System Safety Management

Charlie - Delta Increments

Portfolio Overview

The planned growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety. System safety management research provides a shared, proactive approach to identifying, assessing and mitigating risk, enabling all stakeholders to be more effective in their approach to managing safety.

This portfolio contains activities that will improve safety in the NAS and ensure that changes introduced with NextGen capabilities enhance safety. These activities will support development of safety standards and risk mitigation efforts to be applied systematically to the air transportation system in order to support improved safety practices.

System Safety Management benefits the American Public by reducing aviation accidents and fatalities across a broad range of aviation communities. Aviation Safety Information Analysis and Sharing (ASIAS) discovers and analyzes safety risks in the NAS and supports safety enhancements to mitigate risk, working with the Commercial Aviation Safety Team (CAST), the General Aviation Joint Steering Committee (GAJSC), Unmanned Aircraft Safety Team (UAST), FAA stakeholders and other government agencies. System Safety Management Transformation (SSMT) discovers safety risks in the NAS through its anomaly detection tools and analyzes those risks through its integrated baseline safety risk models, contributing to overall safety through risk-informed evaluation of proposed changes to operations and proposed safety enhancements.

The SSM portfolio includes the following projects:

- ASIAS: A collaborative government and industry initiative to share and analyze data to proactively discover system safety concerns before accidents or incidents occur, leading to timely mitigation and prevention. Information shared within ASIAS will be used to enable future System Safety Assessment.

- SSMT: A stakeholder-driven, cross-functional effort to incorporate best-available and most timely safety risk data and current and forecasted operations spanning NAS operations. Its anomaly detection and safety risk assessment tools reflect historical fatal accidents and significant incidents, represent potential system failures and barrier successes and inter-dependencies, and support identification of latent and emergent risk

Note: The dates and timelines included in the NAS Segment Implementation Plan (NSIP) are for planning purposes only. All capability schedules are tentative until their supporting programs are officially baselined.

System Safety Management

Portfolio Content Summary Statistics

		Increment Status				
Segment	Total by Segment	Planned	Concept Exploration & Maturation	Development	Initial Operational Availability	Completed
*Alpha (2010 - 2015)	11	0	0	0	0	11
*Bravo (2016 - 2020)	8	0	0	0	0	8
Charlie (2021 - 2025)	6	0	6	0	0	0
Delta (2026 - 2030)	0	0	0	0	0	0
TOTAL	25	0	6	0	0	19
Segment	**% by Segment**	**% by Segment/Increment Status**				
*Alpha (2010 - 2015)	44 %	0 %	0 %	0 %	0 %	100 %
*Bravo (2016 - 2020)	32 %	0 %	0 %	0 %	0 %	100 %
Charlie (2021 - 2025)	24 %	0 %	100 %	0 %	0 %	0 %
Delta (2026 - 2030)	0 %	0 %	0 %	0 %	0 %	0 %
TOTAL	100%	0 %	24 %	0 %	0 %	76 %

* Please see Appendix A and B for information about Alpha and Bravo Increments, respectively.

System Safety Management

Operational Improvements/Current Operations & Increments

Benefits

OI: [601104] Automated Safety Information Sharing and Analysis (2022 - 2025)

- C [601104-01] Expanded Participation **(2022 - 2025)**
- C [601104-02] Data Fusion **(2022 - 2025)**
- C [601104-03] Expanded Analytical Capabilities to Include New Entrants **(2022 - 2025)**
- C [601104-04] Vulnerability Discovery through Automated Outlier Detection **(2022 - 2025)**

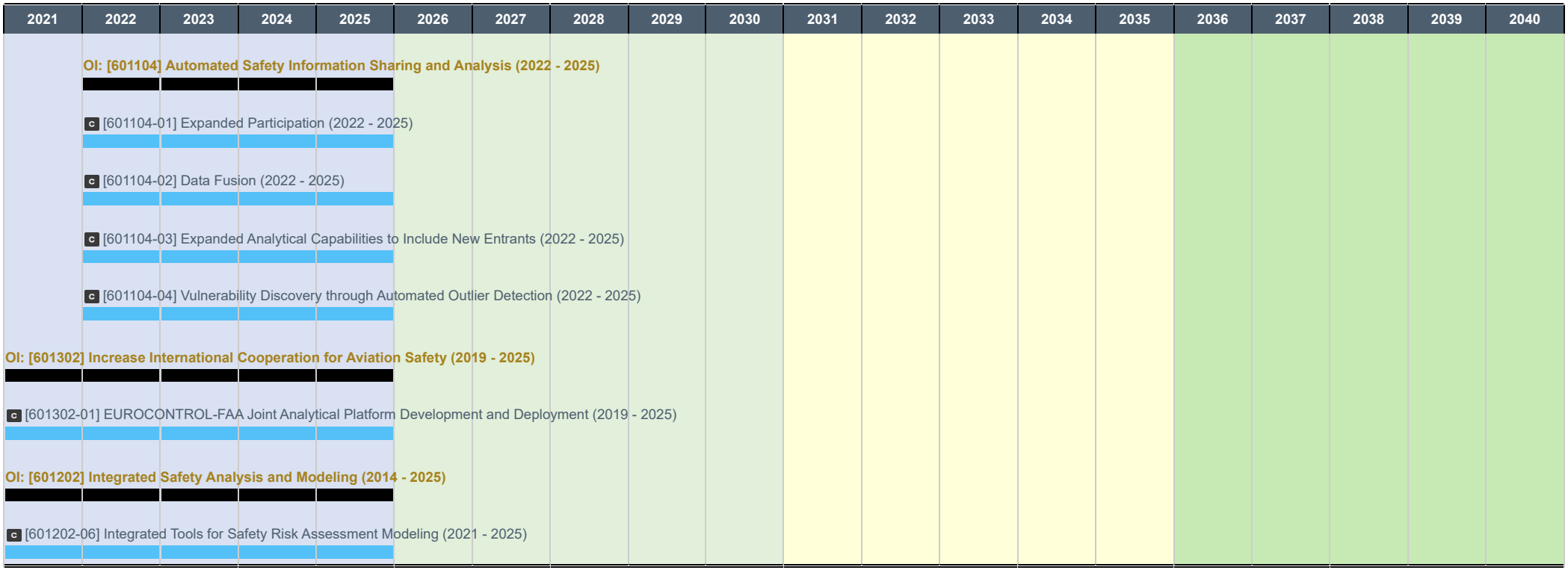
OI: [601302] Increase International Cooperation for Aviation Safety (2019 - 2025)

- C [601302-01] EUROCONTROL-FAA Joint Analytical Platform Development and Deployment **(2019 - 2025)**

OI: [601202] Integrated Safety Analysis and Modeling (2014 - 2025)

- C [601202-06] Integrated Tools for Safety Risk Assessment Modeling **(2021 - 2025)**

System Safety Management



Planned | Concept Exploration & Maturation | Development | Inital Operation Available | Complete

OI | CO | COE/CBTE | C Charlie | D Delta | External Commitment

System Safety Management

OI: [601104] Automated Safety Information Sharing and Analysis (2022 - 2025)

This OI will enhance aviation operational safety and contribute to reduced risk by automating risk identification and notification processes in the Aviation Safety Information Analysis and Sharing (ASIAS) program. Following the creation of the ASIAS environment and the integration of existing analytical tools within it, improvements will be made to analytical capabilities to extend their coverage, improve the speed of risk identification and notification, and enhance safety mitigation evaluation. Expansion of the ASIAS environment to include additional data sources, combined with actions that improve data security and quality will provide continuous improvement. Improvements in the analytical techniques and tools, leveraging artificial intelligence technologies and new methods to monitor complex patterns and discover new aviation vulnerabilities/safety hazards, will enhance the understanding of the data and its implications. ASIAS will provide a collaboration environment that expands querying and analysis of aviation safety issues by ASIAS stakeholders. New collaboration capabilities, including analytic workspaces and knowledge management capabilities, will enable dynamic interaction and engagement with partners during the analytic lifecycle. ASIAS capabilities will include expanded collaboration with international organizations and others in the aviation safety community (such as general aviation/private operators, UAS operators, research entities), on common safety issues.

OI Benefit

Safety (S): Improved safety assessment processes and metrics identify trends in order to identify potential safety risks so that they can be mitigated.

Increments

Charlie

(2021 - 2025)

4

C **[601104-01] Expanded Participation (2022 - 2025)** (Concept Exploration & Maturation)

C **[601104-02] Data Fusion (2022 - 2025)** (Concept Exploration & Maturation)

C **[601104-03] Expanded Analytical Capabilities to Include New Entrants (2022 - 2025)** (Concept Exploration & Maturation)

C **[601104-04] Vulnerability Discovery through Automated Outlier Detection (2022 - 2025)** (Concept Exploration & Maturation)

System Safety Management

Increments/Enabling Activities

C [601104-01] Expanded Participation (2022 - 2025)

Increment Overview

ASIAS will continue to expand participation to new communities and provide domain-specific metrics and dashboards for monitoring their safety risks. The addition of aviation communities, such as UAS, military, International, and Local/Federal agencies will extend and augment the ASIAS data sets used to characterize safety risk and aggregated operator interactions in the NAS. In addition, ASIAS will expand participation to include supporting communities that interact with aviation operations such as maintenance, cabin, ground, and dispatch functions. The data from these supporting communities will provide new insights and context for determining root causes of anomalous flight operations.

Increment Status

Concept Exploration & Maturation

Success Criteria

2024 : Integrate additional rotorcraft operators as stakeholders in ASIAS; collect, process and analyze additional operational flight data for rotorcraft studies and metrics

2025 : Integrate additional international operators and entities; establish collaborative relationships with global safety entities and researchers to advance safety analysis

Implementation Approach

The ASIAS program will expand current networks of operators and aviation industry participants to include partnerships with global entities, new operators, government agencies, academia, and others.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): To be determined

System Interactions

ASIAS (P): interacts with Enterprise Information Management for access to specific data sources

Primary Systems

ASIAS: Aviation Safety Information Analysis and Sharing system

System Safety Management

Increments/Enabling Activities

C [601104-02] Data Fusion (2022 - 2025)

Increment Overview

ASIAS data will include new data sources, including those from multiple aviation communities. The inclusion of Unmanned Aircraft Systems (UAS), Rotorcraft, Military, and other operations will play new or emerging roles in the analysis of NAS operations. Air- ground voice transmissions and other unstructured, textual data sources will be essential for understanding the context of alerts, emerging trends, and anomalies. The availability and analysis of Flight Data Monitoring (FDM) parameters for new communities will be automatically fused into an ASIAS data set for use in further analyses as well as to expand existing analyses. Fusion data will also be used as the foundation for automated detection and correction of known data quality issues and will include the integration of voice data and other contextual information.

Increment Status

Concept Exploration & Maturation

Success Criteria

2024 : Develop an aviation safety metric, merging multiple datasets from the Enterprise Information Management (EIM) system or other sources; incorporate additional sources of data for use in analysis; this may include data maintained on the Enterprise Information.
2025 : Expand ASIAS data analyses to include additional domains (such as maintenance, dispatch), or initial data processing with new communities (such as UAS) based on safety analysis requirements.

Implementation Approach

The ASIAS program will integrate large volumes of data from additional sources to develop more consistent, accurate, and useful information, in order to support safety analysis and hazard mitigation. ASIAS will combine varieties of data and interface with Enterprise Information Management to provide analysts with improved analytical products.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

Safety (P): To be determined

System Interactions

ASIAS (P): interacts with Enterprise Information Management for access to specific data sources

Primary Systems

ASIAS: Aviation Safety Information Analysis and Sharing system

System Safety Management

Increments/Enabling Activities

C [601104-03] Expanded Analytical Capabilities to Include New Entrants (2022 - 2025)

Increment Overview

ASIAS will create adaptive analytical capabilities and mechanisms to provide quick responses to emerging issues while monitoring trends in existing issues. Fusion will be leveraged for automated anomaly detection and will provide alerts including previously unknown trends using enhanced data visualization capabilities. Automated processes will alert safety organizations and participants of potential safety risks, empowering them to rapidly communicate potential issues. ASIAS will further enhance analytical capabilities for air carriers, GA, and Rotorcraft communities, while expanding capabilities for newer communities such as UAS, International, and others. Analytical capabilities will leverage the Cloud computing environment to allow access of mature ASIAS capabilities to FAA Lines of Business and other ASIAS communities.

Increment Status

Concept Exploration & Maturation

Success Criteria

2023 : Implement a cloud-based IT system to support analytic tools for rotorcraft safety analyses

2025 : Use advanced capabilities to deliver predictive analytic capabilities; this may include artificial intelligence and machine learning technologies and methodologies such as human-machine teaming and advanced network analysis

Implementation Approach

The ASIAS program will analyze and monitor data, and develop predictive capabilities using new technologies and enhanced ASIAS IT platform architectures. These capabilities will enable more sophisticated analysis of aviation hazards by discovering unique patterns, relationships and other insights within the data, with improved speed.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

Safety (P): To be determined

System Interactions

ASIAS (P): interacts with Enterprise Information Management for access to specific data sources.

Primary Systems

ASIAS: Aviation Safety Information Analysis and Sharing system

System Safety Management

Increments/Enabling Activities

C [601104-04] Vulnerability Discovery through Automated Outlier Detection (2022 - 2025)

Increment Overview

ASIAS will develop automated processes to compare observed behaviors with typical behaviors, thereby identifying anomalies. The development of capabilities and methodologies for vulnerability discovery will move the aviation safety communities' risk assessments from "event-based" to "data-driven" assessments. Vulnerability discovery will identify problems that are emerging or increasing in new locations or operations by utilizing data-driven precursor analysis to assess safety risks. Investigative toolsets will be developed to automatically detect and analyze trends for undesired aircraft states, beyond those that have already been identified. Additional risk models and vulnerability discovery capabilities will be deployed in the ASIAS operational environment using the fused dataset and other analysis tools as they become available.

Increment Status

Concept Exploration & Maturation

Success Criteria

2025 : Apply the ASIAS predictive analytics strategies to enhance program vulnerability/risk management processes; this includes discovering, vetting, and sharing hazards with the aviation community, with focus on data-driven procedures to prioritize high-risk safety issues and guide mitigation actions.

Implementation Approach

The ASIAS program will develop additional methods to identify, vet, prioritize and share aviation risks with affected parties. Analytical results will be more widely disseminated with the aviation community, and new capabilities will allow enhanced access to ASIAS capabilities and information by participants.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

Safety (P): To be determined

System Interactions

ASIAS (P): interacts with Enterprise Information Management for access to specific data sources.

Primary Systems

ASIAS: Aviation Safety Information Analysis and Sharing system

System Safety Management

OI: [601302] Increase International Cooperation for Aviation Safety (2019 - 2025)

This OI promotes worldwide aviation safety enhancements for the traveling public through international participation in the development and implementation of safer practices and systems. Specifically, increased U.S. participation in international aviation results in the establishment of international aviation partnerships that enhance safety for the global aviation community. This OI will encourage the aviation community to better manage safety by implementing the goals set forth in the GASP and the EUROCONTROL-FAA MOU. It also contributes to the continued viability of the U.S. Aviation industry by supporting the required harmonization of international standards for an interoperable Safety Management System (SMS).

OI Benefit

Safety (S): International collaboration, improved safety management processes, modeling and metrics will enable the aviation community to identify trends in order to identify potential safety risks and better manage the overall safety of the system.

Increments

Charlie

(2021 - 2025)

1

C **[601302-01] EUROCONTROL-FAA Joint Analytical Platform Development and Deployment (2019 - 2025)** (Concept Exploration & Maturation)

System Safety Management

Increments/Enabling Activities

C [601302-01] EUROCONTROL-FAA Joint Analytical Platform Development and Deployment (2019 - 2025)

Increment Overview

This increment includes the joint development and deployment of an analytical system to evaluate current and future risks in an integrated fashion. The web-based platform integrates the Integrated RISk picture (IRIS) software from EUROCONTROL with the Integrated Safety Assessment Model (ISAM) from the FAA in a common platform that will be accessible to the international community. Information exchange, analysis and results sharing will be provided within the context of this joint platform and shared for an improved world-wide safety risk assessment and management process.

Increment Status

Concept Exploration & Maturation

Success Criteria

2020 : Joint acceptance by FAA and EUROCONTROL of an integrated ISAM / web-based platform incorporating models for Air Traffic focused events

2024 : Joint acceptance by FAA and EUROCONTROL of a set of long-term capabilities to be implemented within web-based platform representing commercial air carrier operations.

2024 : Joint acceptance by FAA and EUROCONTROL of an operational integrated ISAM / IRiS (III) web-based platform representing commercial air carrier operations.

Implementation Approach

Through a joint agreement under Appendix 12 to Annex 5 to the MoC NAT-I-3454, FAA and EUROCONTROL will jointly develop a project plan to move from conceptually aligned risk analysis tools (ISAM, IRiS) to prototype and implement an operational integrated platform. The active reference may change in the future from Appendix 12.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): Through international collaboration, improved safety management processes, modeling and metrics will enable the aviation community to identify trends in order to identify potential safety risks and better manage the overall safety of the system.

System Interactions

No system interactions applicable

To be determined

System Safety Management

OI: [601202] Integrated Safety Analysis and Modeling (2014 - 2025)

This OI mitigates safety risk associated with the design and implementation of NextGen by providing enhanced integrated safety risk assessment methods and anomaly detection tools that support making changes to the air transportation system. By incorporating FAA and industry data, together with Subject Matter Expert (SME) input, this OI develops advanced capabilities for integrated baseline and predictive risk assessment for NAS-wide operations. The OI utilizes improved validation and verification (V&V) processes supporting certification; simulation (fast-time and HITL) protocols that provide enhanced evaluation frameworks for safe operational procedures; and enhanced training requirements analysis for safe system operation.

This OI mitigates safety risk associated with the evolution of NextGen by providing enhanced safety risk assessment methods and anomaly detection tools that support making changes to the air transportation system. The increment's system-wide models account for latent and emerging risk impacts of new technologies and procedures. Together, the models and tools enable enterprise-level views of risk management processes, procedures and technologies; provide common integrated baseline information to support the Concept Readiness Decision (CRD) in the Acquisition Management Process (AMS); and support for cost-benefit decision making and risk-informed rulemaking at the enterprise level. The OI's data collection and analysis protocols underlie predictive models that support user-enabled ""what-if"" assessments and connectivity to the Safety Data Analysis Team's (SDAT) hazard library.

OI Benefit

Safety (S): Improved safety assessment processes and metrics identify trends in order to identify potential safety risks so that they can be mitigated.

Increments

Charlie

(2021 - 2025)

1

C **[601202-06] Integrated Tools for Safety Risk Assessment Modeling (2021 - 2025)** (Concept Exploration & Maturation)

System Safety Management

Increments/Enabling Activities

C [601202-06] Integrated Tools for Safety Risk Assessment Modeling (2021 - 2025)

Increment Overview

This increment provides the capability to (1) identify candidate safety events in the NAS and assess the precursors of and potential contributing factors to those events and (2) provide an integrated safety risk assessment capability that provides baseline risk models and enables predictive assessment of latent and emergent safety risk across the NAS for commercial, general aviation, and unmanned airspace operations. The planned growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety.A shared, proactive approach to identifying, assessing, and mitigating risk allows all stakeholders to be more effective in their approach to managing safety.

Increment Status

Concept Exploration & Maturation

Success Criteria

2020 : In cooperation with SSMT Stakeholders Group, identify and prioritize analytical capabilities, reporting formats, and safety risk models (commercial, general aviation, unmanned airspace operations) for new versions of SSMT tools to be released in 2022 and 2025.

2024 : Release new versions of ISAM (7.0), ASAIC (4.0), SITAR (4.0), and WVSS (3.0) incorporating new analytical capabilities and reporting formats identified and prioritized by the SSG to support safety risk assessment and candidate safety event detection.

2024 : Implement SSMT 2.0 system architecture, to include a centralized, cloud-based model to support data storage, data analytics, and customized / partitioned versions of its tools, which is necessary to support improved NAS safety analyses.

2025 : Release new versions of ISAM (8.0), ASAIC (5.0), SITAR (5.0), and WVSS (4.0) within in a centralized, cloud -based model, incorporating additional safety risk models and new analytical capabilities identified and prioritized by the SSG to support safety risk assessment and candidate safety event detection.

Implementation Approach

SSMT 2.0 will continue to evolve its capabilities through collaboration with key FAA stakeholders (e.g RASCI matrix) and in cooperation with the SSMT Stakeholders Group (SSG). The SSMT Program will share analytical results and capabilities with these stakeholders as well as with other safety programs (e.g. ASIAS), other federal agencies (e.g. NASA), and international partners (e.g. EUROCONTROL). SSMT will continue to identify and access best available data sources, maintain data standards and governments consistent with FAA best practices, and enhance existing analytical capabilities to leverage these data. The SSMT Program will continue to evolve the SSMT 2.0 architecture towards a centralized, cloud based model to support data storage, data analytics, and customized / partitioned versions of its tools. SSMT will provide access by the FAA and other participants to standardized and customizable safety risk assessment and candidate safety event detection tools for use in their own analyses.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

External Commitment Primary Benefit Secondary Benefit Operationally Available Complete

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety C Charlie D Delta

System Safety Management

Safety (P): Risk management to a desirable level will further enable improvements in NAS operations developed within NextGen. However, this system will establish a coordinated NAS service that enables the harmonization of safety risk assessment across phases of flight and operational domains by managing risk transfer as well as local risks within each domain or area.

System Interactions

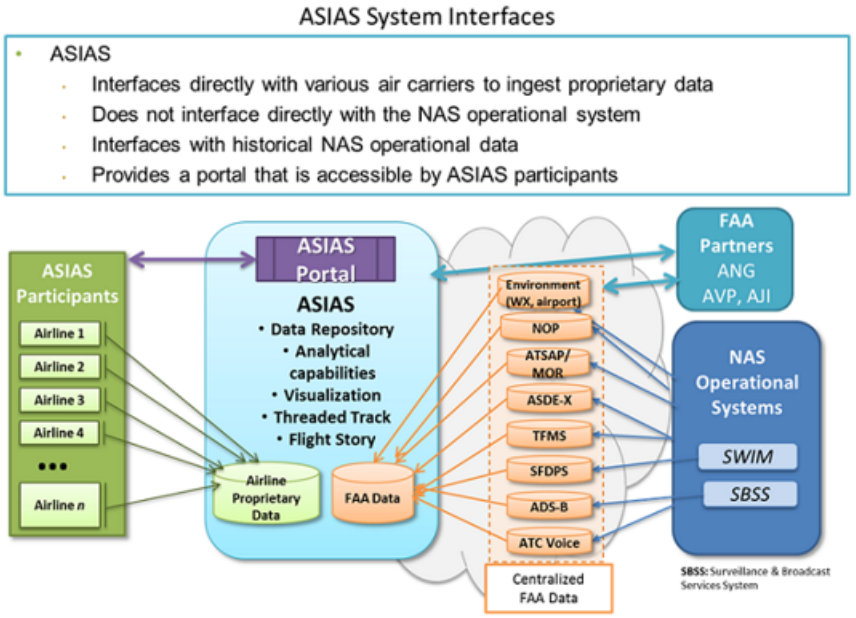
No system interactions applicable

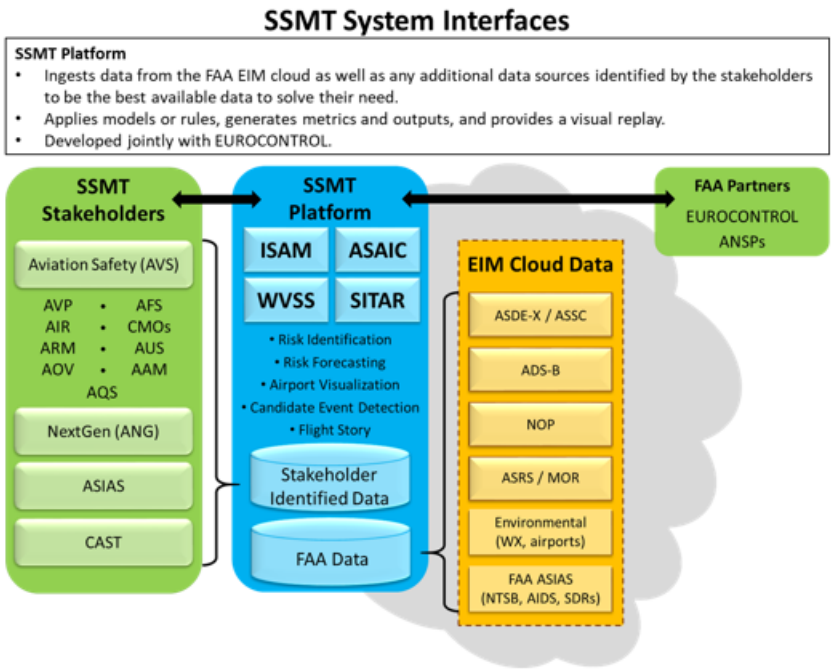
To be determined

System Safety Management

Systems Interactions

Safety System Management (SSM) aims to keep pace with planned growth and complexity in the air transportation system by developing and implementing the analytical tools, processes, and policies that the FAA and industry will use to ensure safety. Combining the efforts between Aviation Safety Information Analysis and Sharing (ASIAS) and System Safety Management Transformation (SSMT) to discover and analyze safety risks in the NAS and supports safety enhancements to mitigate risk.





System Safety Management

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System Safety Management

Portfolio Delta System Interaction

No Delta Diagram is available for this portfolio

System Safety Management

Increment	ASIAS
C [601104-01] Expanded Participation	P
C [601104-02] Data Fusion	P
C [601104-03] Expanded Analytical Capabilities to Include New Entrants	P
C [601104-04] Vulnerability Discovery through Automated Outlier Detection	P
C [601202-06] Integrated Tools for Safety Risk Assessment Modeling	
C [601302-01] EUROCONTROL-FAA Joint Analytical Platform Development and Deployment	

Operationally Available | Complete | In Service System | Planned System

P Primary Systems | S Secondary Systems | T Tertiary Systems | A Avionics Systems

C Charlie

System Safety Management

Stakeholders

Specific roles and responsibilities for the execution of the enabling activities in this portfolio are outlined in the RASCI (Responsible, Accountable, Supporting, Consulted, Informed) matrix. All stakeholder organizations involved in the delivery of capabilities/enabling activities are listed across the top. SSM enabling activities are listed on the left side of this table. ASIAS stakeholders include broad representation within the FAA to include the Air Traffic Organization (ATO), Flight Standards (AFS), AUS, ANG, and multiple other organizations. Stakeholder organizations are represented in an external governance body, the ASIAS Executive Board (AEB), which develops policy, prioritizes and approves studies, and reviews and disseminates ASIAS findings. The AEB consists of two co-chairs, one representing the aviation industry and the other from AVS. The AEB includes representatives of various FAA offices, NASA, commercial airlines, manufacturers, and labor organizations. AEB decision making is accomplished by consensus agreement. Stakeholder organizations will be represented through a newly-formed SSMT Stakeholder Group (SSG) which will meet semi-annually. Members of this group will inform the SSMT program manager and SSMT Technical Lead of their requirements for independent and integrated use of the SSMT toolkit. The SSG will provide input on program development and investment and prioritization of new capabilities and applied case studies as well as disseminate the results of the studies and the utilization of SSMT tools within members' organizations. The SSG will be chaired by the SSMT Technical Lead and will include the SSMT Program Manager, the AVP -220 Integration Manager, the ASIAS Program Manager, the System Safety Management Portfolio Manager, and representatives of various FAA offices and NASA.

A	Accountable for the completion of NextGen capability. The highest level within the RASCI matrix, this office is charged by the FAA to deliver a particular capability. Typically, this designation is provided via an AcquisitionProgram Baseline. To foster a clear line of accountability, two different offices can never be Accountable for the same increment, andAccountability can never be delegated to another office.
R	Responsible for the successful completion of NextGen capability or a critical component of the capability. This office is responsible to theAccountable office. The Responsible office is responsible for initiating an actual change to the NAS such as automation changes, and is often also designated as the Accountable office for that increment. However, there are examples in the NSIP where one office is Accountable for an increment while another office (or offices) is actually making a change in the NAS on behalf of the Accountable office.
A/R	Accountable for the completion of NextGen capability as well as Responsible for its implementation.
S	Supports the Responsible office in the implementation of NextGen capability.Typically, this support is in the form of subject matter expertise, procedural guidance, or training activities.
C	Consulted for input during the implementation of NextGen capability. Provides input on a specific aspect in the development and implementation of a capability, such as safety analysis or approval. Input may or may not be used as determined by the Responsible and Accountable offices.
I	Informed about the progress of implementation.

System Safety Management

RASCI Matrix	ANG			ARP	AVP	AVS	AJI				AJM		AJV	AFS	AOV	APO	AIR
	C7	1	B	001	001	001	0	3	1	2	0	22	0	001	001	001	001
• C [601104-01] Expanded Participation (2022 - 2025)	C	S		S	A/R	S	C				C		C				
• C [601104-02] Data Fusion (2022 - 2025)	C	S		S	A/R	S	C				C		C				
• C [601104-03] Expanded Analytical Capabilities to Include New Entrants (2022 - 2025)	C	S		S	A/R	S	C				C		C				
• C [601104-04] Vulnerability Discovery through Automated Outlier Detection (2022 - 2025)	C	S		S	A/R	S	C				C		C				
• C [601202-06] Integrated Tools for Safety Risk Assessment Modeling (2021 - 2025)	C		S	S	A/R	S		C	I	I		C		I	I	S	
• C [601302-01] EUROCONTROL-FAA Joint Analytical Platform Development and Deployment (2019 - 2025)	C		C	I	A/R	S		I								I	

Operationally Available Complete External Commitment C Charlie D Delta

Appendix A

Alpha Increments

Portfolio Overview

The planned growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety. System safety management research provides a shared, proactive approach to identifying, assessing and mitigating risk, enabling all stakeholders to be more effective in their approach to managing safety.

This portfolio contains activities that will improve safety in the NAS and ensure that changes introduced with NextGen capabilities enhance safety. These activities will support development of safety standards and risk mitigation efforts to be applied systematically to the air transportation system in order to support improved safety practices.

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TOTAL	11	0	0	0	0	11
Segment	**% by Segment**	**% by Segment/Increment Status**				
*Alpha (2010 - 2015)	100%	0 %	0 %	0 %	0 %	100 %
TOTAL	100%	0 %	0 %	0 %	0 %	100 %

System Safety Management

Operational Improvements/Current Operations & Increments

Benefits

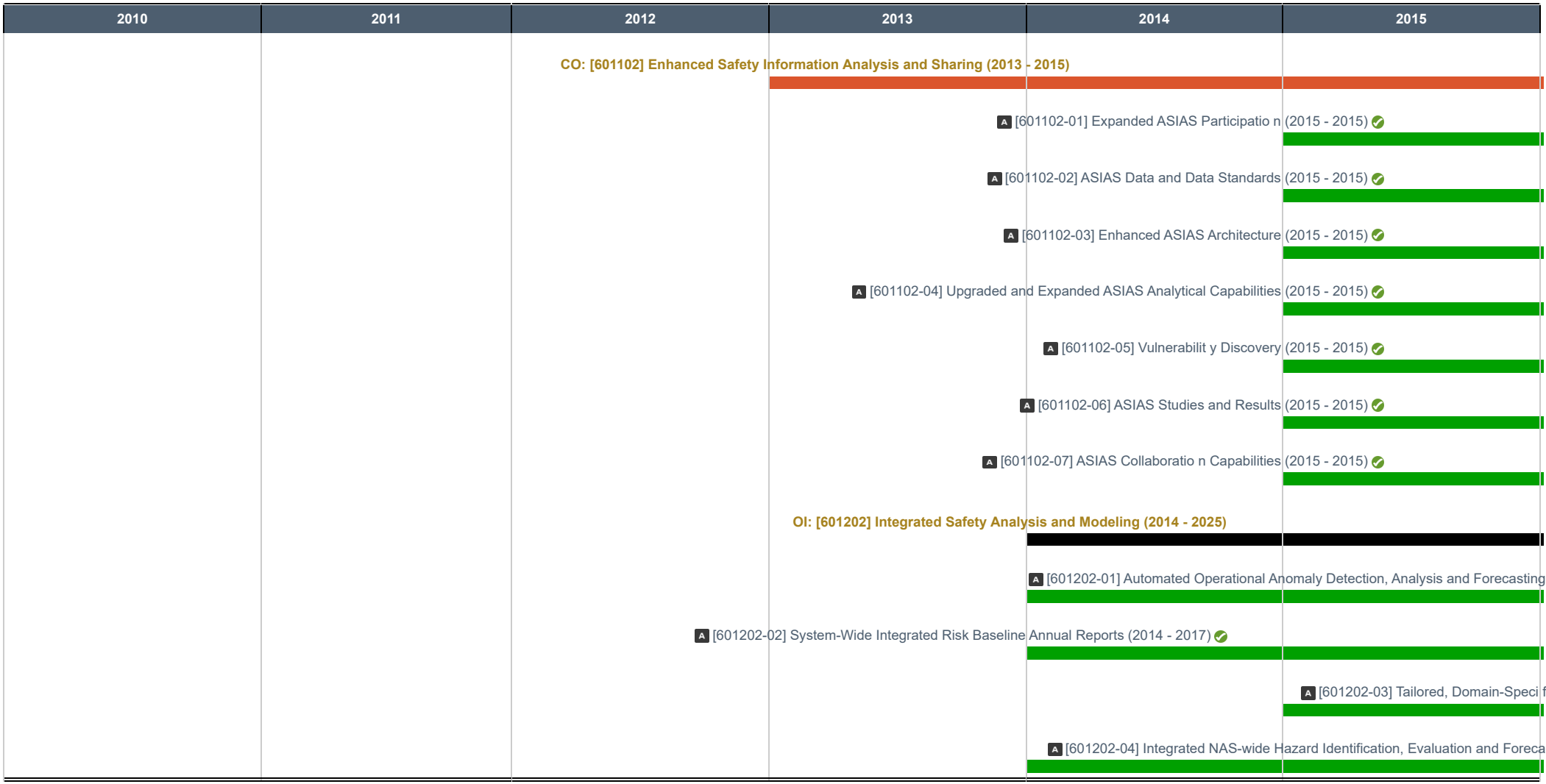
CO: [601102] Enhanced Safety Information Analysis and Sharing (2013 - 2015)

- A [601102-01] Expanded ASIAS Participation **(2015 - 2015)**
- A [601102-02] ASIAS Data and Data Standards **(2015 - 2015)**
- A [601102-03] Enhanced ASIAS Architecture **(2015 - 2015)**
- A [601102-04] Upgraded and Expanded ASIAS Analytical Capabilities **(2015 - 2015)**
- A [601102-05] Vulnerability Discovery **(2015 - 2015)**
- A [601102-06] ASIAS Studies and Results **(2015 - 2015)**
- A [601102-07] ASIAS Collaboration Capabilities **(2015 - 2015)**

OI: [601202] Integrated Safety Analysis and Modeling (2014 - 2025)

- A [601202-01] Automated Operational Anomaly Detection, Analysis and Forecasting Models **(2014 - 2018)**
- A [601202-02] System-Wide Integrated Risk Baseline Annual Reports **(2014 - 2017)**
- A [601202-03] Tailored, Domain-Specific Baseline and Predictive Risk Models (NextGen Portfolio Support) **(2015 - 2018)**
- A [601202-04] Integrated NAS-wide Hazard Identification, Evaluation and Forecasting **(2014 - 2018)**

System Safety Management



Planned | Concept Exploration & Maturation | Development | Inital Operation Available | Complete

OI | CO | COE/CBTE | A Alpha | External Commitment

System Safety Management

CO: [601102] Enhanced Safety Information Analysis and Sharing (2013 - 2015)

Aviation Safety Information Analysis and Sharing (ASIAS) will improve system-wide risk identification, integrated risk analysis and modeling, and implementation of emergent risk management. Source software, meta-ware and analytical processes will be developed to link together existing databases, expert knowledge, the results of experimentation and modeling capability to continually assess the performance of the Air Transportation System (ATS) for safety risk management. All participants in ASIAS, including FAA (such as AVS and ATO), industry, and other government agencies, will collaborate to study and evaluate aggregate level system issues within the ATS at the organization level. Participants will be able to access ASIAS information and analysis tools to support the safety management of their own operations or those they regulate. Collaborative ASIAS activities allow stakeholders to draw on more information as context, to raise issues to be worked by the larger community, and to share their assessments with others. The aggregation of information and the sharing of benchmarks, analysis tools, and issues create a context and framework for individual stakeholders' SMS activities. The modeling and analysis conducted under the AVS System Safety Management Transformation (SSMT) extend the capability of the ASIAS data and stakeholder community to identify and manage systemic risks, as preparation to implementation of NextGen systems, and to monitor the impact of system deployments (including but not exclusively NextGen).

CO Benefit

Safety (S): Improved safety assessment processes and metrics identify trends in order to identify potential safety risks so that they can be mitigated.

System Safety Management

Increments

Alpha

(2010 - 2015)

7

- A [601102-01] Expanded ASIAS Participation (2015 - 2015) (Complete)
- A [601102-02] ASIAS Data and Data Standards (2015 - 2015) (Complete)
- A [601102-03] Enhanced ASIAS Architecture (2015 - 2015) (Complete)
- A [601102-04] Upgraded and Expanded ASIAS Analytical Capabilities (2015 - 2015) (Complete)
- A [601102-05] Vulnerability Discovery (2015 - 2015) (Complete)
- A [601102-06] ASIAS Studies and Results (2015 - 2015) (Complete)
- A [601102-07] ASIAS Collaboration Capabilities (2015 - 2015) (Complete)

System Safety Management

Increments/Enabling Activities

A [601102-01] Expanded ASIAS Participation (2015 - 2015)

Increment Overview

To date, ASIAS has been focused on key U.S. domestic FAR Part 121 operators. In upcoming years, ASIAS will work toward expanding participation to enhance safety throughout the NAS.

Increment Status

Complete

Success Criteria

2015 : Increase participation in ASIAS to address NAS-wide safety risk by the recruitment of General Aviation, Corporate/Business operators, and begin relationships with rotorcraft operators

Implementation Approach

The ASIAS program will lead the process to expand operator participation to enhance safety throughout the NAS. It will conduct stakeholder meeting with business/corporate GA, rotorcraft, UAS, Military, and International ANSPs and organizations. ASIAS will recruit new participants by developing marketing materials and demonstrating ASIAS capabilities and benefits. It will facilitate the process of obtaining participants and negotiate agreements with new operators.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P) ASIAS will support NextGen with in-depth analysis of safety data from industry and government sources to identify existing or prospective operational risks that exist in the NAS.New aviation community participants will provide additional data sources, which enables ASIAS to deliver more value and safety-related insights for a broader set of stakeholders.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601102-02] ASIAS Data and Data Standards (2015 - 2015)

Increment Overview

Each ASIAS data source must support established data quality standards. Data quality standards are unique for each source and are based on the identified purposes and use of the data source as outlined in the ASIAS Data Source Assessment. This enabling activity continues to enhance the data available for ASIAS in addition to implementing data standards within the ASIAS community.

Increment Status

Complete

Success Criteria

2015 : Augment data types, quality and standards, incorporation of Voice Data, FAA LOB, and other aviation sector data in order to more efficiently capture the data needed for enhanced safety analyses.

Implementation Approach

The ASIAS program will continue to obtain additional data sources and develop data standards for efficient data processing. It will enhance existing analytical capabilities to leverage new data sources. ASIAS will deploy Threaded track information that will combine various data sources for each flight. The ASIAS program will establish data standards for all voluntary safety reports, including ASAP data, and Surveillance and Broadcast Services (SBS) data. It will develop rigorous data quality processes and resolve data quality issues.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): ASIAS will support NextGen with fused and aggregated safety information produced from sources across the aviation system. ASIAS data quality and taxonomy standards that will improve the ability of analysts to identify existing or prospective operational risks in the NAS.

System Interactions

No system interactions applicable

System Safety Management

To be determined

System Safety Management

Increments/Enabling Activities

A [601102-03] Enhanced ASIAS Architecture (2015 - 2015)

Increment Overview

One of the principal drivers of the cost of data archiving is the location of the archive servers for the participants. The original ASIAS system was built on a distributed model, with servers on the premises of the participants and high-speed lines to connect to the central analysis station. The cost to the FAA is less for centralized data storage and access. There are other substantial benefits in efficiency, and possibly in fusion capabilities, when data is stored in a central archive. This enabling activity will continue to evolve the ASIAS architecture toward a more centralized model to achieve operational cost efficiencies.

Increment Status

Complete

Success Criteria

2015 : Implement secure cloud-based data storage and computation, resulting in increased storage and computational power necessary for larger datasets and more sophisticated analyses to support improved NAS safety analyses.

Implementation Approach

The ASIAS program will continue to evolve the ASIAS architecture towards a centralized, cloud based model to achieve operational cost efficiencies. It will transition the centralized model to a cloud service provider for data storage, big data analytics, and computations, where governance permits.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): A centralized ASIAS architecture will allow analysts to process, fuse, and mine terabytes of aviation data in a flexible, efficient, cost effective, and secure manner.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601102-04] Upgraded and Expanded ASIAS Analytical Capabilities (2015 - 2015)

Increment Overview

The development of analytical capabilities requires a combination of tailoring commercially available capabilities and researching and developing emerging capabilities to support ASIAS analyses. This enabling activity will upgrade and expand ASIAS capabilities in the areas of dashboards and visualization, metrics and monitoring tools, information management and retrieval, text/digital data fusion, voice recorder to data linkage (including fusion of voice data with threaded track data), development of customized data mining and extraction techniques, and enhanced query tools and techniques (including the capability to query and extract voice data).

Increment Status

Complete

Success Criteria

2015 : Deploy analytical capabilities for directed safety studies and metric development to fuse data sets for query capabilities across ASIAS information (both FAA and proprietary), support vulnerability discovery, in order to efficiently to identified safety risks.

Implementation Approach

The ASIAS program will deploy a capability to query multiple databases, both FAA and protected data, with a graphical interface and integrated search capabilities. It will develop analytical capabilities for using Voice data. It will deploy Trend/Anomaly detection capabilities to find high risk safety events focusing on commercial (Part 121) operations. It will also conduct technology transfer to the FAA of text mining capabilities that incorporate threaded track data. It will develop methodologies to conduct cross data set analysis.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): ASIAS will support NextGen with in-depth analysis of safety data from industry and government sources to identify existing or prospective operational risks that exist in the NAS.Advanced analytical capabilities, data visualization, and comprehensive data will unlock new insights about potential safety risks in both the current NAS and as the NAS evolves with NextGen operational improvements.

System Interactions

System Safety Management

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601102-05] Vulnerability Discovery (2015 - 2015)

Increment Overview

Vulnerability discovery capabilities will leverage commercial tools and will build on the concepts and tools being developed by research organizations, as well as ASIAS. These tools will be used to establish typical behavior so that deviations can be investigated and prioritized for further study. This enabling activity will develop enhanced risk assessment techniques and will enhance the timeliness of NextGen safety analysis results through improved data access, reduction, and management techniques.

Increment Status

Complete

Success Criteria

2015 : Deploy metric monitoring and discovery tools (

Implementation Approach

The ASIAS program will share results from Vulnerability Discovery studies throughout the FAA and with ASIAS stakeholders as appropriate. It will monitor known-risk metrics and disseminate discovered safety vulnerability information to the appropriate stakeholders for mitigation. ASIAS will develop a risk assessment and risk prioritization framework. it will deploy an Airport Safety Event Overview (ASEMO) for monitoring and assessing various safety measures at NAS airports.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): ASIAS Vulnerability Discovery capabilities will utilize known-risk metrics and other measures to enable NextGen safety analysis to determine specific safety needs (e.g., to detect issues after implementing a new procedure) and the ability to monitor and act on NextGen proposed changes.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601102-06] ASIAS Studies and Results (2015 - 2015)

Increment Overview

Under the direction of the ASIAS Executive Board (AEB), ASIAS conducts various studies including directed studies, safety enhancement assessments, known-risk monitoring, and benchmarking. This enabling activity will support sharing of the results of these studies throughout the FAA and the ASIAS community at the direction of the AEB or the ASIAS Issue Analysis Team (IAT).

Increment Status

Complete

Success Criteria

2015 : Develop monitoring metrics for NextGen Implementation.Demonstrate the safety benefits of using fused data sources.Use monitored safety metrics and Bayesian risk assessment model to track the reduction in fatal accident risk resulting from the FAA implementation of CAST Safety Enhancements.

Implementation Approach

ASIAS will conduct in-depth analytical studies as directed by the ASIAS Executive Board (AEB). it will report findings from directed studies to appropriate organizations for risk mitigation. It will also periodically report on initial set of safety metrics.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

Safety (P): ASIAS will support NextGen with in-depth analysis of safety data from industry and government sources to identify existing or prospective operational risks that exist in the NAS. Communication of in-depth analyses to cognizant organizations will improve understanding of safety risks during NextGen OI implementation.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601102-07] ASIAS Collaboration Capabilities (2015 - 2015)

Increment Overview

This enabling activity supports the sharing of ASIAS results and capabilities with and among ASIAS participants, the FAA, and the global aviation safety community.

Increment Status

Complete

Success Criteria

2015 : Participate as a member of the FAA Safety Collaboration Team to identify necessary supporting information and studies in furtherance of FAA safety initiatives and Risk-Based Decision Making.

Implementation Approach

ASIAS will continue to evolve its collaboration capabilities. It will share analytical results and capabilities with ASIAS participants and the FAA. It will provide access by the FAA and ASIAS participants, through collaboration capabilities, to data visualization tools that allow the users to customize parameters and visualization for their own analysis.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): Collaboration will provide ASIAS participants with analytical capabilities to perform safety analyses will assist NextGen airspace redesign activities by providing valuable safety information to alleviate potential safety issues and avoid inadvertently creating new safety issues as a result of a redesign.

System Interactions

No system interactions applicable

To be determined

System Safety Management

OI: [601202] Integrated Safety Analysis and Modeling (2014 - 2025)

This OI mitigates safety risk associated with the design and implementation of NextGen by providing enhanced integrated safety risk assessment methods and anomaly detection tools that support making changes to the air transportation system. By incorporating FAA and industry data, together with Subject Matter Expert (SME) input, this OI develops advanced capabilities for integrated baseline and predictive risk assessment for NAS-wide operations. The OI utilizes improved validation and verification (V&V) processes supporting certification; simulation (fast-time and HITL) protocols that provide enhanced evaluation frameworks for safe operational procedures; and enhanced training requirements analysis for safe system operation.

This OI mitigates safety risk associated with the evolution of NextGen by providing enhanced safety risk assessment methods and anomaly detection tools that support making changes to the air transportation system. The increment's system-wide models account for latent and emerging risk impacts of new technologies and procedures. Together, the models and tools enable enterprise-level views of risk management processes, procedures and technologies; provide common integrated baseline information to support the Concept Readiness Decision (CRD) in the Acquisition Management Process (AMS); and support for cost-benefit decision making and risk-informed rulemaking at the enterprise level. The OI's data collection and analysis protocols underlie predictive models that support user-enabled ""what-if"" assessments and connectivity to the Safety Data Analysis Team's (SDAT) hazard library.

OI Benefit

Safety (S): Improved safety assessment processes and metrics identify trends in order to identify potential safety risks so that they can be mitigated.

Increments

Alpha

(2010 - 2015)

4

A **[601202-01] Automated Operational Anomaly Detection, Analysis and Forecasting Models (2014 - 2018)** (Complete)

A **[601202-02] System-Wide Integrated Risk Baseline Annual Reports (2014 - 2017)** (Complete)

A **[601202-03] Tailored, Domain-Specific Baseline and Predictive Risk Models (NextGen Portfolio Support) (2015 - 2018)** (Complete)

A **[601202-04] Integrated NAS-wide Hazard Identification, Evaluation and Forecasting (2014 - 2018)** (Complete)

System Safety Management

Increments/Enabling Activities

A [601202-01] Automated Operational Anomaly Detection, Analysis and Forecasting Models (2014 - 2018)

Increment Overview

Enables SRMD analysis (through hazard assessment and evaluation) and simulation of new procedures involved in automation integration in the NAS. The enabler provides the capability to identify anomalous behavior in the NAS that is an indicator that a procedure or condition is potentially hazardous, and to provide a forecast of the risk of that behavior post ENABLER implementation. Significant improvement in the modeling and analysis of the impacts of automation on safety are required to manage safety at a level commensurate with its current levels when manual processes are replaced by automation. Automated operations are necessary to achieve Air Transportation System efficiency and capacity benefits. As particular operations become more automated, newly developed operational procedures that involve human interaction must be optimized with assurance that an acceptable level of safety is maintained. Additionally, advanced training concepts will maintain levels of proficiency for humans to conduct safe operations in place of degraded or failed automation.

Increment Status

Complete

Success Criteria

2015 : A database that is updated annually that produces a high fidelity annual NAS wide risk estimates for all historical accident and incident scenarios that have led to fatal accidents in the last 20 years.

Implementation Approach

Implementation is accomplished through coordination with AJI and the Surface Risk Assessment Process teams as well as the Office of Runway Safety. Algorithms, reports and results are shared and confirmed with these program offices as they are evaluated and identified by the anomaly detection software.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): Helps to identify and reduce anomaly rates for flights movements at airports and airborne operations, particularly for arrivals and departures.

System Safety Management

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601202-02] System-Wide Integrated Risk Baseline Annual Reports (2014 - 2017)

Increment Overview

Enables integration of historical risk estimates and hazard information and data for all operational domains in the NAS (ATO, ARP, AVS, AST) and provide all NextGen users with an integrated safety risk baseline.The enabler will employ this baseline risk analysis to deliver an advanced integrated, predictive safety assessment capability that will ensure the management of safety risk associated with complex systems and interactions between these systems. It will develop and provide software, data interchange requirements and monitoring protocols to enable system safety performance assessment.The enabler will allow FAA users to accelerate the detection of unrecognized safety risks and thus contribute to overall safer operational practices and reduce operational risks from the concept design phase of NextGen to full implementation.

Increment Status

Complete

Success Criteria

2014 : An annual document and automated reporting system that provides a safety risk baseline for all fatal accident scenarios, incidents and their precursors. Report and validate metrics for historical trends that compares the risk performance of the NAS versus the FAA strategic plan.

2015 : Update the risk forecast and the ISAM model with new FY15 data

2016 : Update the risk forecast and release ISAM version 2.2

2017 : Update the risk forecast and release ISAM version 3.0

Implementation Approach

The risk baseline analysis is accomplished both through modeling and coordination with all LOBs through the system assessment "table top exercise" process.This is an in-person real-time discussion and simulation activity that is used to validate concepts and models, identify hazards, and provide input with which to create a risk forecast. The SSMT program team conducts monthly meetings with stakeholders and SMEs to get input into the model structure, data and risk estimates produced in this annual report.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

Safety (P): The annual report supports the development of an enterprise-wide system baseline that can be appliedin the acquisition process and in the AMS.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601202-03] Tailored, Domain-Specific Baseline and Predictive Risk Models (NextGen Portfolio Support) (2015 - 2018)

Increment Overview

Individual users will require specific models of risk for their domain (e.g. airports, enroute, terminal ops) and/or specific methods of operation.This enabler provides a tailored system-wide model for individual NextGen user's needs.Models of significant safety risk (collision, high-damage bearing events) and compromise of safe operating conditions for each actor in the NAS (operator, controller, air vehicle, ATC, airport and ground infrastructure) will be constructed by domain (surface, terminal en route and oceanic) and phase of flight.These independent models will be linked to represent integrated risk modeling for all domains and actors to support an integrated safety risk baseline for the entire air navigation system.Modeling will produce annual safety risk baselines for current and future operations given NextGen implementation assumptions.

Increment Status

Complete

Success Criteria

2015 : Create and update annually a NAS wide database that will provide NAS users with the ability to conduct risk based simulations of NAS changes and calculate estimated risk impacts.

2016 : Update a subset of the Event Sequence Diagrams, Fault Trees, quantification of nodes, and UAS operations within ISAM.

2017 : Update the Event Sequence Diagrams, Fault Trees, and quantification of nodes and conduct applied case analyses on the use of ISAM with an operational carrier

2018 : Update the Event Sequence Diagrams, Fault Trees, and quantification of nodes and conduct applied case analyses on the use of ISAM for General Aviation loss of control in flight (LOC-I)

Implementation Approach

Each domain within the NAS (airports, terminal and en-route operations, aircraft, crews, etc.) makes specific contributions to the overall risk in the NAS but the types of risks are unique to each domain. The models developed in this increment are adaptations of the overall NAS-wide model, and are constructed to enhance the ability of the stakeholders to understand and describe their specific risks.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

System Safety Management

Safety (P): Provides integrated, cross-domain safety-related information as NextGen evolves and domain-specific or site-specific when operational improvements are deployed.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

A [601202-04] Integrated NAS-wide Hazard Identification, Evaluation and Forecasting (2014 - 2018)

Increment Overview

Improved hazard modeling supports more reliable V&V processes. In this increment, linkages between hazards identified in SRMDs and potential safety consequences will be modeled for the NextGen portfolio. Models can support simulation (fast-time, HITL, and NRT) and will ensure that systems are certified to be reliable enough to perform automated operations, to include recovery from critical failures, without compromising safe operations. All NAS stakeholders integrated impacts will be represented (AVS, ARP, ATO, AST).

Increment Status

Complete

Success Criteria

2014 : Create and update annually a hazard database which is embedded in the baseline and predictive risk models.Hazards are named according to a standard FAA taxonomy and provided via the web based platform to support RBDM for qualified and permitted users in the NAS community.

2015 : Update embedded hazard database within ISAM to include meta-data from the FAA's Hazard Identification, Risk Management & Tracking (HIRMT) tool.

2016 : Update embedded hazard database within ISAM to include a hazard taxonomy, a data dictionary, and a Human-in-the-Loop (HITL) hazard assessment.

2018 : Develop and implement barrier analysis and sensitivity analysis dashboards within ISAM to enable identification of barrier failure and the mapping of accidents and incidents to hazards.

Implementation Approach

The RBDM program has developed an enterprise level capture process for SRMD outputs; the hazard data collected in that manner will be passed through to the ISAM model and incorporated in the risk modeling, the assessments and the annual reports. Coordination with RBDM Common Taxonomy Team and Hazard Identification, Risk Management & Tracking (HIRMT) tool will ensure consistent definitions of hazards. Further development of Accident DNA (A-DNA) tools will support linkages between ISAM and NTSB accident reports.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

System Safety Management

Safety (P): Improves the SRMD process, improves the risk baseline and risk tracking process and helps to generate and validate requirements for system implementation to meet safety criteria by linking hazard analyses to data reflecting the rate and potential severity of these risks. Reduces the deployment time and costs associated with potential safety roadblocks to implementation by providing specific identification of incidents or accidents that might result from hazards identified in the SRMD process, and provides a method of tracking the impact of safety mitigation strategies on these hazards.

System Interactions

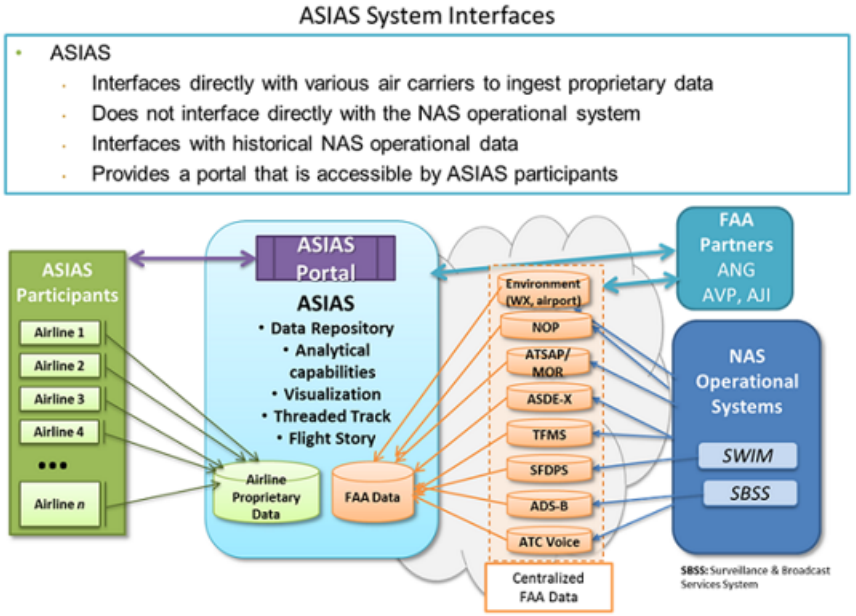
No system interactions applicable

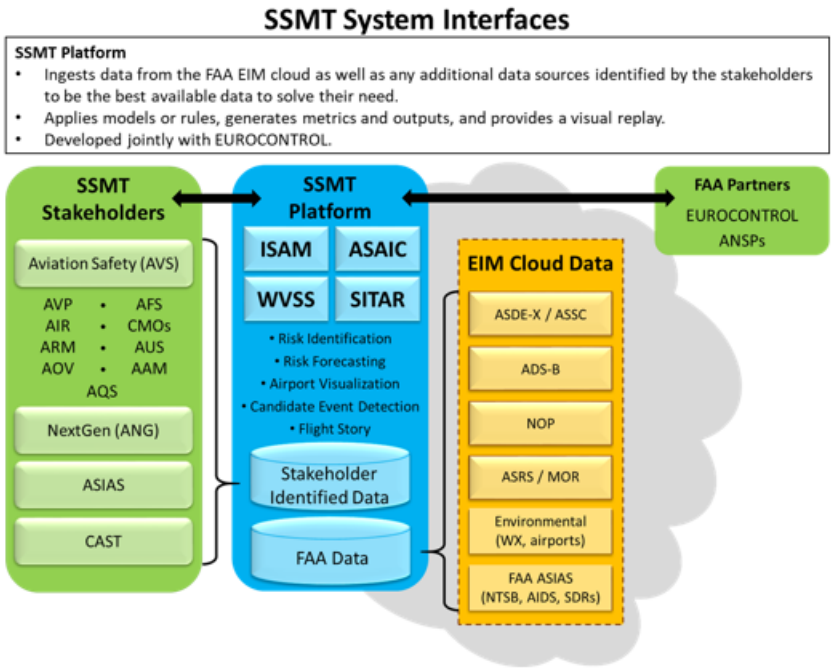
To be determined

System Safety Management

Systems Interactions

Safety System Management (SSM) aims to keep pace with planned growth and complexity in the air transportation system by developing and implementing the analytical tools, processes, and policies that the FAA and industry will use to ensure safety. Combining the efforts between Aviation Safety Information Analysis and Sharing (ASIAS) and System Safety Management Transformation (SSMT) to discover and analyze safety risks in the NAS and supports safety enhancements to mitigate risk.





System Safety Management

Increment
A [601102-01] Expanded ASIAS Participation
A [601102-02] ASIAS Data and Data Standards
A [601102-03] Enhanced ASIAS Architecture
A [601102-04] Upgraded and Expanded ASIAS Analytical Capabilities
A [601102-05] Vulnerability Discovery
A [601102-06] ASIAS Studies and Results
A [601102-07] ASIAS Collaboration Capabilities
A [601202-01] Automated Operational Anomaly Detection, Analysis and Forecasting Models
A [601202-02] System-Wide Integrated Risk Baseline Annual Reports
A [601202-03] Tailored, Domain-Specific Baseline and Predictive Risk Models (NextGen Portfolio Support)
A [601202-04] Integrated NAS-wide Hazard Identification, Evaluation and Forecasting

Operationally Available | Complete | In Service System | Planned System

P Primary Systems | S Secondary Systems | T Tertiary Systems | A Avionics Systems

A Alpha

System Safety Management

Stakeholders

Specific roles and responsibilities for the execution of the enabling activities in this portfolio are outlined in the RASCI (Responsible, Accountable, Supporting, Consulted, Informed) matrix. All stakeholder organizations involved in the delivery of capabilities/enabling activities are listed across the top. SSM enabling activities are listed on the left side of this table. ASIAS stakeholders include broad representation within the FAA to include the Air Traffic Organization (ATO), Flight Standards (AFS), AUS, ANG, and multiple other organizations. Stakeholder organizations are represented in an external governance body, the ASIAS Executive Board (AEB), which develops policy, prioritizes and approves studies, and reviews and disseminates ASIAS findings. The AEB consists of two co-chairs, one representing the aviation industry and the other from AVS. The AEB includes representatives of various FAA offices, NASA, commercial airlines, manufacturers, and labor organizations. AEB decision making is accomplished by consensus agreement. Stakeholder organizations will be represented through a newly-formed SSMT Stakeholder Group (SSG) which will meet semi-annually. Members of this group will inform the SSMT program manager and SSMT Technical Lead of their requirements for independent and integrated use of the SSMT toolkit. The SSG will provide input on program development and investment and prioritization of new capabilities and applied case studies as well as disseminate the results of the studies and the utilization of SSMT tools within members' organizations. The SSG will be chaired by the SSMT Technical Lead and will include the SSMT Program Manager, the AVP -220 Integration Manager, the ASIAS Program Manager, the System Safety Management Portfolio Manager, and representatives of various FAA offices and NASA.

A	Accountable for the completion of NextGen capability. The highest level within the RASCI matrix, this office is charged by the FAA to deliver a particular capability. Typically, this designation is provided via an AcquisitionProgram Baseline. To foster a clear line of accountability, two different offices can never be Accountable for the same increment, andAccountability can never be delegated to another office.
R	Responsible for the successful completion of NextGen capability or a critical component of the capability. This office is responsible to theAccountable office. The Responsible office is responsible for initiating an actual change to the NAS such as automation changes, and is often also designated as the Accountable office for that increment. However, there are examples in the NSIP where one office is Accountable for an increment while another office (or offices) is actually making a change in the NAS on behalf of the Accountable office.
A/R	Accountable for the completion of NextGen capability as well as Responsible for its implementation.
S	Supports the Responsible office in the implementation of NextGen capability.Typically, this support is in the form of subject matter expertise, procedural guidance, or training activities.
C	Consulted for input during the implementation of NextGen capability. Provides input on a specific aspect in the development and implementation of a capability, such as safety analysis or approval. Input may or may not be used as determined by the Responsible and Accountable offices.
I	Informed about the progress of implementation.

System Safety Management

RASCI Matrix	ANG			ARP	AVP	AVS	AJI				AJM		AJV	AFS	AOV	APO	AIR
	C7	1	B	001	001	001	0	3	1	2	0	22	0	001	001	001	001
• A [601102-01] Expanded ASIAS Participation (2015 - 2015)																	
• A [601102-02] ASIAS Data and Data Standards (2015 - 2015)	C			I		A/R		S	S	S		C		C	S		C
• A [601102-03] Enhanced ASIAS Architecture (2015 - 2015)	C					A/R		S	S	S		C		C	S		C
• A [601102-04] Upgraded and Expanded ASIAS Analytical Capabilities (2015 - 2015)	C					A/R		S	S	S		C		C	S		C
• A [601102-05] Vulnerability Discovery (2015 - 2015)	C			C		A/R		S	S	S		C		C	S		C
• A [601102-06] ASIAS Studies and Results (2015 - 2015)	C			C		A/R		S	S	S		C		C	S		C
• A [601102-07] ASIAS Collaboration Capabilities (2015 - 2015)	C			C		A/R		S	S	S		C		C	S		C
• A [601202-01] Automated Operational Anomaly Detection, Analysis and Forecasting Models (2014 - 2018)	C					A/R		C	C	C		C		C	I		C
• A [601202-02] System-Wide Integrated Risk Baseline Annual Reports (2014 - 2017)	C					A/R		C	C	C		C		C	I		C
• A [601202-03] Tailored, Domain-Specific Baseline and Predictive Risk Models (NextGen Portfolio Support) (2015 - 2018)	C					A/R		C	C	C		C		C	I		C
• A [601202-04] Integrated NAS-wide Hazard Identification, Evaluation and Forecasting (2014 - 2018)	C					A/R		C	C	C		C		C	I		C

Appendix B

Bravo Increments

Portfolio Overview

The planned growth and complexity in the air transportation system requires a fundamental change in the way the air transportation community manages safety. System safety management research provides a shared, proactive approach to identifying, assessing and mitigating risk, enabling all stakeholders to be more effective in their approach to managing safety.

This portfolio contains activities that will improve safety in the NAS and ensure that changes introduced with NextGen capabilities enhance safety. These activities will support development of safety standards and risk mitigation efforts to be applied systematically to the air transportation system in order to support improved safety practices.

System Safety Management benefits the American Public by reducing aviation accidents and fatalities across a broad range of aviation communities. Aviation Safety Information Analysis and Sharing (ASIAS) discovers and analyzes safety risks in the NAS and supports safety enhancements to mitigate risk, working with the Commercial Aviation Safety Team (CAST), the General Aviation Joint Steering Committee (GAJSC), Unmanned Aircraft Safety Team (UAST), FAA stakeholders and other government agencies. System Safety Management Transformation (SSMT) discovers safety risks in the NAS through its anomaly detection tools and analyzes those risks through its integrated baseline safety risk models, contributing to overall safety through risk-informed evaluation of proposed changes to operations and proposed safety enhancements.

The SSM portfolio includes the following projects:

- ASIAS: A collaborative government and industry initiative to share and analyze data to proactively discover system safety concerns before accidents or incidents occur, leading to timely mitigation and prevention. Information shared within ASIAS will be used to enable future System Safety Assessment.

- SSMT: A stakeholder-driven, cross-functional effort to incorporate best-available and most timely safety risk data and current and forecasted operations spanning NAS operations. Its anomaly detection and safety risk assessment tools reflect historical fatal accidents and significant incidents, represent potential system failures and barrier successes and inter-dependencies, and support identification of latent and emergent risk

Note: The dates and timelines included in the NAS Segment Implementation Plan (NSIP) are for planning purposes only. All capability schedules are tentative until their supporting programs are officially baselined.

System Safety Management

Portfolio Content Summary Statistics

		Increment Status				
Segment	Total by Segment	Planned	Concept Exploration & Maturation	Development	Initial Operational Availability	Completed
*Bravo (2016 - 2020)	8	0	0	0	0	8
TOTAL	8	0	0	0	0	8
Segment	**% by Segment**	**% by Segment/Increment Status**				
*Bravo (2016 - 2020)	100%	0 %	0 %	0 %	0 %	100 %
TOTAL	100%	0 %	0 %	0 %	0 %	100 %

System Safety Management

Operational Improvements/Current Operations & Increments

Benefits

CO: [601103] Safety Information Sharing and Emergent Trend Detection (2016 - 2021)

- B [601103-01] Additional ASIAS Participants **(2016 - 2021)**
- B [601103-02] NextGen Enabled Data **(2016 - 2021)**
- B [601103-03] Architecture Evolution and NextGen Support **(2016 - 2021)**
- B [601103-04] Analytical Capabilities in Support of NextGen **(2016 - 2021)**
- B [601103-05] Automated Vulnerability Discovery **(2016 - 2021)**
- B [601103-06] Continued Studies and Results **(2016 - 2021)**
- B [601103-07] Expanded Collaboration Environments **(2016 - 2021)**

OI: [601202] Integrated Safety Analysis and Modeling (2014 - 2025)

- B [601202-05] Integrated NAS-wide Automation System Modeling and Anomaly Detection **(2016 - 2020)**

External Commitment | Primary Benefit | Secondary Benefit | Operationally Available | Complete

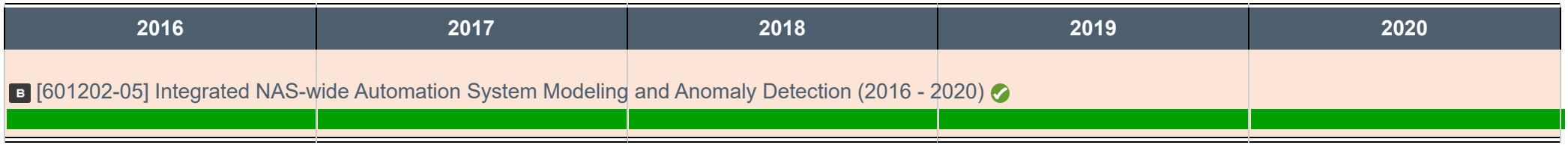
Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety | B Bravo

System Safety Management

Planned | Concept Exploration & Maturation | Development | Inital Operation Available | Complete

OI | CO | COE/CBTE | B Bravo | External Commitment

System Safety Management



Planned | Concept Exploration & Maturation | Development | Inital Operation Available | Complete

OI | CO | COE/CBTE | B Bravo | External Commitment

2023 Approved Baseline

FOR INTERNAL FAA USE ONLY

System Safety Management

CO: [601103] Safety Information Sharing and Emergent Trend Detection (2016 - 2021)

Further enhancements to Aviation Safety Information Analysis and Sharing (ASIAS) will provide additional improvements in the identification of risks and vulnerabilities in the NAS. Through the development and sharing of emergent trend detection and other analytical techniques with stakeholders, additional potential system vulnerabilities will be identified in order for both internal FAA and external stakeholders to develop and implement mitigation strategies.

The ability to better assess potential safety issues will be further enhanced through the expansion of the fused data set to incorporate data from new deployed NextGen operational systems and data needed to assess additional aircraft types including general aviation and rotorcraft. Disparate aviation data sources will be aggregated in a central repository, increasing its potential value for analysis-based insights. Data from these disparate sources (e.g., weather, narrative, and terrain data) will be integrated using a threaded track capability in order to create a synthetic trajectory that depicts an optimal representation of an aircraft's end-to-end flight position that provide analysts greater context for safety reports. These improvements will provide supplemental information and enable monitoring for a wider range of system indicators and lay the foundation for the development of increasingly complex metrics and analytical capabilities.

New adaptive analytic strategies will support an automated identification of safety risks. Analytical model improvements include both empirical/regression models and a vulnerability discovery-based risk model. Additional enhancements to improve risk identification include the ability to assess all flight phases and 3-D and geospatial visualization capabilities that will improve data analysis and interpretation. ASIAS will further develop and refine NextGen known-risk monitoring metrics and directed studies, including studies for general aviation (GA) and rotorcraft. Technology transfer of these capabilities to the FAA and industry stakeholders will be made as appropriate.

CO Benefit

Safety (S): Improved safety assessment processes and metrics identify trends in order to identify potential safety risks so that they can be mitigated.

System Safety Management

Increments

Bravo

(2016 - 2020)

7

- B [601103-01] Additional ASIAS Participants (2016 - 2021) (Complete)
- B [601103-02] NextGen Enabled Data (2016 - 2021) (Complete)
- B [601103-03] Architecture Evolution and NextGen Support (2016 - 2021) (Complete)
- B [601103-04] Analytical Capabilities in Support of NextGen (2016 - 2021) (Complete)
- B [601103-05] Automated Vulnerability Discovery (2016 - 2021) (Complete)
- B [601103-06] Continued Studies and Results (2016 - 2021) (Complete)
- B [601103-07] Expanded Collaboration Environments (2016 - 2021) (Complete)

System Safety Management

Increments/Enabling Activities

B [601103-01] Additional ASIAS Participants (2016 - 2021)

Increment Overview

This enabling activity comprises a significant expansion of ASIAS participation to include other aviation communities (GA, rotorcraft, UAS) and global collaboration. This enabling activity will establish participation in ASIAS by corporate/business operators (e.g., high-end) based upon risk-based, statistically significant standards and establish data-sharing agreements with key international carriers operating in U.S. airspace, to improve visibility of safety issues that ASIAS can directly influence. In addition, both GA and rotorcraft ASIAS portals will be deployed in which directed studies, known risk monitoring, and information sharing among GA operators can be conducted for issues specifically related to the GA and rotorcraft communities.

Increment Status

Complete

Success Criteria

2019 : Integrate additional General Aviation operators into the ASIAS program and specialized safety studies, metrics, and event monitoring to increase the breadth and depth of safety analyses.

2021 : Enable data sharing relationships and/or capability with new communities such as rotorcraft and international operators.

Implementation Approach

The ASIAS program will conduct activities to establish relationships with data contributing partners across the aviation system. Diverse operational communities will be engaged, including general aviation, corporate/business aviation, and international.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): Gathering an expanded set of data inflows will allow for improved analytical capabilities to assess interactions between different operations (i.e., interactions between GA and commercial ops) and will enable improved capabilities for ASIAS to provide safety analyses to other operational sectors such as GA, RC, UAS, etc.

System Interactions

No system interactions applicable

System Safety Management

To be determined

System Safety Management

Increments/Enabling Activities

B [601103-02] NextGen Enabled Data (2016 - 2021)

Increment Overview

As NextGen matures, additional safety data through changes in technology and procedures will become essential for ASIAS safety analysis.This enabling activity incorporates these new data sources into ASIAS, including the incorporation of Surveillance Broadcast Service (SBS) data (e.g., ADS-B) into the ASIAS data set, the assessment of the value of ADS-B data as source of surface data at non-ASDE-X airports, and support the development of standards for SBS data quality.Further, under this enabling activity, initial uses of ASDE-X, voice, and GA digital flight data will be consolidated and expanded, including the establishment of test projects involving select ARTCC, TRACON and ATCT facilities.

Increment Status

Complete

Success Criteria

2019 : Incorporate new data sources (e.g. ADS-B) into ASIAS determined by a risk-based benefits assessment, fusing to current data where possible.

2020 : Develop data mining capabilities which leverage the new information in NextGen and ASIAS safety analyses.

2021 : Assess gaps in ASIAS data sources and collect additional data.

Implementation Approach

ASIAS will continue to lead the ASIAS Data and Data Standards effort to enhance the data available for NextGen. ASIAS will incorporate initial voice data into the ASIAS data set as appropriate. ASIAS will ensure that SBS data is available for use in ASIAS vulnerability discovery and ASIAS studies. ASIAS will also incorporate available General Aviation, Rotorcraft, and additional data into the ASIAS data set, as permitted by governance.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): As new aviation communities are included in ASIAS, they will bring additional and new types of data. This will substantially increase the value of analyses using this data fused with the airline data, particularly with respect to the identification of contributing factors.

System Safety Management

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

B [601103-03] Architecture Evolution and NextGen Support (2016 - 2021)

Increment Overview

This enabling activity evolves the ASIAS architecture to support the ingestion of NextGen data for safety analysis along with new efficiencies that are identified as technology evolves, and will include the deployment of data storage capabilities that are expanded to support additional data sources and resultant data fusion (e.g., expanded threaded track).From an ASIAS architecture evolution point of view, this enabling activity will comprise the isolation of proprietary ASIAS data on a secure private network, the transition to virtual storage and cloud capabilities, and the replacement of legacy distributed servers with a centralized model as part of tech refresh. ASIAS architectural enhancements will also be deployed to support the collection of General Aviation data.Finally, this enabling activity will include the modification of the underlying ASIAS architecture as needed to support the use of emerging technologies (e.g., smart phones, tablets, etc.), and the modification of the underlying architecture as needed to support access of enhanced data visualization tools by FAA and ASIAS participants.

Increment Status

Complete

Success Criteria

2021 : Deploy an architecture to support GA and Rotorcraft safety analyses. Develop collaboration enclaves for FAA, airlines, research institutions, or government agencies which enable cross-institutional collaboration and sharing of safety information.

Implementation Approach

The ASIAS program will continue to evolve the ASIAS Architecture to achieve operational cost efficiencies. ASIAS will transition to cloud services where possible, for participant data storage and computational resources where governance permits.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): The creation of a cloud-based architecture will provide efficient, flexible, and secure solutions for robust data fusion of disparate data sets that can be mined for potential causal factors, providing a rich context for the understanding of safety events across intersecting NAS operations.

System Safety Management

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

B [601103-04] Analytical Capabilities in Support of NextGen (2016 - 2021)

Increment Overview

This enabling activity will include the deployment of expanded ASIAS analytical capabilities that cover all phases of flight. This enabling activity includes the practical assessment of capabilities, the use of an automated approach for creating regression models based on a linked data archive, and the evolution of the safety risk model to include an expanded set of risk factors from vulnerability discovery. This enabling activity will also include deployment of trend/anomaly detection capabilities that incorporate risk modeling of safety events to find high-risk flights not accounted for by current risk models and deployment of enhanced text mining capabilities, providing the FAA and ASIAS participants with additional web-based applications and capabilities, which incorporate fused data sets and a methodology for cross-data set analysis, and which fully integrate pilot-controller voice communications data.Visualization capabilities will also be deployed with links to related data layers to enable visualization of all relevant data sources.

Increment Status

Complete

Success Criteria

2020 : Deploy capabilities for trend/anomaly detection of high risk or otherwise anomalous flight states. Develop analytic tools and techniques to leverage fused data sets which may include any collected voice data. Deploy ASIAS analytic capabilities for greater community availability. Make available to FAA and ASIAS participants data mining capabilities, trend tracking, and anomaly detection technology for use on their own data as governance permits.

2021 : Develop time-series forecasting capability to address data latencies that impact ASIAS metrics

Implementation Approach

The ASIAS program will deploy Trend/Anomaly Detection Capabilities to find high-risk safety events for operations across the NAS. It will also deploy data fusion capabilities to enable multiple data set views of flights to assess safety impacts of operations and procedures. It will continue to refine data mining capabilities, including the enhancement of unstructured data sources. ASIAS will share results of analytical capabilities of ASIAS with the FAA and other stakeholders, as appropriate.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

System Safety Management

Safety (P): Being able to detect trends and anomalies in data is a crucial to the FAA Risk-Based Decision Making initiative and understanding the safety risks in the NAS. ASIAS' analytical, trending and anomaly detection capabilities will empower participants to rapidly communicate that have been discovered for NAS operations.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

B [601103-05] Automated Vulnerability Discovery (2016 - 2021)

Increment Overview

As NextGen matures, ASIAS vulnerability discovery of aviation safety risks will need to become more automated and enable analysis on more types of data sources.This enabling activity will comprise the implementation of additional data fusion capabilities required for vulnerability discovery (e.g., data fusion of digital textual data and voice) to alert on non-typical flight and system behavior, the application of risk assessment to proposed NextGen changes to prioritize changes for applicable development of vulnerability detection capabilities, the application of available vulnerability discovery research techniques to monitor and identify heretofore unknown risks as initial NextGen changes are implemented (i.e., new RNAV procedures, changes in airspace design), and the expansion of vulnerability discovery techniques employed for assessing proposed NextGen changes prior to implementation.

Increment Status

Complete

Success Criteria

2020 : Deploy capability for exploratory analysis on text incident report data, and for vulnerability assessment on fused text, voice and digital data where governance permits. Deploy vulnerability discovery capability to assess safety impacts of implemented NAS changes based on data analyses.Implement ability to monitor safety metrics for a wide spectrum of aviation risks.

2021 : Develop artificial intelligence/advanced technologies to advance predictive capabilities

Implementation Approach

ASIAS will deploy automated capabilities to alert on non-typical flight and system behavior. It will develop a more comprehensive, formal method for monitoring recent text reports to detect emerging and previously unknown systemic problems. Vulnerability Discovery will include a capability to search for additional, more frequent, precursors from rare (infrequent) known event types. It will provide additional scrutiny to detect safety problems that may result from announced changes to the NAS, such as a closed runway, new arrival procedures at an airport, or a proposed NextGen initiative.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

System Safety Management

Safety (P): ASIAS will support the FAA's Risk-Based Decision Making initiatives and NextGen with in-depth analysis of safety data from industry and government sources to identify existing or prospective operational risks that exist in the NAS. Enhanced ASIAS capabilities will allow for NAS-wide analyses to determine whether issues or concerns are widespread or localized to a particular carrier, fleet, airport, etc.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

B [601103-06] Continued Studies and Results (2016 - 2021)

Increment Overview

As NextGen matures, ASIAS studies will be extended to include data from international carriers and will include the monitoring of NextGen known-risk metrics.The work under this enabling activity will comprise the alignment of directed studies and analytical techniques with NextGen system changes (e.g., ATM procedures, airspace redesign) and community changes (e.g., fleet changes, avionics), for analysis of known risks, safety enhancements, and benchmarks.Further, at the direction of the ASIAS Executive Board (AEB), ASIAS will incorporate international carrier data for U.S. locations into ASIAS studies, benchmarks, known-risk monitoring and directed studies, and will incorporate safety issues into directed studies at international locations that could pose risk to U.S. carriers, with the potential to influence safety improvements based upon a risk assessment framework.Finally, under this enabling activity and at the direction of the AEB, ASIAS will expand studies beyond those affecting commercial aviation in the NAS through assessment of issues that impact multiple segments of the aviation community (e.g., interaction of GA and commercial aviation) as well as targeted studies for specific communities such as rotorcraft or GA fixed-wing aircraft.

Increment Status

Complete

Success Criteria

2020 : Align ASIAS studies and reporting with NextGen and operator procedural or system changes, to support and demonstrate the use of ASIAS monitoring and analysis capabilities

2021 : Provide FAA controlled access to ASIAS safety information through expanded of Summary Information Request process

Implementation Approach

The ASIAS program will continue to perform Directed Studies as directed by the AEB and respond to other information requests from FAA and safety organizations. It will expand ASIAS studies by assessing issues that impact multiple segments of the aviation community (e.g., interaction of GA and commercial aviation). It will also expand ASIAS studies to include risks at international locations where U.S. operators operate.

Benefits

Access & Equity Capacity Flexibility Efficiency Environment Predictability Safety

System Safety Management

Safety (P): Directed Studies support the ASIAS participants and stakeholders by identifying and characterizing systemic aviation risks. Results of Directed studies will be available to appropriate FAA LOBs and other aviation stakeholders for consideration in future airspace and procedure designs, and other NAS improvements.

System Interactions

No system interactions applicable

To be determined

System Safety Management

Increments/Enabling Activities

B [601103-07] Expanded Collaboration Environments (2016 - 2021)

Increment Overview

As NextGen matures, the ASIAS collaboration environment will expand to support other FAA Lines of Business (LOBs) and will provide enhanced capabilities including 3D visualizations.This enabling activity will initiate delivery of ASIAS capabilities and products in support of FAA stakeholder organizations identified in outreach meetings with identified FAA LOBs (i.e., ATO, ARP, and ANG communities).Further, ASIAS will technology-transfer full text mining capabilities to FAA and ASIAS participants for use on their own data under this enabling activity.Finally, ASIAS will deploy via collaboration capabilities an initial and an expanded set of NextGen known-risk monitoring metrics, and will deploy through collaboration methodologies (e.g., portal) quarterly known-risk monitoring, benchmarks and trending to the FAA and ASIAS as appropriate.

Increment Status

Complete

Success Criteria

2020 : Provide collaboration capabilities via emerging technologies to the FAA and ASIAS participants, via community-targeted InfoShare event, through cross-Agency support of FAA safety initiatives and Risk-Based Decision Making, and through improved information sharing across FAA and industry stakeholders.

2021 : Establish a shared analytical enclave where approved data can be shared and stored

Implementation Approach

ASIAS will develop enhanced collaboration capabilities and expand the types of information shared among ASIAS stakeholders. It will provide collaboration by the U.S. aviation community through ASIAS InfoShare events. It will develop an integrated Portal to share information with new communities, such as General Aviation. It will provide collaboration with the international aviation community through aviation forums featuring presentations by ASIAS and international participants on aviation safety risks.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): Enhanced collaboration across the aviation community will help deliver expanded ASIAS capabilities and products in support of NextGen and FAA stakeholder organizations. Collaboration and sharing of ASIAS information will inform proposed changes

to the NAS, such as improved closely spaced parallel runway operations and/or changes in airspace and procedures.

System Interactions

No system interactions applicable

To be determined

System Safety Management

OI: [601202] Integrated Safety Analysis and Modeling (2014 - 2025)

This OI mitigates safety risk associated with the design and implementation of NextGen by providing enhanced integrated safety risk assessment methods and anomaly detection tools that support making changes to the air transportation system. By incorporating FAA and industry data, together with Subject Matter Expert (SME) input, this OI develops advanced capabilities for integrated baseline and predictive risk assessment for NAS-wide operations. The OI utilizes improved validation and verification (V&V) processes supporting certification; simulation (fast-time and HITL) protocols that provide enhanced evaluation frameworks for safe operational procedures; and enhanced training requirements analysis for safe system operation.

This OI mitigates safety risk associated with the evolution of NextGen by providing enhanced safety risk assessment methods and anomaly detection tools that support making changes to the air transportation system. The increment's system-wide models account for latent and emerging risk impacts of new technologies and procedures. Together, the models and tools enable enterprise-level views of risk management processes, procedures and technologies; provide common integrated baseline information to support the Concept Readiness Decision (CRD) in the Acquisition Management Process (AMS); and support for cost-benefit decision making and risk-informed rulemaking at the enterprise level. The OI's data collection and analysis protocols underlie predictive models that support user-enabled ""what-if"" assessments and connectivity to the Safety Data Analysis Team's (SDAT) hazard library.

OI Benefit

Safety (S): Improved safety assessment processes and metrics identify trends in order to identify potential safety risks so that they can be mitigated.

Increments

Bravo

(2016 - 2020)

1

B [601202-05] Integrated NAS-wide Automation System Modeling and Anomaly Detection (2016 - 2020) (Complete)

System Safety Management

Increments/Enabling Activities

B [601202-05] Integrated NAS-wide Automation System Modeling and Anomaly Detection (2016 - 2020)

Increment Overview

NextGen will introduce significant increases in the use of automated systems for information collection, notification, decision making and control.The complexity introduced by the interactions between these systems, the human operator, and existing infrastructure will require advanced methods for safety monitoring and assurance.This enabling step will provide a methodology to evaluate the safety of new automation systems as they are integrated into the NAS, and to monitor and evaluate the complex impacts of automation after implementation.Significant improvement in the modeling and analysis of the impacts of automation on safety are required to manage safety at a level commensurate with its current levels when manual processes are replaced by automation. This enabler provides analysts with the capability to evaluate the impact of newly developed operational procedures that involve human interaction with this new automation and establish assurance that an acceptable level of safety is maintained. Additionally, the enabler supports the development of advanced training concepts that can help personnel to maintain the necessary levels of proficiency for humans to conduct safe operations in place of degraded or failed automation.

Increment Status

Complete

Success Criteria

2016 : Create and update a database of historical hazard data as new complex systems are implemented. Create a baseline risk analysis of events related to automation hazards and feed as an input into the predictive model.

2017 : Update the database of historical hazard data through an automation related prototype of a safety analysis of candidate surface events for 5 major US airports (ATL, JFK, ORD, HOU, SFO). Update the baseline risk analysis.

2018 : Support the research and design of the study for SE210: Airplane State Awareness - Flight Crew Performance Data and update the database of historical hazard data through a review and quantification of new or developing systems associated with Event Sequence Diagrams and Fault Trees that were updated during 2018. Update the baseline risk analysis.

2020 : Develop and quantify ESDs and Fault Trees for small UAS operations in the NAS for use in risk informed rulemaking. Update the baseline risk analysis.

Implementation Approach

Data collection and modeling will occur through direct cooperation with an OEM and other FAA offices for data feeds. Definition of anomalies, modeling, consequence definition and frequency detection will be performed through a cooperative effort with these

stakeholders.

Benefits

Access & Equity | Capacity | Flexibility | Efficiency | Environment | Predictability | Safety

Safety (P): This enabler provides analysts with the capability to evaluate the impact of newly developed operational procedures that involve human interaction with this new automation and establish assurance that an acceptable level of safety is maintained.

System Interactions

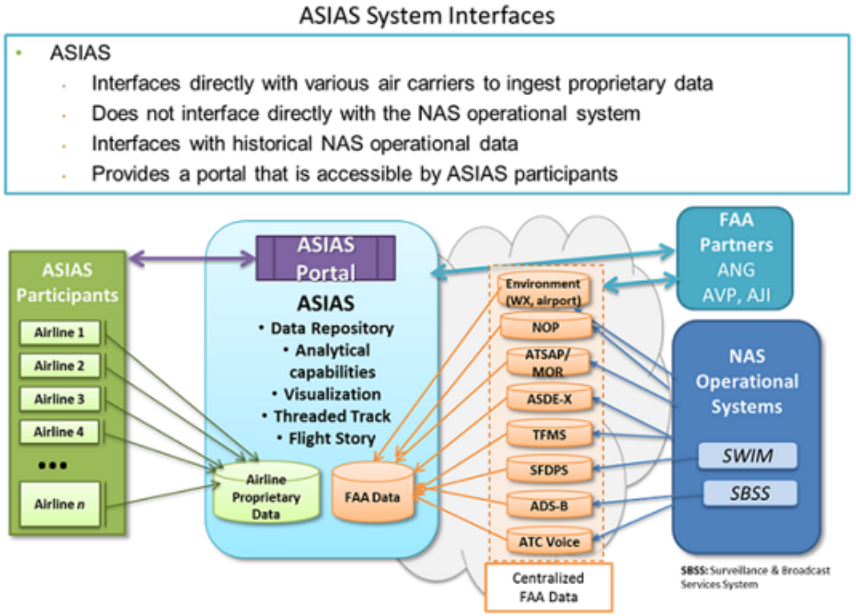
No system interactions applicable

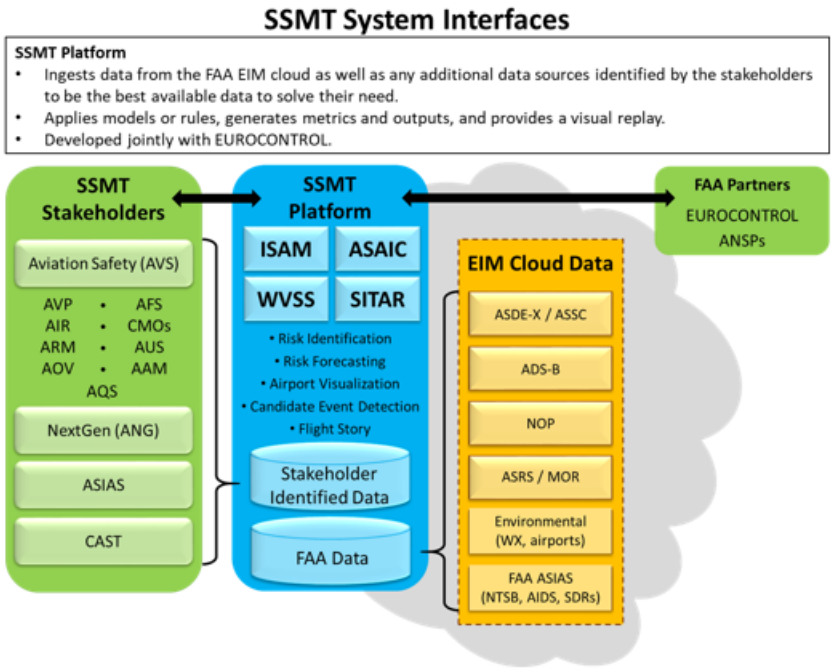
To be determined

System Safety Management

Systems Interactions

Safety System Management (SSM) aims to keep pace with planned growth and complexity in the air transportation system by developing and implementing the analytical tools, processes, and policies that the FAA and industry will use to ensure safety. Combining the efforts between Aviation Safety Information Analysis and Sharing (ASIAS) and System Safety Management Transformation (SSMT) to discover and analyze safety risks in the NAS and supports safety enhancements to mitigate risk.





System Safety Management

Increment
B [601103-01] Additional ASIAS Participants
B [601103-02] NextGen Enabled Data
B [601103-03] Architecture Evolution and NextGen Support
B [601103-04] Analytical Capabilities in Support of NextGen
B [601103-05] Automated Vulnerability Discovery
B [601103-06] Continued Studies and Results
B [601103-07] Expanded Collaboration Environments
B [601202-05] Integrated NAS-wide Automation System Modeling and Anomaly Detection

Operationally Available | Complete | In Service System | Planned System

P Primary Systems | S Secondary Systems | T Tertiary Systems | A Avionics Systems

B Bravo

System Safety Management

Stakeholders

Specific roles and responsibilities for the execution of the enabling activities in this portfolio are outlined in the RASCI (Responsible, Accountable, Supporting, Consulted, Informed) matrix. All stakeholder organizations involved in the delivery of capabilities/enabling activities are listed across the top. SSM enabling activities are listed on the left side of this table. ASIAS stakeholders include broad representation within the FAA to include the Air Traffic Organization (ATO), Flight Standards (AFS), AUS, ANG, and multiple other organizations. Stakeholder organizations are represented in an external governance body, the ASIAS Executive Board (AEB), which develops policy, prioritizes and approves studies, and reviews and disseminates ASIAS findings. The AEB consists of two co-chairs, one representing the aviation industry and the other from AVS. The AEB includes representatives of various FAA offices, NASA, commercial airlines, manufacturers, and labor organizations. AEB decision making is accomplished by consensus agreement. Stakeholder organizations will be represented through a newly-formed SSMT Stakeholder Group (SSG) which will meet semi-annually. Members of this group will inform the SSMT program manager and SSMT Technical Lead of their requirements for independent and integrated use of the SSMT toolkit. The SSG will provide input on program development and investment and prioritization of new capabilities and applied case studies as well as disseminate the results of the studies and the utilization of SSMT tools within members' organizations. The SSG will be chaired by the SSMT Technical Lead and will include the SSMT Program Manager, the AVP -220 Integration Manager, the ASIAS Program Manager, the System Safety Management Portfolio Manager, and representatives of various FAA offices and NASA.

A	Accountable for the completion of NextGen capability. The highest level within the RASCI matrix, this office is charged by the FAA to deliver a particular capability. Typically, this designation is provided via an AcquisitionProgram Baseline. To foster a clear line of accountability, two different offices can never be Accountable for the same increment, andAccountability can never be delegated to another office.
R	Responsible for the successful completion of NextGen capability or a critical component of the capability. This office is responsible to theAccountable office. The Responsible office is responsible for initiating an actual change to the NAS such as automation changes, and is often also designated as the Accountable office for that increment. However, there are examples in the NSIP where one office is Accountable for an increment while another office (or offices) is actually making a change in the NAS on behalf of the Accountable office.
A/R	Accountable for the completion of NextGen capability as well as Responsible for its implementation.
S	Supports the Responsible office in the implementation of NextGen capability.Typically, this support is in the form of subject matter expertise, procedural guidance, or training activities.
C	Consulted for input during the implementation of NextGen capability. Provides input on a specific aspect in the development and implementation of a capability, such as safety analysis or approval. Input may or may not be used as determined by the Responsible and Accountable offices.
I	Informed about the progress of implementation.

System Safety Management

RASCI Matrix	ANG			ARP	AVP	AVS	AJI				AJM		AJV	AFS	AOV	APO	AIR
	C7	1	B	001	001	001	0	3	1	2	0	22	0	001	001	001	001
• B [601103-01] Additional ASIAS Participants (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601103-02] NextGen Enabled Data (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601103-03] Architecture Evolution and NextGen Support (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601103-04] Analytical Capabilities in Support of NextGen (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601103-05] Automated Vulnerability Discovery (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601103-06] Continued Studies and Results (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601103-07] Expanded Collaboration Environments (2016 - 2021)	C	S		S	A/R	S	C				C		C				
• B [601202-05] Integrated NAS-wide Automation System Modeling and Anomaly Detection (2016 - 2020)	C		I	S	A/R	S		C				C		I			