Aviation Safety Information Analysis and Sharing (ASIAS)

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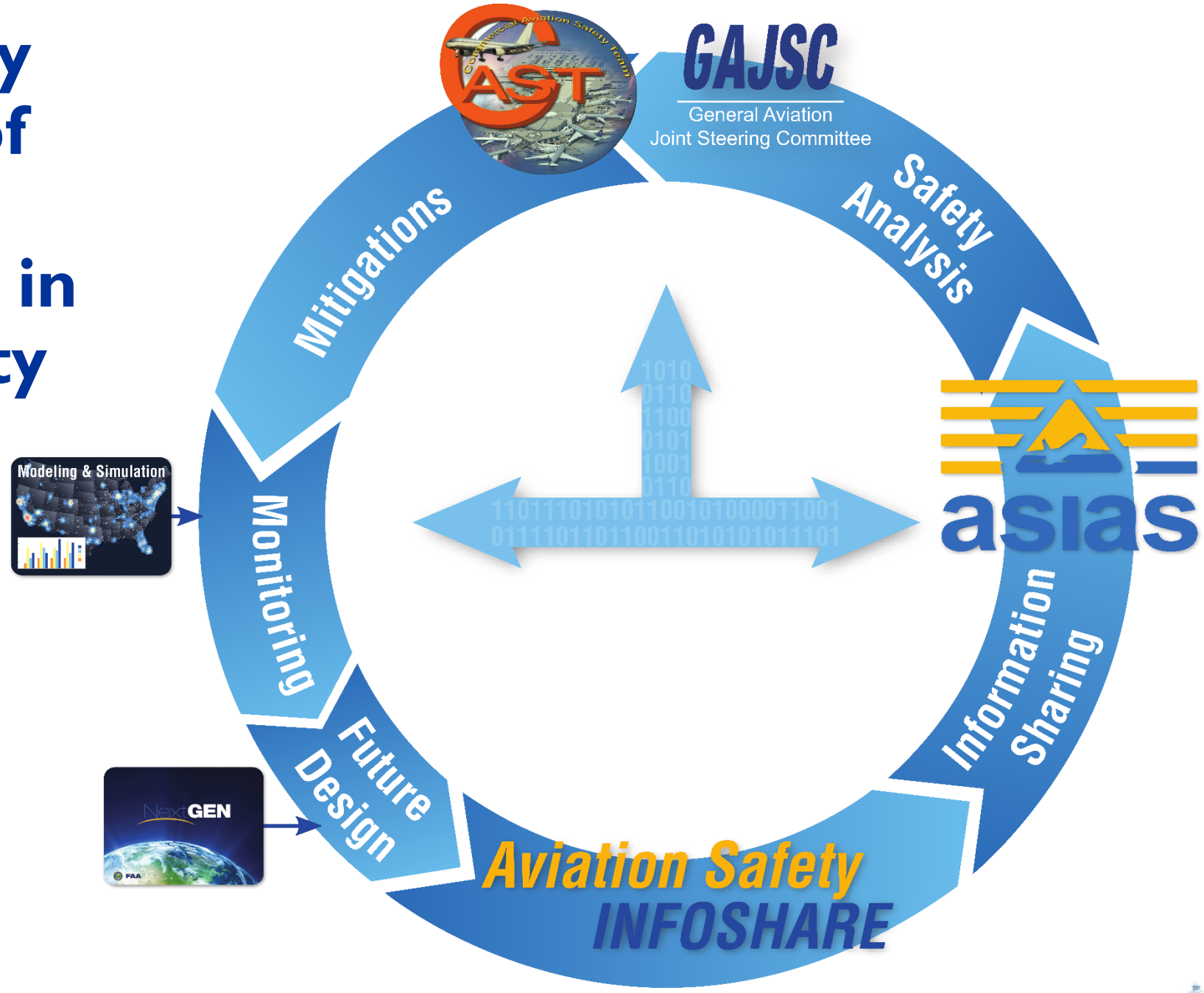
EASA FDM Conference

ASIAS is a Key Component of Continuous Improvement in Aviation Safety



What is ASIAS?

- A collaborative Government-Industry initiative on safety data analysis & sharing
- A risk-based approach to aviation safety, identifying & understanding risks before accidents or incidents occur
- Timely mitigation & prevention

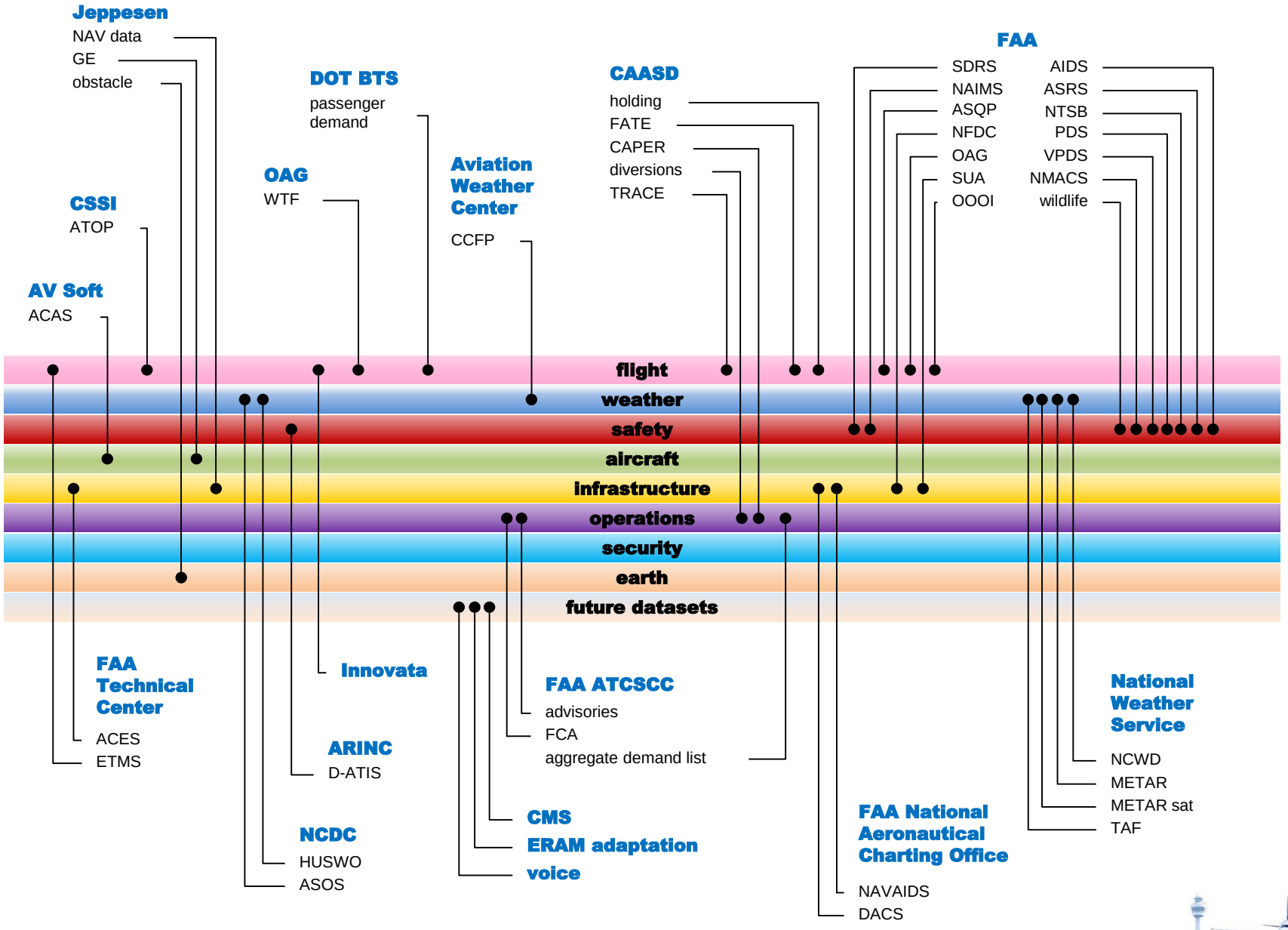
ASIAS Is Governed by Formal Principles

- Data used solely for advancement of safety
- Voluntary submission of safety-sensitive data
- Carrier/OEM/MRO data are de-identified
- Transparency – knowledge of how data are used
- Procedures & policies established through collaborative governance
- Analyses approved by an ASIAS Executive Board

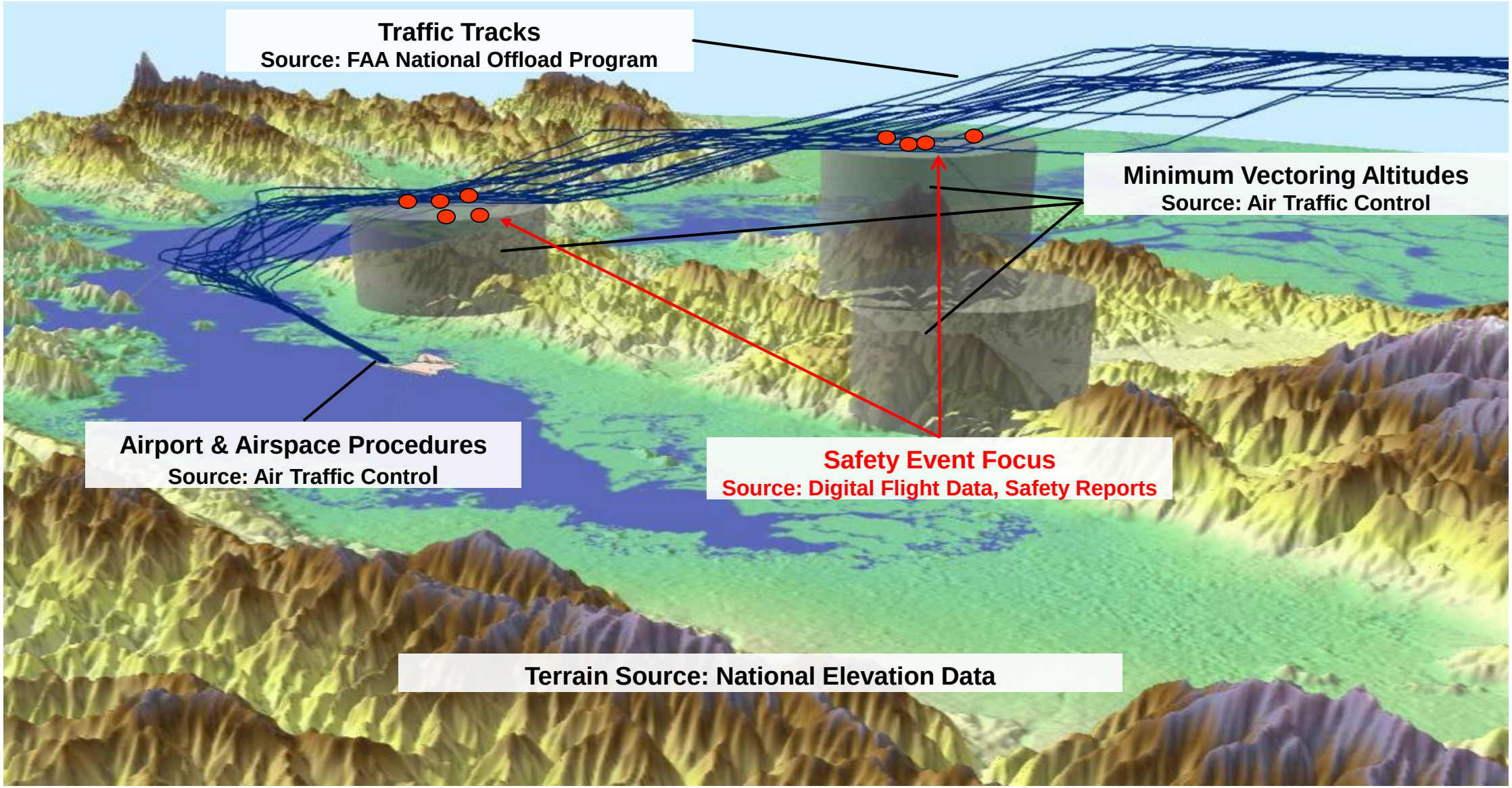
Data – Types

Proprietary Data

Sources



Leveraging Data From Across the Industry Provides Valuable Insights



Conditions for Allowing Fusion in ASIAS

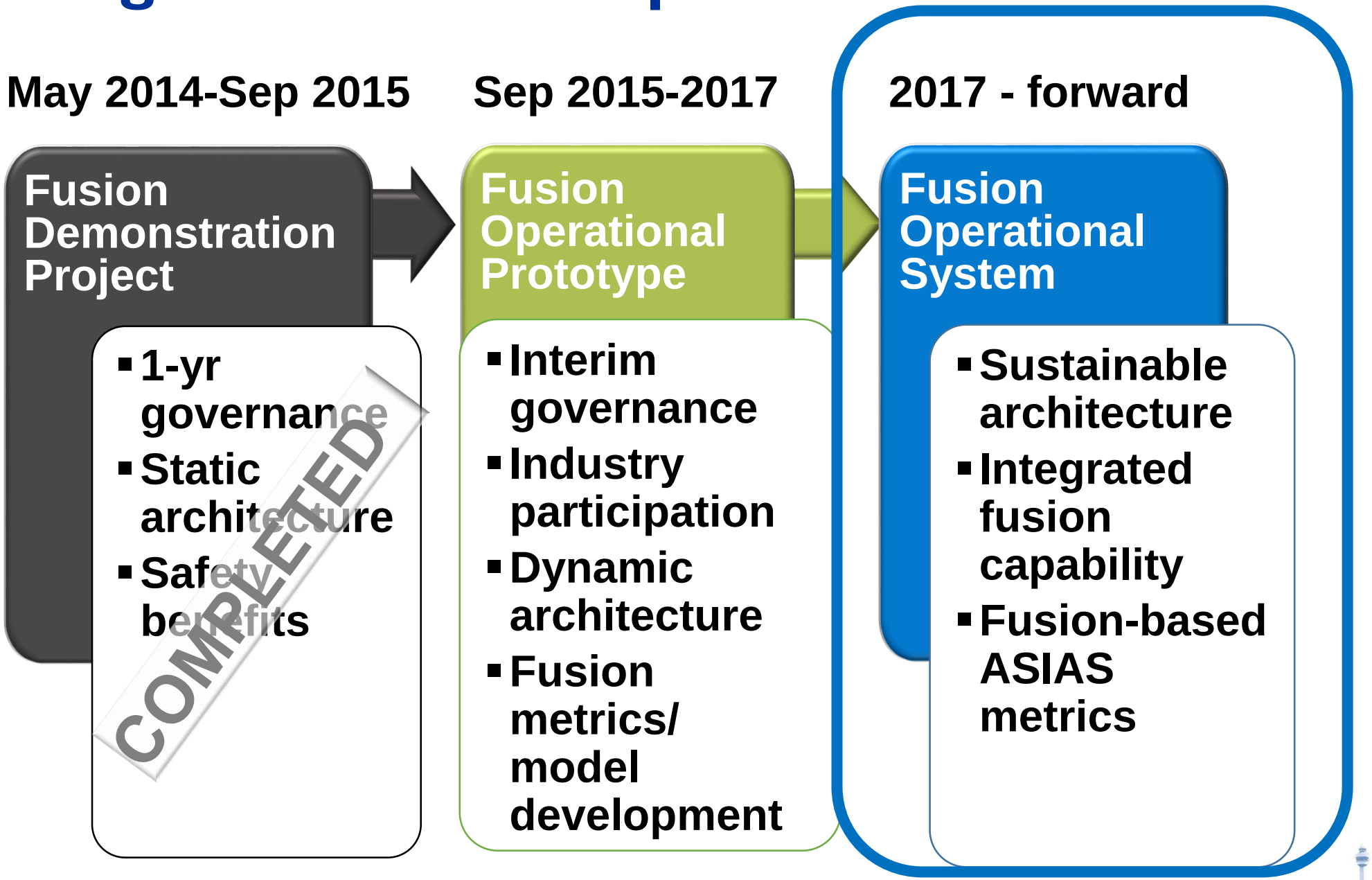
Approved Use Only

Enhance safety assessments

Inform mitigations

Improve safety in the National Airspace System

Three-Stage Fusion Development



Data – Key Challenges

Working with **big data** requires a **methodical approach** that comprehensively addresses data management

Data quality issues require multiple processes to make narrative data meaningful & useable

Wide **variety of data types and sources** requires complex processes for effective integration

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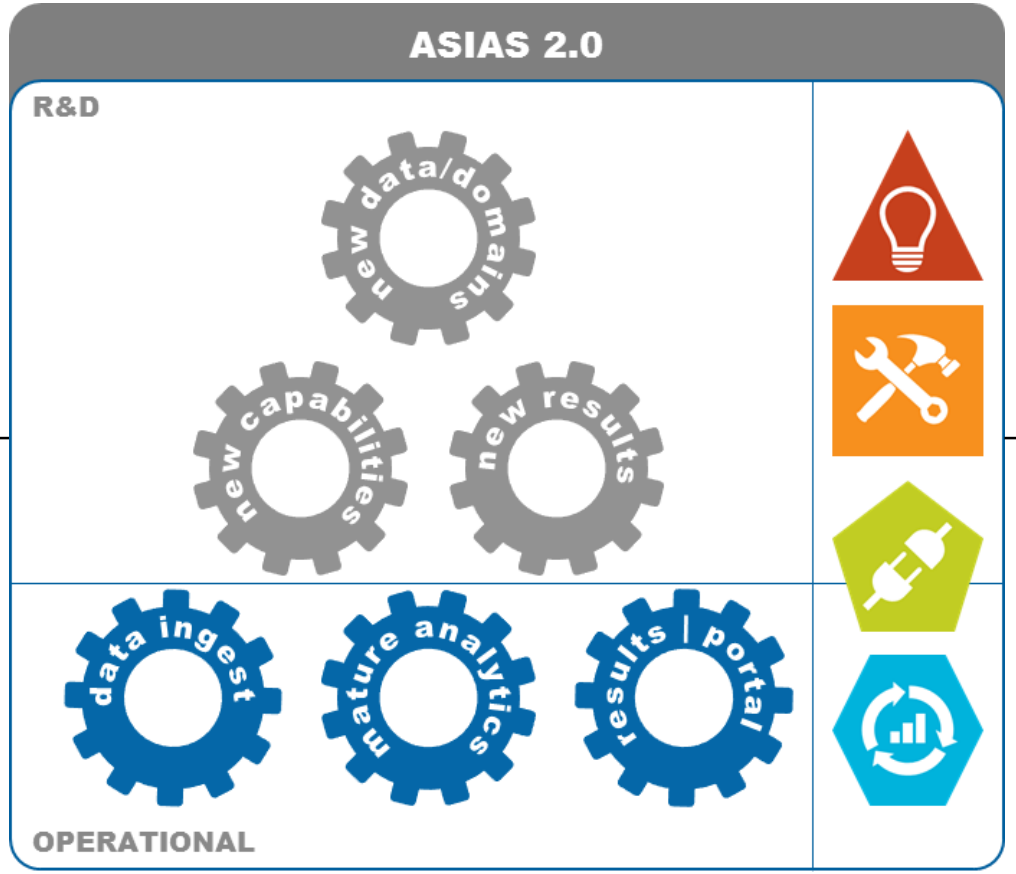
Architecture – Key Challenges

Centralized Architecture & Security to gain efficiencies and implement access and controls in line with governance

Continuous validation and verification to address data quality issues, inconsistent data feeds and new algorithms with limited verification

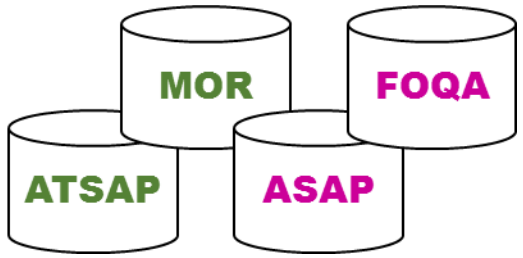


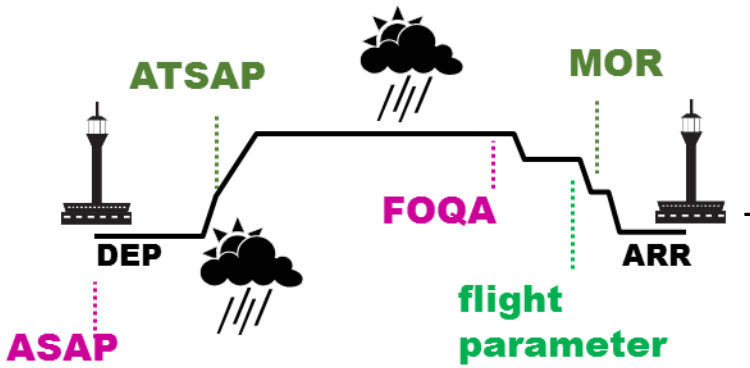
Data analytics software and tools integration with computing environment (in situ | in cloud)

Data management practices that can handle the volume, velocity and diversity of data

Analysis – Key Challenges

Fusion of information from NAS-wide data sources to individual flights is required to enable more complete safety analyses





Surveillance	NAS-wide trends | aircraft performance | traffic separation
Environment	meteorological conditions | runway configuration | weather – winds | delays, diversions
Avionics	equipage hardware and software
ATSAP / MOR	loss of separation | controller factors
ASAP	pilot factors | contributing factors
FOQA	aircraft performance | configuration | event locations
ADS-B	high quality position reports
ATC voice	ATC clearance

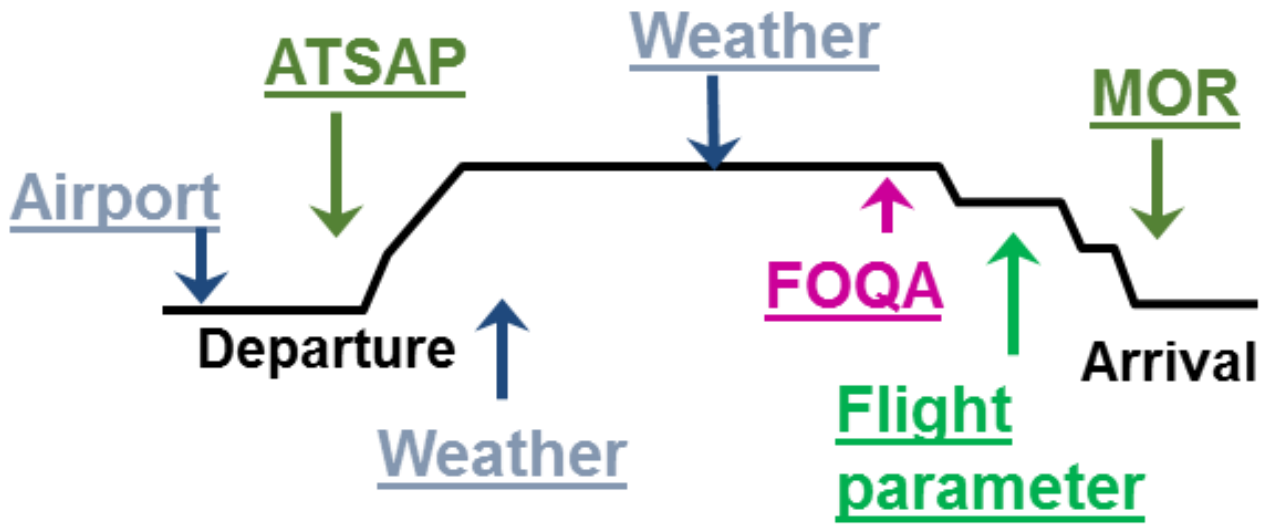
non-protected

protected

TBD

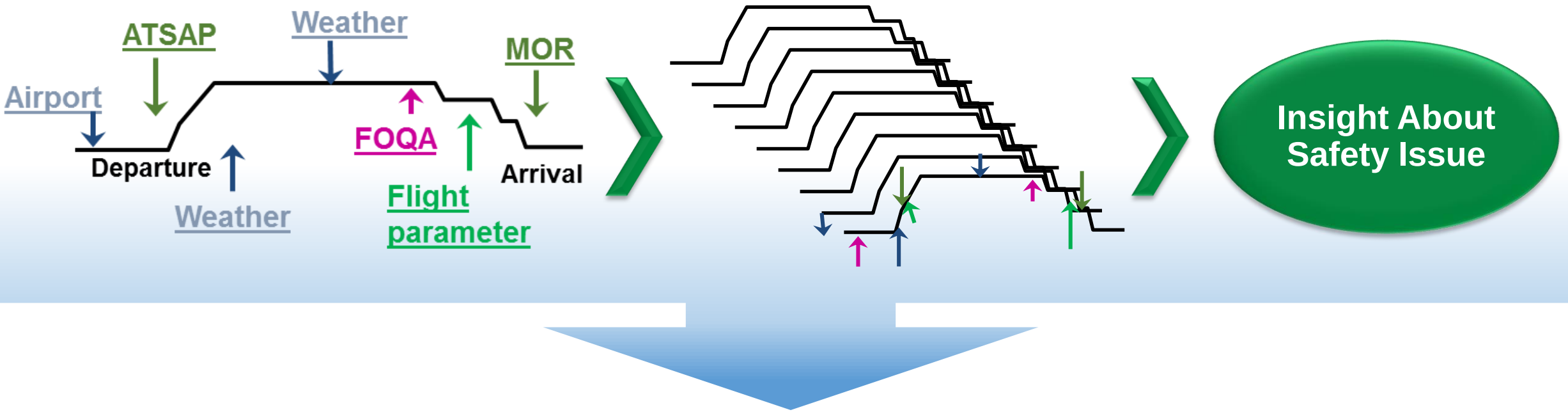
Integrated Information Provides the Most Accurate Picture of Safety Issues in the National Airspace

- Surveillance Data
- Environment
- Avionics
- ATSAP / MOR
- Safety Reports
- FOQA



Fused Flight Story

Fusion Enables Enhanced Insight About Safety Issues



360° perspective of safety issue

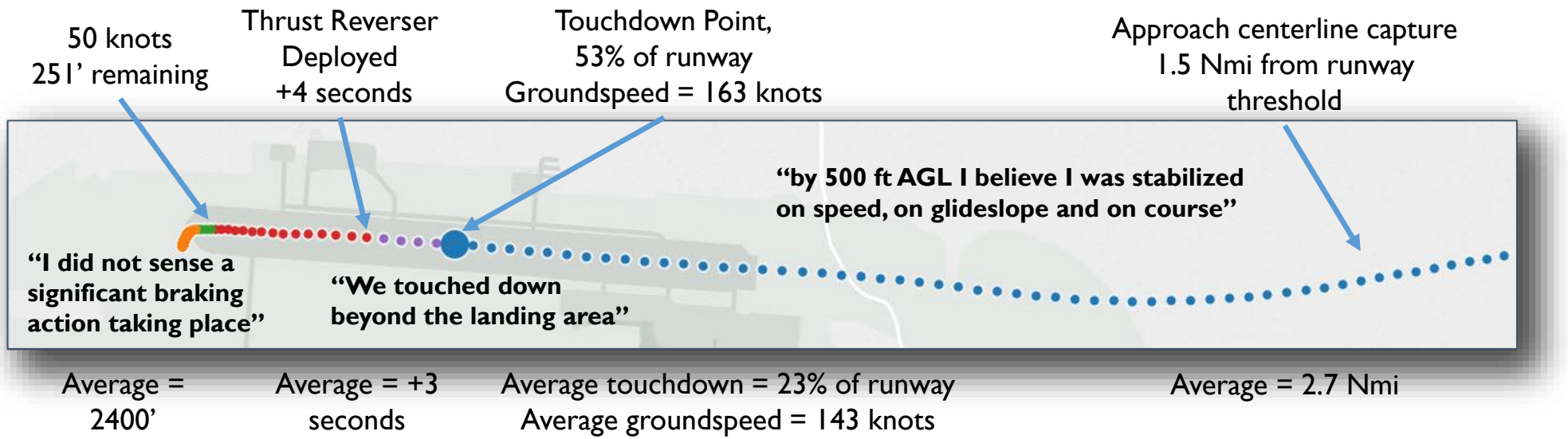
Deeper understanding of underlying contributing factors

Better inform potential mitigations

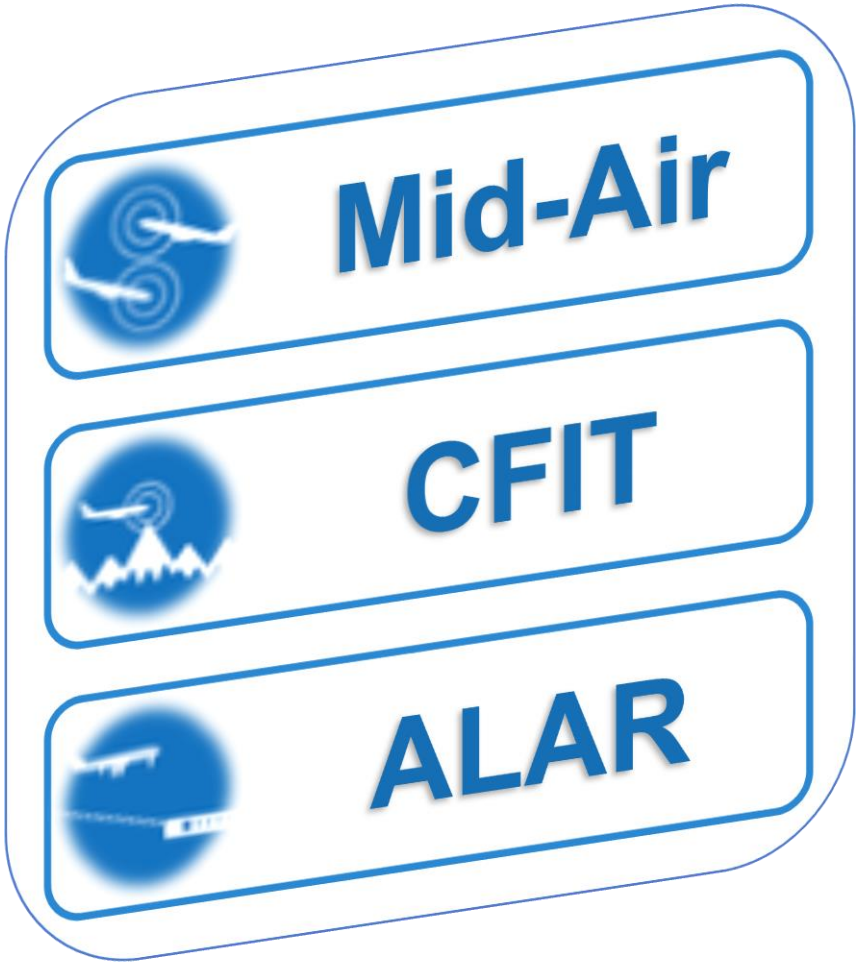
Fusion View of a Runway Overrun Event

Weather information from ASOS

ASOS Report Offset	Headwind (knots)	Crosswind (knots)	Wind Gust (knots)	Precip Within 1 HR (in)	Visibility (Mi)	Ceiling (ft)	Sigweather
2	-6.6	-14.6	24	0.04	7	9500	-RA



Fusion Operational Prototype:
Creating the First Fusion Metrics



- **Leveraging existing metrics** developed from stand-alone data sources
- **Pioneering techniques** for interpreting different views from various sources
- **Providing an integrated risk picture**

Fusion Study Findings

Misconfiguration:

- Confirmed delayed takeoff and adverse weather to be strong predictors for misconfigured flaps state.
  - Findings could lead to more focused mitigation strategies.
- Data quality issue identified by potential missing or split RTO FOQA flights.
- Cross validation between flight stories with ASAP and FOQA enabled expansion of models for both metrics.

Runway Excursion:

- Exemplar reported excursion event used to understand importance of measuring a range of factors including pilot effort, thrust reverser delay, and flare in comparison to similar flights.
  - Knowledge attained from fused data of exemplar event can be used to improve, verify and validate risk of runway excursion models.

Fusion Study Findings

TCAS RA:

- Fusion data provided a rich source of contextual information – including perspectives from ATC, environmental conditions, aircraft position and pilot response.
- Discrepancies were identified between two established TCAS RA metrics currently in use in ASIAS.
  - Fusion data is needed to identify and correct TCAS RA metric discrepancies.

Loss of Control:

- Fusion results identified influence of late runway change and automation management on overbank state as potential systemic issue.
- Fusion results identified influence of ATC and pilot actions to adjust for spacing on stall events.
- Fusion data provides opportunity to statistically derive predicting factors for flights that are risk for stalls.
- Findings suggest LOC Safety Enhancements should be revised based on knowledge gained through preliminary Fusion results where relationship between casual factors and high risk states aircraft states are identified.

Today and Beyond

- We are in the midst of the safest period in aviation history.
- In the United States there are no longer major causes of accidents.
- With so few accidents and no “common causes,” we need more data points so we can move to a prognostic or predictive approach.
- And, we need to share what we learn.