

- * Commercial Aviation Safety Team
- * Airplane State Awareness Study, LOC-I safety enhancements
- * FAA Update on Stall and Upset Prevention, Recovery Training

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U.S. Commercial Aviation Safety Team

FAA Office of Aviation Safety,

Accident Investigation & Prevention

RASG-MID Safety Summit, May 25 2016, Doha, Qatar

Commercial Aviation Safety Team (CAST)

Overview

CAST brings key stakeholders to cooperatively develop & implement a prioritized safety agenda

Industry

Government

AIA
Airbus
ALPA
APA
A4A
IFALPA
NACA
Boeing
GE*
RAA
FSF

IATA**
AAPA**
ATAC**
APFA**
ACI-NA**

* Representing P&W and RR
** Observer

**Commercial Aviation
Safety Team
(CAST)**

DOD
FAA

- Aircraft Certification
- Flight Standards
- Accident Investigation
- Air Traffic Operations
- Airports

NASA
ICAO**
EASA
TCCA
NATCA**
NTSB**

Vision - Mission - Goals



Vision

- * Key aviation stakeholders acting cooperatively to lead the world-wide aviation community to the highest levels of global commercial aviation safety by focusing on the right things.

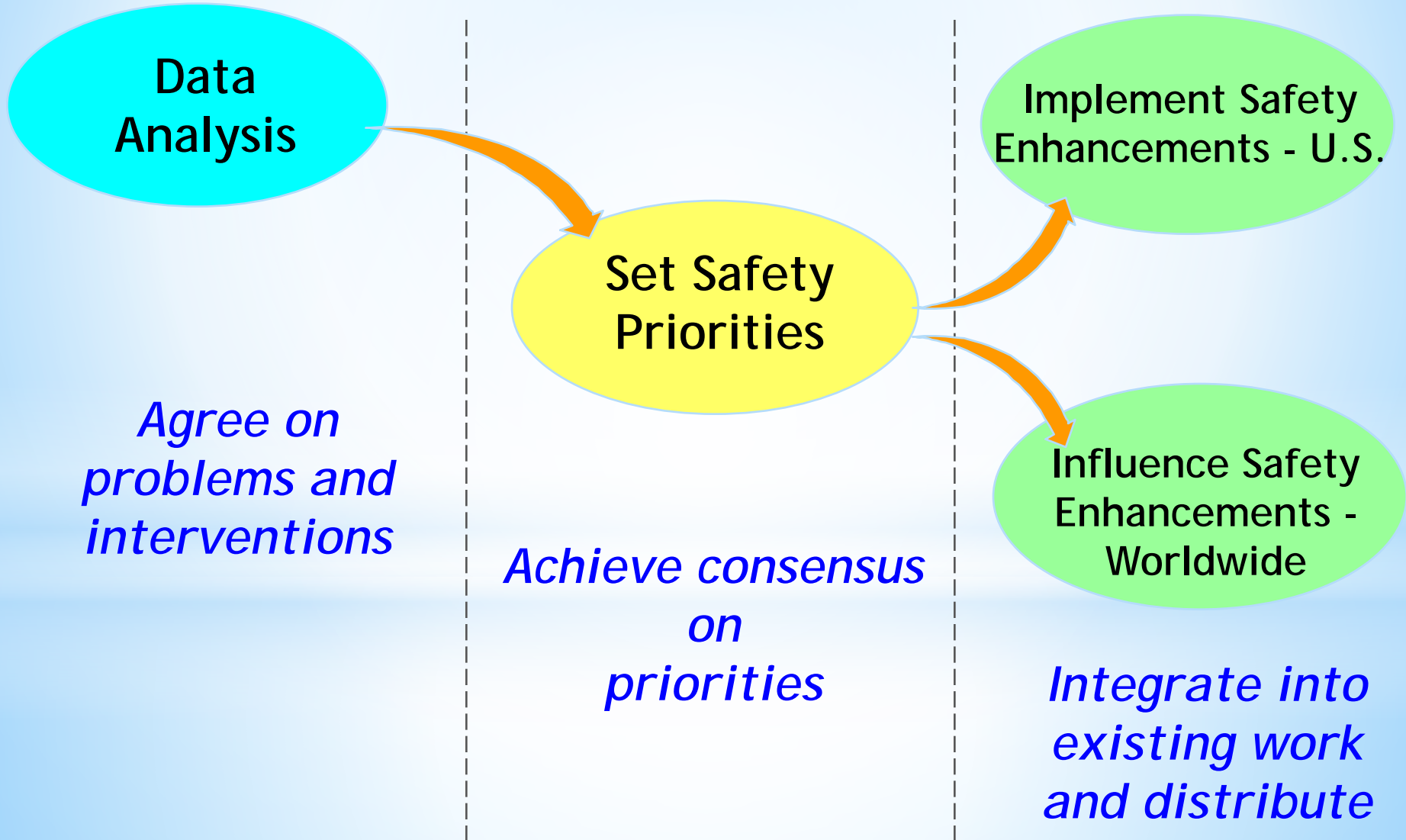
Mission

- * Enable a continuous improvement framework built on the proactive identification of current and future risks, developing mitigations as needed and monitoring the effectiveness of implemented actions.

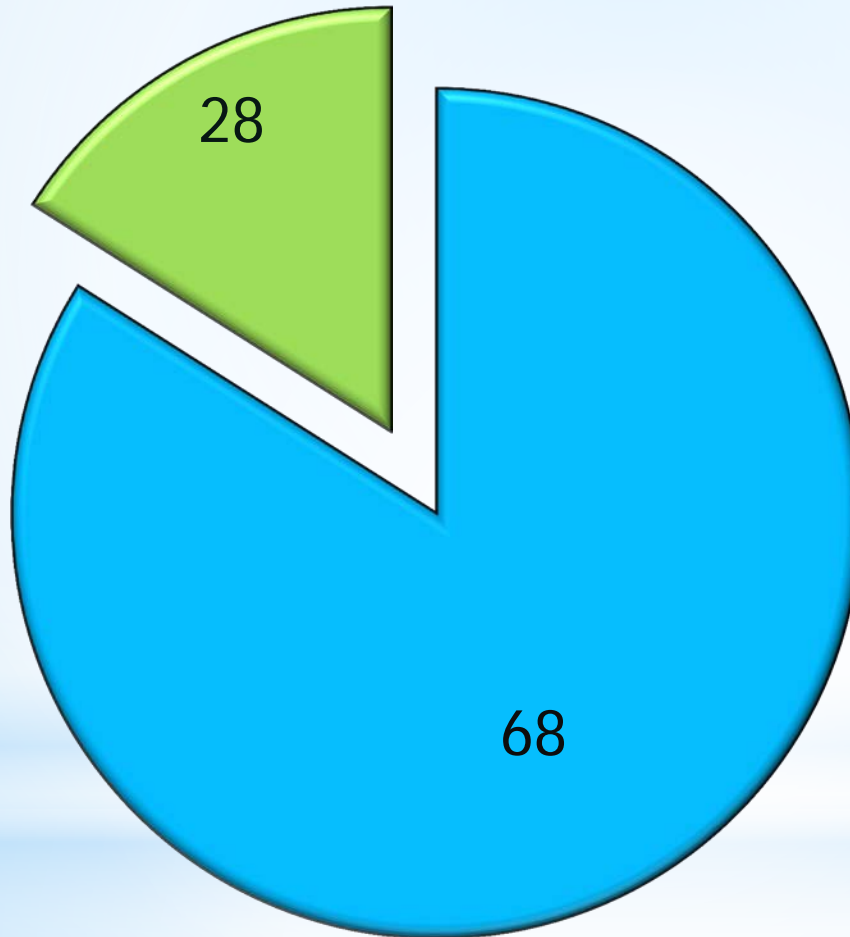
Goal

- * Reduce the U.S. commercial aviation fatality risk by at least 50% from 2010 to 2025
- and
- * Continue to work with our international partners to reduce fatality risk world-wide commercial aviation.

CAST Safety Strategy



CAST - Safety Enhancements



96 Safety Enhancements
68 Complete - 71%
28 Underway - 29%

- Completed
- Underway

2025 Plan Risk Reduction Estimate

50 %

* Recent CAST Safety Enhancements Issued

Airplane State Awareness

- Previously completed JSIT
 - 19 new Safety Enhancements (SEs 192-211)

RNAV-Departures and STARs

- Recently completed JSAIT
 - 3 new Safety Enhancements (SEs 212-214)

Runway Excursions

- Recently Completed JSAIT
 - 8 new Safety Enhancements (SEs 215-222)

Misconfiguration

- Analysis Underway

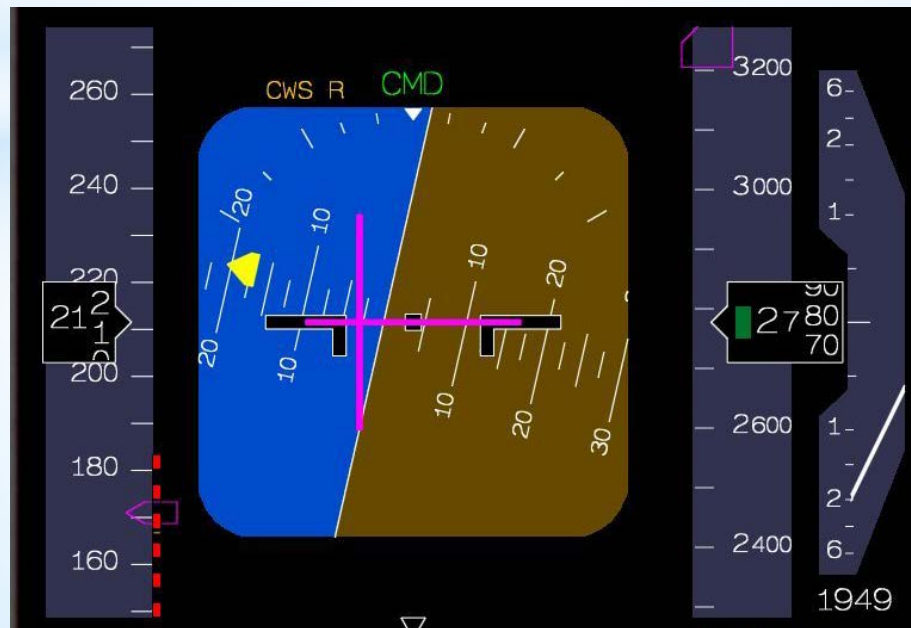
Safety Enhancements available on Skybrary:

http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan

CAST Role in the Regions

- Work with States or regional safety teams to introduce CAST to the regional aviation community.
- Work with interested parties to build momentum for safety initiatives.
- Provide detailed CAST safety plan information based on regional risk data at official meetings.
- Provide assistance in tailoring CAST safety enhancements to each regional environment.
- Work with States or regional safety teams to adopt Safety Enhancements (SE)
- Current formal sharing agreements with RASG Pan America and Asia-Pacific

OVERVIEW OF AIRPLANE STATE AWARENESS JOINT SAFETY IMPLEMENTATION TEAM METHODOLOGY



Review of ASA Study

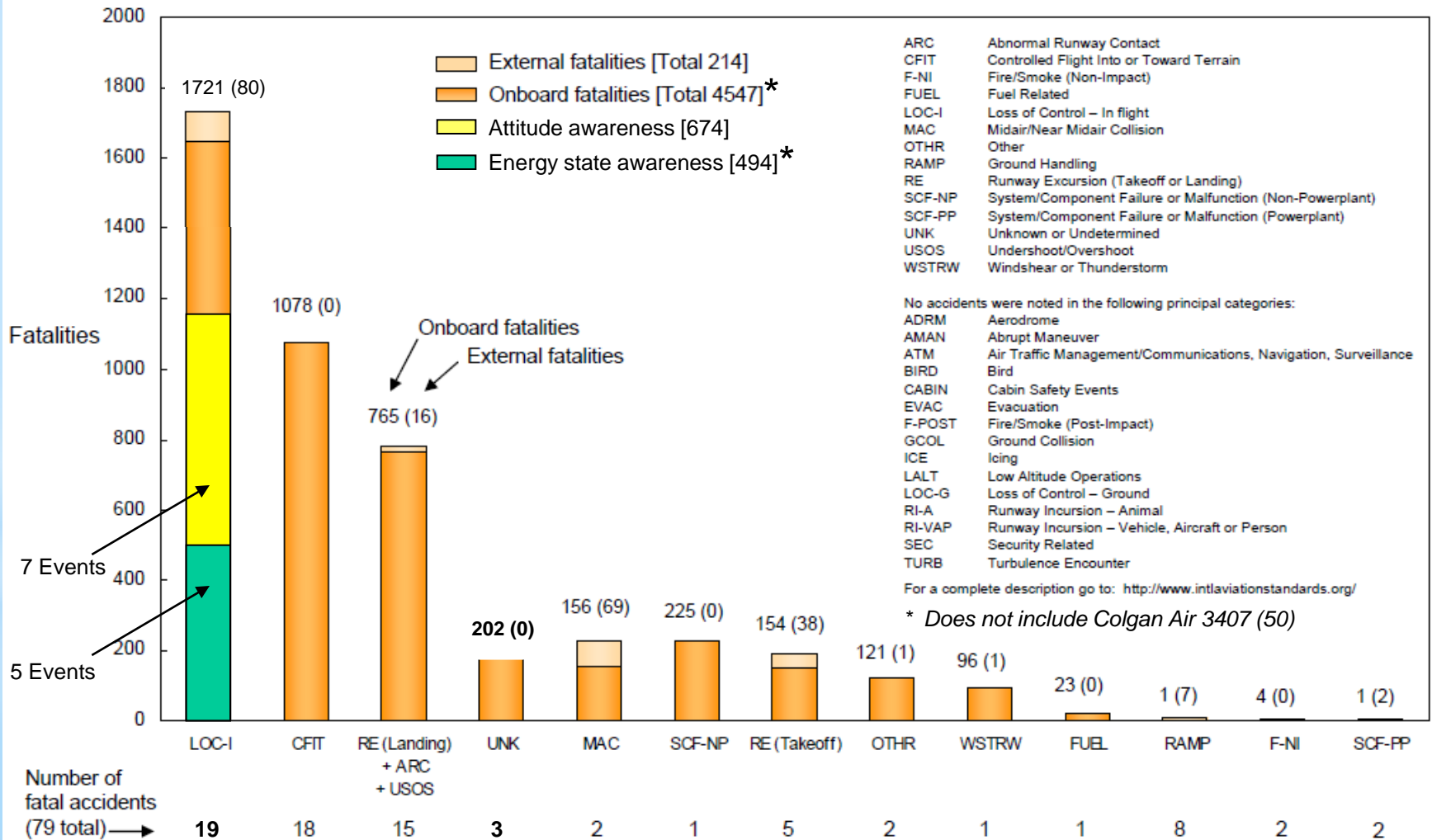
Defining the Issue

- * Loss of Control (LOC) remains a primary contributor to commercial airplane accidents
- * Roughly half of recent LOC events stem from airplane state awareness errors
- * Airplane state defined by two main categories
 - Attitude (roll and pitch angles and rates)
 - Energy (airspeed, vertical speed, altitude, power setting, and configuration)
- * In the events, information was available to the crew that was not used to prevent the accident / incident

APPLICABILITY - U.S. AND WORLD OPERATIONS

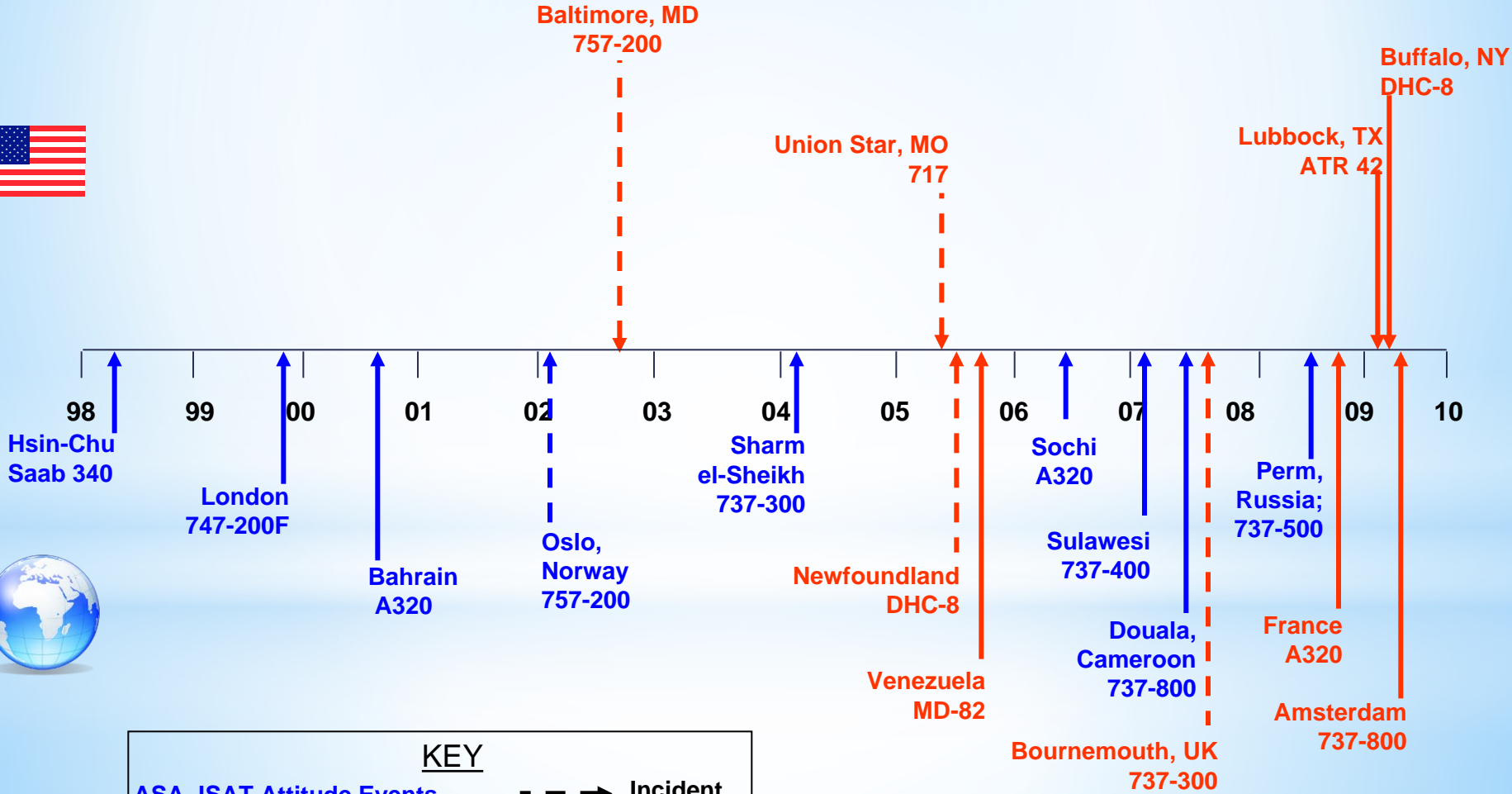
RELEVANCE TO ASA ISSUE

Fatalities by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories Fatal Accidents – Worldwide Commercial Jet Fleet – 2002 Through 2011



Note: Principal categories as assigned by CAST.

ASA JSAT EVENT SET



KEY

ASA JSAT Attitude Events - - - -> Incident

ASA JSAT Energy State Events ———> Accident

Safety Enhancements ASA Themes

	<i>Lack of External Visual References</i>	<i>Flight Crew Impairment</i>	<i>Training</i>	<i>Airplane Maintenance</i>	<i>Safety Culture</i>	<i>Invalid Source Data</i>	<i>Distraction</i>	<i>Systems Knowledge</i>	<i>Crew Resource Management</i>	<i>Automation Confusion / Awareness</i>	<i>Ineffective Alerting</i>	<i>Inappropriate Control Actions</i>	<i>Total</i>
Formosa Airlines Saab 340	x	x			x		x	x	x		x		7
Korean Air 747-200F	x			x		x	x		x		x		6
Flash Airlines 737-300	x		x		x		x		x	x	x	x	8
Adam Air 737-400	x		x	x			x	x	x	x	x	x	9
Kenya Airways 737-800	x		x				x		x	x	x	x	7
Aeroflot-Nord 737-500	x	x	x	x	x		x	x	x	x	x	x	11
Gulf Air A320	x		x				x		x		x	x	6
Icelandair 757-200 (Oslo)	x						x		x	x	x	x	6
Armavia A320	x	x			x		x		x	x	x	x	8
Icelandair 757-200 (Baltimore)	x				x	x	x	x	x	x	x	x	9
Midwest Express 717	x				x	x	x		x		x	x	7
Colgan Air DHC-8-Q400	x	x	x		x		x	x	x	x	x	x	10
Provincial Airlines DHC-8	x		x				x			x	x	x	6
Thomsonfly 737-800	x		x	x	x		x			x	x		7
West Caribbean MD-82	x	x			x		x	x	x	x	x	x	9
XL Airways A320		x	x	x	x	x	x	x	x	x	x		10
Turkish Airlines 737-800	x			x	x	x	x		x	x	x		8
Empire Air ATR-42	x	x			x		x		x	x	x		7
Overall	17	7	9	8	12	5	18	7	16	14	18	12	

CAST Safety Enhancements

Air Carrier Actions

- **SE 192 Low Airspeed Alerting**
 - Incorporate existing service bulletins to install low airspeed aural alerting in the U.S. fleet
- **SE 194 SOP Effectiveness and Adherence**
 - Review and update SOPs to align with latest CAST, manufacturer, and ATO recommendations
 - Assess and revise SOPs based on feedback from data monitoring programs
- **SE 193 Non-Standard Flight Operations**
 - Improve safety of non-revenue, non-standard flight operations
- **SE 195 Training Verification and Validation**
 - Improve air carrier oversight of training provided by third -party vendors

CAST Safety Enhancements

Flight Crew Training

- SE 196 Enhanced Upset Recovery Training, Including Approach-to-Stall
 - New approach-to-stall recovery procedures and realistic scenarios, including autoflight ON
 - Upset prevention & recovery, including unreliable airspeed
- SE 198 Scenario-Based Training for Go-Arounds
 - Go-arounds for other than decision height
 - Complicating factors (trim, light weight, entry into clouds)



- SE 199 Enhanced Crew Resource Management
 - Focus on pilot monitoring duties
- SE 197 Training for Non-Normal Situations
 - Focus on flying the airplane first



Recommended Safety Enhancements

Airplane Design

- For new airplanes:
 - Continue incorporating features currently delivered on latest type designs, plus:
 - SE 200 Virtual day-VMC displays with energy path guidance
 - SE 201 Advanced bank angle alerting with recovery guidance
 - SE 202 Bank angle protection on new fly-by-wire airplanes



At 35° bank...



At 45° bank...



Recommended Safety Enhancements

Airplane Design

- For existing in-production designs (SE 203, SE 204)
 - Study feasibility of production change and retrofit of:
 - Bank angle protection on fly-by-wire airplanes
 - Advanced bank angle alerting with recovery guidance
 - Virtual day-VMC displays with energy path guidance
 - Low airspeed alerting
- For existing out-of-production designs (SE 205)
 - Consider retrofit of feasible features based on results for in-production designs

Recommended Safety Enhancements Research

- Flight Deck Systems (SE 207, 208)
 - Effectiveness of angle-of-attack indicators/displays
 - Low energy state monitoring and alerting
 - Spatial disorientation detection and alerting
 - Smart alerting schemes
 - Improved display of automation states
- Simulator Fidelity (SE 209)
 - Full stall modeling
 - In-flight validation of simulator-based training
- Human Performance (SE 210, 211)
 - Database of pilot responses to critical warnings and alerts
 - Training scenarios for attention issues

Eleven new ASA Safety Enhancements

	Lack of External Visual References	Flight Crew Impairment	Training	Airplane Maintenance	Safety Culture	Invalid Source Data	Distraction	Systems Knowledge	Crew Resource Management	Automation Confusion / Awareness	Ineffective Alerting	Inappropriate Control Actions	Total
Formosa Airlines Saab 340								x					1
Korean Air 747-200F						x	x						2
Flash Airlines 737-300							x			x			2
Adam Air 737-400								x		x			2
Kenya Airways 737-800							x			x			2
Aeroflot-Nord 737-500		x					x	x		x			4
Gulf Air A320			x				x				x		3
Icelandair 757-200 (Oslo)										x	x		2
Armavia A320							x			x	x		3
Icelandair 757-200 (Baltimore)					x			x				x	3
Midwest Express 717					x							x	2
Colgan Air DHC-8-Q400							x	x					2
Provincial Airlines DHC-8							x						1
Thomsonfly 737-800													0
West Caribbean MD-82							x	x			x		3
XL Airways A320								x		x			3
Turkish Airlines 737-800					x					x			2
Empire Air ATR-42							x			x			2
Overall	0	1	1	0	3	1	10	7	0	9	4	2	

Eleven new ASA Safety Enhancements + Research & Development


Lack of External Visual References
Flight Crew Impairment
Training
Airplane Maintenance
Safety Culture
Invalid Source Data
Distraction
Systems Knowledge
Crew Resource Management
Automation Confusion / Awareness
Ineffective Alerting
Inappropriate Control Actions
Total

Formosa Airlines Saab 340														0
Korean Air 747-200F						x								1
Flash Airlines 737-300														0
Adam Air 737-400														0
Kenya Airways 737-800														0
Aeroflot-Nord 737-500		x												1
Gulf Air A320			x											1
Icelandair 757-200 (Oslo)														0
Armavia A320														0
Icelandair 757-200 (Baltimore)					x									1
Midwest Express 717					x									1
Colgan Air DHC-8-Q400								x						1
Provincial Airlines DHC-8														0
Thomsonfly 737-800														0
West Caribbean MD-82								x			x			2
XL Airways A320														0
Turkish Airlines 737-800					x									1
Empire Air ATR-42														0
Overall	0	1	1	0	3	1	0	2	0	0	1	0		

ASA JSAT RESULTS - SUMMARY

- Recently completed JSAT/JSIT
 - 11 new Safety Enhancements (SE 192 - 202)
 - 3 Manufacturer Feasibility Studies for Design (SE 203 - 205)
 - 5 R&D plans (SE 207 - 211)
- Safety Enhancements available on Skybrary:
 - http://www.skybrary.aero/index.php/Portal:CAST_SE_Plan
 - Search Engine "skybrary CAST Safety Enhancements"


* FAA UPRT Update



**U.S. Department
of Transportation
Federal Aviation
Administration**

Advisory Circular

Subject: Stall and Stick Pusher Training **Date:** 8/6/12 **AC No:** 120-109
Initiated by: AFS-200 **Change:**



**U.S. Department
of Transportation
Federal Aviation
Administration**

Advisory Circular

Subject: Upset Prevention and Recovery
Training **Date:** 4/14/15 **AC No:** 120-111
Initiated by: AFS-200 **Change:**

Stall and Upset Training

Timeline:

- 2009 Industry-FAA Stall/Stick-Pusher Working Group
- 2010 Public Law 111-216
- 2011 FAA Aviation Rulemaking Committee on Stick Pusher and Adverse Weather Event Training (208 ARC)
- 2011 AC 120-109, *Stall and Stick Pusher Training*
- 2012 FAA/EASA/ICAO LOCART (208 ARC)
- 2014 AC 120-109 Rev-1, AC 120-UPRT

Inspector Education:

- * Briefings before the release of the final rule
- * On line training sessions with field inspectors
- * Release of inspector guidance/job aids
- * Annual Principal Operations Inspector (POI) conference
- * POI FSTD Training (Stall and Upset Training)

**THANK YOU
&
Questions?**