AN UPDATE ON THE PROGRESS OF THE GENERAL AVIATION ASIAS PROGRAM

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Jeff Mittelman— MITRE

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The year was 1996...
What is the Commercial Aviation Safety Team (CAST)?

• Work began in 1997 after two significant accidents in 1996 (TWA 800 & ValueJet 592)

• CAST focus was set by:
  – White House Commission on Aviation Safety
  – The National Civil Aviation Review Commission (NCARC)

• Opportunity for industry and government to focus resources on one primary aviation safety initiative
What is CAST?

Vision
• Key aviation stakeholders acting cooperatively to lead the worldwide aviation community to the highest levels of global commercial aviation safety by focusing on the right things.

Mission
• Enable a continuous improvement framework built on monitoring the effectiveness of implemented actions and modifying actions to achieve the goal.

Goal
• Reduce the US commercial aviation fatal accident rate 80% by 2007 and
What is the General Aviation – Joint Steering Committee (GA-JSC)?

In order to turn the tide of GA fatal accidents, government and industry needed a new approach…

Formed in the late 1990s, the GAJSC had seen success reducing fatal GA accidents.

The GAJSC adopted the Commercial Aviation Safety Team (CAST) methodology in 2011, further ensuring its success.
What is Aviation Safety Information Analysis & Sharing?

• Extensive warehouse of voluntarily provided safety-related data
• Enables authorized users to perform integrated queries across multiple databases
• Proactively identify and analyze safety issues
ASIAS Principles

Data used solely for advancement of safety

Non-punitive reporting

A collaborative approach

Balancing interests of all participants
Governance Model

ASIAS Executive Board (AEB)

Commercial Issue Analysis Team (IAT)
General Aviation Issue Analysis Team (GA-IAT)

GAJSC

SAT
Effective Governance Ensures That All Data Are Used Appropriately

- Data are accessed only for approved studies
Diverse Data are Available for ASIAS Studies

Safety Reports
Aircraft Data
ATC Safety Reports

Radar
Weather
Infrastructure
ASIAS privacy & governance

- Hierarchical bodies govern the program
  - All governing bodies include industry chairs
- Strong governance tightly controls who can see data and how the data is used
  - Executed Cooperative Agreement required to participate
  - Specific circumstances require NDAs
- **FAA cannot see any operator specific data**—can only see aggregate information
  - Can only be used for safety programs
  - Cannot be used for enforcement
Path to participation

- Execute Cooperative Agreement with MITRE

- Voluntary Submission of one or more:
  - FOQA Data
  - Safety reports
  - GAARD data
Role of MITRE in ASIAS
Role of MITRE in ASIAS

Collect, Store, and Aggregate Data
- Data capture and storage
- Parsing and mapping
- Data quality processes
- Information systems security

Facilitate Analysis
- Statistical analysis
- Assist in data and text mining
- Information retrieval and indexing
- Fusion

Facilitate Collaboration
- Assist in developing policies and procedures
- Legal agreements

Share Results
- Portal for sharing
- Visualization
- Meetings and briefings
Protections/security

- MITRE is a “trusted agent”
- MITRE employs the strictest data protection standards and practices
Protections/security
Protections/security

Strong Legal Defense
General Aviation Members

Operators

12 Corporate/Business
1 University
~40 Individuals

Fleet

- Size ranges from one to several hundred
- 50+ airframe models
- All major GA airframe manufacturers
- Operating under Part 91, 91K, 135 and 141

640+ Jets
170+ Piston

Icon Credits: Dan Hetteix, Gerald Wildmoser, Bybzee, Juan Garces, Marc Serre
General Aviation Data

- **Safety reports**
  - 8,000+ events
- **FOQA**
  - 10,000+ flights
- **National General Aviation Flight Information Database (NGAFID)**
  - 200,000+ flights
General Aviation Airborne Recording Device (GAARD)
General Aviation Airborne Recording Device (GAARD)

• Now expanding the concept to include Corporate/Business and Commercial operators
  – Many not have the ability to collect FOQA data
  – Too old or not equipped
  – Offers a low cost solution to collect FOQA-like data and participate in ASIAS

• “Fleet” operator version now under development
ASIAS Members’ Obligations Highlights

• Data is considered confidential and proprietary and cannot be shared without permissions
• Data cannot be used for commercial, competitive, punitive, or litigation purposes
• Cannot discuss or share information using any form of social media
• Safety issues/mitigations can be shared within the organizations for the purpose of improving aviation safety
• All members are treated equally, regardless of fleet size and type of operation
Benefits for ASIAS Members

• Access to Web Portal & Dashboards
• Understand the Safety Issue trends
• Participate in InfoShare
• Directed Studies
• Results through Safety Enhancements
• True GA Systemic Safety
General Aviation Portal

General Aviation Stakeholders

Metrics

General Aviation Metrics
- ALAR (Unstable Approach) - GA
- Midair (TCAS) - GA
- CFIT - GA
- Loss of Control - GA
- ASAP Trends - GA

CAST Metrics
- CAST Metrics Overview
- ALAR (Unstable Approach)
- Midair (TCAS)
- CFIT
- Loss of Control
- CAST ASAP Metrics

Operational Reviews
- ADO
- AMO
- AWO
- EDO
- Airport Daily
- Airport Monthly
- Arrival Winds
- En Route Daily

Federal Aviation Administration
General Aviation Joint Steering Committee
Dashboards

• **Tableau based**
  – Excellent query/analysis ability
  – Fully customizable
  – Ability to drilldown and retain specific queries for future analysis
# CAST Metrics

Assessing the Effectiveness of CAST Safety Enhancements

<table>
<thead>
<tr>
<th>Existing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOC</strong> – Loss of Control</td>
</tr>
<tr>
<td><strong>ALAR</strong> – Approach and Landing Accident Reduction</td>
</tr>
<tr>
<td><strong>CFIT</strong> – TAWS</td>
</tr>
<tr>
<td><strong>Midair Collision</strong> – TCAS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Under Development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RNAV Departures, STAR Arrivals</strong></td>
</tr>
</tbody>
</table>
General Aviation Portal: FOQA Metrics

• Derived from the Commercial Aviation Safety Team (CAST) metrics
  – Unstable Approach
  – CFIT
  – Mid-air (TCAS)
  – Loss of Control
## UA – Custom options

**Customizable ASIAS Unstable Approach Definition** - Set to Defaults, but can be Customized.

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>On/Off</th>
<th>Standard Threshold 1000 to 500 ft HAT &amp; &lt; 500 ft HAT</th>
<th>Standard Settings</th>
<th>Egregious Threshold</th>
<th>Egregious Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILS</td>
<td>1. Above Glideslope</td>
<td>On</td>
<td>&gt; 1 dot high for 5 sec</td>
<td>1</td>
<td>&gt; 2 dot high for 5 sec, 500 to 200 ft HAT</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2. Below Glideslope</td>
<td>On</td>
<td>&lt; -1 dot low for 5 sec</td>
<td>-1</td>
<td>&lt; -2 dot low for 5 sec, 500 to 200 ft HAT</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td>3. Localizer Deviation</td>
<td>On</td>
<td>&gt; 1 dot left/right for 5 sec</td>
<td>1</td>
<td>&gt; 2 dot left/right for 5 sec, 500 to 200 ft HAT</td>
<td>2</td>
</tr>
<tr>
<td>Airspeed</td>
<td>4. High Speed</td>
<td>On</td>
<td>&gt; (Vref + 20 kts) for 3 sec</td>
<td>20</td>
<td>&gt; (Vref +35 kts) for 3 sec, 500 to 50 ft HAT</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>5. Low Speed</td>
<td>On</td>
<td>&lt; Vref for 3 sec</td>
<td>0</td>
<td>&lt; (Vref - 3 kts) for 3 sec, 500 to 50 ft HAT</td>
<td>-3</td>
</tr>
<tr>
<td>ROD</td>
<td>6. High Decent Rate</td>
<td>On</td>
<td>&gt; 1000 ft/min for 3 sec</td>
<td>1,200</td>
<td>&gt; 1500 ft/min for 3 sec, 500 to 50 ft HAT</td>
<td>1,500</td>
</tr>
<tr>
<td>Thrust</td>
<td>7. Low Thrust Decent</td>
<td>On</td>
<td>N1 35% for 5 sec; N1 &lt; 5th Percentile by Fleet Type</td>
<td></td>
<td>Below Approach Power Limit (Fleet Constant) for 5 sec, 500 to 50 ft HAT</td>
<td></td>
</tr>
<tr>
<td>GPWS</td>
<td>8. GPWS Alert</td>
<td>On</td>
<td>Any GPWS Alert</td>
<td></td>
<td>Any GPWS Alert below 1000 ft HAT</td>
<td></td>
</tr>
</tbody>
</table>
General Aviation Portal: Operational Reviews

- Airport Daily Overviews
- Airport Monthly Overviews
- Arrival Winds Overview
- En-Route Daily Overview
General Aviation Portal – Analysis Dashboards

- Safety Event Metrics Overview
- TCAS Exploration
General Aviation Portal: Safety Reporting Trending

- Altitude deviation
- Automation Management
- Go Around
- GPWS
- Inaccurate Weight
- Landing without Clearance
- Missed Crossing Restrictions
- Runway incursion
- TCAS RA
- Unstable Approach

- 11 more under development
Directed Studies & Risk Analysis

National  Regional  Local
Analysis Tools
✓ **Confidential** biannual conference facilitated by the FAA

✓ InfoShare offers the safety community a unique opportunity to come together in a *private* setting to learn from each other’s experiences.

✓ Government and industry representatives *share* aviation safety concerns and discuss current aviation safety issues and mitigations.
The Most Complete *Flight Story Data Repository* Fuses All Available Data Sources and Incorporate New Sources

### Surveillance Data
- 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

### ADS-B
- High quality position reports

### ATC Voice Records
- ATC clearance

### ASAP
- Pilot factors
- Contributing factors

### FOQA
- Aircraft performance/config
- Event locations

### Flight Story Data Repository

*Under development*
1. Improved ability to identify and understand emerging vulnerabilities and systemic safety issues.

2. Enable better insight into factors contributing to high-risk safety events to support operationally effective, data-driven mitigations.
## ASIAS Fusion Studies

<table>
<thead>
<tr>
<th>Enhancements to Established ASIAS Metrics</th>
<th>Exploratory Assessment of Emerging Safety Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety Issues:</strong></td>
<td><strong>Safety Issues:</strong></td>
</tr>
<tr>
<td>▪ Runway Excursion Events</td>
<td>▪ Loss of Control</td>
</tr>
<tr>
<td>▪ TCAS Events</td>
<td>▪ Aircraft Misconfiguration</td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
<td><strong>Objectives:</strong></td>
</tr>
<tr>
<td>✓ Use of fusion capabilities to <em>enhance insight</em> into established ASIAS Metrics</td>
<td>✓ Use of fusion capabilities to <em>establish</em> and <em>validate</em> new ASIAS metrics</td>
</tr>
<tr>
<td>✓ Characterize <em>safety benefits</em> that derive from data fusion relative to current practices</td>
<td>✓ Characterize <em>new capabilities</em> for identifying undesired aircraft states</td>
</tr>
</tbody>
</table>
ASIAS Works Closely with CAST to Continuously Improve Aviation Safety

• ASIAS analysis helps CAST develop data-driven Safety Enhancements
• CAST monitors status of implementation of Safety Enhancements by government and industry
• ASIAS generates metrics for CAST to monitor effectiveness of Safety Enhancements
Summary of Contributing Factors from ASIAS

**RNAV Departures**
- Pilot Error
  - Incorrect Programming of the FMS Before Departure
  - Incorrect Management of ATC Clearances After Departure
- Communication
- ATC Changes
- Procedure Design, Implementation, Charting
- Aircraft or Equipment Performance Issues
- Training
- PDC Changes or Confusion

**STAR Arrivals**
- Pilot Error
  - Omissions and Lapses
  - Automation Programming
- Communication
- ATC Clearance Amendments
- Procedure Design, Implementation, Charting
- Aircraft or Equipment Performance Issues
- Training
CAST Safety Enhancements Underway for STAR Arrivals and RNAV Departures

<table>
<thead>
<tr>
<th>Safety Enhancement</th>
<th>Output</th>
</tr>
</thead>
</table>
| **SE 212** Equipment and Procedures to Improve Route Entry for RNAV Departures | 1 Airline dispatch filing improvements  
  2 PDC format standardization  
  3 DCL implementation to auto-load PDC |
| **SE 213** Safe Operating and Design Practices for STARs and RNAV Departures | 1 Alignment of training activities  
  2 Best practices for flight crews  
  3 Best practices for ATC  
  4 Best practices for procedure designers |
| **SE 214** Procedures and Standards to Improve Path Compliance for STARs and RNAV Departures | 1 Standards that reflect current performance and capabilities  
  2 Standards to improve path conformance in new equipment |

CAST Approved in February 2014
Benefits for Business Aviation

- ASIAS offers opportunity for a deeper understanding of *Business Aviation* safety issues
- ASIAS provides much needed expert analysis of data
- ASIAS promotes proactive systemic solutions through Safety Enhancements
Accidents Rates 1990-2013

Taken from Breiling
Business Jet Accidents 2001-2014

- 2001: 14
- 2002: 8
- 2003: 14
- 2004: 8
- 2005: 15
- 2006: 9
- 2007: 12
- 2008: 11
- 2009: 7
- 2010: 8
- 2011: 7
- 2012: 7
- 2013: 8
- 2014: 14

- 5 per. Mov. Avg. (Business Jet Accidents)
Monitor → Identify → Communicate → Analysis → Mitigation → Monitor
NBAA Top Safety Issues
Based upon an analysis of accident data from 2009-2013
NBAA Safety Hazards

- Fatigue
- Procedural Noncompliance
- Distraction & Technology Management
- Airspace Complexities
- Single Pilot Task Saturation
- Birds and Wildlife
- Ground Handling Collisions
National Safety Forum
Thursday November 19, 2015 - 09:00-15:00

• Continue the conversation on the future of Business Aviation Safety

• High Level Safety Leaders in a Town Hall forum directly engaged with business aviation safety leaders
Safety Leadership

• **General Aviation/Business Aviation**
  – Has been the leader in adopting technologies and safety management programs
  – Has been slow to adopt data management programs
    • Complexities
    • Collection rates
    • Misconceptions/fear

• **ASIAS is the opportunity to engage in next generation 360 safety program**
Become a part of the solution!

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