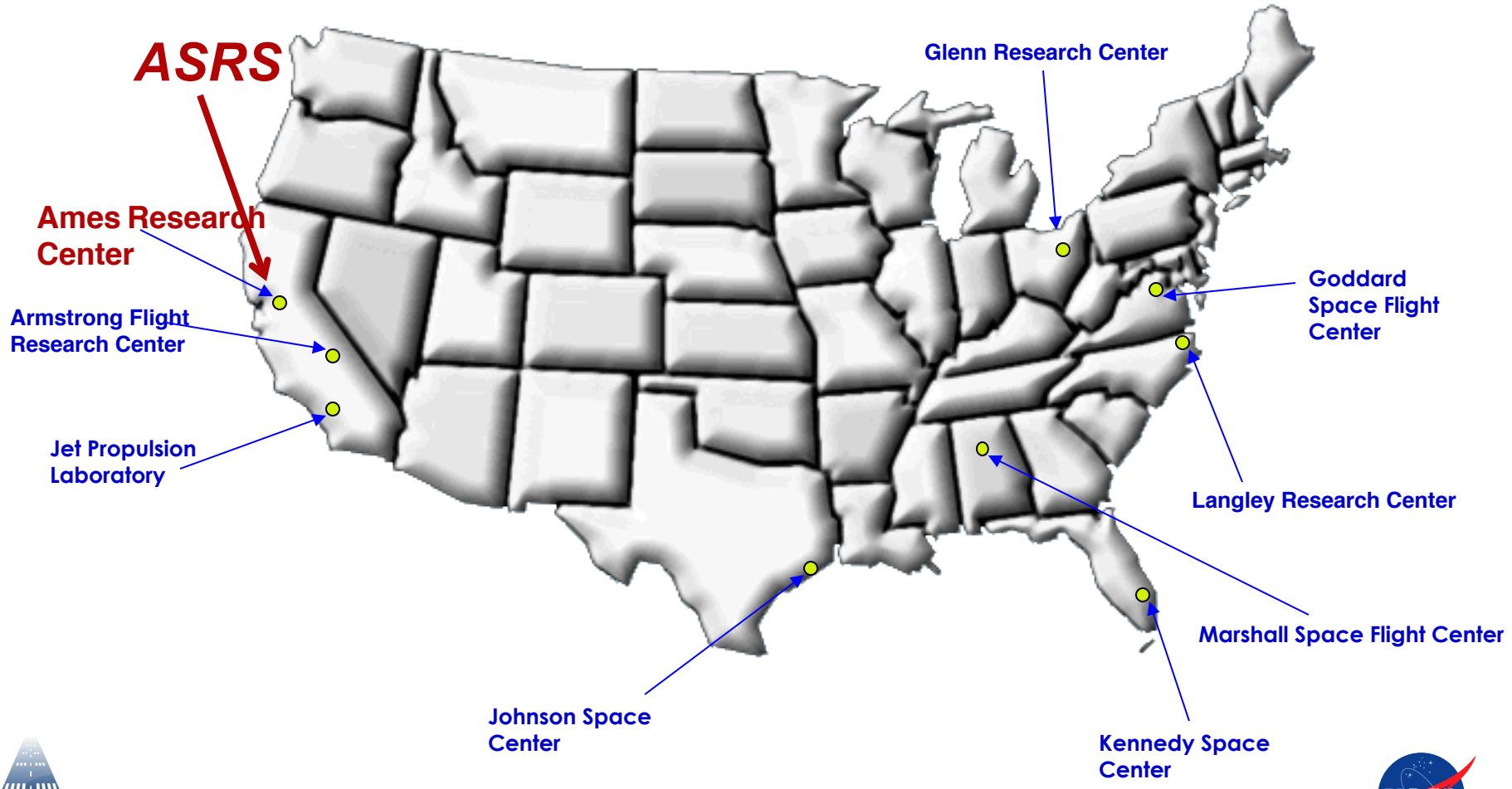
NASA Aviation Safety Reporting System (ASRS)

ICASS 2017 CHIRP – London UK

Linda J Connell
Program Director, NASA ASRS

NASA Aviation Safety Reporting System

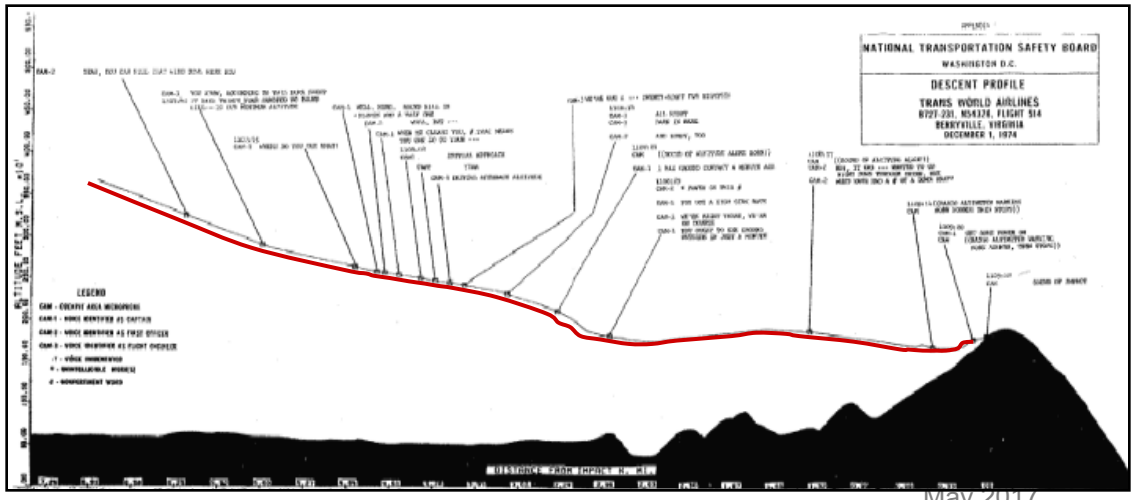



Moffett Field - Hangar One
1932

ASRS History and Background

ASRS History

- After a fatal TWA crash in 1974, the investigation revealed that six weeks prior, a United Airlines crew had experienced an identical ATC misunderstanding and narrowly missed the same mountain
- Although the information was shared with FAA at the time, there was no method of sharing the United pilot's experience with TWA and other airline operators
- This solidified the idea of a need for a national aviation reporting program that would enable collection and dissemination of safety information
- In April 1976, NASA and FAA implemented the Aviation Safety Reporting System (ASRS)



NTSB Identification: DCA75AZ005

Linking Risk Assessment and Risk Management

Risk Management

- Risk Management Encompasses:
  - Risk Assessment
  - Risk Mitigation
  - Evaluation of Residual Risk
  - Risk Acceptance

Confidential Reporting Model Has Specific Contributions to:

Risk Assessment

Nine Steps of Risk Assessment

1) System Characteristics
2) Threat Identification
3) Vulnerability Identification
4) Control Analysis
5) Probability Determination
6) Impact Analysis
7) Risk Determination
8) Control Recommendations
9) Results Documentation

System-Wide Event Occurrences

- **ASRS is complementary to other systems of reporting and focuses on precursors to the most severe events**

ASRS since 1976

40th

AVIATION SAFETY REPORTING SYSTEM

Anniversary

1976-2016

Over 1.3 Million Reports

ASRS Purpose and Mission Mandate

Identify **deficiencies and discrepancies in the National Airspace System**

Provide data **for planning and improvements to the future National Airspace System**

Mandated scope in original Federal Register Notice, FAA Advisory Circulars, FAA/NASA MOA(s) and IAA(s). Largely determines program priorities.

ASRS Principles

VOLUNTARY PARTICIPATION

Aviation personnel voluntarily submit reports concerning events related to safety for the purpose of system alerting, understanding and learning

CONFIDENTIALITY PROTECTION

Protection of identity is provided by NASA through de-identification of persons, companies, and any other identifying information

NON-PUNITIVE

FAA will not use, nor will NASA provide, any report submitted for inclusion under ASRS guidelines or information derived therein for use in any disciplinary or other adverse action (14 CFR 91.25 & AC 00-46E)

INDEPENDENT

Necessary for trust building and unbiased dissemination of safety information

The ASRS is a . . . .

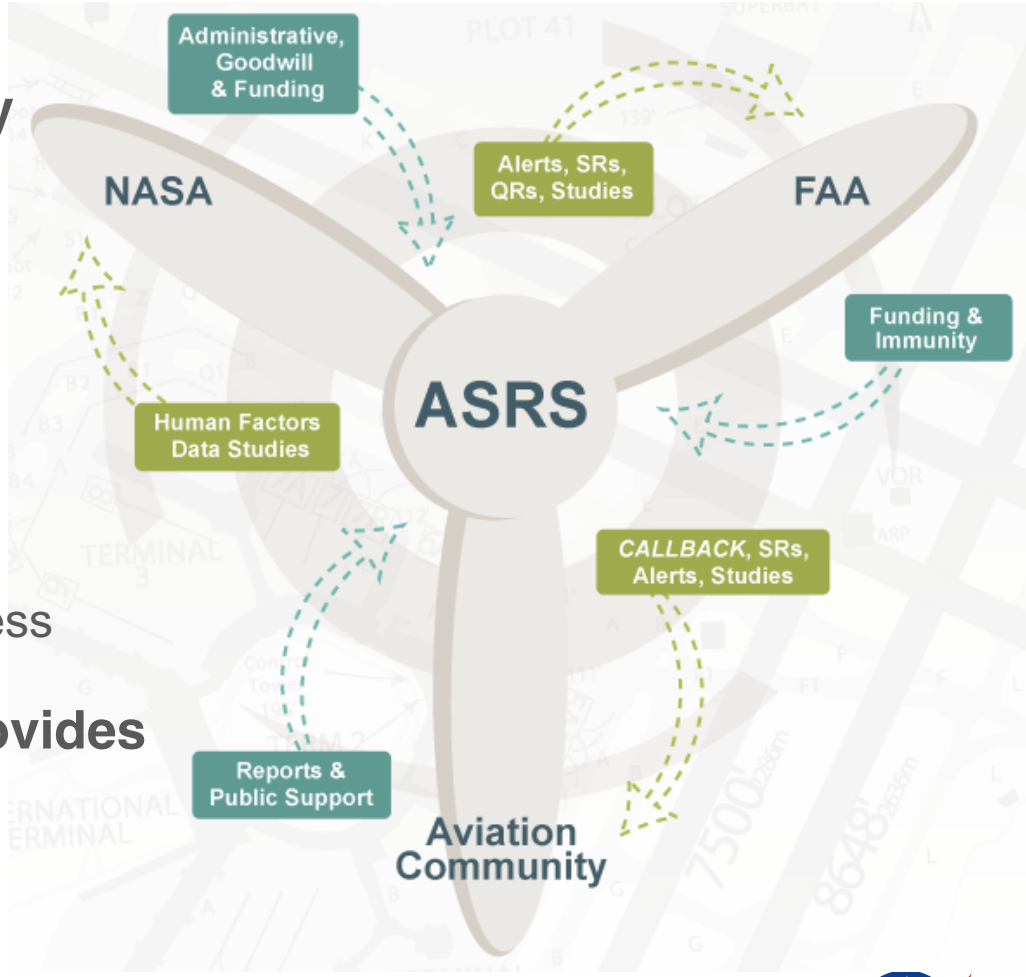
- Reporting System for Learning
- A System to Detect Safety Issues – sometimes “weak” signals
- A System for Hypothesis Generation
- A System for Quality Assurance Checks

<u>BUT IT IS NOT A</u>:

- Whistleblowing Reporting System
- Accountability/Enforcement System
- Adversarial System
- “Big Data” Reporting System

ASRS Gov't/Industry Stakeholders

- **FAA provides reimbursable funding to NASA for ASRS support through Interagency Agreement**
- **NASA provides funding for Director to provide overall management**
  - Assures independence and confidentiality
  - Reinforces role of trust in success
- **The Aviation Community provides support through aviation community advocacy for reporting, feedback, and communications**



Legal Immunity Provision

(FAA Advisory Circular AC No. 00-46E)

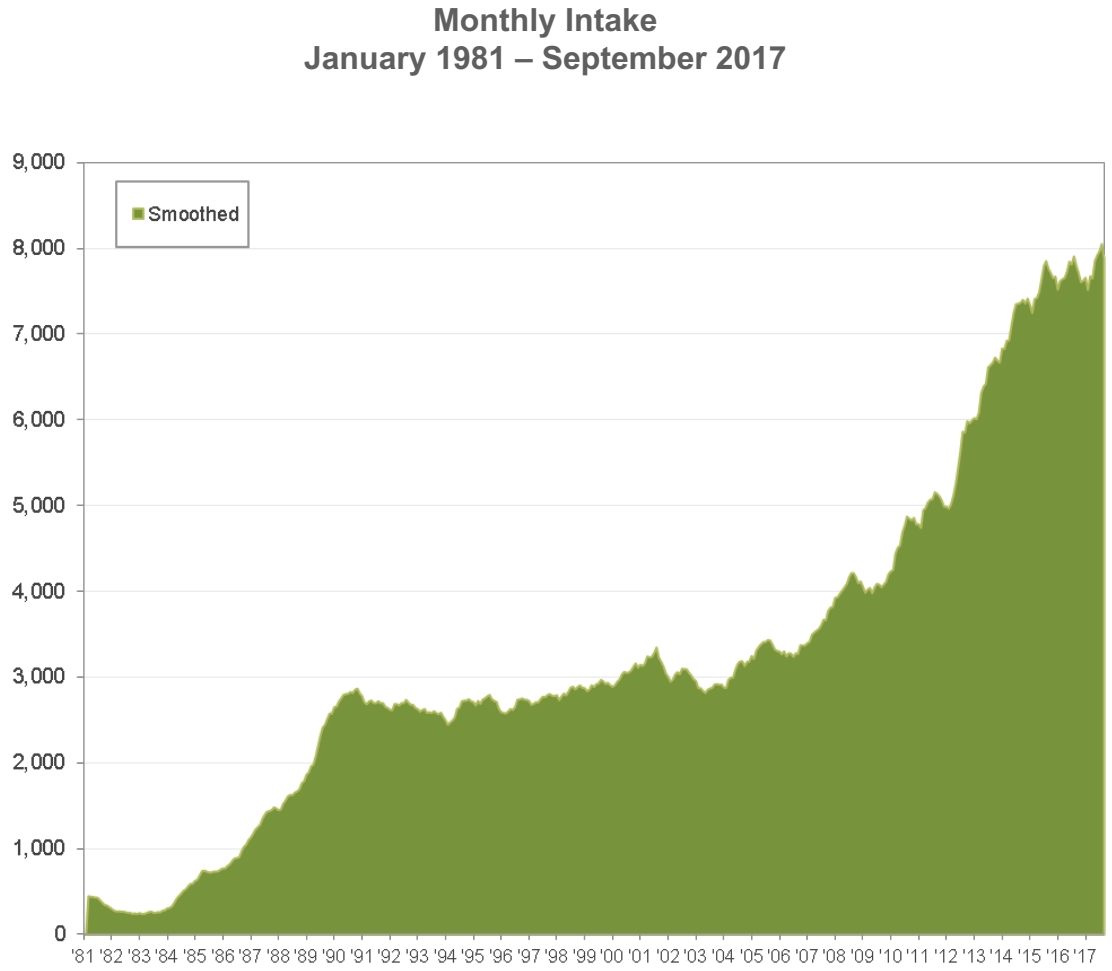
c. The FAA considers the filing of a report with NASA concerning an incident or occurrence involving a violation of 49 U.S.C. Subtitle VII, or the 14 CFR, to be indicative of a constructive attitude. Such an attitude will tend to prevent future violations. Accordingly, although a finding of a violation may be made, neither a civil penalty nor certificate suspension will be imposed if:

- The violation was inadvertent and not deliberate;
- The violation did not involve a criminal offense, or accident, or action under 49 U.S.C. Section 44709, which discloses a lack of qualification or competency, which are wholly excluded from this policy;
- The person has not been found in any prior FAA enforcement action to have committed a violation of 49 U.S. C. Subtitle VII, or any regulation promulgated there for a period of 5 years prior to the date of the occurrence; and
- The person proves that, within 10 days after the violation, or date when person became aware or should have been aware of the violation, he or she completed and delivered or mailed a written report of the incident or occurrence to NASA.

NOTE: Paragraphs 9 does not apply to air traffic controllers, who are covered under the provisions of the Air Traffic Safety Action Program (ATSAP), as described in the ATSAP Memorandum of Understanding (MOU).

ASRS Report Volume Profile

- Over 41 years of confidential safety reporting
- Over 1,485,000 reports received
- Over 6,350 alert messages issued
- Over 7,944 reports per month, or 378 per working day
- Total report intake for 2016 was 91,970
- Current rate estimate for 2017 is over 95,000



U.S. Aviation Statistics *

- **Aviation Personnel ***
  - Pilots 618,707
  - Air Traffic Controllers 14,305
  - Dispatchers 21,664
  - Mechanics 314,931
  - Flight Attendants 170,155

- **Active Aviation Labor Force ****
  - Pilots - Commercial/ATP 99,980
  - Aircraft Mechanics 35,070
  - Flight Attendants 87,190

Potential Aviation Reporters

TOTAL (Est.) 1,139,795

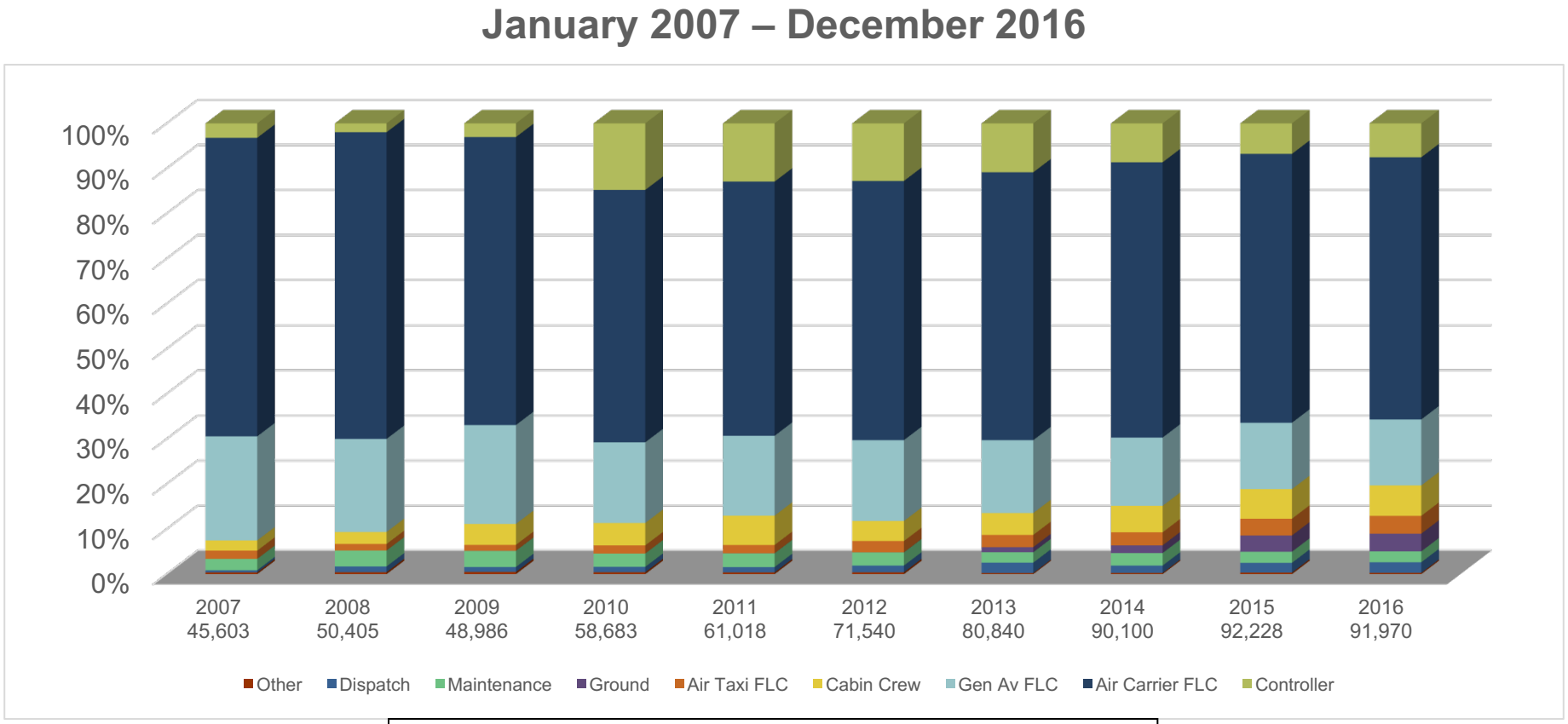
Flight Volume ***

62,000 Flights/Day (Air Carrier, Cargo, Military)

27,178 Flights/Day (General Aviation)

*July 2012 FAA Certification Database
** 2011 Bureau of Labor Statistics
*** RITA Statistics

Incident Reporter Distribution



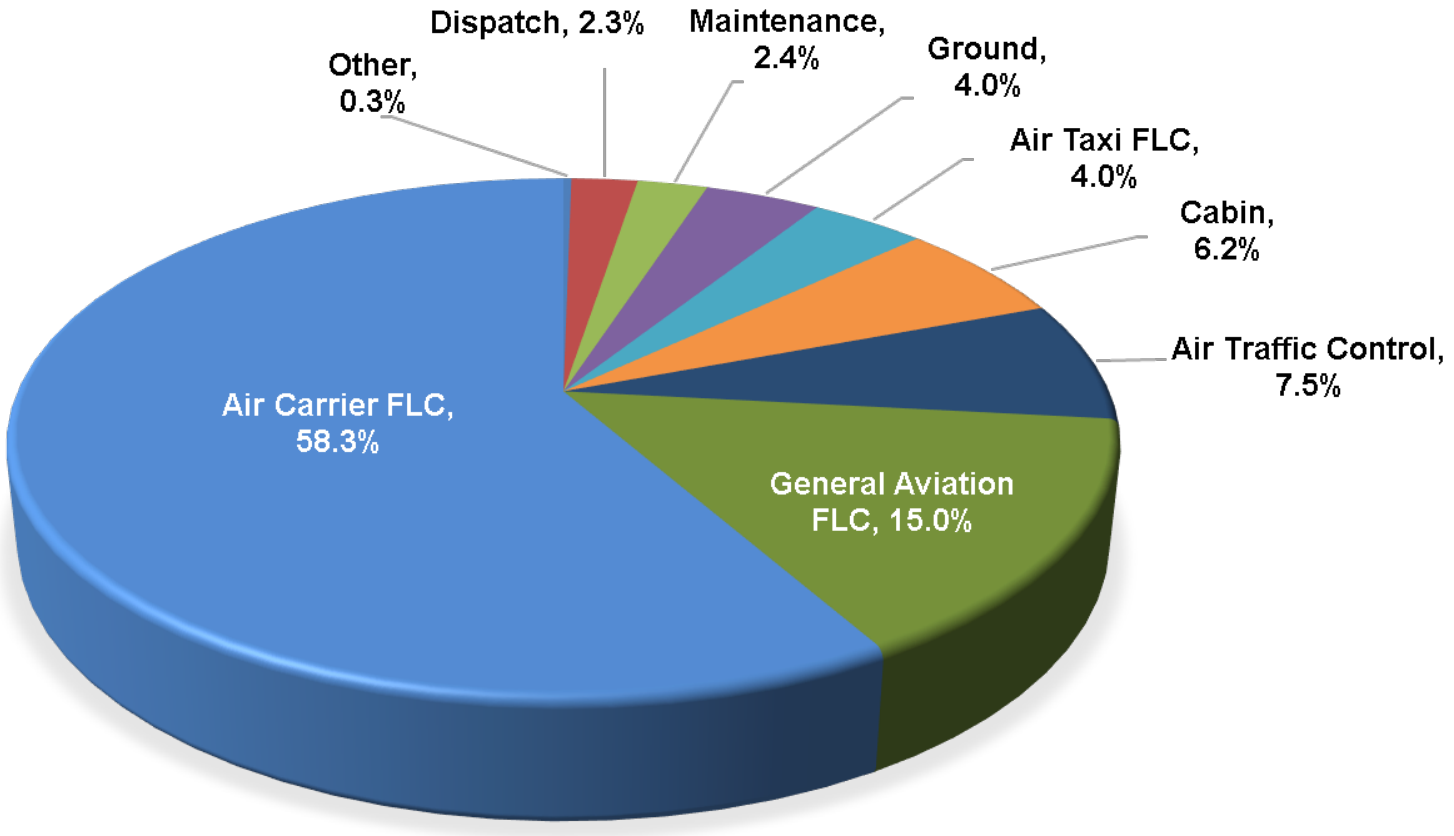
2016 Intake

- **Air Carrier FLC Reporting 58.1%**
- **General Aviation FLC 14.7%**

28% of all reports are matched to unique events in 2016

Incident Reporter Distribution

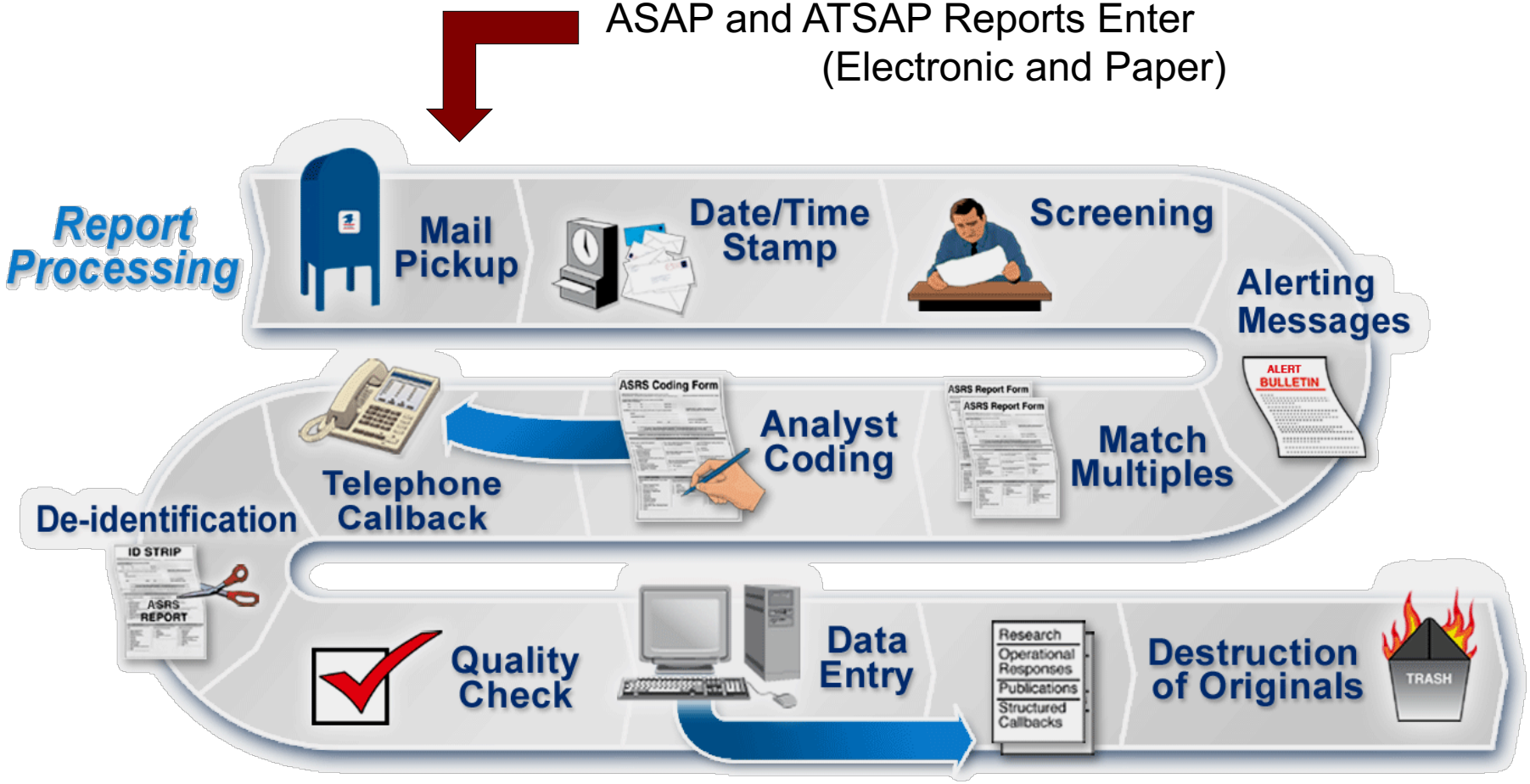
January 2016 – September 2017



n = 163,473

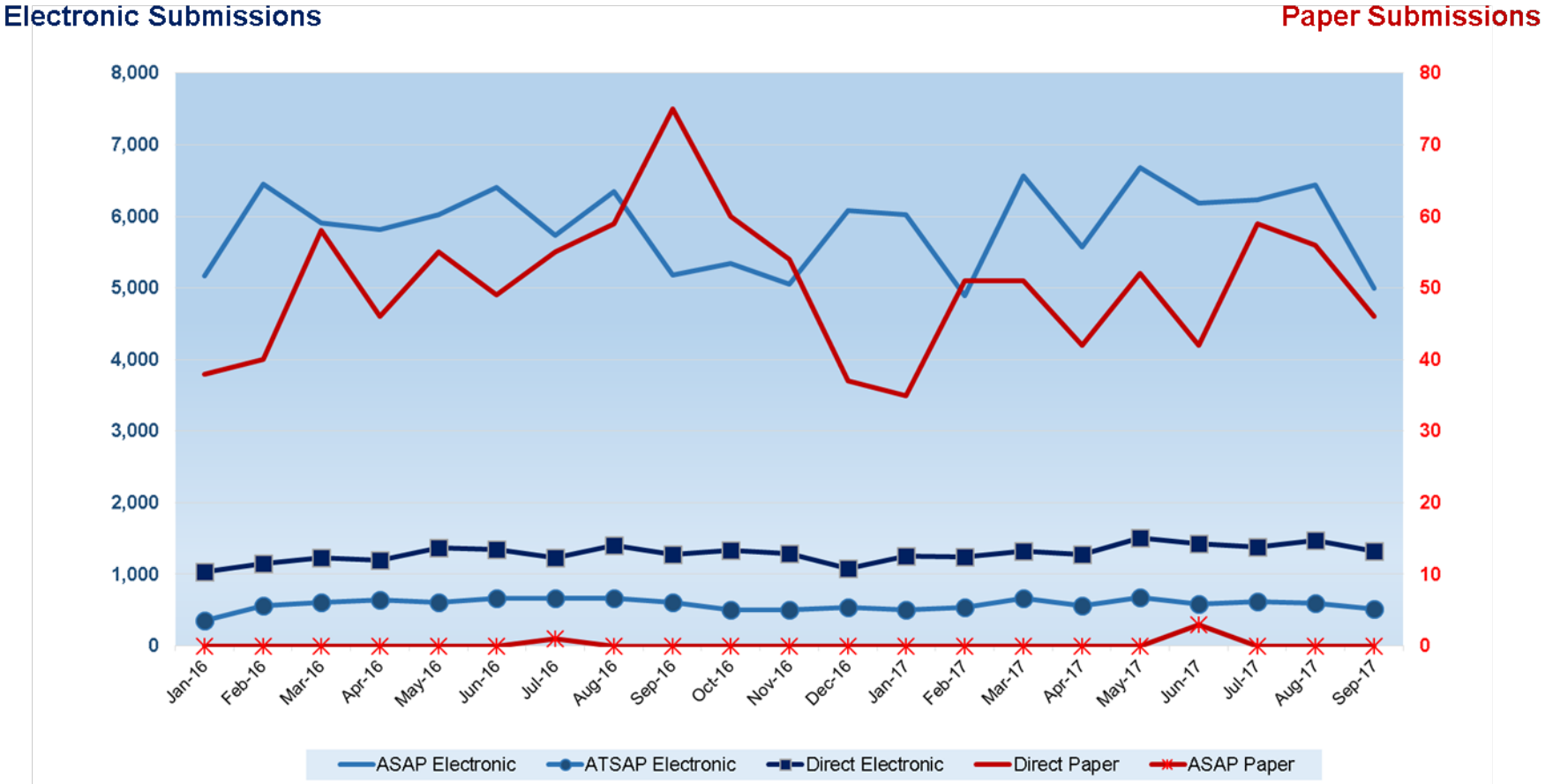
Source: 100% ASRS Report Data

Report Processing Flow



Report Intake Source Summary

January 2016 – September 2017

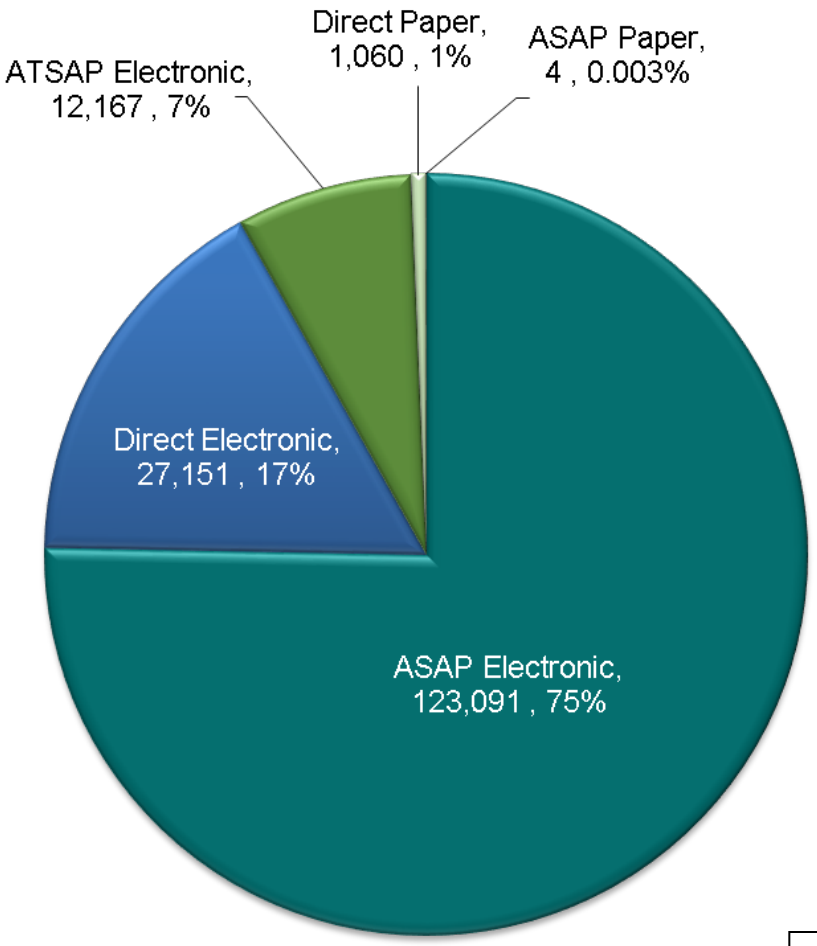


n = 163,473

May 2017

Report Intake Source (ALL)

January 2016 – September 2017



n = 163,473

100% Data Capture

- ASRS Internal Screening Dataset (Month/Yr, Time of Day, Location, Make-Model, Type of Event (Anomaly), Type of Reporter (pilot, ATC, etc).
- ASRS Full Form coding by Expert Analysts of 100% of incidents identified as:

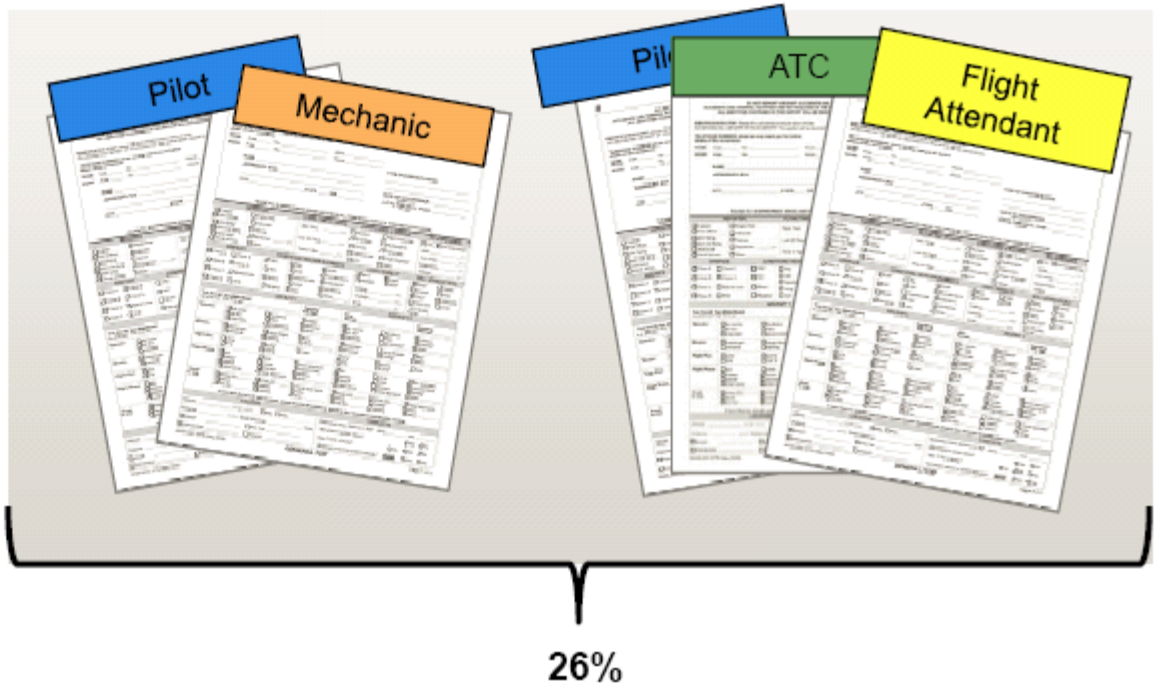
  "Bold Items"* (since beginning of ASRS)

  - NMAC
  - Controlled Flight Towards Terrain (CFTT)
  - Critical Aircraft Equipment Problem
  - Critical Ground Conflict
  - Loss of Aircraft Control

* Bold Items list developed by jointly FAA and NASA ASRS

Incidence of ASRS Multiple Reports

- Provides information from more than one person's perspective on a single event



ASRS focuses activity to meet fundamental program objectives while maintaining confidentiality and independence

ALERTS

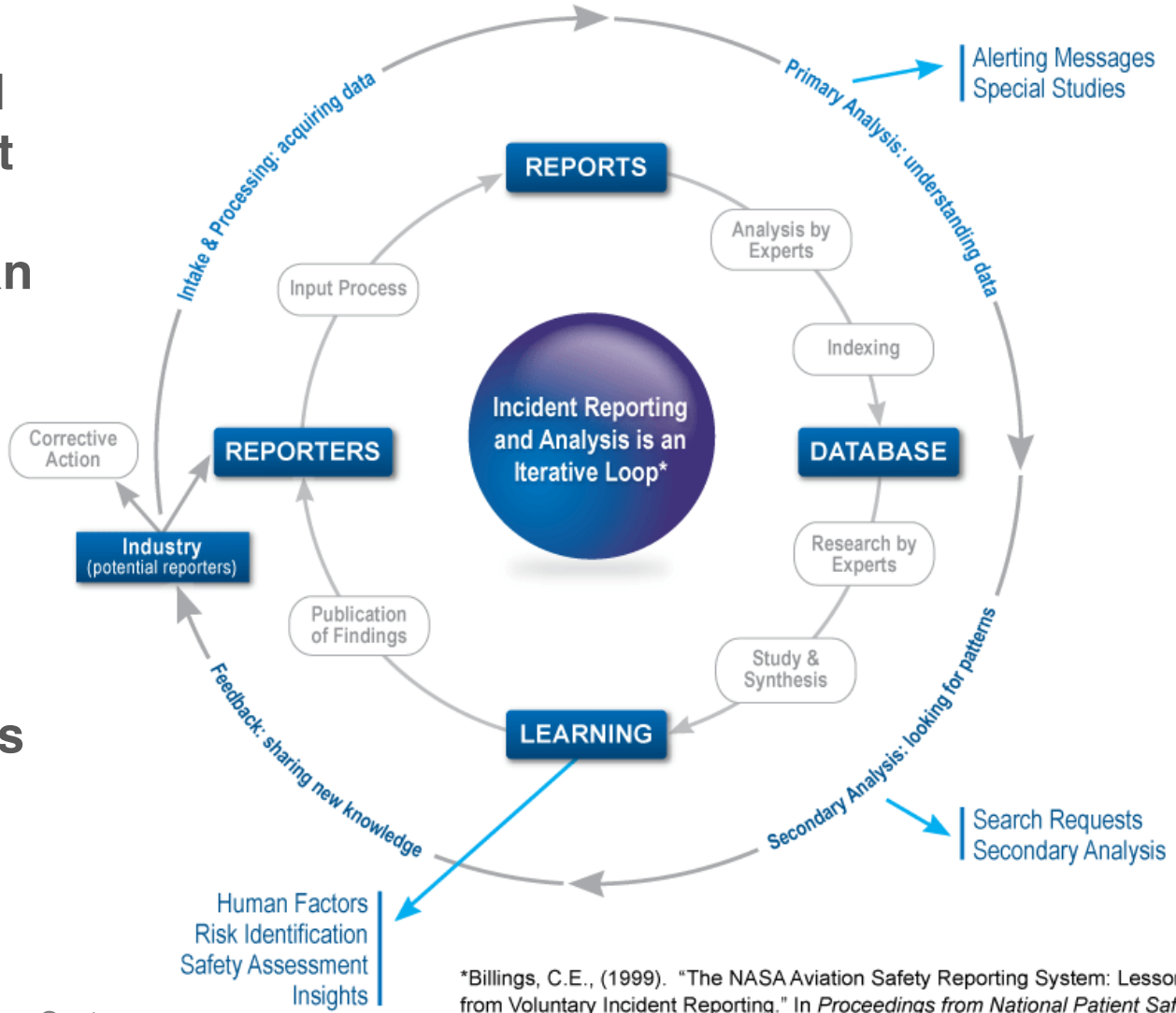
Identify Deficiencies and Discrepancies

PRODUCTS

Provide Data for Planning and Improvements

Incident Reporting Model

- **ASRS is a closed loop process that supports System Safety and Human Factor insights**
- **Government / Industry are provides information that may result in corrective actions**



*Billings, C.E., (1999). "The NASA Aviation Safety Reporting System: Lessons Learned from Voluntary Incident Reporting." In *Proceedings from National Patient Safety Foundation Conference Enhancing Patient Safety and Reducing Errors in Health Care.*

ASRS Products

- **These products and services fulfill the program's mission to disseminate safety data**

Alert Messages

Safety information issued to organizations in positions of authority for evaluation and possible corrective actions.

CALLBACK

Monthly newsletter with a lessons learned format, available via website and email.

Quick Responses

Rapid data analysis by ASRS staff on safety issues with immediate operational importance generally limited to government agencies.

ASRS Directline

Safety topic summaries based on ASRS reports published to meet the needs of operators and flight crews.

ASRS Database

The public ASRS Database Online and data available in Database Report Sets or Search Requests fullfilled by ASRS staff.

Focused Studies/Research

Studies/Research conducted on safety topics of interest in cooperation with aviation organizations.

Incident Reporting Model

- **ASRS is a closed loop process that supports System Safety and Human Factors**
- **Government / Industry are provided information that result in corrective actions**

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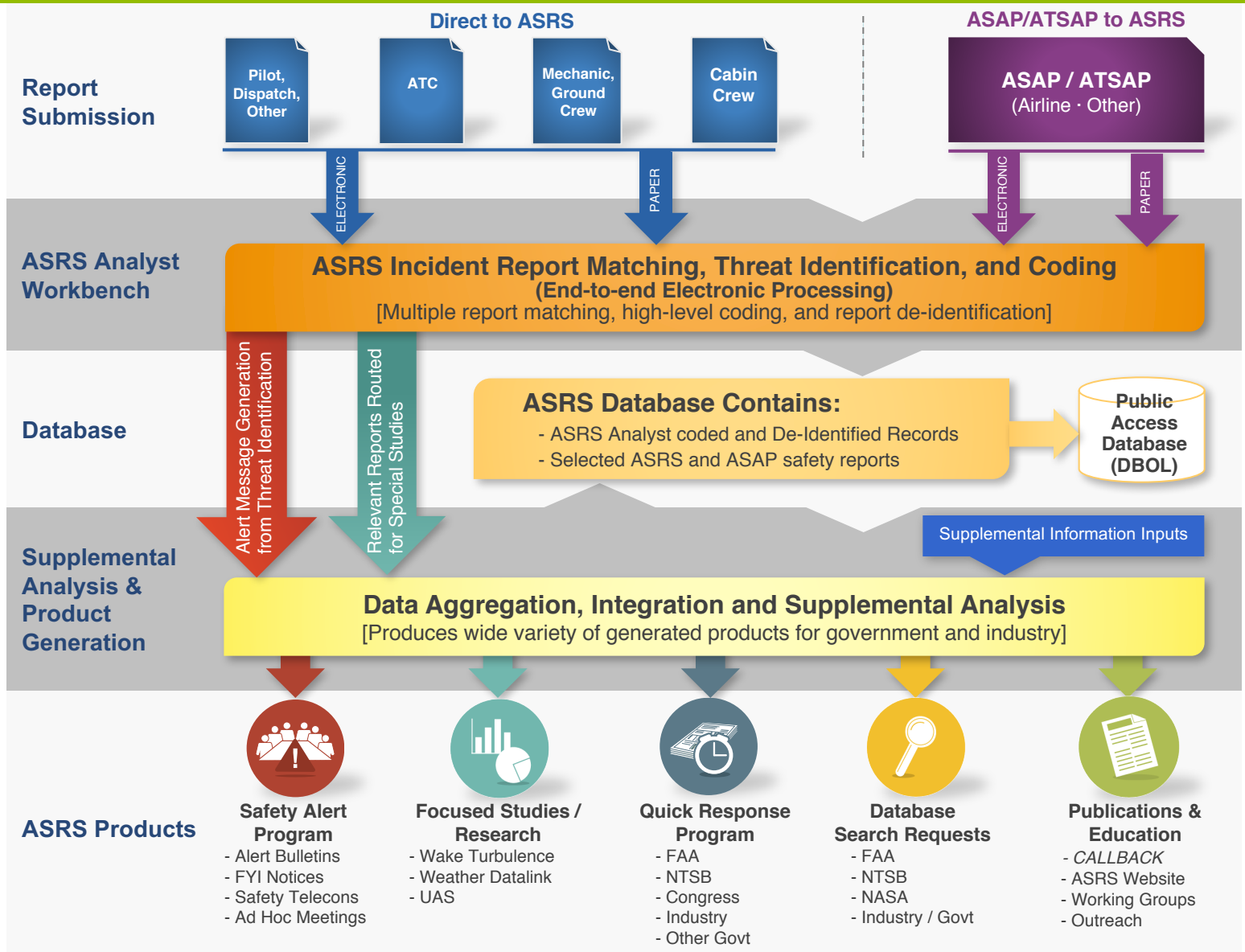
ASRS Report Processing Flow Chart



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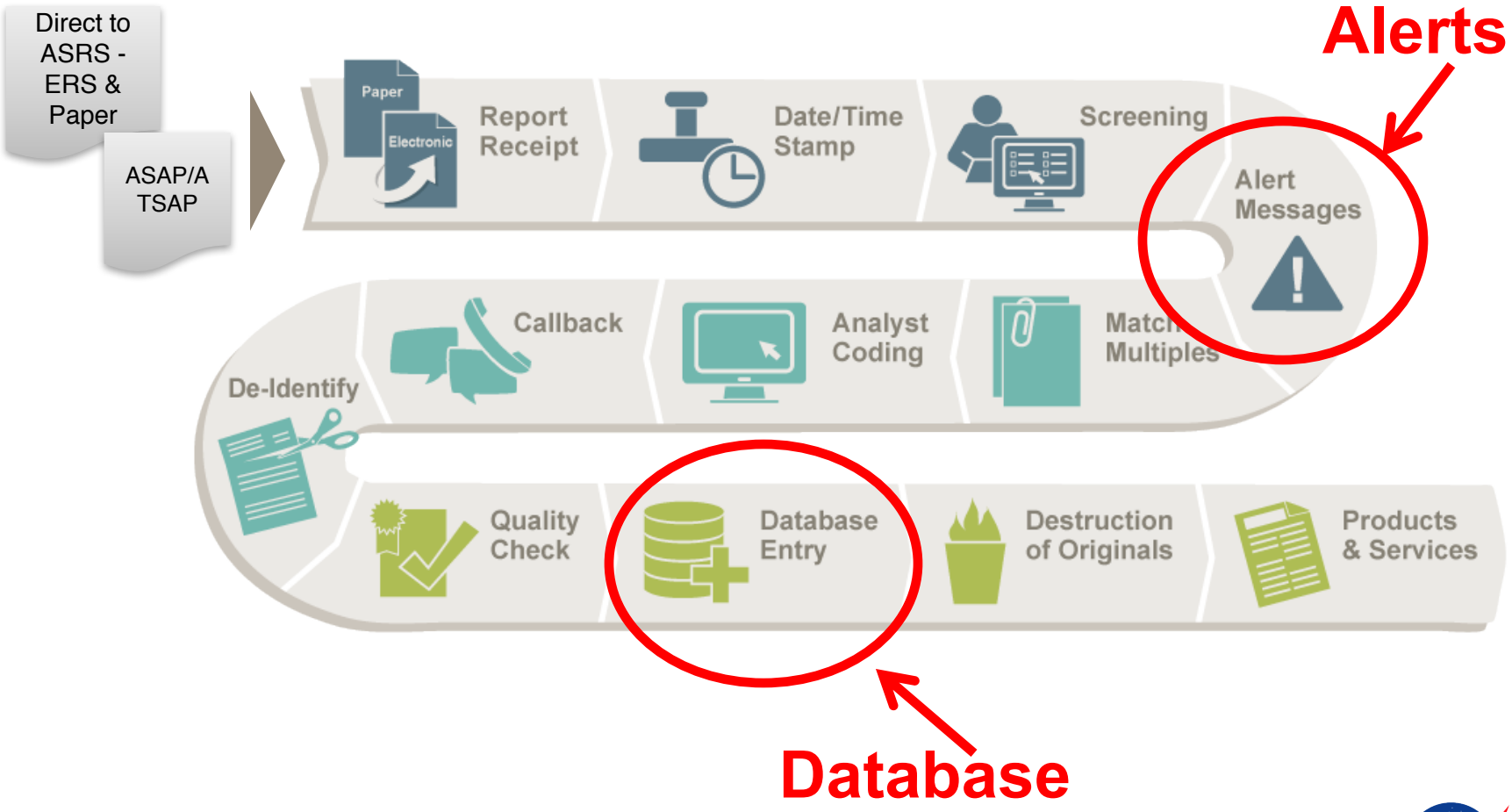

ALERTS

ASRS Purpose and Mission Mandate

Identify **deficiencies and discrepancies in the National Airspace System**

Provide data **for planning and improvements to the future National Airspace System**

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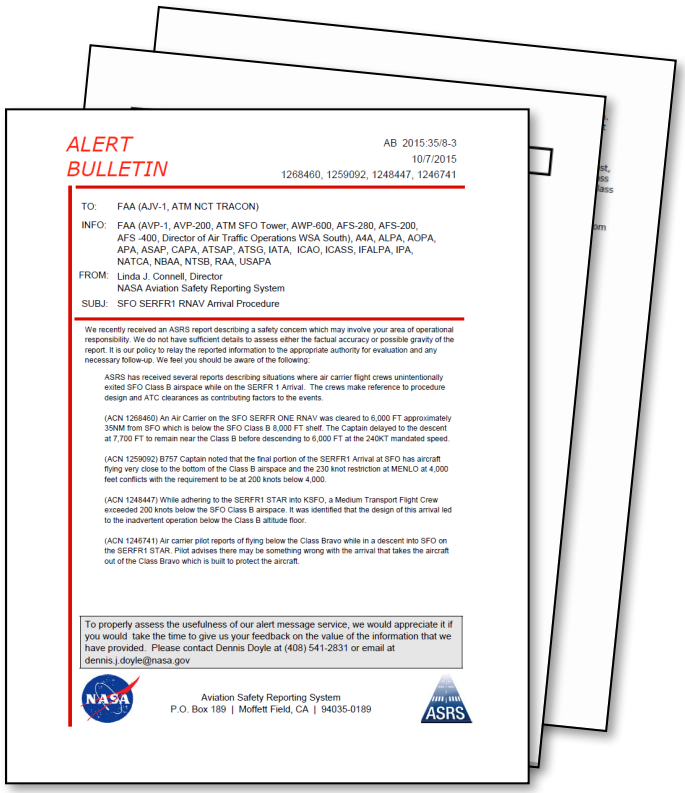
Alert Bulletin & FYI Notices

Alert Bulletin



ALERT BULLETIN

AB 2015:35/8-3
10/7/2015
1268460, 1259092, 1248447, 1246741

TO: FAA (AJV-1, ATM NCT TRACON)

INFO: FAA (AVP-1, AVP-200, ATM SFO Tower, AWP-600, AFS-280, AFS-200, AFS -400, Director of Air Traffic Operations WSA South), A4A, ALPA, AOPA, APA, ASAP, CAPA, ATSAP, ATSG, IATA, ICAO, ICASS, IFALPA, IPA, NATCA, NBAA, NTSB, RAA, USAPA

FROM: Linda J. Connell, Director
NASA Aviation Safety Reporting System

SUBJ: SFO SERFR1 RNAV Arrival Procedure

We recently received an ASRS report describing a safety concern which may involve your area of operational responsibility. We do not have sufficient details to assess either the factual accuracy or possible gravity of the report. It is our policy to relay the reported information to the appropriate authority for evaluation and any necessary follow-up. We feel you should be aware of the following:

ASRS has received several reports describing situations where air carrier flight crews unintentionally exited SFO Class B airspace while on the SERFR 1 Arrival. The crews make reference to procedure design and ATC clearances as contributing factors to the events.

(ACN 1268460) An Air Carrier on the SFO SERFR ONE RNAV was cleared to 6,000 FT approximately 35NM from SFO which is below the SFO Class B 8,000 FT shelf. The Captain delayed to the descent at 7,700 FT to remain near the Class B before descending to 6,000 FT at the 240KT mandated speed.

(ACN 1259092) B757 Captain noted that the final portion of the SERFR1 Arrival at SFO has aircraft flying very close to the bottom of the Class B airspace and the 230 knot restriction at MENLO at 4,000 feet conflicts with the requirement to be at 200 knots below 4,000.

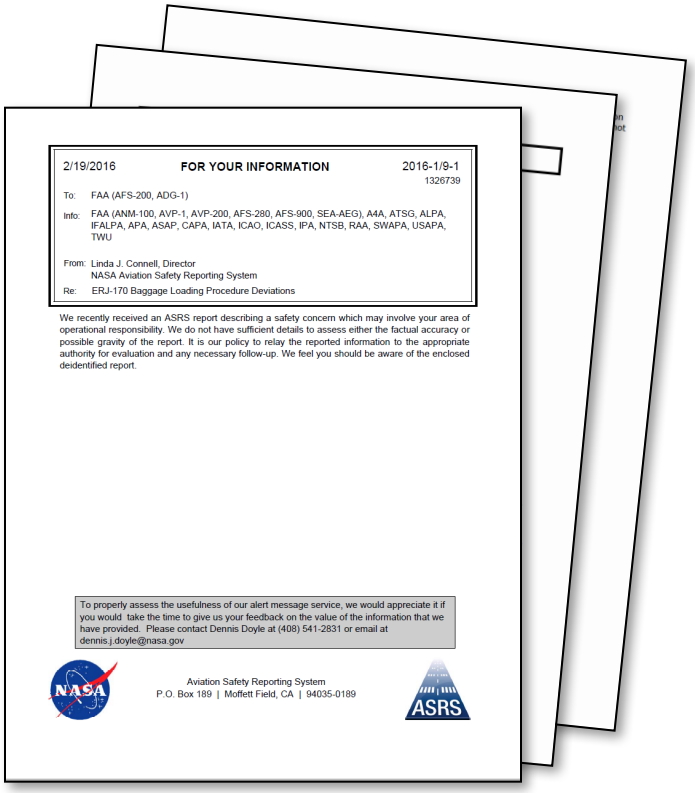
(ACN 1248447) While adhering to the SERFR1 STAR into KSFO, a Medium Transport Flight Crew exceeded 200 knots below the SFO Class B airspace. It was identified that the design of this arrival led to the inadvertent operation below the Class B altitude floor.

(ACN 1246741) Air carrier pilot reports of flying below the Class Bravo while in a descent into SFO on the SERFR1 STAR. Pilot advises there may be something wrong with the arrival that takes the aircraft out of the Class Bravo which is built to protect the aircraft.

To properly assess the usefulness of our alert message service, we would appreciate it if you would take the time to give us your feedback on the value of the information that we have provided. Please contact Dennis Doyle at (408) 541-2831 or email at dennis.j.doyle@nasa.gov

Aviation Safety Reporting System
P.O. Box 189 | Moffett Field, CA | 94035-0189

For Your Information



2/19/2016 **FOR YOUR INFORMATION** 2016-1/9-1
1326739

To: FAA (AFS-200, ADG-1)

Info: FAA (ANM-100, AVP-1, AVP-200, AFS-280, AFS-900, SEA-AEG), A4A, ATSG, ALPA, IFALPA, APA, ASAP, CAPA, IATA, ICAO, ICASS, IPA, NTSB, RAA, SWAPA, USAPA, TWU

From: Linda J. Connell, Director
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Re: ERJ-170 Baggage Loading Procedure Deviations

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Aviation Safety Reporting System
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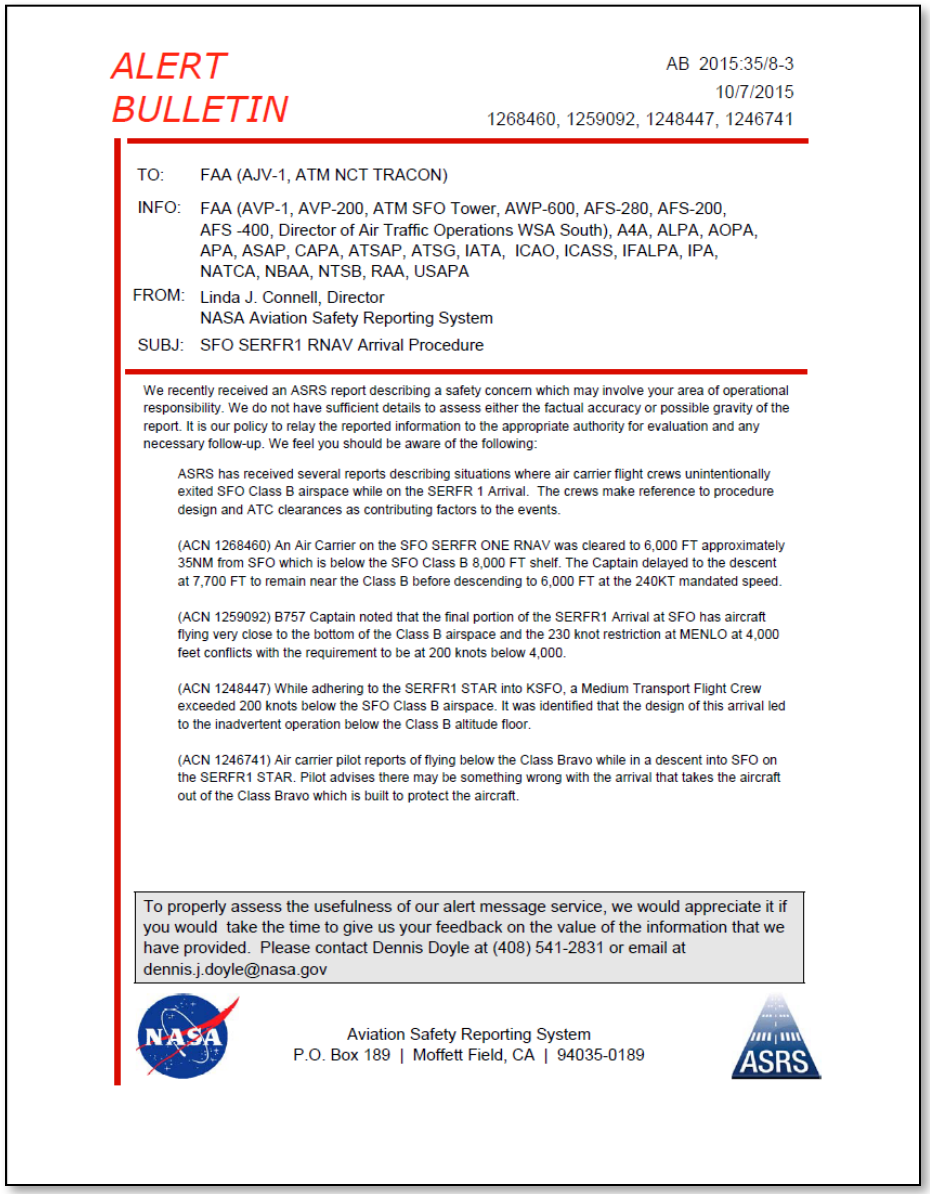
Alert Bulletin Example – SFO RNAV Arrival

Alert Bulletin



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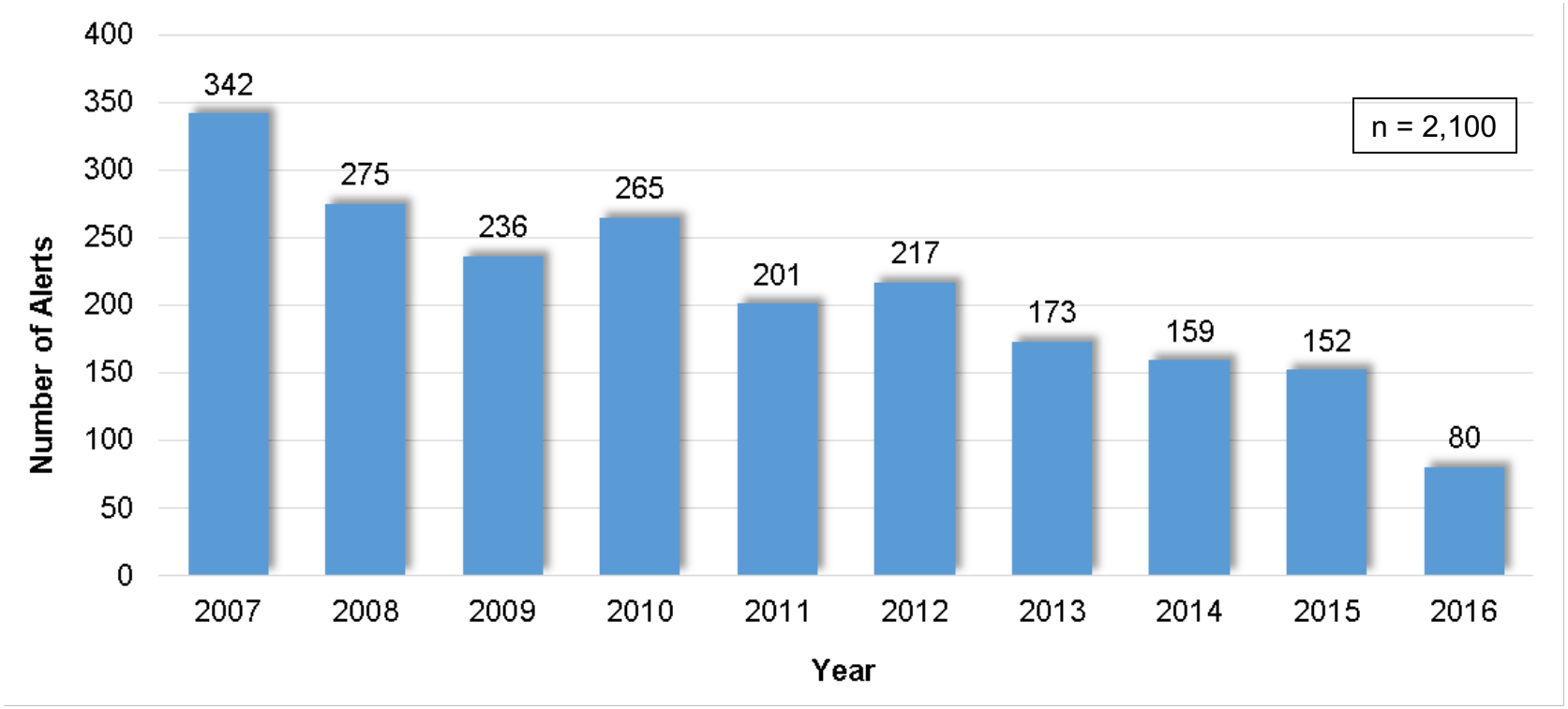
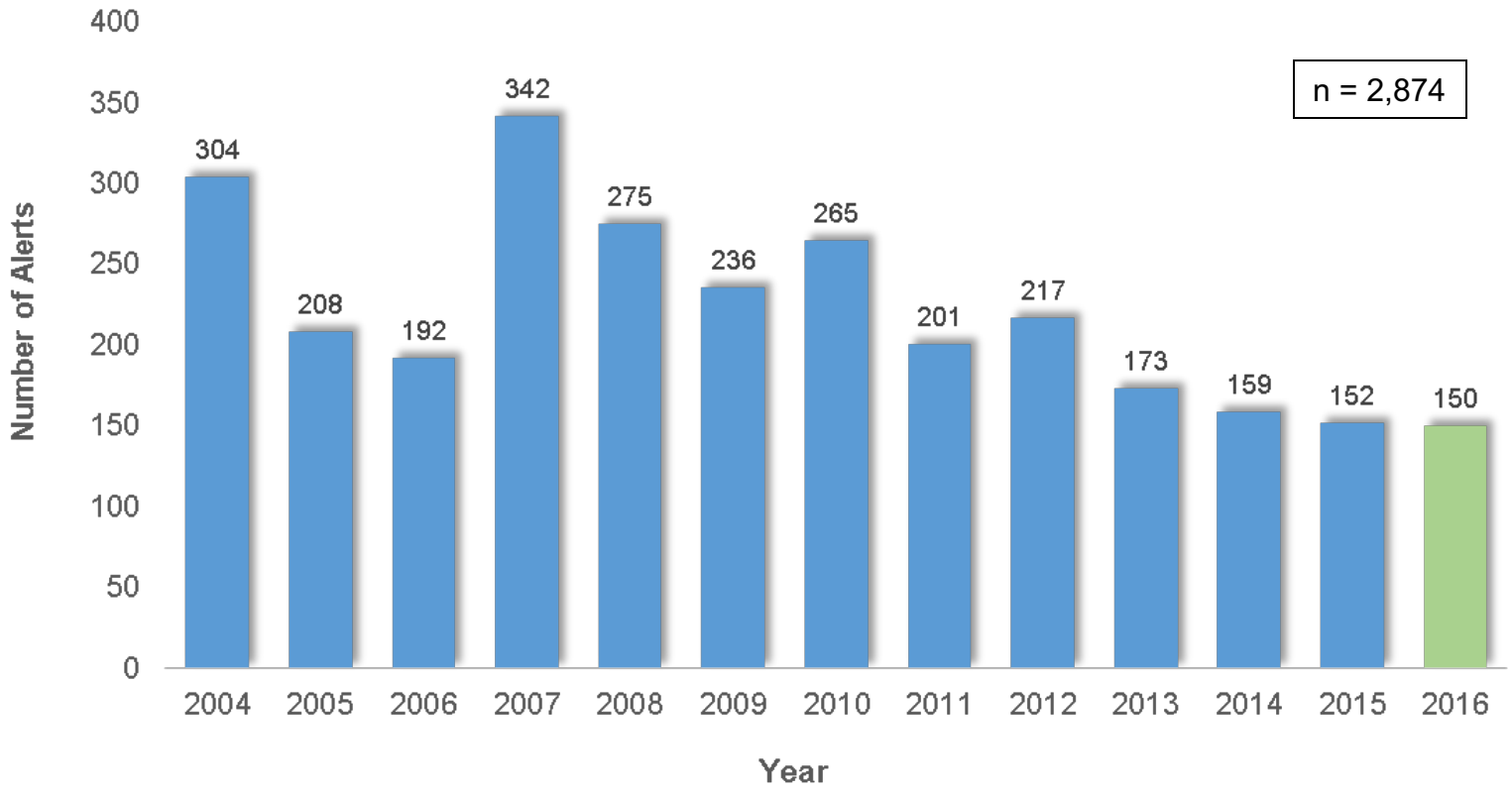
Safety Alerts

Messages Issued 2007 – 2016



Safety Alerts

Messages Issued 2004 – Present

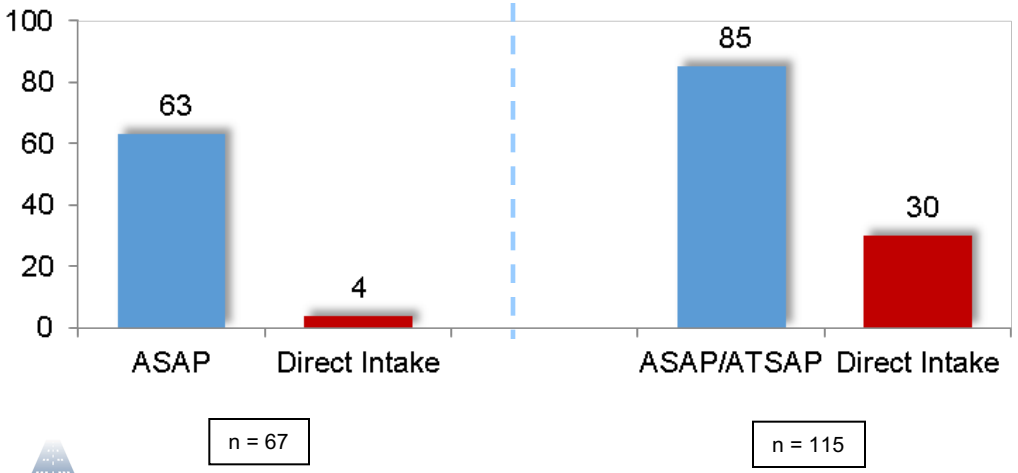


*2016 data is projected based on alerts issued and currently under process through July 12th.

Alert Messages Reporter Type

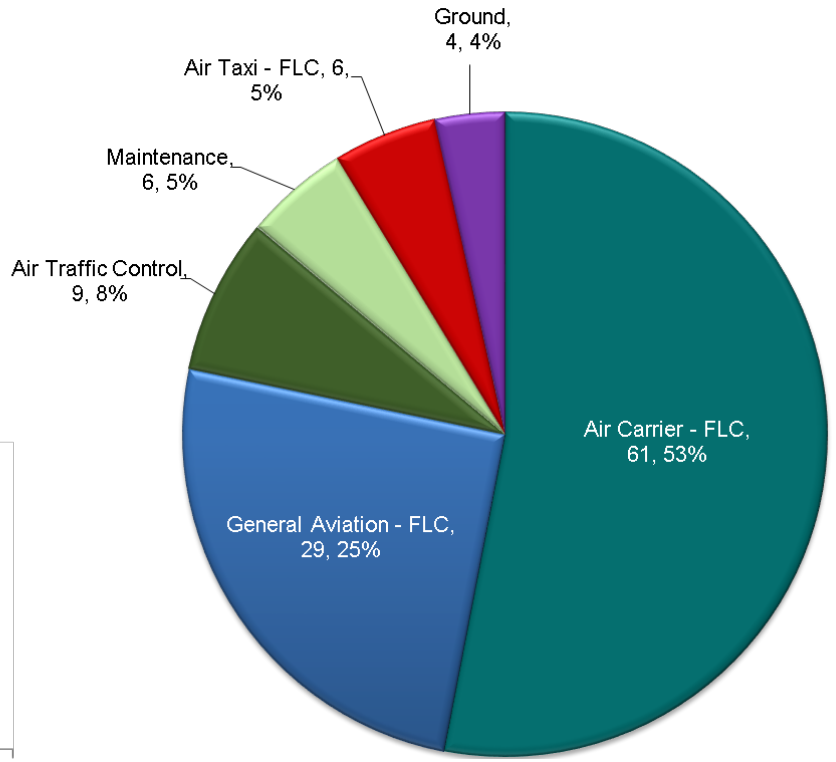
January 2016 – September 2017

- ASRS issued a total of 115 alert messages
  - 63 Alert Bulletins
  - 52 For Your Information Notices



n = 67

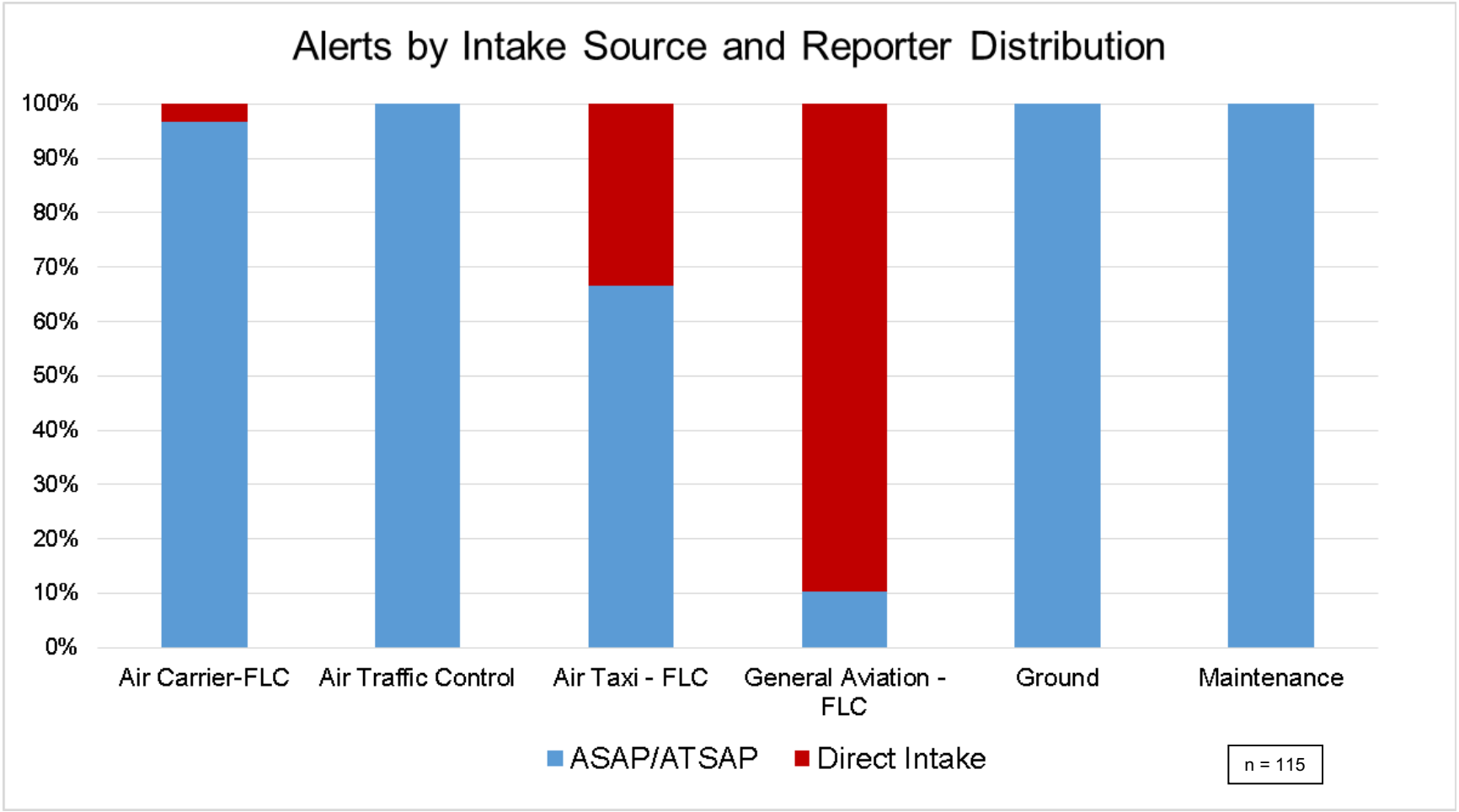
n = 115



n = 115

Alert Message Originated by Source

January 2016 – September 2017



Safety Alerts (Alert Bulletin & FYI Notices)

Messages Issued 2007 – 2016

- ASRS issued 2,100 Alert Messages from January 2007 to December 2016
  - Approximately One Alert Message per working day
- A total of 887 responses were received
  - 47.6% total response rate (62% positive)
  - FAA responded to 304 alerts (34% of all responses)

Alert Responses
(2007 – 2016)

Response	Percentage
T. Action taken as a result of the AB/FYI	21%
B. Action initiated before AB/FYI received	15%
I. Action initiated in response to AB/FYI but not completed	12%
N. Addressee agrees with AB/FYI but sees no problem	7%
U. Issue raised by AB/FYI under investigation	4%
H. Addressee in factual agreement but is unable to resolve	3%
W. Addressee disputes factual accuracy of AB/FYI	21%
Q. Information in AB/FYI insufficient for action	13%
C. Action not within addressee's jurisdiction	3%
F. For information only, no response expected	1%

62%

n = 887

ASRS Alert Messages – Early Warning

- **The following are examples of ASRS' role in identifying deficiencies and discrepancies in the National Airspace System that have or could result in an accident**
  - **E170 Engine Fire Bottle Installation**
    - **Significant potential for improper installation of engine fire extinguishing agent plumbing system**
    - **Several design features appear to have been used to mitigate a possible system misconfiguration, but not solved**
    - **Undetected misconfiguration could result in the loss of life due to the inability to extinguish an engine fire on one or both aircraft engines**
  - **Solar Power Tower Array – Sun Glare**
    - **Many examples of heading and altitude deviations due to the distraction caused by reflective glare and the effects of after-image spotting and temporary blindness**
  - **Unmanned Aerial Vehicles (UAVs)**
    - **In 2009 ASRS identified UAV incidents as an emerging safety issue**
    - **Main concerns are NMAC events involving UAVs and all type of Operator type aircraft**
    - **Over 300 reports received since 2009**

DATABASE

ASRS Database Searches

ASRS Report Records Are Public:

- Direct request to ASRS Office via website “Contact Us”, email, or phone
- Direct Access to Database Online (DBOL) from ASRS Website using self-search capability

http://asrs.arc.nasa.gov

- Aviation Safety Reporting System

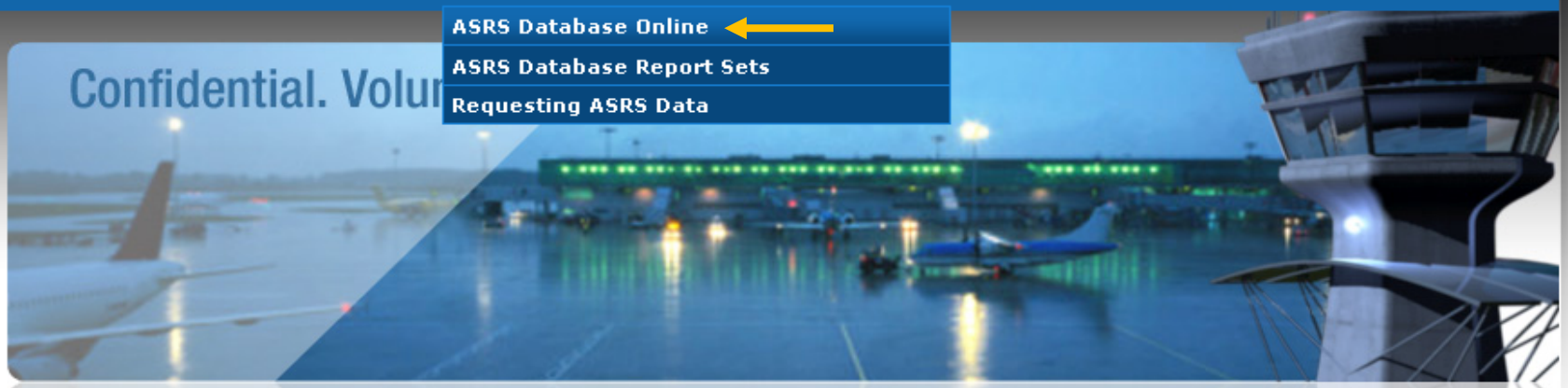
Google

Aviation Safety Reporting System

Home | Contact Us

Program Information | Report to ASRS | Search ASRS Database | Publications/Studies | International | Online Resources

- ASRS Database Online
- ASRS Database Report Sets
- Requesting ASRS Data



ASRS captures confidential reports, analyzes the resulting aviation safety data, and disseminates vital information to the aviation community.

CALLBACK

Receive FREE monthly newsletter by email! (Please Read)

Subscribe to *CALLBACK*

NOTAM Issues

July 2015, Issue 426

HTML | PDF

Select a Form To Submit a Report

- General - Pilots, Dispatchers, Others
- Air Traffic Control - Air Traffic Controllers
- Maintenance - Mechanics
- Cabin - Cabin Crew

How to Report Online

Review proper browser settings, security tips, and provisions.

- FAQ for Electronic Report Submission
- Online Security Tips
- Immunity Policy

View Program Briefing

Learn more about ASRS such as report processing and reporting metrics.

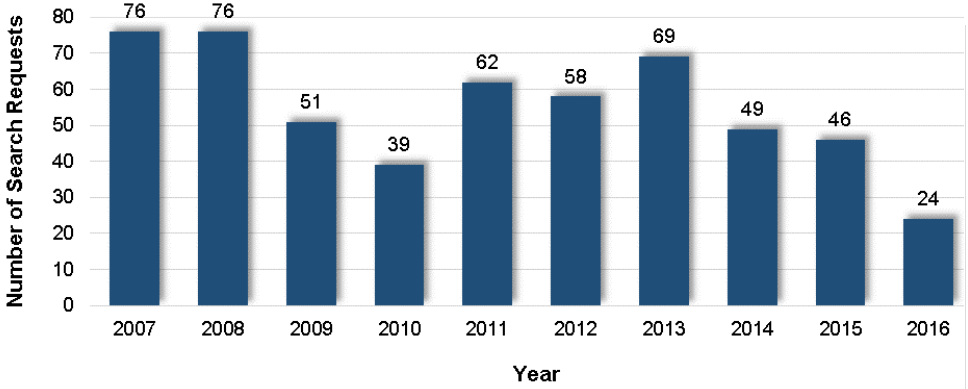
ASRS Website Administrator: Mariana Carmona || NASA/ASRS Director: Linda Connell
NASA Privacy Statement || NASA Home || NASA Ames

http://asrs.arc.nasa.gov/

Direct to ASRS for Database Analysis Requests

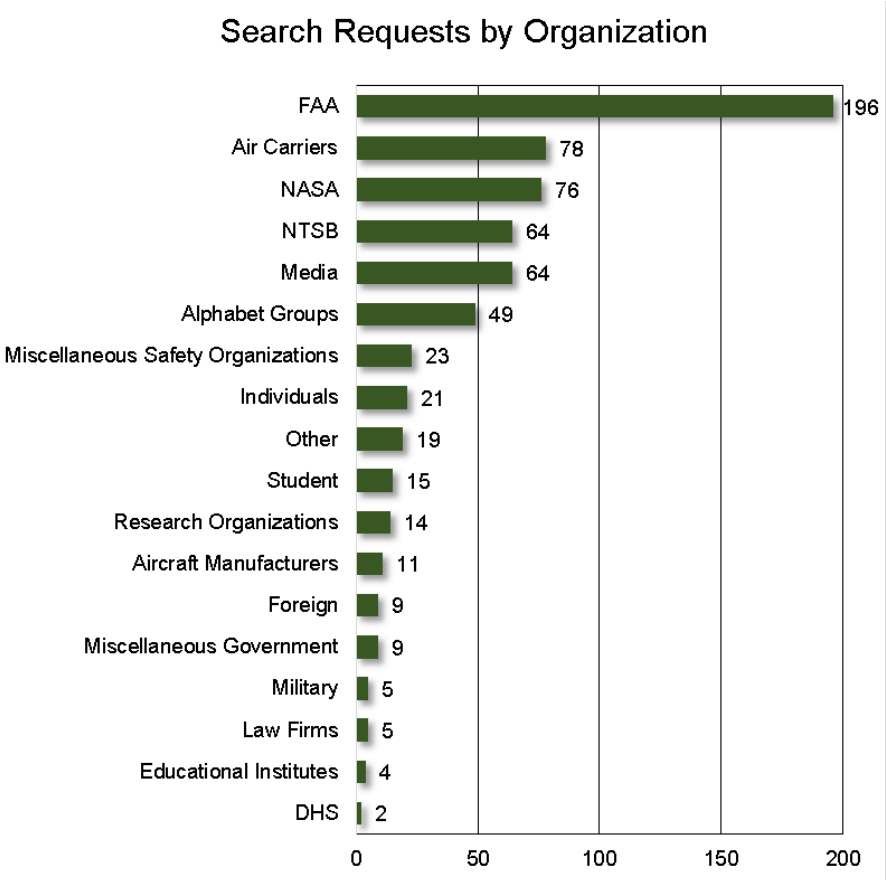
2007 – 2016

ASRS Database Online became available in 2006

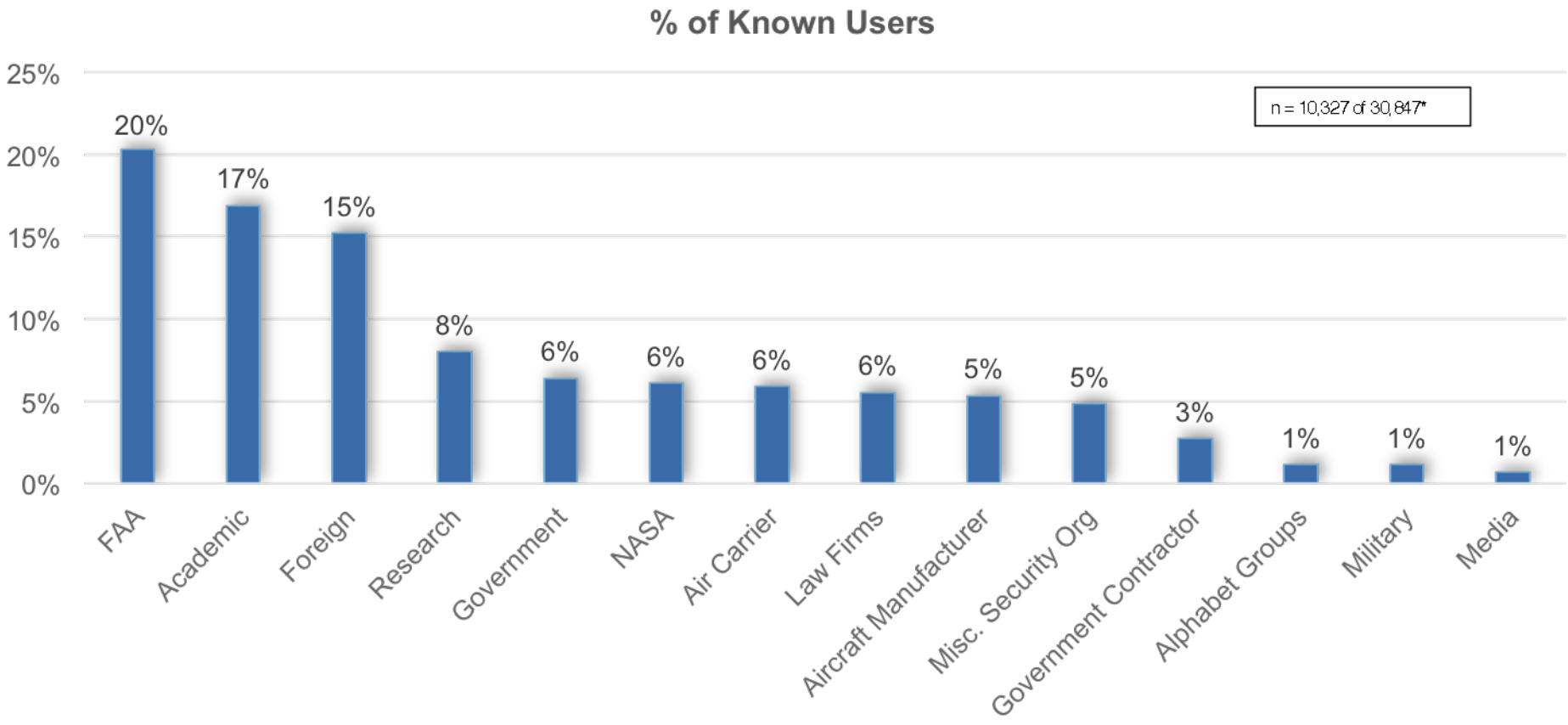


- **FAA is the most frequent requestor of specific data searches**
- **All requests are completed within 14 calendar days**

n = 550



Sampling of Website Database Online Access
(One Month Snapshot of Activity)



*A total of 20,514 User Types were Other/Individuals/Unknown.

ASRS Top 10 Safety Issues

- Identified by ASRS Expert Analysts
  (Pilots, Controllers, Mechanics and Dispatchers)
- Issues determined
  (Emerging, Re-emerging or Continuing)

Automation Dependency/Overreliance

Climb/Descend Via Issues

Operational Fatigue

Controller - Pilot Data Link Communications (CPDLC)

Unmanned Aerial Vehicle (UAV) Incidents

ATC Communication Issues

Passenger Misconduct

Altitude Deviations

Aircraft Equipment Problems

Airspace Violations

Item No. 2 – Fumigation in Cargo Compartment Caused Smoke ECAM

Report 1473000

This graphic is for illustrative purposes only and not to be used for any other purpose.

Item No. 2 – Fumigation in Cargo Compartment Caused Smoke ECAM
Report 1473000

- ASRS received a report from an Airbus Captain describing a smoke ECAM incident reportedly triggered by fumigant spray used in the cargo compartment at an international airport
- Reporter observed "AFT CARGO SMOKE " ECAM after parking at the gate

May 2017

Item No. 2 – Fumigation in Cargo Compartment Caused Smoke ECAM
Report 1473000

- In accordance with procedure, extinguishing agent was discharged to the cargo compartment, and an evacuation via main entry door and aft stairs was ordered
- The smoke alert was later found to be caused by insecticide spray treatment in the cargo compartment, a procedure that is r mr to the flig

Item No. 2 – Fumigation in Cargo Compartment Caused Smoke ECAM
Report 1473000

SMOKE (FWD or AFT) CARGO SMOKE (With Cargo Door Closed)

WARNING

Smoke may be caused by some other source. If smoke is detected in the cockpit or cabin perform the ECAM actions then go to SMOKE / AVIONICS SMOKE / FUMES Immediate Actions page iv.

If in flight or on the ground with the cargo door closed:

Note: *Expect* the SMOKE warning to remain after agent *discharge*, even if the smoke source is extinguished. *[Gases from the smoke source are not evacuated, and smoke detectors are also sensitive to the extinguishing agent.]*

1. Advise ground crew not to open the door of the affected cargo compartment unless the passengers have deplaned and fire services are present.
2. SMOKE (FWD OR AFT) CARGO SMOKE Checklist complete, and
   - ☛ Establish and Communicate a plan.

AIR APU BLEED FAULT

Crew Awareness: Resetting the APU BLEED OFF then ON once may allow recovery of the APU bleed.

ASRS Model Applied to Aviation & Other Industries

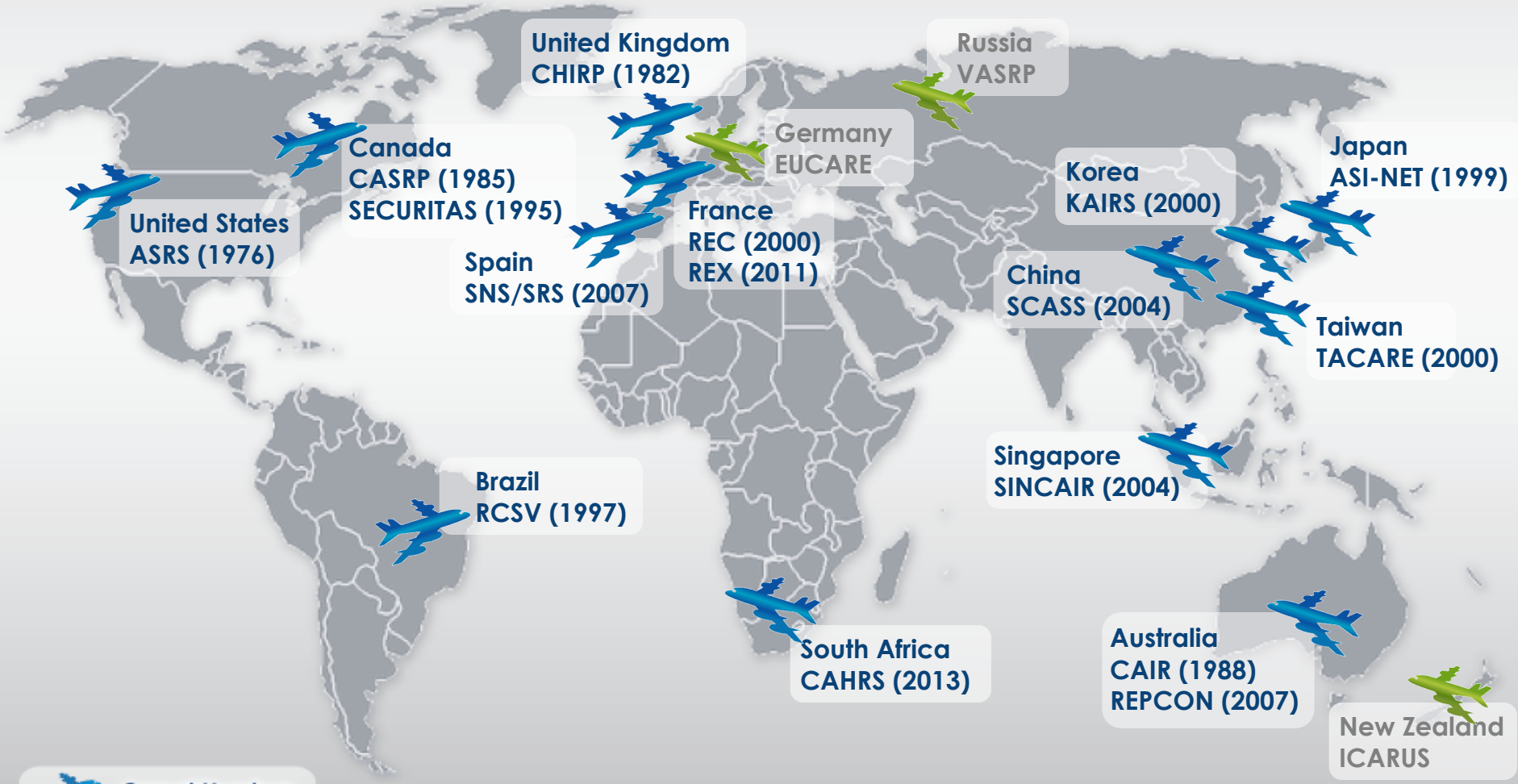
ASRS Model Applied

- **International Confidential Aviation Safety Systems**
  - 12 other countries have ASRS-type reporting systems in their nations
  - ICAO Annex 19 incudes national confidential reporting system as Standard to member states
- **Confidential Close Call Reporting System (C^3RS)**
  - Railroad Safety Reporting System was modeled after ASRS
  - Under Interagency Agreement between NASA ASRS and Federal Rail Administration (FRA)
- **Fire Fighters Near Miss Reporting System (FFNMRS)**
  - Launched August 2005; modeled after ASRS
  - Development Task Force included FAA and NASA ASRS

ICASS

INTERNATIONAL CONFIDENTIAL
AVIATION SAFETY SYSTEMS

ASRS Model Applied to International Aviation Community



International Confidential Aviation Safety Systems (ICASS)

NASA ASRS and Federal Railroad Administration Interagency Agreement signed on May 21, 2010

C³RS

WHY CONFIDENTIAL REPORTING WORKS

- When organizations want to learn more about the occurrence of events, the best approach is simply to ask those involved.
- People are generally willing to share their knowledge if they are assured:
  - Their identities will remain protected
  - There is no disciplinary or legal consequences
- A properly constructed *confidential*, *voluntary*, *non-punitive, independent* reporting system can be used by any person to safely share information

Unique Aspects of ASRS Confidential Reporting Model

System-Wide Perspective - capability to identify hazards identified by aviation personnel and match reports from all segments of aviation community

- ASRS was catalyst for recent FAA focus on Teterboro Departures

System-Wide Alerting - both national and international capability to provide ASRS Alert Messages to industry and government

Data Processing through Aviation Expert Analysts

- ASRS Office staff include Aviation Expert Analysts with a combined total of 380 years of experience in aviation (air carrier pilots, corporate pilots, general aviation pilots, air traffic control, and maintenance)
- Experts read and review 100% of reports and reliably code information to databases

Comprehensive and Time Tested Coding Taxonomy

- Fixed Field Codes combined with Narrative Text yields qualitative data for further secondary analysis techniques (Perilog, special studies, focused analytic techniques, etc)

Unique Aspects of ASRS Confidential Reporting Model

Strong Immunity and Legal Provisions

- Federal Law specifically addressing ASRS (14 CFR 91.25)
- FAA Advisory Circular 00-46E
- ASRS Addressed by Congress in 1980's

Information Sharing - both nationally and internationally with industry and government

- Database Search Requests, Database Publically Available, Topical Studies, Structured Telephone Callback Studies, Collaborations with Industry and Gov't (FAA, NTSB, NASA, TSA, etc.)
- Largest source of airline ASAP data collected in central location

National and International Reputation

- ASRS Recognized Model for Proactive Contribution to Safety Process
- ASRS Model Being Utilized by Other Domains for Safety Improvements

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