A Decade of Safety through Collaboration

ASIAS | 2007–2017

Aviation Safety Information Analysis and Sharing

asias

ASIAS *by the numbers*

Stakeholders

147 ASIAS stakeholders

- 47 commercial air carriers
- 69 general aviation operators
- 23 industry
- 2 maintenance, repair, and overhaul
- 1 flight training university
- 5 government

166 ASIAS portal communities supported

623 ASIAS portal users

FOQA

Flight Operational Quality Assurance

69 programs tracked

- 37 commercial air carriers
- 32 general aviation operators

9 metrics and benchmarks

99% of commercial operations with approved FOQA programs participate in ASIAS

25.9 million records

ASAP

Aviation Safety Action Program

187 programs tracked

- 44 commercial air carriers
- 37 general aviation operators
- 41 maintenance
- 39 dispatch
- 26 inflight service

17 safety metrics

97% of commercial operations with approved ASAP programs participate in ASIAS

307,000 reports

Studies

5 ASIAS directed studies led to **23** CAST (Commercial Aviation Safety Team) SEs (Safety Enhancements).

Awards

2008

CAST awarded Collier Trophy

2015

Winner of the DOT Transportation Safety Award

2016

ASIAS named an Aviation Week Laureate Awards finalist

2017

ASIAS honored with Airlines for America Award

2018

CAST/ASIAS named winners of an Aviation Week Laureate Award

R&D 100 Award for most innovative technologies and scientific discoveries

> *"ASIAS has been a game-changer that applies leading-edge data analytics to aviation safety data to identify, understand, and mitigate aviation risk."*
>
> Al Madar, Managing Director, Operations Safety & Compliance, American Airlines

> *"Data and collaboration are the backbones of aviation safety, and ASIAS has directly contributed to our impressive commercial aviation safety record in the United States."*
>
> Michael P. Huerta, former FAA Administrator

> *"ASIAS gives us the first 360-degree view of a problem through the eyes of controllers, pilots, maintenance technicians, and dispatchers."*
>
> Jay Pardee, former FAA Director of the Office of Accident Investigation and Prevention

ASIAS *10 years*

2007

FAA and Industry partnered with MITRE and founded ASIAS; ASIAS begins receiving safety data from 10 major airlines (47 participate today).

ASIAS begins supporting the biannual Aviation Safety InfoShare conference.

2008

ASIAS delivers the results of its first study to the FAA and aviation stakeholders on Terrain Warnings. This led to the development of 3 CAST SEs.

ASIAS studies the Traffic Alert and Collision Avoidance System (TCAS) and how alerts and advisories are resolved. This led to the development of 3 CAST SEs.

CAST is awarded the Collier Trophy.

2009

First voluntary solution to mitigate controlled flight into terrain risk is developed based on ASIAS findings.

2010

ASIAS concludes directed study on Unstable Approaches.

First ASIAS benchmark monitoring allows airlines to begin comparing their operations to an aggregate, de-identified norm.

ASIAS concludes directed study on Pilot/Controller Communications.

2011

ASIAS concludes directed study on Rejected Takeoffs.

ASIAS provides information about known safety risks and hot spots to Metroplex airspace and procedure design teams to enable them to build safety enhancements into the new designs.

CAST begins international information sharing with the Regional Aviation Safety Group–Pan America (RASG–PA) to support safety improvement efforts in Central and South America.

2012

ASIAS developed metrics to detect precursors to loss-of-control events. This led to the development of 11 CAST SEs.

ASIAS concludes directed study Area Navigation (RNAV) Departures.

2013

ASIAS outreach to General Aviation stakeholders begins; six corporate/business operators join the program (69 participate today).

ASIAS concludes directed study on Standard Terminal Arrival Route Operations and Procedures (STAR OPs).

CAST expands international information sharing to include the Regional Aviation Safety Group–Asia and Pacific Regions (RASG–APAC).

2014

3 CAST SEs are implemented based on ASIAS RNAV Departure and STAR OPs directed studies. This marks the first CAST SEs created without a prior accident or incident.

FAA issues Safety Alert for Operations (SAFO 14005) in response to an ASIAS directed study of the risks of Misconfiguration on Departure, specifically the risk of zero flap takeoffs and flaps moving on takeoff.

2015

ASIAS concludes directed study on aircraft misconfiguration. This led to the development of 3 CAST SEs.

ASIAS stakeholder airlines agree to flight-level fusion of their data, enabling researchers to obtain a more complete picture of potential safety trends and their causes.

The Department of Transportation honors ASIAS with the Transportation Safety award.

2016

Fusion operational prototype is completed.

ASIAS named a finalist for the Aviation Week Commercial Aviation Laureate Award.

2017

FAA issues SAFO 17001 in response to an ASIAS study on Class B Airspace Excursion events.

ASIAS governance updated to enable routine Data Fusion.

Digital Copilot named R&D 100 most innovated technologies and scientific discoveries.

Airlines for America award honors ASIAS for 10 years of outstanding achievement.

ASIAS

ENHANCING SAFETY THROUGH COLLABORATION

In 2007, the Federal Aviation Administration (FAA) and the aviation industry launched a collaborative safety analysis and data sharing initiative known as Aviation Safety Information Analysis and Sharing (ASIAS).

For many years, the aviation industry realized that risk-based assessments must be the foundation of decision-making to advance safety. Further, for data collection programs to be comprehensive and effective, industry recognized that all stakeholders—government, manufacturers, operators, and employee groups—must establish a reporting culture based on trust and focus on proactive mitigation of adverse outcomes. ASIAS is built on these beliefs. The dedicated safety professionals who created this initiative established mechanisms and forums for sharing data and technical approaches. Most importantly, they established trust among stakeholders by guaranteeing that sensitive and proprietary data would be used only to advance safety.

THE GUIDING PRINCIPLES

I. ASIAS information is used solely for the identification, monitoring, and mitigation of systemic safety issues. It is not used punitively.

II. ASIAS stakeholders voluntarily submit safety-sensitive data.

III. Data is de-identified to preserve anonymity.

IV. Roles and responsibilities of ASIAS stakeholders are developed collaboratively.

V. ASIAS data use is transparent to all stakeholders and supporting organizations.

VI. The ASIAS Executive Board (AEB) is responsible for safeguarding the trust stakeholders have placed in ASIAS. Further, the AEB assures the integrity and relevance of each analysis through careful deliberation.

Today, ASIAS leverages FAA data, airline proprietary safety data, publicly available data, manufacturers' data, and other industry data sources to monitor known risks, evaluate the effectiveness of deployed mitigations, and identify emerging hazards. ASIAS stakeholders provide data, help contextualize it in the course of analyses, and collectively draw conclusions and establish best practices.

ASIAS has enabled the aviation community to transition from a forensic approach to managing safety to a more prognostic/diagnostic approach. It is an active, robust example of how 10 years of dedicated collaborative data sharing initiatives can have a positive impact in advancing safety.

The ASIAS process begins with the intake, protection, and integration of disparate data sources. The data is then used to gain insight on safety issues in the National Airspace System (NAS) from a variety of perspectives:

- **Benchmarks** allow airlines to compare their operations against an aggregate de-identified norm.
- **Metrics** monitor safety trends, detect safety issues, and assess efficacy of implemented safety enhancements.
- **Quick-look Studies** allow initial investigation of emerging issues.
- **Vulnerability Discovery** probes for new hazards and changes in threat levels.
- **Directed Studies** are undertaken to dive deeply into systemic issues and gain insights into underlying contributing factors. The results are shared with government and industry safety teams—such as the Commercial Aviation Safety Team (CAST) and the General Aviation Joint Steering Committee (GAJSC)—for mitigation consideration. (CAST and GA JSC are public/private partnerships working to improve aviation safety in their respective domains.)

When a potential safety issue is identified, the ASIAS Issue Analysis Team evaluates it and determines if additional analysis is warranted. Some issues are resolved at the local level. For systemic issues, CAST and GAJSC recommends mitigation strategies for adoption at a systemic level.

Once mitigations have been deployed, ASIAS works in partnership with the safety teams to monitor and assess their effectiveness.

Additionally, the semi-annual, industry-sponsored Aviation Safety InfoShare meetings provide a unique opportunity for organizations to share safety issues and best practices to help raise awareness across the aviation community. ASIAS leverages the knowledge gained at InfoShare to search its data repositories to identify potential systemic safety issues.

TERRAIN AWARENESS AND WARNING SYSTEM ALERTS

When ASIAS initially started work in 2007, the program was asked to assist with an ongoing CAST study on risks associated with Controlled Flight Into Terrain. Through analysis of digital flight data, ASIAS learned that the Terrain Awareness and Warning System (TAWS) was generating alerts that pilots perceived to be incorrect, nuisance, or overly conservative.

To fully characterize this issue, ASIAS pioneered an approach that fused multiple data sources and identified underlying factors that prompted TAWS alerts when aircraft were not at risk.

Based on the contributing factors identified, CAST concluded that enhanced ground proximity warning system (EGPWS) software with GPS position information—along with updated terrain databases—could eliminate 97 percent of all so-called "nuisance" TAWS alerts.

CAST therefore developed two Safety Enhancements (SE184 and SE185) and added a supplement to SE120 to reduce the occurrence of nuisance TAWS alerts.

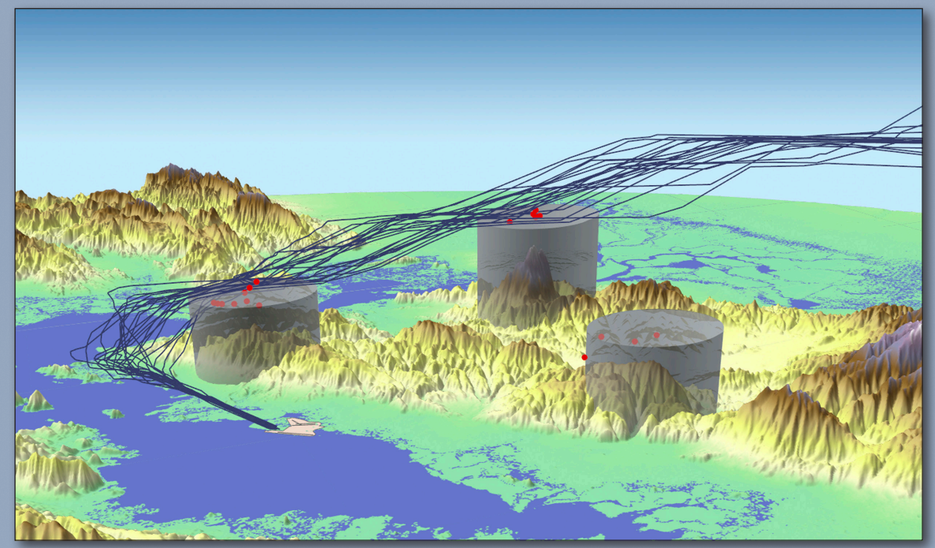
The SEs:

- Re-evaluated Minimum Vectoring Altitudes (MVA) to always consider the elevation of the underlying terrain when determining the MVA in addition to any obstructions.
- Established navigation procedures such as area navigation (RNAV) visuals to provide aircraft with consistent approach paths that avoid high terrain.
- Identified the need for operators to update their TAWS software and terrain databases, as well as improving the TAWS logic's position accuracy by enabling Global Positioning Systems (GPS) to the TAWS box.

By monitoring hot spots through ASIAS, CAST has observed a marked reduction of these nuisance TAWS alerts since the SEs were released. In two key hot spot areas—Oakland, California and Albuquerque, New Mexico—CAST has observed no TAWS alerts in the ASIAS results since the implementation of mitigations.

This is an example of how ASIAS's ability to identify contributing factors and monitor the effectiveness of deployed mitigations plays a key role in enabling CAST to reduce the potential for accidents/incidents.

In two key hot spot areas—Oakland, California and Albuquerque, New Mexico—CAST has observed no TAWS alerts in the ASIAS results since the implementation of mitigations in the Fall of 2013.



Data integration enabled identification of terrain risks associated with arrivals to Oakland Runway 11. Subsequent mitigations have all but eliminated these highlighted risks.

In the Southern California (SoCal) airspace redesign, SE188 helped lead to the consideration of new refinements to help deconflict traffic at known TCAS hot spots.

Analysis of ASIAS data informed the adoption of three CAST Safety Enhancements to mitigate latent midair collision risk in the NAS.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM

In 2008, ASIAS became aware that European and Asian airlines were experiencing frequent Traffic Alert and Collision Avoidance System (TCAS) Resolution Advisories (RAs) that they deemed unnecessary given proximity to other aircraft.

Though TCAS RAs had been studied in the past, a high prevalence of RAs remained. In response, ASIAS embarked on a systemic analysis using their de-identified, aggregate data, allowing for the first time a broad examination of the pair of aircraft involved in the various types of traffic interactions rather than an operator's independent assessment of an individual aircraft's RA. These included interactions between certified commercial flight operations and aircraft using "see and avoid" procedures or general aviation aircraft, arrival traffic into busy airports interacting with departure traffic that is leveling off, and arrivals interacting with each other on final approach. Furthermore, this study examined the pilot response to RAs.

One key output of the ASIAS study was the creation of a collision alert simulation. The simulation uses radar data and a detection algorithm to identify flights that potentially received an RA and to understand the severity of the RA, including quantitatively measuring the slant range separation or closure rate between the aircraft. By using the surveillance data and TCAS simulator, industry was able to view TCAS analysis at a systemic level (or a local/regional level).

From the findings of the ASIAS study, CAST concluded that new or modified airspace design procedures and refinements to the TCAS functionality could help deconflict traffic at known TCAS hot spots. Furthermore, CAST determined many nuisance TCAS alerts could be reduced by addressing the increased TCAS sensitivity at high-altitude airports. It therefore adopted three safety enhancements—SE186, SE188, and SE191—to recommend such changes.

AIRPLANE STATE AWARENESS

Loss of control (LOC) remains a primary contributor to worldwide commercial airplane accidents. In 2011, a CAST study of accident and incident data showed that ineffective responses to alerts on the flight deck contributed to many of these events. In fact, the data indicated that half of all LOC events are related to a lack of Airplane State Awareness (ASA), including awareness of the aircraft's orientation to the ground, aircraft attitude, and the aircraft's power setting, airspeed, and pitch angle, or energy.

In response to this identified safety issue and its causes, in 2012 ASIAS collaborated with CAST research teams to develop metrics to detect precursors to loss-of-control events by monitoring attitude control through overbanks and energy control through assessment of stall warnings. Intervention strategies were identified to mitigate the common problems observed in ASA events. They were grouped into categories, based on how and by whom they would be implemented. These intervention strategy categories for situational awareness displays include:

- Airplane manufacturers and suppliers consider redesign of current and future aircraft where feasible
- Re-emphasizing or making changes to current flight crew training
- Operators or air traffic service providers modifying and expanding airline operating policies or procedures
- Continuing research in human performance, automatic systems, maintaining flight crew awareness, and spatial disorientation.

These findings supported the voluntary adoption of 11 CAST safety enhancements (SEs 192–202). Additionally, three manufacturer feasibility studies for design (SEs 203–205), and five research and development plans (SEs 207–211) were created. Loss-of-control precursor events are also now captured in a dashboard available to all ASIAS stakeholders.

ASIAS collaborated with CAST analysis teams to develop metrics to detect precursors to loss-of-control events.

AREA NAVIGATION DEPARTURES AND STANDARD TERMINAL ARRIVAL ROUTE OPERATIONS AND PROCEDURES

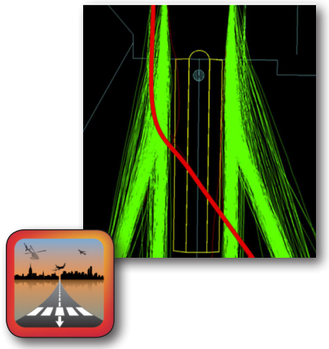
As more RNAV departures and optimized STARs are put into service, new safety issues can potentially be observed and new contributing factors to previously known safety issues can be identified. The FAA and airline community highlighted some of their own local concerns about aircraft deviations from these procedures at the biannual Aviation Safety InfoShare conference. As part of the evolution of safety analysis from a reactive, forensic activity toward a more proactive analysis, ASIAS began monitoring compliance with published course and altitude clearances for departure operations, though a deviation (speed, course, or altitude) from these procedures had not yet led to an accident. Analysis of pilot and controller voluntary safety reports indicated that RNAV departures were a potential safety concern. A subsequent ASIAS study identified the major factors contributing to deviations from the published limits on these procedures.

The reasons for the deviations included late changes to the route of flight, crew distraction, and air traffic changes to speed or altitude.

In a parallel ASIAS study, altitude deviations were also observed on standard arrival routes, and ASIAS analysts concluded that many of the same factors were contributing to these deviations.

Based on the ASIAS inputs, CAST developed three safety enhancements—SE212, SE213, and SE214—that covered all the major factors contributing to these airborne deviations. These SEs will reduce systemic risks in the frequency of crew errors and establish safe operating and design practices for departure and arrival procedures. The FAA and industry collaborated to establish elements of commonly accepted safe operating and design practices for flight crews, air traffic service providers, and procedure designers to standardize the format of pre-departure clearances.

This represented government and industry's first voluntary adoption of mitigations based solely on an ASIAS proactive safety analysis.



Lateral deviations are the most common, and they occur most frequently before the first fix on the departure procedure. This location correlates to the highest risk of midair collision because there is typically less separation from other departing aircraft immediately after takeoff.

"The adoption of these [safety enhancements] represents the first approval of SEs by the CAST to mitigate systemic risk without a previous fatal accident—demonstrating the evolution of safety analysis from a reactive, forensic activity toward a more proactive analysis."

Michael Quiello, Vice President, Corporate Safety, United Airlines

MISCONFIGURATION OF FLAPS ON TAKEOFF

When ASIAS stakeholder airlines reported events indicating that takeoff rolls might have begun with improperly set aircraft flaps and slats, ASIAS began a study that prompted the FAA to take quick action to alert operators to the issue, and CAST to develop longer-term fixes.

The ASIAS study identified the reasons behind the higher-than-expected incidence of flap misconfigurations on takeoff. It concluded that the potential for takeoff misconfiguration events occurs most frequently when flights are running behind schedule and pilots feel rushed to complete their takeoff duties, and when freezing temperatures or deicing conditions interfere with the normal checklist flow.

In the fall of 2014, to reduce the risk of human error identified by ASIAS, the FAA issued SAFO 14005 to quickly increase awareness of the potential for flap misconfiguration during takeoff. It did so within weeks of the ASIAS findings to alert flight crews about the issue before it could become a more significant risk as the winter season approached and temperatures dropped.

Three CAST safety enhancements—SE227, SE228, and SE229—were subsequently issued to reduce the number of flap misconfiguration events on takeoff. These SEs recommend that air carriers review and modify pre-taxi configuration policies and procedures, airplane manufacturers develop and make available enhanced airplane design features, and airplane manufacturer and air carrier maintenance programs include appropriate actions and procedures for the proper operation of the takeoff configuration warning system.

Air carriers that delay takeoff configuration until after initiating taxi have about four times greater likelihood of an attempted flaps-up takeoff.

Today, 69 corporate/business operators (representing more than 1,800 aircraft) and one flight training university contribute data to ASIAS.

GENERAL AVIATION

Over the last few years, ASIAS's success in commercial aviation has begun to translate to General Aviation (GA). In 2013, ASIAS launched an outreach effort to obtain the GA data necessary to extend best practices in commercial aviation to general aviation, with the goal of making general aviation safer. That same year, the first corporate/business operator from the GA community joined ASIAS.

Today, 69 corporate/business operators (representing more than 1,800 aircraft) and one flight training university contribute digital flight data and narrative safety reports to ASIAS. The flight university, as well as individual pilots, are participating in ASIAS using the National General Aviation Flight Information Database (NGAFID) via installed avionics recordings and a free, MITRE-developed mobile application—the General Aviation Airborne Recording Device (GAARD). GAARD offers light GA operators without digital fight data collection capabilities a low-cost solution to collecting their flight data. *fleet*GAARD offers the same capability to GA and business fleet operators. These apps provide the operator the ability to track, analyze, and manage basic flight information as part of ASIAS.

The data provided by these ASIAS stakeholders is then used to generate safety metrics and trends, including:

- 16 corporate/business metrics and trends
- Several other existing ASIAS metrics enhanced by adding GA data and over 2,600 GA airports
- 14 light GA self-assessment aircraft performance exceedance tools

In response to GA stakeholder requests, ASIAS is also using this data to study GA-related high-energy approaches and TCAS alerts. In the future, these metrics and studies will help the GA Joint Steering Committee (GAJSC) offer safety mitigations for the GA community via voluntary safety enhancements.

In coordination with the GAJSC, MITRE is also researching how to lower the very high accident rate of single-pilot operations by investigating ways to reduce the solo pilot's high workload—the primary cause of the higher accident rate. As a result, MITRE created the Digital Copilot, a tablet application that acts as a cognitive assistant by reducing the solo pilot's workload. This application infers the pilot's intent, based on the flight context. It then determines when information is required and automatically provides it to the pilot at the appropriate time, in the right format, through a simple interface. The Digital Copilot is now being tech transferred to industry for development and integration into widely available in-cockpit applications. In 2017, this application was named one of R&D 100's most innovative technologies and scientific discoveries.

AN EXPANSIVE BENEFITS LANDSCAPE

ASIAS's work supports a variety of FAA and international aviation efforts.

International Collaboration

Through its collaboration with CAST, ASIAS provides data to regional aviation safety groups in the Pan American and Asia and Pacific Regions, enabling comparison of regional operations to U.S. industry norms. The safety groups are using the information to identify opportunities to enhance safety in their regions. In turn, CAST benefits from the exchange by allowing the tracking of accident precursors to known safety risks outside the United States.

Sharing the ASIAS Model Internationally

ASIAS has become internationally recognized as a model for prognostic safety analyses, engendering interest from many other nations. In 2014, The MITRE Corporation (which provides operational support for ASIAS on behalf of the FAA) and the Flight Safety Foundation formed a partnership to help countries around the world learn from ASIAS and establish similar programs in their own regions.

Aviation Safety INFOSHARE

The InfoShare Connection

ASIAS researchers are regular participants in the biannual FAA-sponsored Aviation Safety InfoShare Conference. InfoShare provides a forum for a wide variety of participants to share knowledge of recently identified safety issues, mitigation strategies, and other best practices and lessons learned. These accounts inform and enhance ASIAS's future research efforts, which are then shared with the wider aviation community at subsequent conferences.

Metroplex

An FAA-sponsored initiative to create greater efficiencies in Metroplexes—regions served by multiple busy airports—is getting an assist from ASIAS research. Since 2012, ASIAS has provided safety analyses to Metroplex teams as they redesign airspace and procedures. Information about known risks and hot spots enables the teams to build safety enhancements into the new NextGen designs.

Leveraging the ASIAS Model in Other Domains

At its foundation, ASIAS is a public/private partnership of data sharing for the common good. That model is now finding applications in the healthcare and child welfare arenas, and research is underway to explore applications for non-aviation modes of transportation, tax fraud prevention, and cybersecurity.

CHARTING THE FUTURE VISION OF ASIAS

What does the future hold for the ASIAS program? The answer is threefold. Moving forward, the ASIAS program will leverage the foundation built over its first ten years to increase the program's depth and impact, improve the program's agility, and expand the program's breadth and reach.

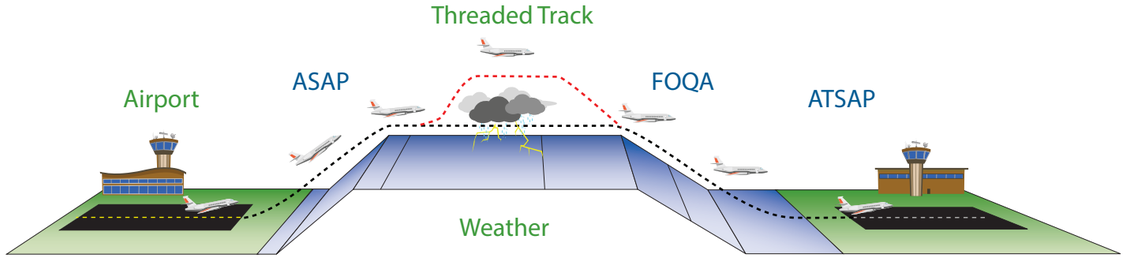
Depth and Impact

To increase depth and impact, the ASIAS program will transition to the use of Fusion as the foundation of all data analysis and products. Data Fusion, or simply Fusion, involves joining together various aviation data sources to provide a complete perspective of all available information at each stage of a flight. Fusion information can be used to identify safety events and enhance knowledge of factors associated with individual flights as well as factors that contribute to aggregate safety metrics.

Furthermore, the program will enhance its ability to proactively identify systemic safety risks through additional rigor and greater focus on vulnerability discovery. As ASIAS moves beyond 2020, strategies will be developed leveraging machine learning and artificial intelligence capabilities to accommodate for changing environments and to discover NAS safety hazards and estimate their likelihood.

Improve Agility

Given the ASIAS program's pivotal role in aviation safety and stakeholder reliance on its products, ASIAS will employ strategies and establish milestones to be positioned to respond and adapt to the rapidly changing dynamics of aviation safety issues and practices. The NAS continues to expand both in capability, via NextGen initiatives, and in operational tempo, with the advent of Unmanned Aircraft Systems (UAS) and the continued growth of commercial and general aviation. This rapid growth and change present new safety challenges that demand proactive and predictive analytics to discover hazards before they become incidents or accidents. The ASIAS architecture will address this growth and the requisite need for robust safety analysis capabilities by leveraging artificial intelligence technologies and industry knowledge databases to develop automated smart services that can evaluate disparate aviation safety data to create a contextualized analysis of NAS hazards.



Expand Breadth and Reach

ASIAS will methodically expand to include other critical operational domains beyond commercial and general aviation. Furthermore, ASIAS will provide direct and indirect safety benefits by defining standards, influencing operational design, collaborating with FAA lines of business and other government agencies, developing and supporting collaborative ASIAS–managed enclaves, and engaging in global harmonization. These initiatives and collaborative efforts are pivotal components to ensuring alignmnet between government, industry, and the ongoing development of procedural improvements in the NAS.

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ASIAS Stakeholders

Commercial Air Carriers (47)

ABX Air
Aerodynamics, Inc.
Air Canada
Air Transport Intl.
Air Wisconsin Airlines
Alaska Airlines
Allegiant Air
Aloha Air Cargo
American Airlines
Atlas Air
Cape Air
CommutAir
Compass Airlines
Delta Air Lines
Empire Airlines
Endeavor Air
Envoy Air
ExpressJet
FedEx Express
Frontier Airlines
GoJet Airlines
Hawaiian Airlines
Horizon Air
JetBlue Airways
Kalitta Air
Mesa Airlines
Miami Air Intl.
Mountain Air Cargo
National Airlines
Northern Air Cargo
Omni Air Intl.
Piedmont Airlines
Polar Air Cargo
PSA Airlines
Republic Airline
Silver Airways
SkyWest Airlines
Southern Air
Southwest Airlines
Spirit Airlines
Sun Country Airlines
Swift Air
Trans States Airlines
United Airlines
United Parcel Service
Via Airlines
Virgin America

Industry

A4A—Airlines for America
AIA—Aerospace Industries Association
Airbus
ALPA—Air Line Pilots Association
APA—Allied Pilots Association
Boeing
CAPA—Coalition of Airline Pilots Associations
IBT—International Brotherhood of Teamsters
IPA—Independent Pilots Association
NACA—National Air Carrier Association
NAFA—National Aircraft Finance Association
NATCA—National Air Traffic Controllers Association
NAV CANADA
RAA—Regional Airline Association
SAPA—SkyWest Airlines Pilot Association
SWAPA—Southwest Airlines Pilots Association

General Aviation Operators (69)

Abbott Laboratories
Aero Charter
Best Jets International
Bombardier Flight Operations
Cook Canyon Ranch Aviation
Costco Wholesale
Eli Lilly
Embraer Executive Jets
Flexjet
Flight Options
Gama Aviation Signature
Jet Edge International
Jet Linx
JetSuite
JetSuiteX
Johnson & Johnson
LECO Corporation
Luck Companies
Mayo Aviation
NetJets
Northeastern Aviation Corp.
Northern Jet
OnFlight, Inc.
Priester Aviation
Qualcomm, Inc.
REVA
Solairus Aviation
Stryker Corporation
Textron Aviation
Vulcan, Inc.
XOJET
38 additional operators

Industry

ACSF—Air Charter Safety Foundation
Embraer
GAMA—General Aviation Manufacturers Association
Gulfstream Aerospace
NBAA—National Business Aviation Association
NJASAP—NetJets Association of Shared Aircraft Pilots
Textron Aviation

Maintenance, Repair & Overhaul

AAR Aircraft Services
HAECO Americas

Government

AMC—Air Mobility Command
Federal Aviation Administration
National Aeronautics and Space Administration
Naval Air Force Atlantic
USAF Safety Center

Flight Training

University of North Dakota

as of March 2018

For additional information about ASIAS, please contact asias@mitre.org.