1	Q2	Q3	Q4
Site Selection for Prototype Demonstration			■	
Finalize NextGen Towers Demonstration Test Plan				■
Metrics Data Collection Plan				■
Field Site Preparation (kickoff)				■

Demonstrations:
Staffed NextGen Towers (SNT)



- **Initiative:** SNT provides surface and tower services without the requirement for direct visual observation by ATC personnel from an airport tower cab
- **Benefits:**
  - Improves service during inclement weather and at night
  - Expands services to a significantly larger number of airports
  - Extends air traffic management tower services when towers close
  - Increases IFR throughput
  - Provides runway incursion awareness and prevention and ability to see new runways obstructed from view of the tower cab
  - Provides flexible staffing through collocation
  - Reduces infrastructure operating and maintenance costs and tower construction
- **Partners:** ATO-Terminal, DFW (potential)
- **Schedule:**
  - Field Site Final Selection – June 2009
  - Field Demonstration Test Plan – August 2009
  - Field Site Preparation Kickoff – September 2009
  - Metrics Data Collection Plan – September 2009
  - Field Demonstration – September 2010
- **Status:**
  - Approved NT ConOps – September 2008
  - Technology Assessment – September 2008
  - Quick Look Study – January 2009