



# Voluntary Data Contributions to Information Sharing

## NASA ASRS Program Overview

August 9 - 10, 2016

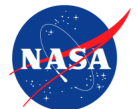
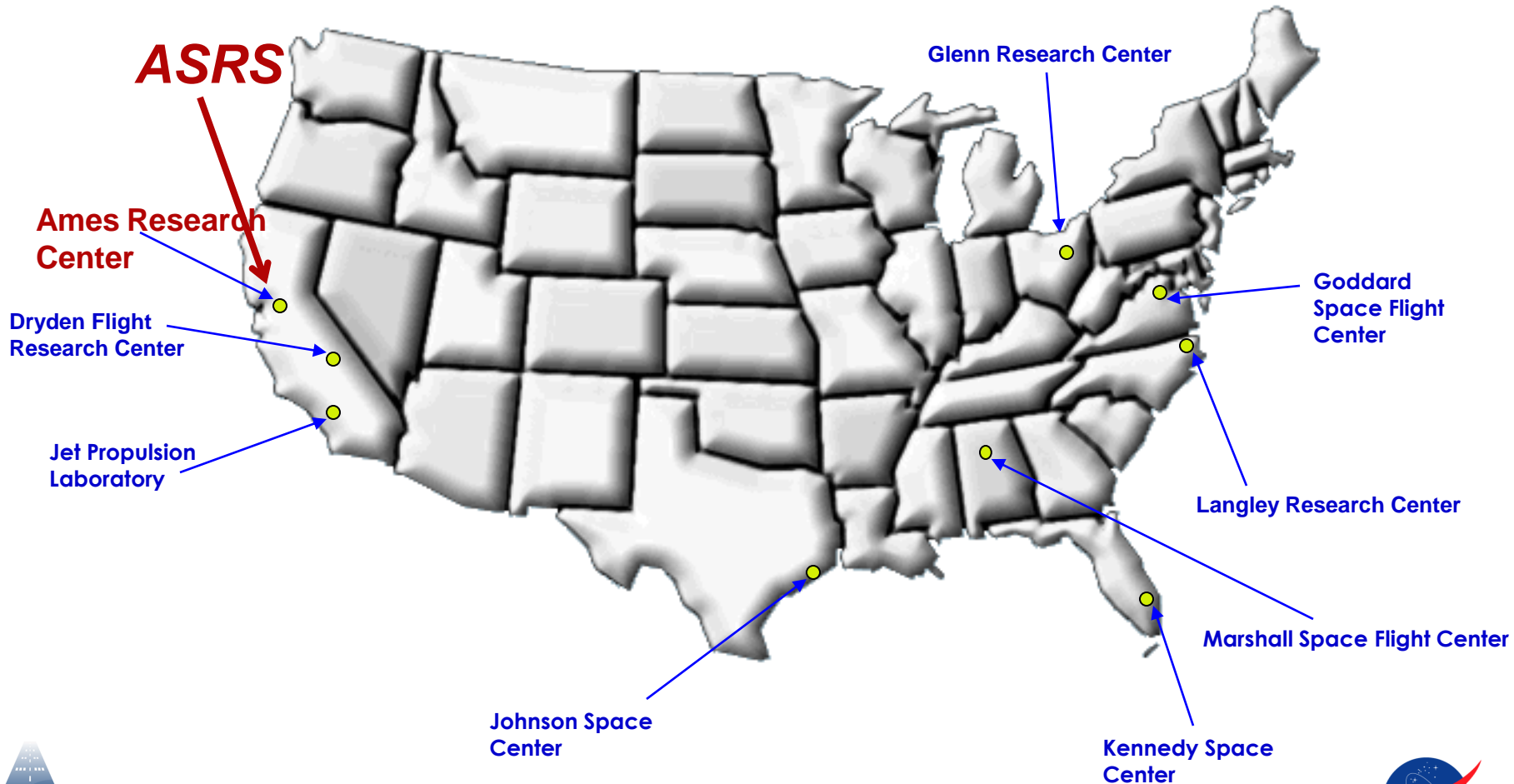
Linda Connell

Program Director, NASA ASRS  
Human Systems Integration Division

**AVIATION SAFETY  
REPORTING SYSTEM**



# NASA Aviation Safety Reporting System



***Moffett Field - Hangar One***  
**1932**

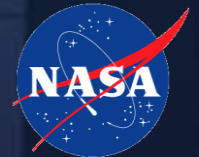




# ASRS History and Background

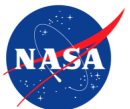
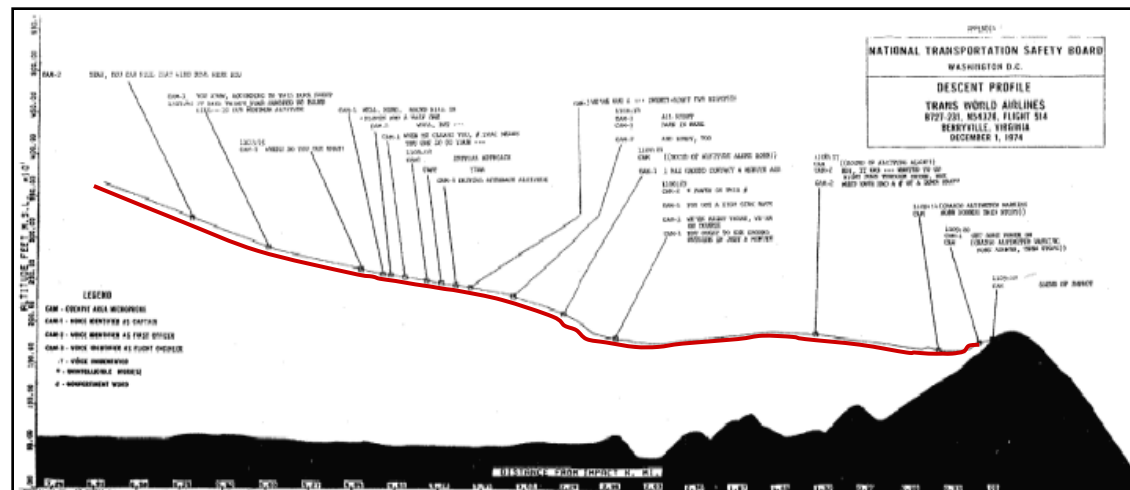
August 9 - 10, 2016

**AVIATION SAFETY  
REPORTING SYSTEM**



# 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)



# ASRS since 1976



th

AVIATION SAFETY  
REPORTING SYSTEM

Anniversary

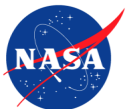
1976-2016

**Over 1.3 Million Reports**

# FAA and NASA Partnership

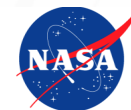
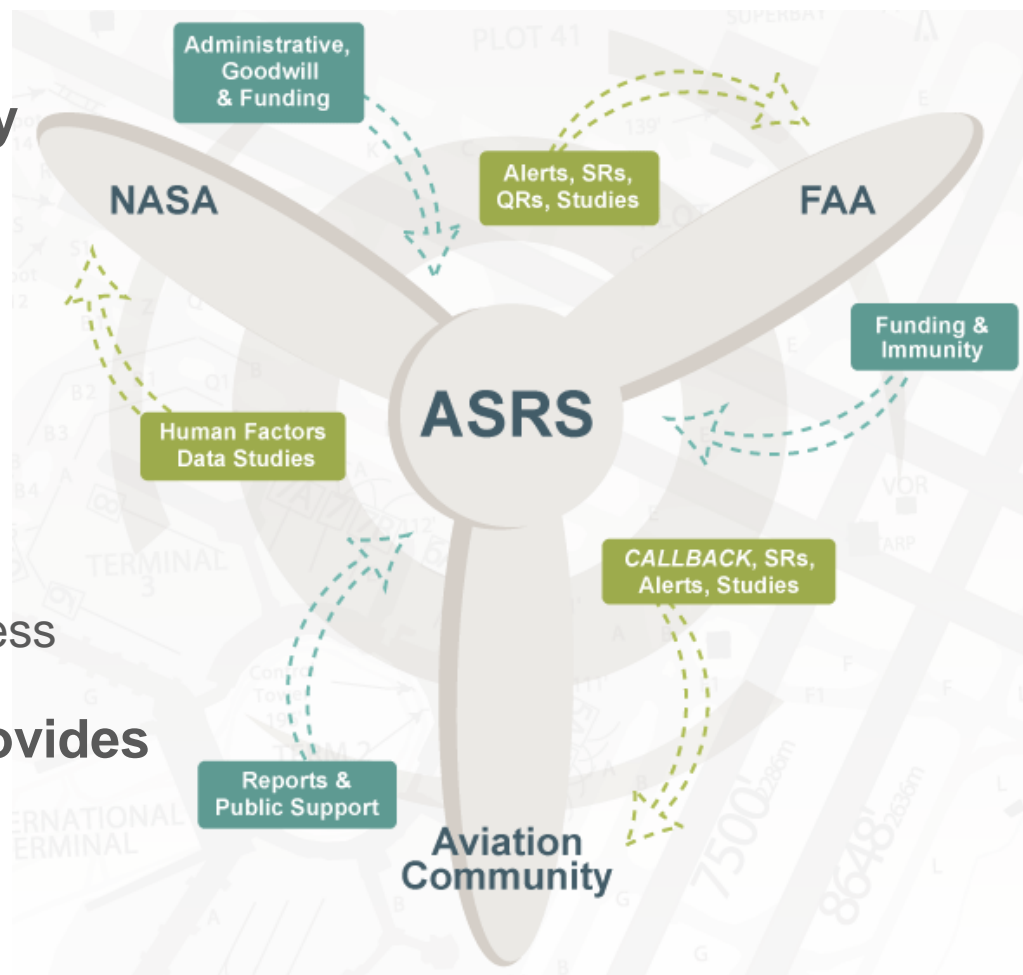
- **MOA signed by Administrators for FAA and NASA**

... To provide information to the FAA and the aviation community to assist them in reaching the goal of identifying and eliminating unsafe conditions to prevent accidents.



# 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**





# *What is Safety Reporting?*



Aviation Safety Reporting System



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# 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)*

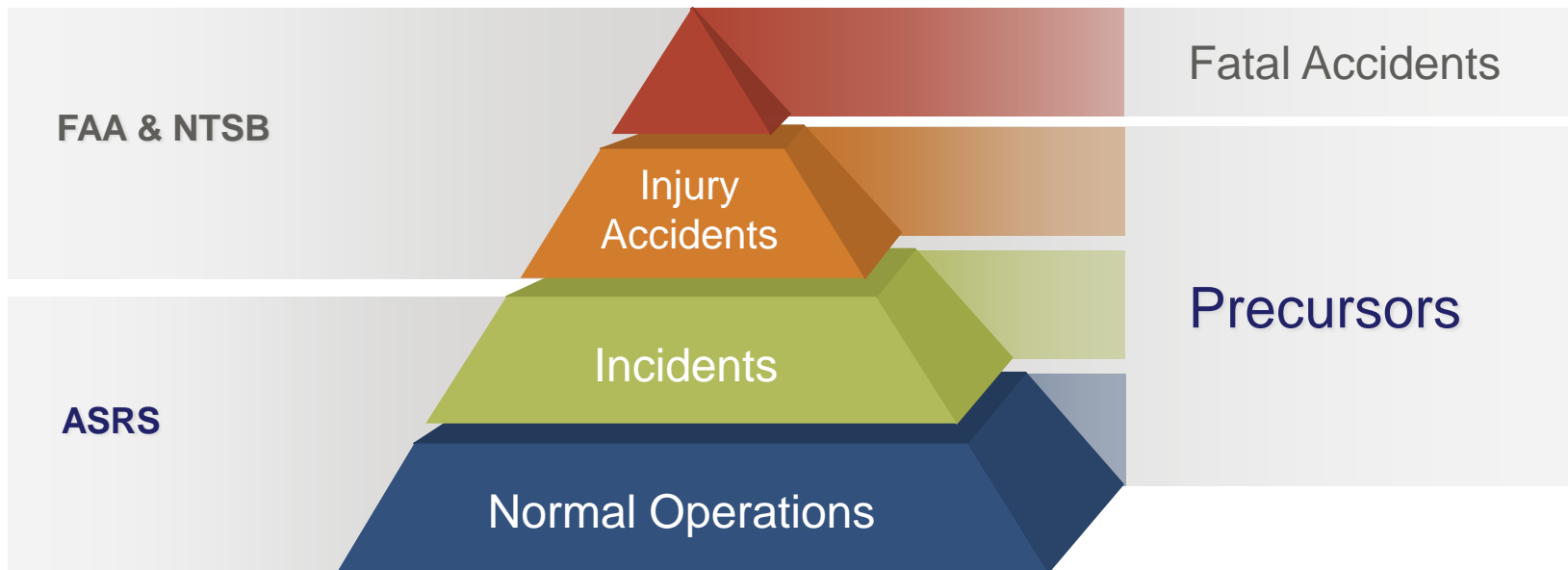
## ***INDEPENDENT***

*Necessary for trust building and unbiased dissemination of safety information*



# System-Wide Event Occurrences

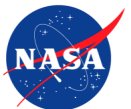
- ASRS is complementary to other systems of reporting and focuses on precursors to the most severe events



# *Why Safety Reporting is Essential for Improving Safety?*



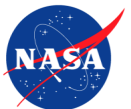
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# Successful Confidential Reporting

- When organizations want to learn more about events, the best approach is simply to ask those involved
- Generally, people are 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



Confidential reporting systems  
have the means to answer the  
question *why?* –

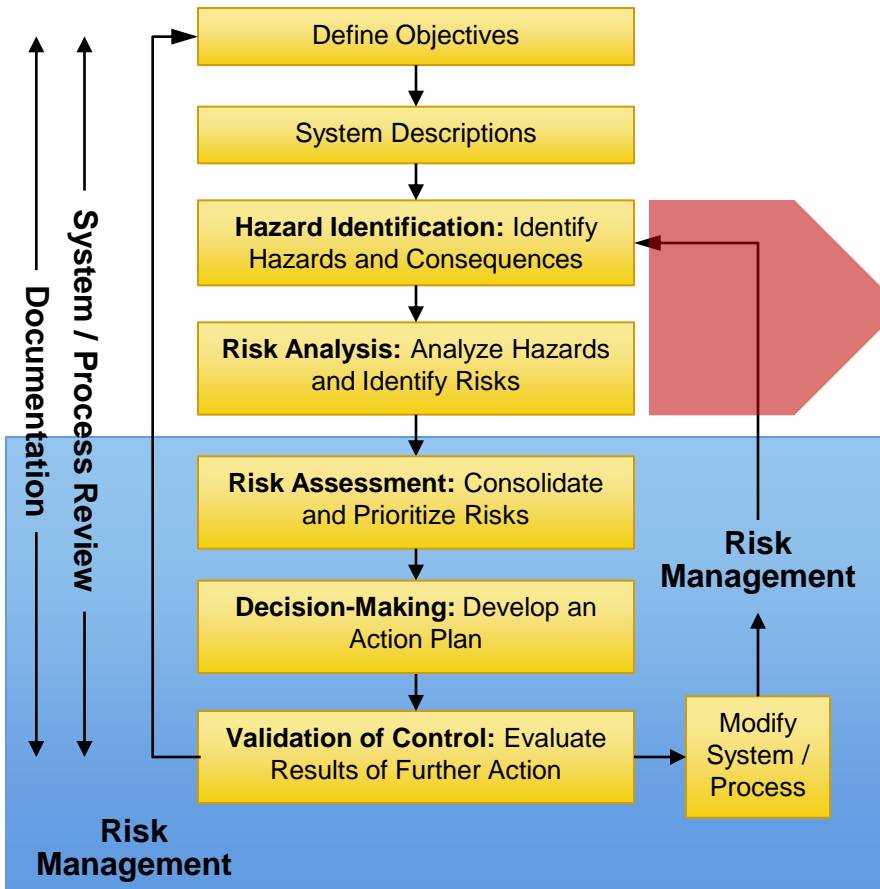
Why a system failed

Why a human erred



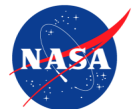
# Contributions to a Safety Management System

## System Safety Process



- ▶ ASRS disseminates vital information to the aviation community
- ▶ This function is specifically designed to help the aviation community recognize accident precursors and take preventive action
- ▶ ASRS promotes the ability of safety professionals to conduct more prospective safety analysis
- ▶ By evaluating the experience of people in the system, safety professionals can learn from other people in similar situations without experiencing the undesired outcome for themselves.

Source: [http://www.faa.gov/gslac/ALC/libview\\_normal.aspx?id=6877](http://www.faa.gov/gslac/ALC/libview_normal.aspx?id=6877)



# 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

## BUT IT IS NOT A:

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

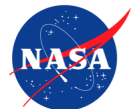




# *What is the work of ASRS?*



Aviation Safety Reporting System



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# 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.

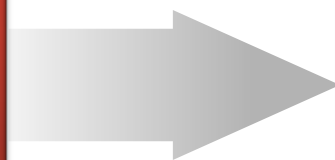
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ASRS focuses activity to meet fundamental program objectives while maintaining confidentiality and independence

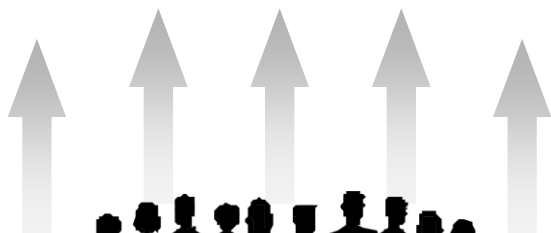
## ALERTS

Identify  
Deficiencies  
and  
Discrepancies



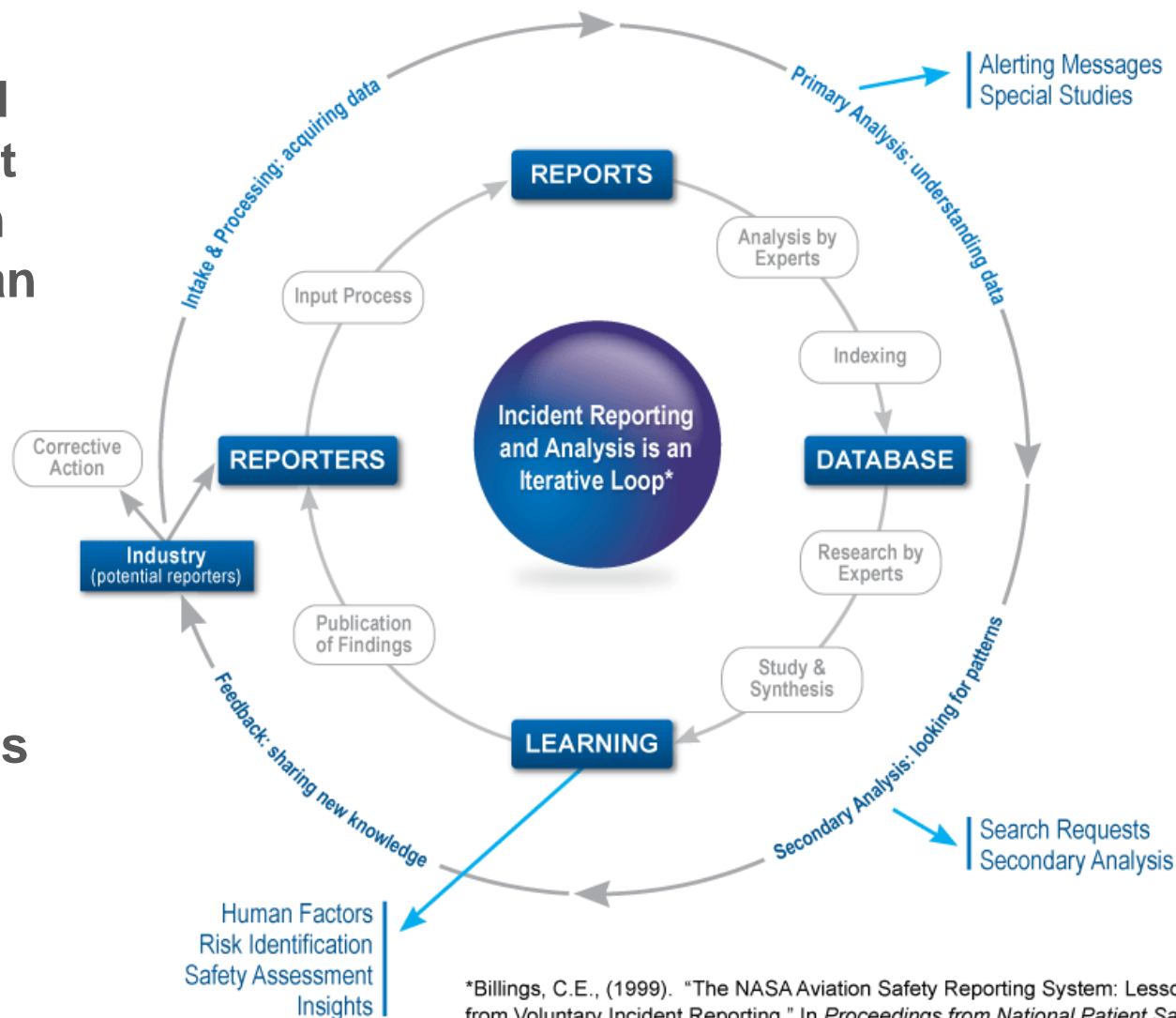
## PRODUCTS

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 provided information that may result in corrective actions



# 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)**

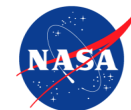
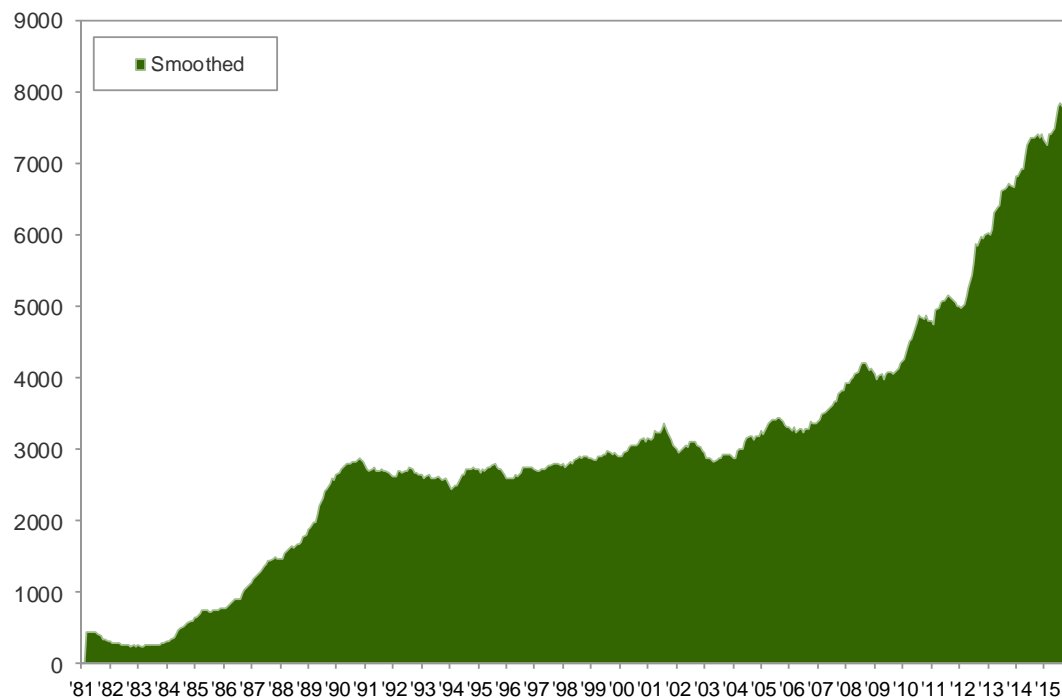
**27,178 Flights/Day (General Aviation)**



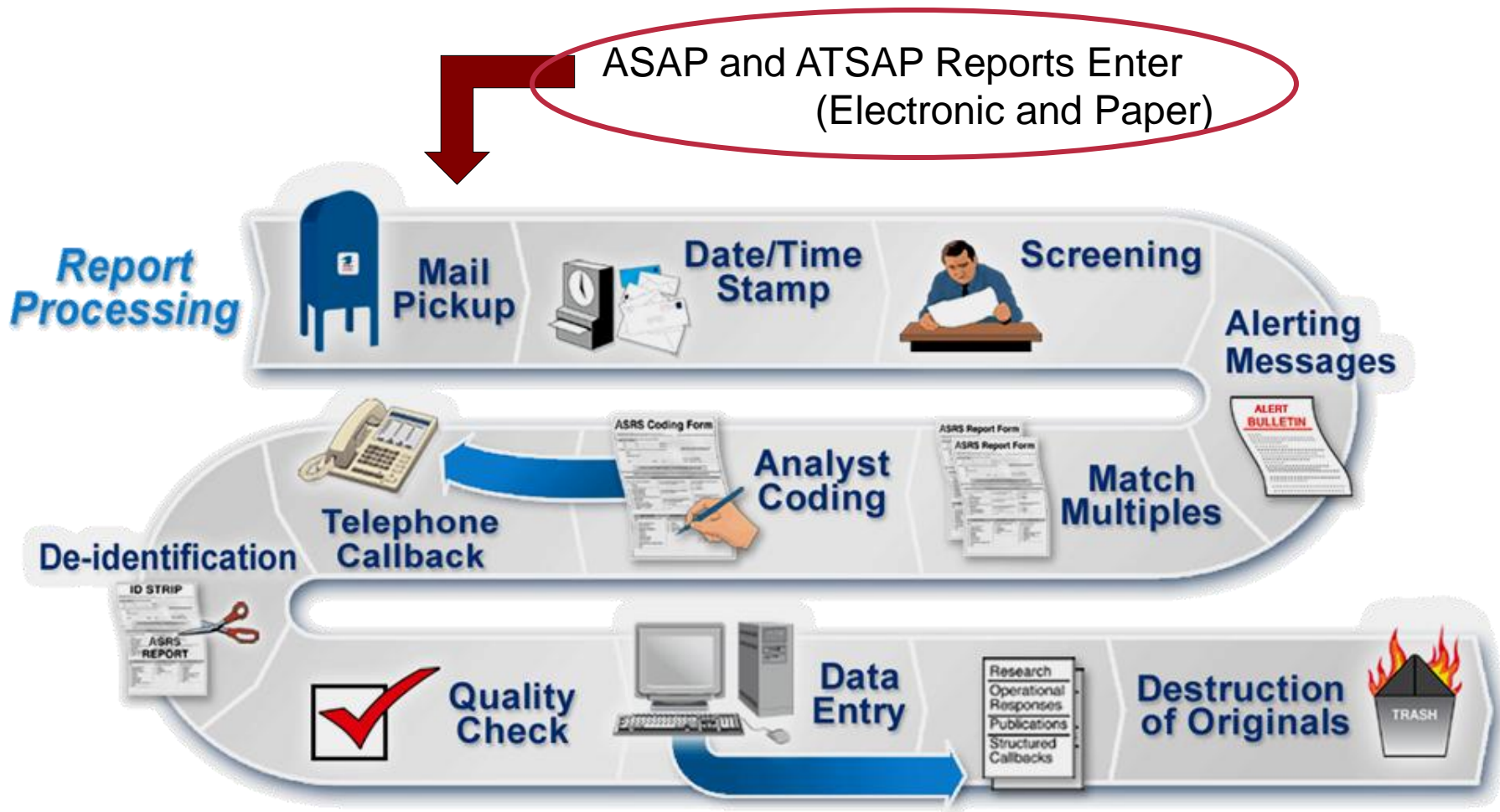
# ASRS Report Volume Profile

- Forty years of confidential safety reporting on April 16th
- **Over 1,334,000 reports received**
- **Over 6,200 alert messages issued**
- **Over 7,686 reports per month or 372 per working day**
- **Total report intake for 2015 was 92,228**
- **Current rate estimate for 2016 is over 93,000**

Monthly Intake  
January 1981 – December 2015



# Report Processing Flow



# ASAP Reporting to ASRS

## ■ **ASAP Reporting**

- 244 Total Programs
- 119 Air Carriers/Operators

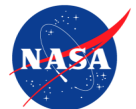
More programs being added continuously

## ■ **Reporting Groups**

- 113 Pilot
- 62 Maintenance
- 41 Dispatch
- 23 Flight Attendant
- 5 Other (Including Ground Crew, etc.)

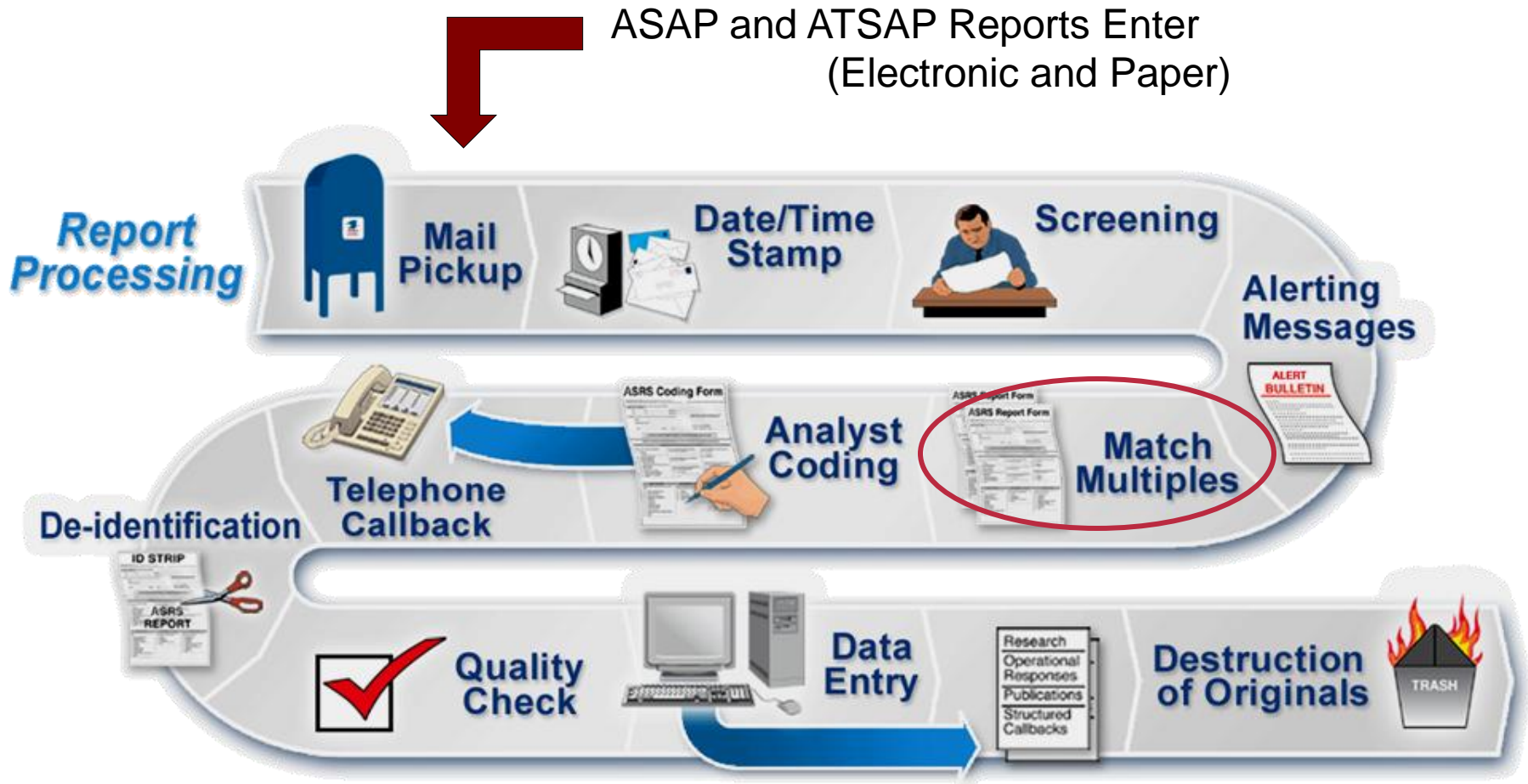
ASRS Electronic Transmission Methodology compatible with numerous software platforms

- **Majority are received through Secure Electronic Data Transmission protocols**
- **Paper form submissions continue to be received at ASRS**





# Report Processing Flow



# Incidence of ASRS Multiple Reports

A single ASRS Transportation Form, showing the header, identification section, and various data entry fields.

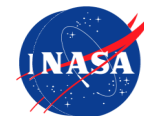
A stack of ASRS Transportation Forms, representing multiple reports for the same event.

Another stack of ASRS Transportation Forms, representing multiple reports for the same event.

20%

Provides information from each person's perspective on event

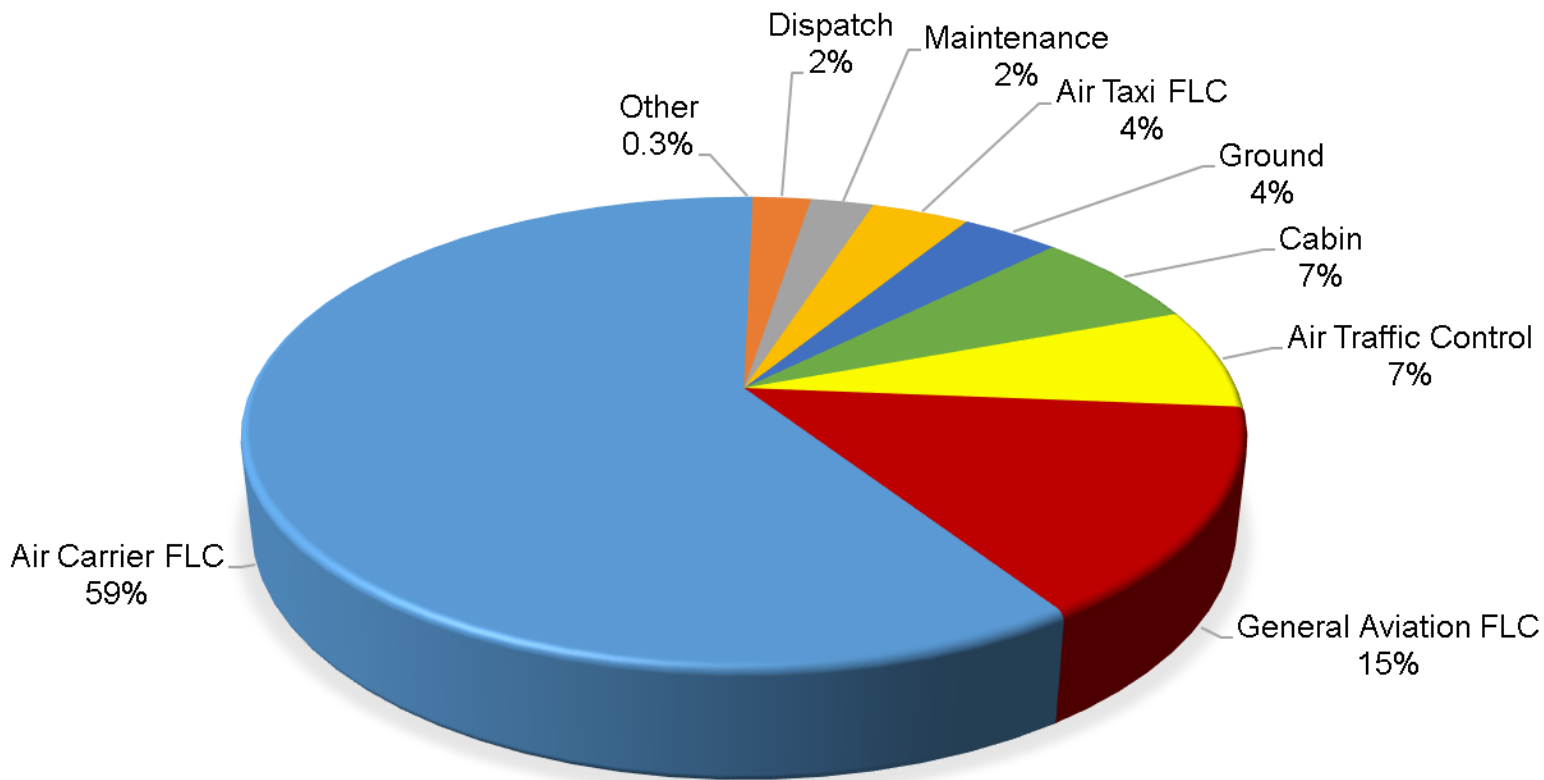
100%



# Incident Reporter Distribution

January 2015 – June 2016

## REPORTER DISTRIBUTION



n = 139,047



Source: 100% ASRS Report Data

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# 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 fulfilled by ASRS staff.



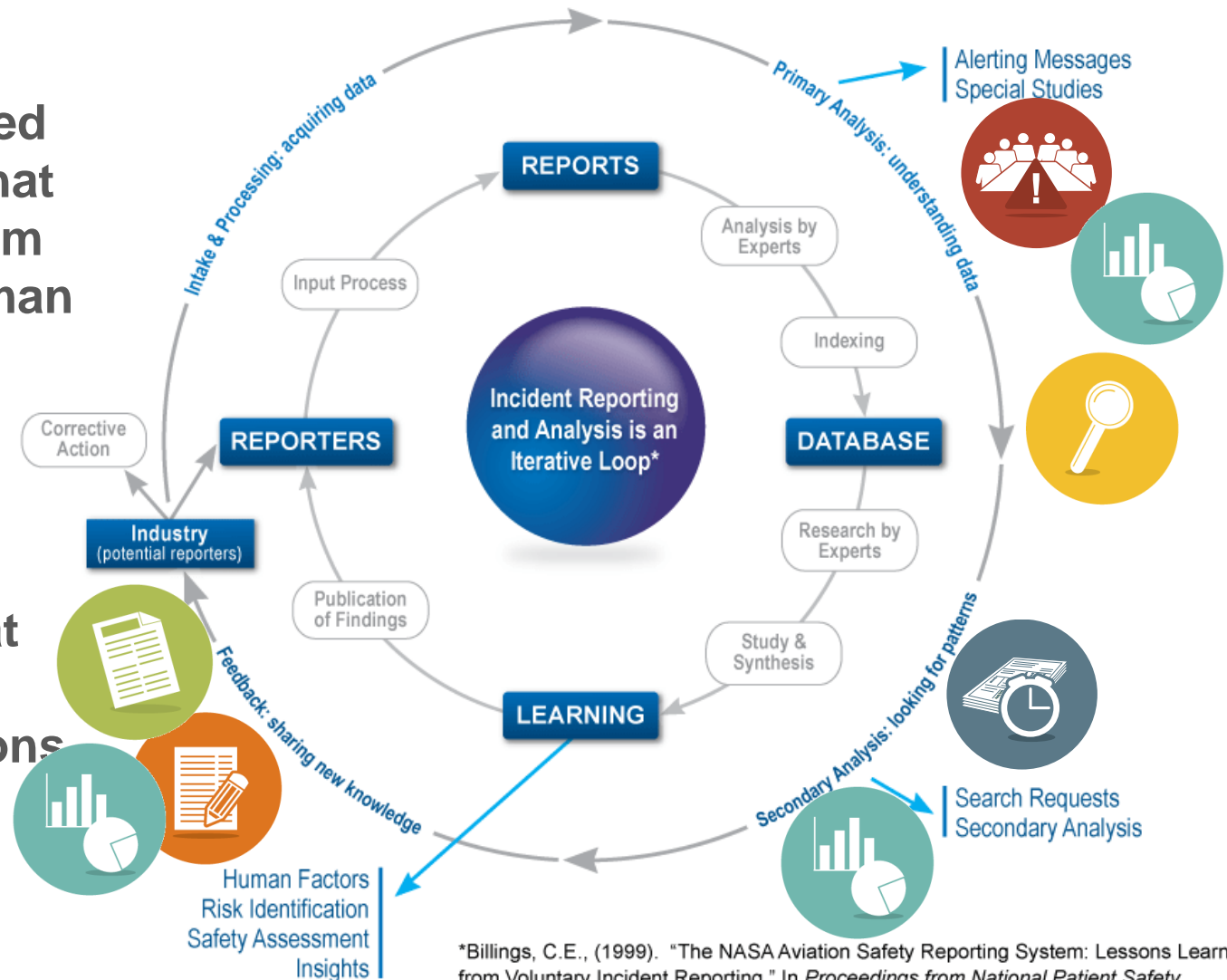
## Focused Studies/Research

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



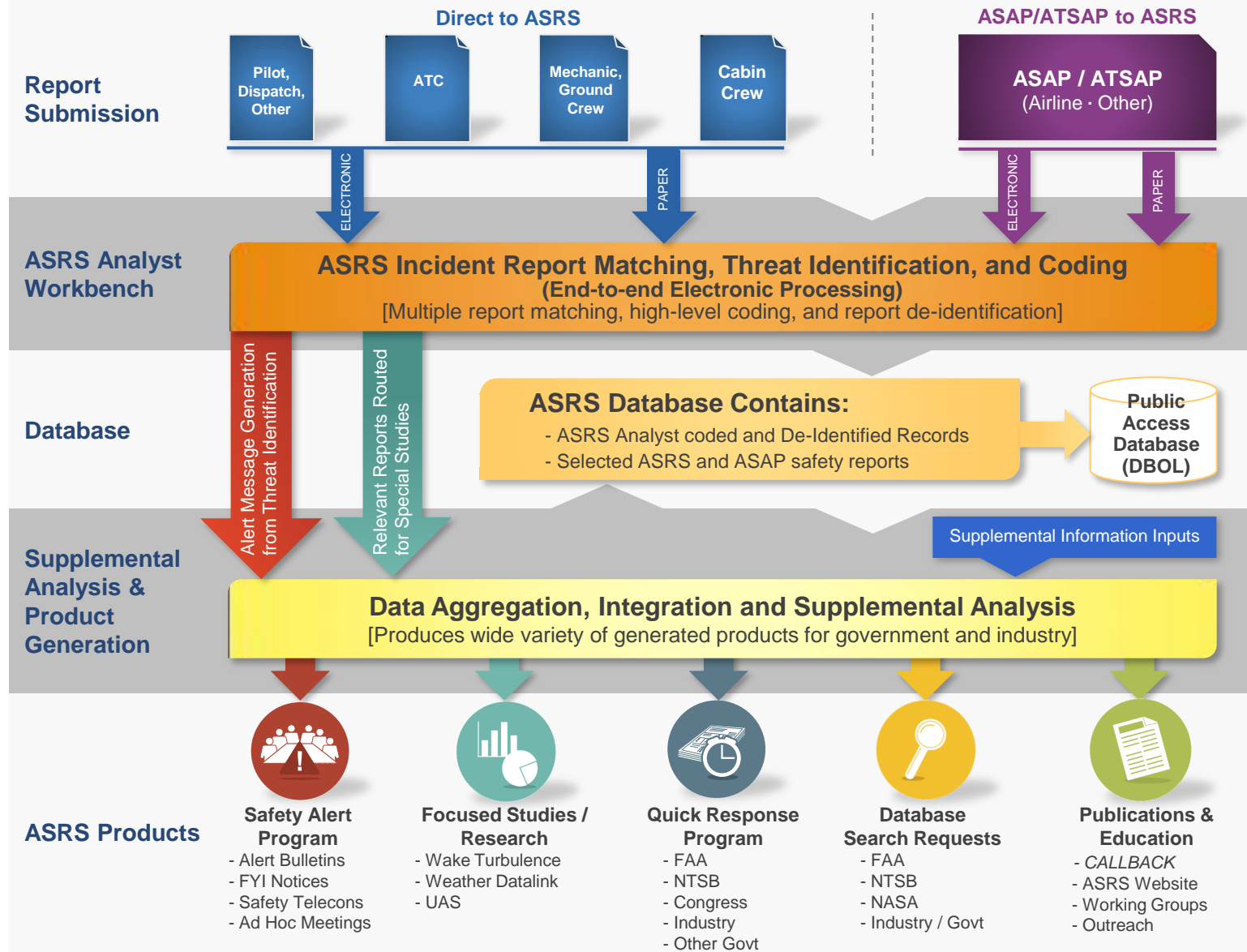
# Incident Reporting Model

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

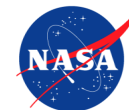
# ASRS Report Processing Flow Chart



# DATABASE



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# ASRS Database Searches

## ASRS Report Records Are Public:

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

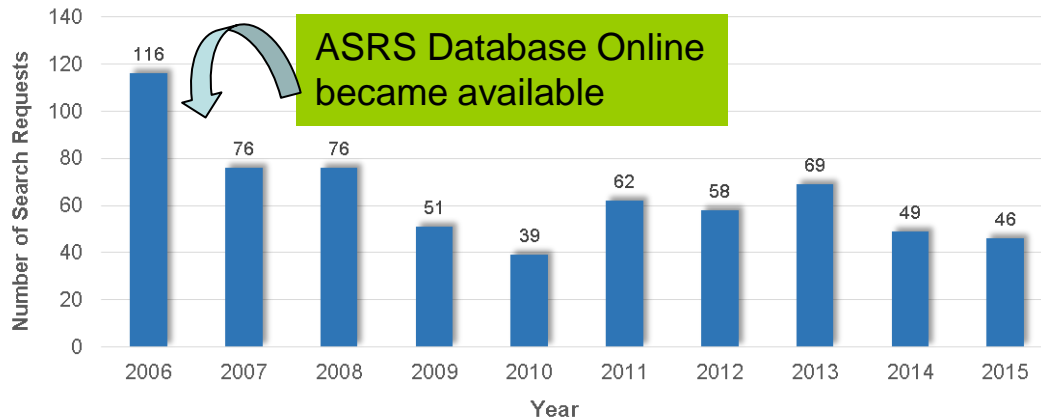
**<http://asrs.arc.nasa.gov>**





# Direct to ASRS for Database Analysis Requests

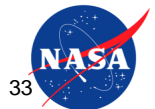
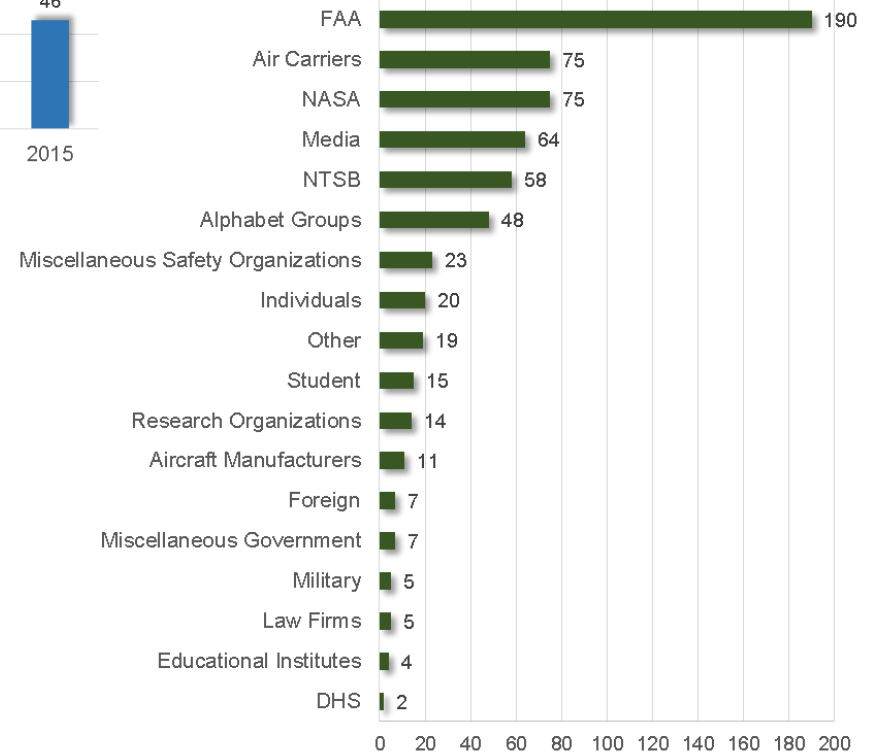
2006 – 2015



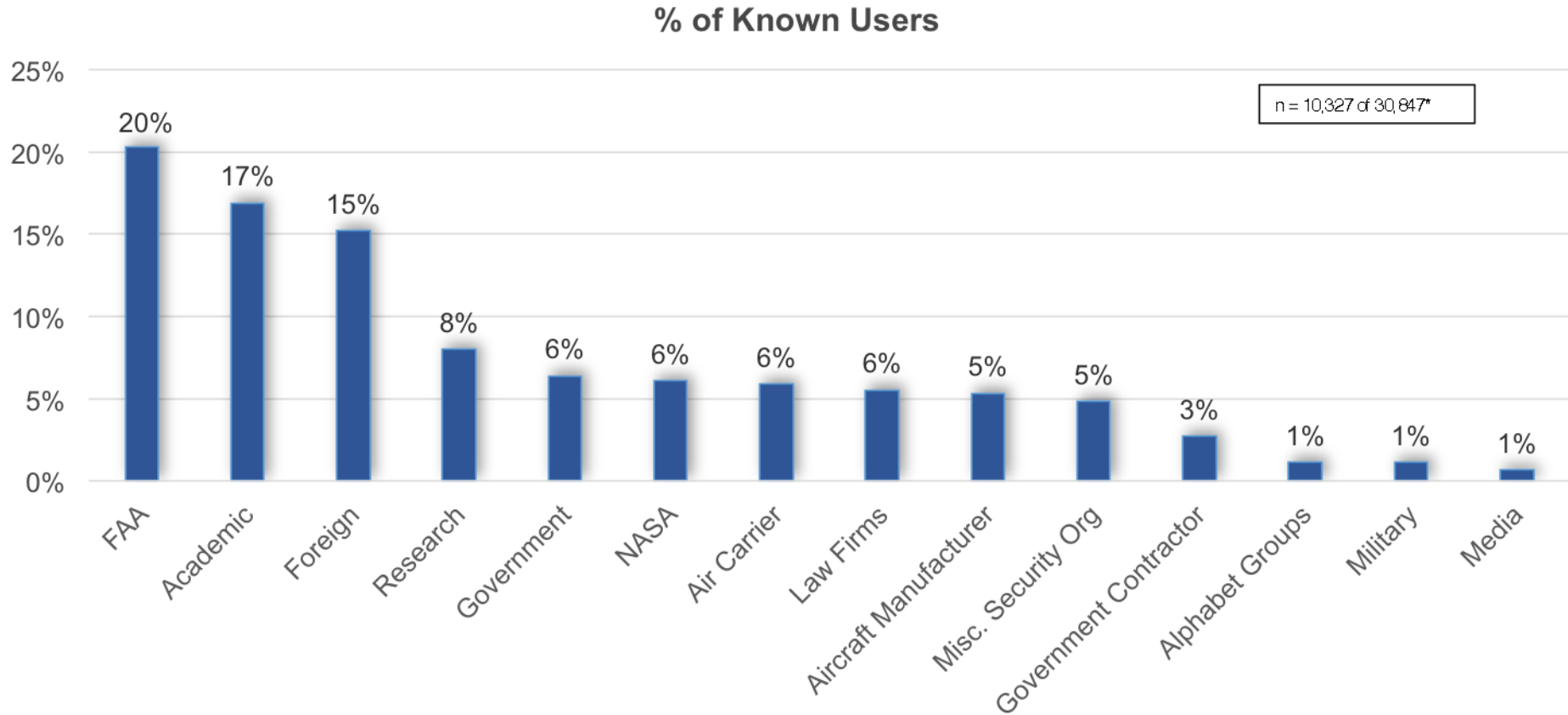
- **FAA is the most frequent requestor of specific data searches**
- **All requests are completed within 14 calendar days**

n = 624

Search Requests by Organization

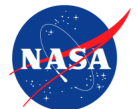


# Sampling of Website Database Online Access (One Month of Activity)

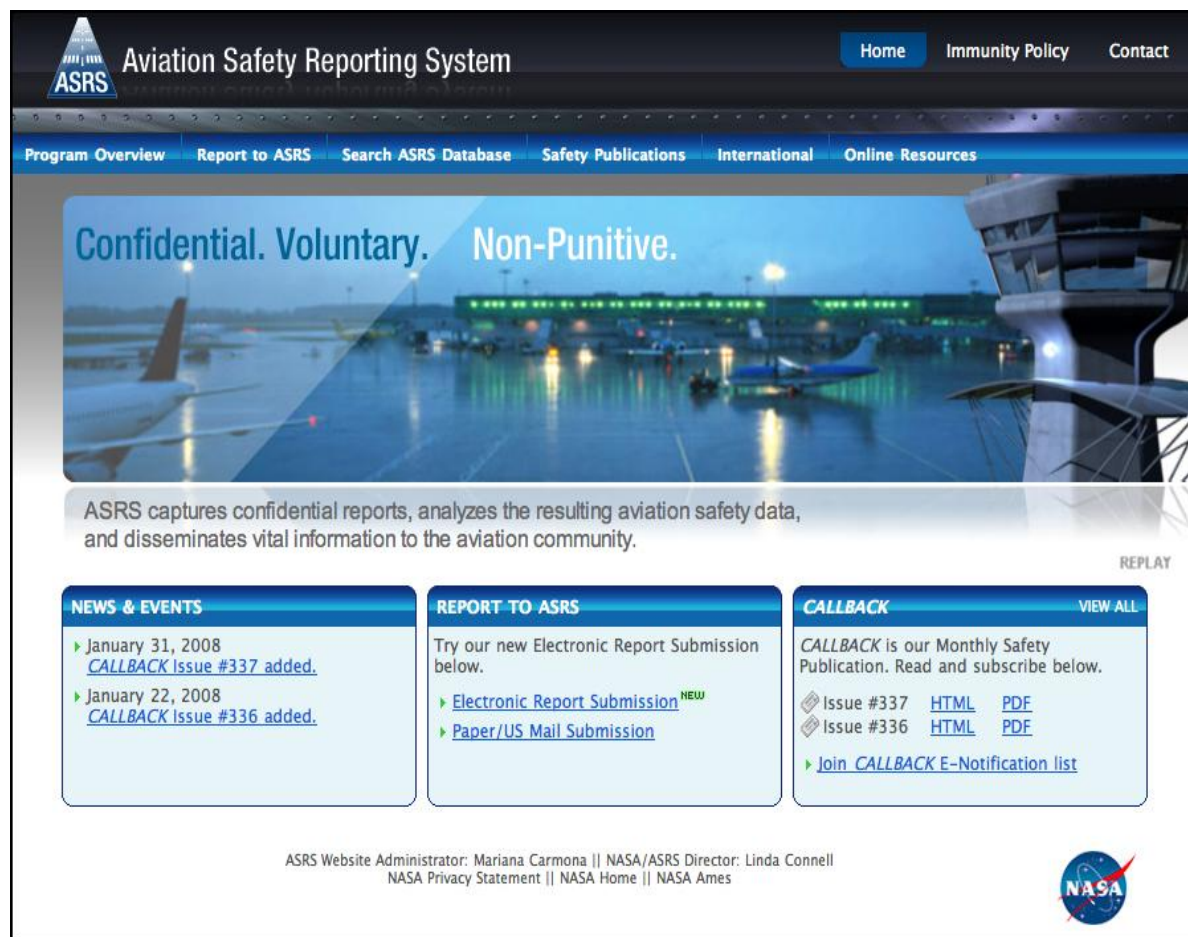


\*A total of 20,514 User Types were Other/Individuals/Unknown.

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# ASRS Web Site



The screenshot shows the ASRS website homepage. At the top left is the ASRS logo. The main header reads "Aviation Safety Reporting System" with navigation links for "Home", "Immunity Policy", and "Contact". Below this is a secondary navigation bar with links for "Program Overview", "Report to ASRS", "Search ASRS Database", "Safety Publications", "International", and "Online Resources". The main content area features a large banner with the text "Confidential. Voluntary. Non-Punitive." over a background image of an airport at night. Below the banner is a paragraph: "ASRS captures confidential reports, analyzes the resulting aviation safety data, and disseminates vital information to the aviation community." There are three main content boxes: "NEWS & EVENTS" with two entries from January 2008; "REPORT TO ASRS" with links for "Electronic Report Submission" (marked as new) and "Paper/US Mail Submission"; and "CALLBACK" with links for "Issue #337" and "Issue #336" in both HTML and PDF formats, plus a link to "Join CALLBACK E-Notification list". At the bottom, there is contact information for the website administrator and director, a NASA logo, and a "REPLAY" button.

- ▶ Launched October 2007
  - Over 10 million sessions in 2008
- ▶ File an ASRS Report
  - Electronic
  - Print and Mail
- ▶ Database Online
- ▶ ASRS Publications
- ▶ Program Information
- ▶ Immunity Policies



<http://asrs.arc.nasa.gov>  
Aviation Safety Reporting System

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# ASRS Database Online (DBOL)

**How to Search:** ASRS Database Items (Taxonomy)

**Step 1:** Click + to add search items.  
**Step 2:** In "Current Search Items" section, select "Click Here" in a statement and choose items from Lookup Window.

**Date & Report Number**

- + Report Number (ACN) was [number]
- + Date of Incident was between [date] and [date]

**Environment**

- + Flight Conditions were [conditions]
- + Lighting was [condition]
- + Weather was [element]

**Aircraft**

- + Federal Aviation Regs (FAR) Part was [regulation]
- + Flight Plan was [type]
- + Flight Phase was [phase]
- + Make / Model was [type]
- + Mission was [operation]

**Place**

- + Location was [identifier]
- + State was [abbreviation]

**Person**

- + Reporter Organization was [type]
- + Reporter Function was [position]

**Event Assessment**

- + Event Type was [anomaly]
- + Detector was [equipment / human]
- + Primary Problem was [most prominent factor]
- + Contributing Factors were [problem areas]
- + Human Factors (since 6/09) were [factor]
- + Result was [consequence]

**Text: Narrative / Synopsis**

- + Text contains [word(s)]

**Current Search Items:**

Back Run Search

- ▶ DBOL launched August 2006
  - Over 185,000 total online queries completed to date
  - Over 19,000 queries completed in 2015
- ▶ Fixed field and text search capability
- ▶ Data formats (export)
  - MS Word, Excel, CSV
  - HTML
- ▶ Experts version (DBOL II) being proposed



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

Aviation Safety Reporting System

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# Sample of Website Database Online Access

June 2015

## Academic

Boston University  
Embry-Riddle Aeronautical University  
Massachusetts Institute of Technology (MIT)  
Purdue University  
Yale University

## Air Carrier

Alaska Airlines  
American Airlines  
FedEx  
NetJets  
Southwest Airlines

## Aircraft Manufacturers

The Boeing Company  
Gulfstream Aerospace Corporation  
Honeywell International Inc.  
Lockheed Martin Corporation  
Jeppesen Sanderson

## Aviation Organizations

Air Line Pilots Association (ALPA)  
International Air Transport Association (IATA)

## Government

Executive Office Of The President  
FAA  
Federal Emergency Management Agency (FEMA)  
NASA  
U.S. Center For Disease Control and Prevention (CDC)  
U.S. Department of Agriculture Office  
U.S. Forest Service  
U.S. Department of Transportation

## Foreign

Transport Canada  
TransCanada Pipeline

## Military

Navy Network Information Center (NNIC)  
USAISC Headquarters

## Security Organizations

Department of Homeland Security (DHS)

## Research

General Atomic, Fusion User Service Center  
North Carolina Research and Education Network



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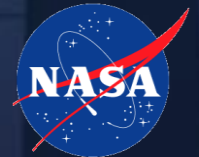




# ASRS Model Applied to Aviation & Other Industries

August 9 - 10, 2016

**AVIATION SAFETY  
REPORTING SYSTEM**



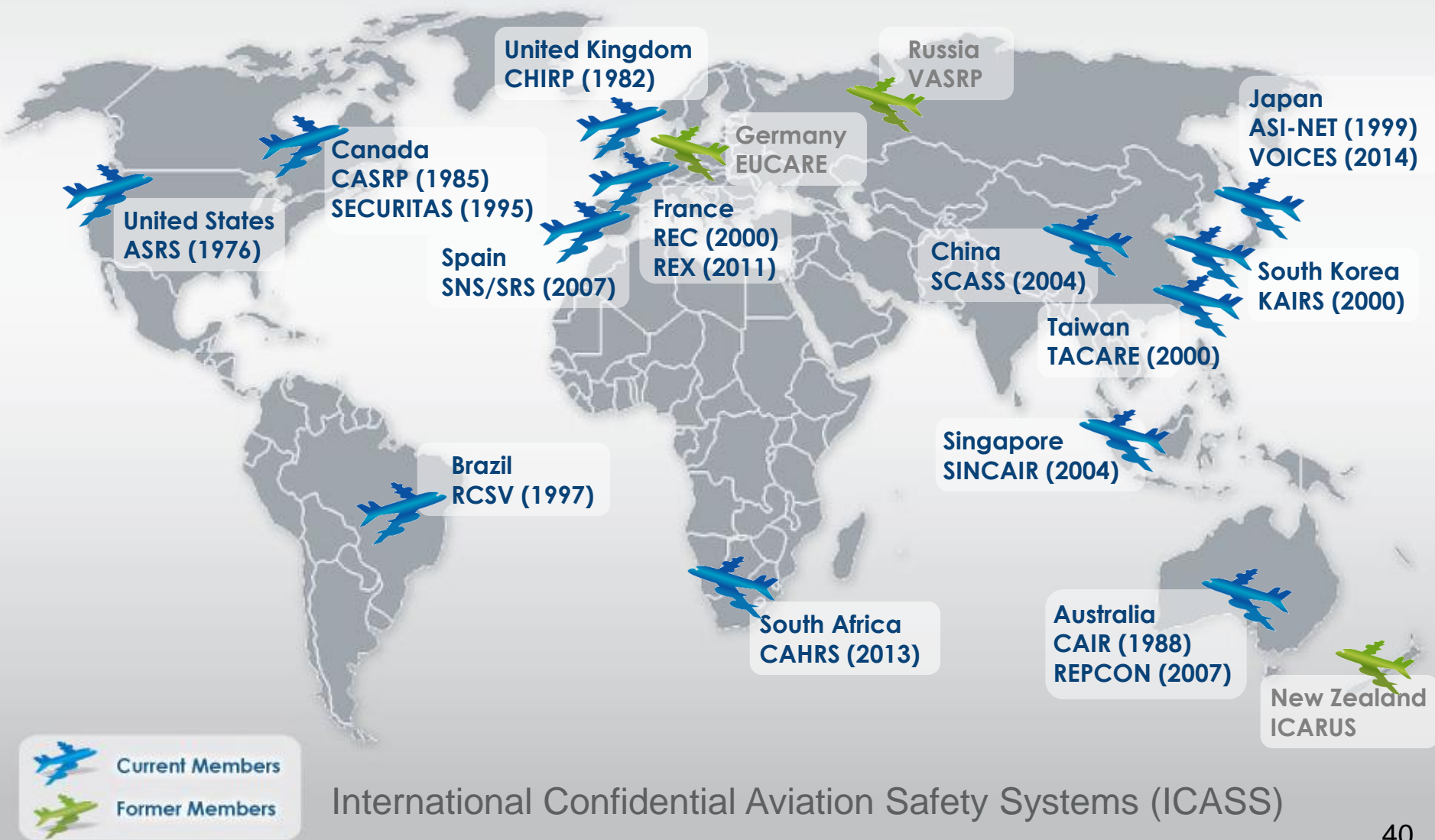


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INTERNATIONAL CONFIDENTIAL  
AVIATION SAFETY SYSTEMS

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# ASRS Model Applied to International Aviation Community

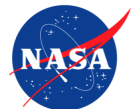


International Confidential Aviation Safety Systems (ICASS)



# Voluntary Reporting Reputation Acknowledged

- ICAO Annex 19 – Accident Prevention
  - Member States to have voluntary, non-punitive safety reporting
    - Revised in 2011 from Recommendation to Standard
- ASRS Model incorporated in aviation safety reporting systems in 13 countries
- Next Meeting:
  - SCASS, Tianjin CHINA



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

## Confidential, Voluntary, Non-Punitive Reporting System for the U.S Railroad Industry



### CONFIDENTIAL CLOSE CALL REPORTING SYSTEM



Aviation Safety Reporting System



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# 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*

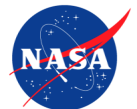
- Federal Law specifically addressing ASRS (14 CFR 91.25)
- FAA Advisory Circular 00-46E
- ASRS Addressed by Congress in 1980's

## *Information Sharing* - both national and international 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
- Contribute semi-annually at FAA InfoShare Conferences

## *National and International Reputation*

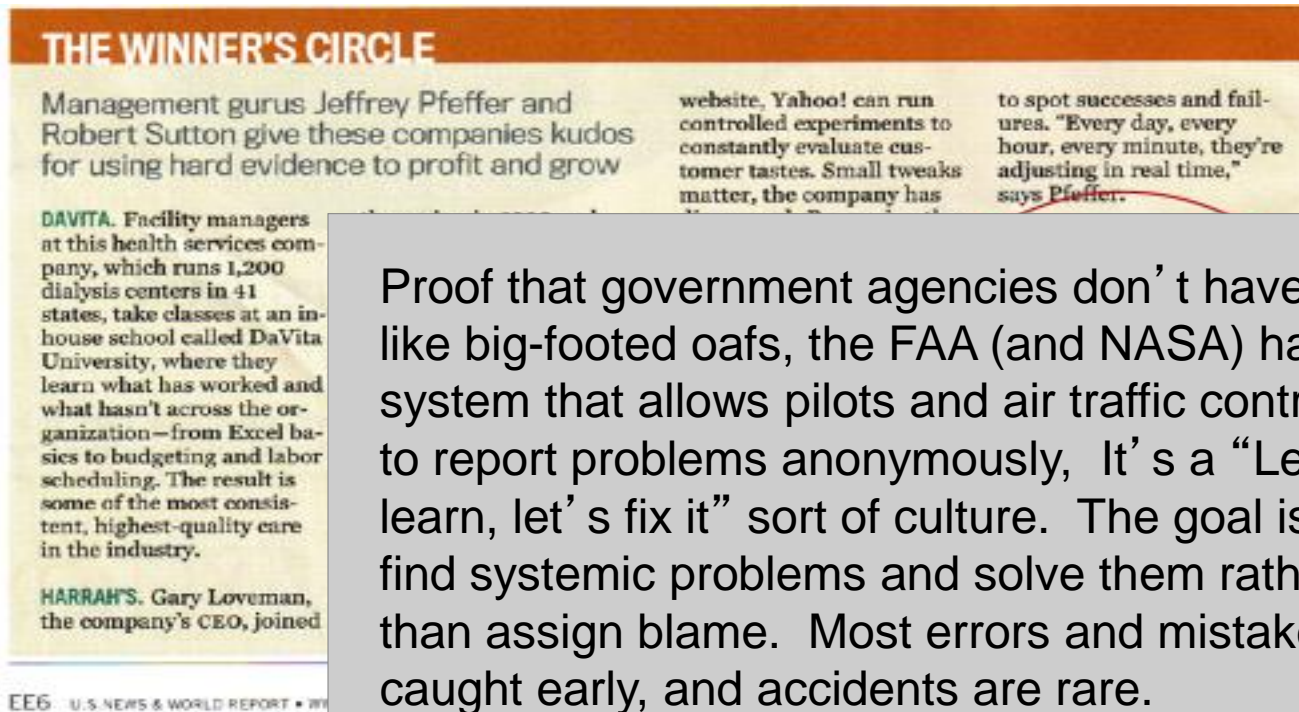
- ASRS Recognized Model for Proactive Contribution to Safety Process
- ASRS Model Being Utilized by Other Domains for Safety Improvements



# System Recognition for Effectiveness

## US News and World Report 2006 praises system

- FAA credited for a positive, proactive approach to safety



# Contact Information

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