

# NAS Enterprise Architecture

## Infrastructure Roadmaps v19.0



**BASELINE**

February 2025



# Infrastructure Roadmap Overview

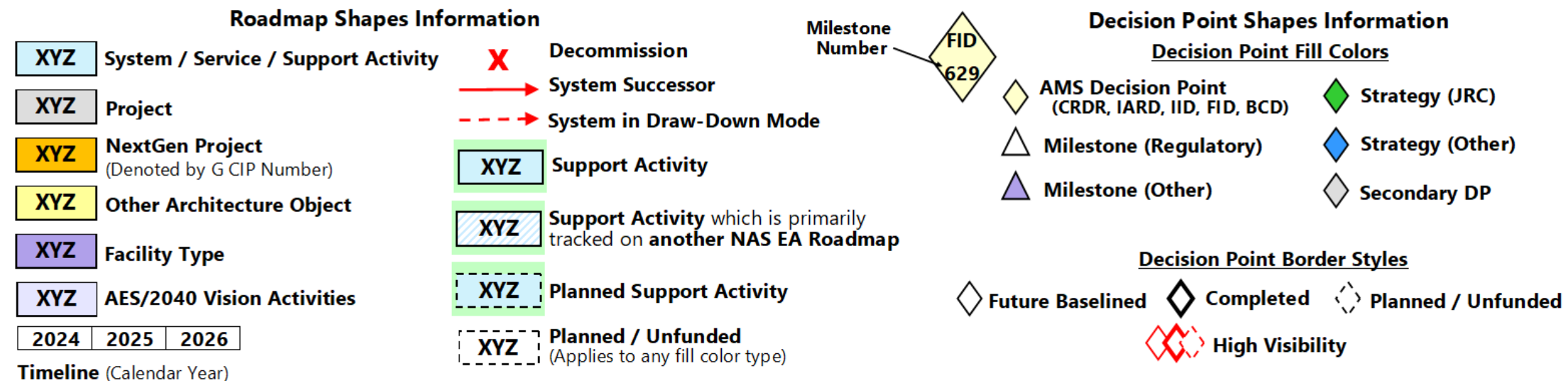
## What are the Infrastructure Roadmaps?

- The FAA Infrastructure Roadmaps show the progression of system deployments, investments, and key decision points for major NAS acquisitions. They depict the acquisition strategy to evolve the NAS from the As-Is to the To-Be environment.
- The Infrastructure Roadmaps show all Capital Investment Plan (CIP) investment projects and systems identified in the NSIP that will deliver the necessary functionality to enable OIs and BTIs.

## Guidelines for Understanding the Roadmaps

- The Infrastructure Roadmaps are organized by Domain (Automation, Communication, etc.) and depict projects, systems, services, decision points, and support activities.
- The timeline is in calendar years and shows a 17-year outlook.
- The roadmaps have swim lanes for Infrastructure (white), Support Activities (green), and Platform/Compute (purple).
- The DP diamonds represent the quarter in which a decision will occur.
- The Support Activity bars represent the dates that work is being performed on the activity.
- The Project bars represent the dates that CIP funding is allocated to a project.
- The System and Service bars represent the dates that a system or service is operational, with red lines indicating sustainment, drawdown, or convergence

## Infrastructure Roadmap Legend



# Human Systems Integration

The Human Systems Integration (HSI) Roadmap provides an Executive View (EV) of investments in human factors activities and their direct contribution to technology concepts, developments, evaluations, and evolution of National Airspace System (NAS) infrastructure. The HSI Roadmap shows the progression of human factors research and engineering activities alongside NAS infrastructure to document human factors product transition points. The HSI Roadmap drives the execution of critical path activities by providing timely human factors inputs to NAS infrastructure investments and related programs.

For more information, please contact the Office of NextGen, Human Factors Division.

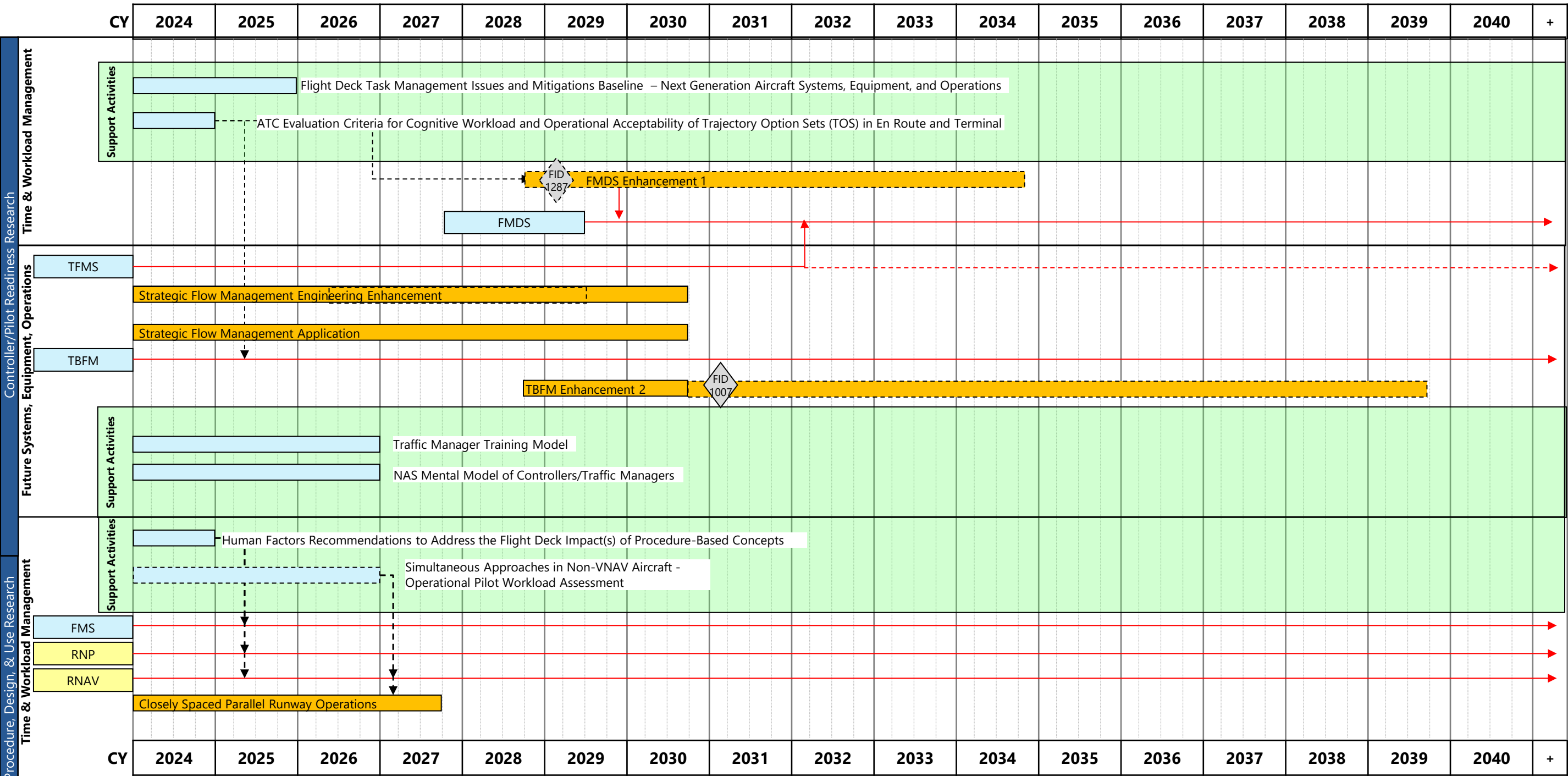
## Human Systems Integration Roadmap (1 of 4)

		CY	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	+	
Human Error and Complex Systems Research	Human-System Safety / Human Factors Risk Assessments		Enterprise Human Factors Development																		
		Support Activities		Human Factors SMS Support for Acquisition Programs																	
					Human Factors Safety Guidance																
		HIRMT																			
		HEAT																			
	Support Activities		Safety Management System (SMS) Executive Council/FAA Safety Collaboration Team (SCT)/Safety Community of Interest (SCOI)																		
			Hazard Enterprise Architecture Traceability (HEAT) Safety Data																		
			Integrated System Safety Assessment (ISSA)																		
			Safety Analyses to Support AMS (Safety Assessments))																		
			Air Traffic Organization Safety Risk Management/Safety Assurance																		
Information Management	Support Activities		Flight Deck Information Management Baseline - Quantity and Type of Information Available to Air Carrier Pilots (visual, aural, tactile)																		
		HUD																			
	EFVS																				
	SVGS																				
		CY	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	+	

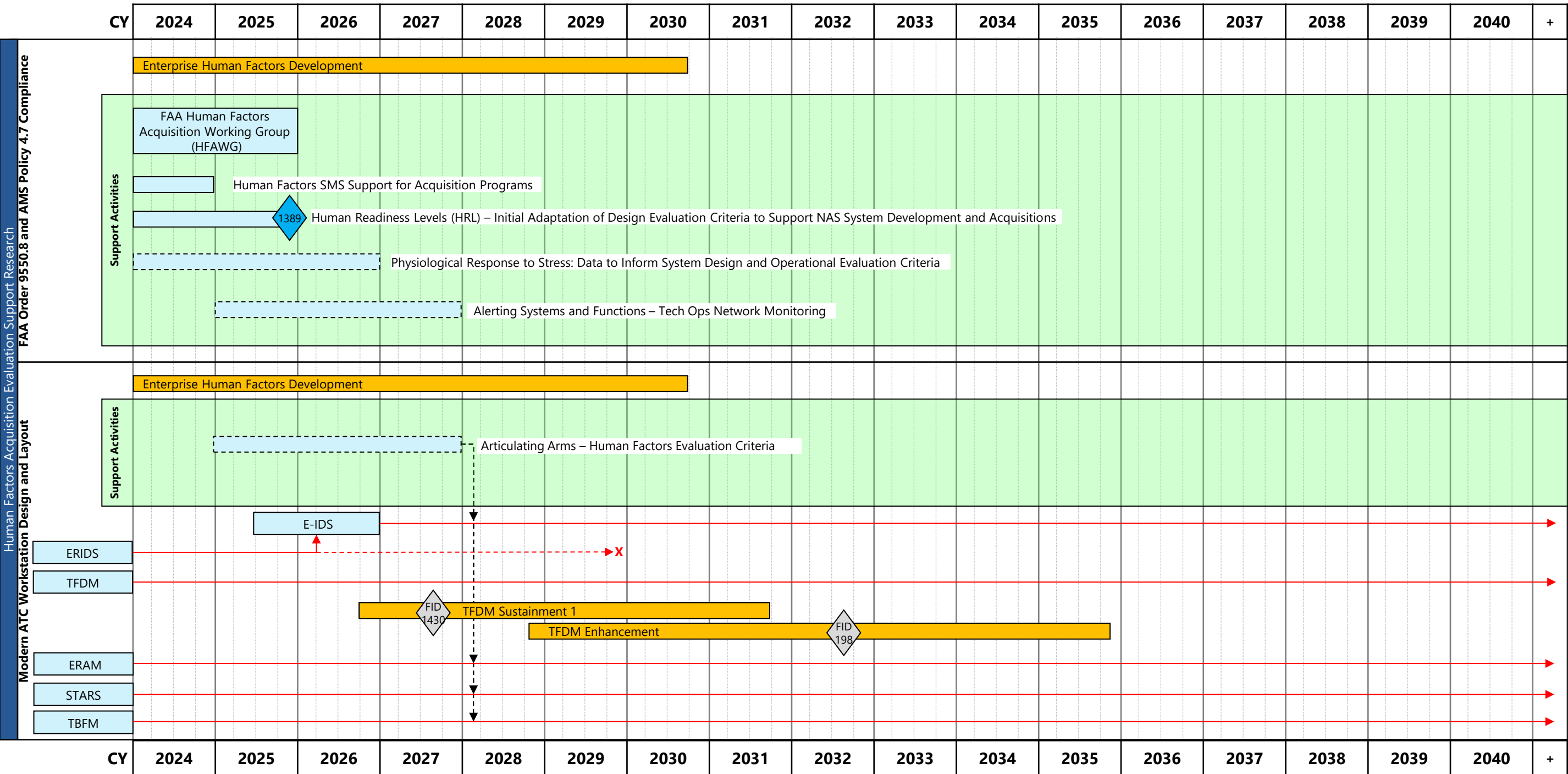
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NAS Enterprise Architecture Infrastructure Roadmaps Version 19.0

# Human Systems Integration Roadmap (2 of 4)

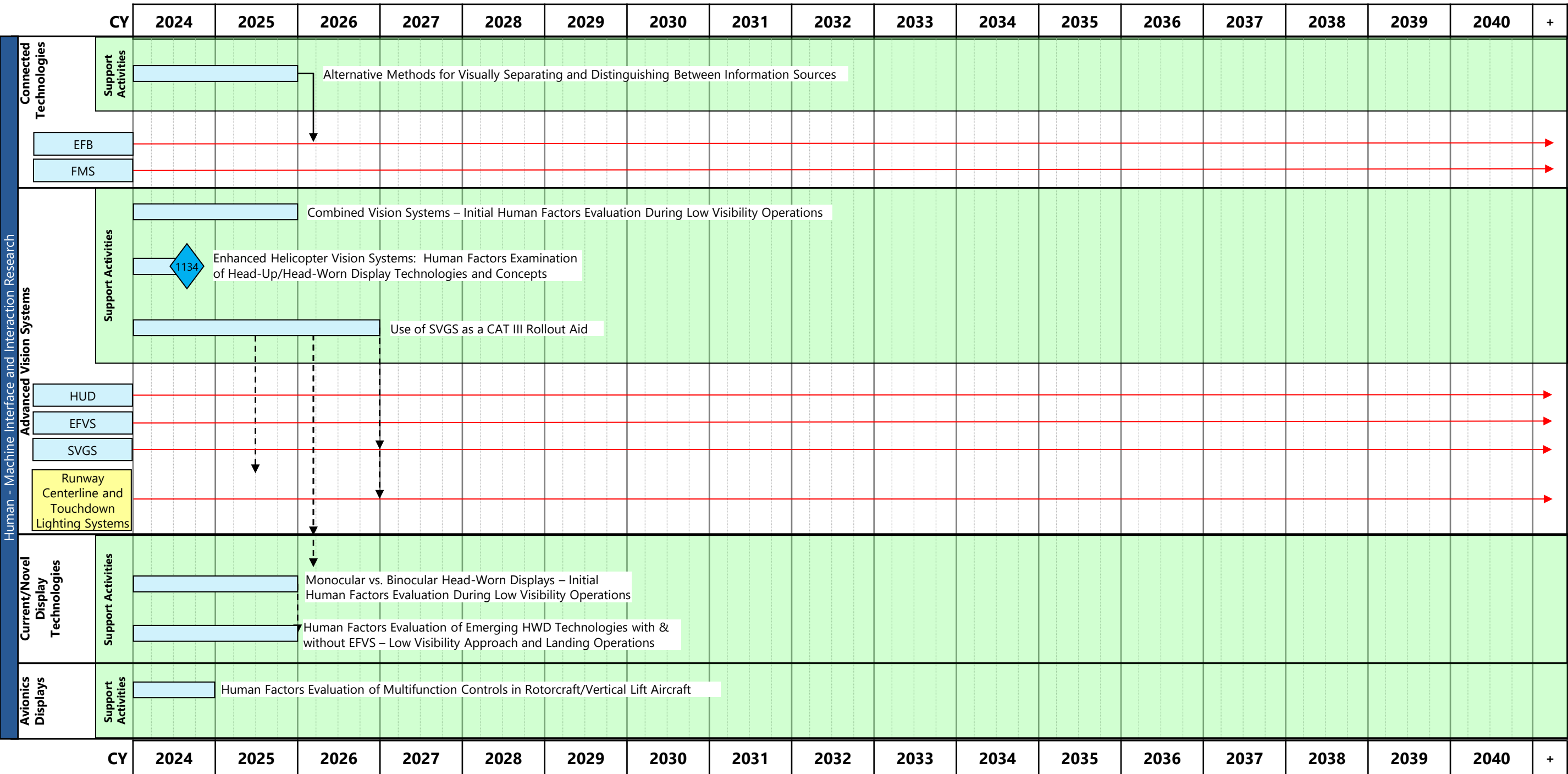


# Human Systems Integration Roadmap (3 of 4)



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# Human Systems Integration Roadmap (4 of 4)






# Human Systems Integration Roadmap: Assumptions

Identifier	Description
HSI-01	The execution of program- and project-specific human factors activities are not represented in the HSI Roadmap.
HSI-02	Human factors integration points represent an identified opportunity for acquisition and procedure development programs to apply specific human factors products.
HSI-03	Human factors integration points represent the final opportunity for acquisition and procedure development programs to apply specific human factors products.
HSI-04	Acquisition and procedure development programs will coordinate with ANG-C1 throughout AMS and other processes to identify and address human factors opportunities.
HSI-05	ANG-C1 will coordinate across programs to identify and address NAS-wide human factors opportunities.



# Human Systems Integration Roadmap Summary

Human Factors Functions	Example Infrastructure Development Influences
<b>Human Error and Complex Systems Research</b> <i>User Centered Design</i> 	<ul style="list-style-type: none"> <li>•FAA methods to factor human behavior in system-safety/risk assessments</li> <li>•Data to evaluate effectiveness of mitigations for human factors risks</li> <li>•Verification of human factors assumptions – e.g., system design, intended function, end-user experience</li> <li>•FAA methods to evaluate system design and minimize occurrence of design related errors</li> <li>•Criteria to evaluate information display, accessibility, and management based on task urgency/criticality</li> </ul>
<b>User Readiness Research</b> <i>Systems, Equipment, Operations</i>	<ul style="list-style-type: none"> <li>•Criteria to determine effect of new systems, operations, and procedures to user tasks, skills, and proficiency needs</li> <li>•Data to evaluate effectiveness of electronic/distance learning technology and methods for systems and procedures training</li> <li>•Change management criteria to support user acceptance of air/ground capabilities and target utilization rate achievement</li> <li>•Criteria for management of unfamiliar situations with highly automated systems and operations</li> </ul>
<b>Human Factors Acquisition Evaluation Support Research</b> <i>FAA Order 9550.8 and AMS Policy 4.7 Compliance</i> 	<ul style="list-style-type: none"> <li>•Apply evidence-based criteria to support the implementation of human factors tools, processes, and requirements into AMS</li> <li>•Evaluate acquisition program requirements and SMS products for human factors</li> <li>•Facilitate the integration of human factors with emerging NAS programs: Independent HF assessment of NextGen concepts</li> <li>•Verify the integration of human factors with NAS programs: Independent HF ISR checklist sign-off</li> <li>•Criteria to evaluate system design for maintainability</li> </ul>
<b>Procedure Design and Use Research</b> <i>Complexity, Operational Acceptability, Usability</i>	<ul style="list-style-type: none"> <li>•Criteria to evaluate procedure design alternatives and potential impacts to usability, complexity, operational acceptability, and human performance</li> <li>•Develop human factors methods to evaluate the documentation of procedures</li> <li>•Verify the operational acceptability of new procedures and develop mitigations as appropriate</li> </ul>
<b>Human-Machine Interface and Interaction Research</b> <i>Systems, Displays, Controls</i> 	<ul style="list-style-type: none"> <li>•Provide data on the contribution of technology to human performance and safety</li> <li>•Inform evidence-based human factors standards, guidelines, requirements, and other documentation for systems, displays, and controls</li> <li>•Support technology design reviews, down-selection of alternatives, and response to emerging user interface and interaction issues</li> <li>•Data on user interactions with advanced technologies – e.g., understanding of system behavior, logic, limitations, minimum system transparency needs</li> </ul>

# Human Systems Integration Roadmap: Decision Points (1 of 1)

DP #	Target Date CY	Primary Domain	Type	Name
1007	2031 Q1	Automation	FID	Final Investment Decision (FID) for TBFM Enhancement 2
1134	2024 Q3	Human Systems Integration	Strategy (Other)	Decision on the Approval and Implementation Strategy of Human Factors Guidance for Helicopter Advanced Vision Systems
1281	2025 Q3	Automation	FID	Final Investment Decision (FID) for Flow Management Data and Services
1287	2029 Q1	Automation	FID	Final Investment Decision (FID) for Flow Management Data and Service (FMDS) Enhancement 1
1389	2025 Q4	Human Systems Integration	Strategy (Other)	Decision to Adapt and Implement Human Readiness Levels in System Development and Acquisition Guidance
1482	2029 Q4	Human Systems Integration	Strategy (Other)	Other Strategy for Human Factors Safety Guidance