RASG-AFI Safety Enhancement Initiatives

Contributions from Partners - Boeing perspective

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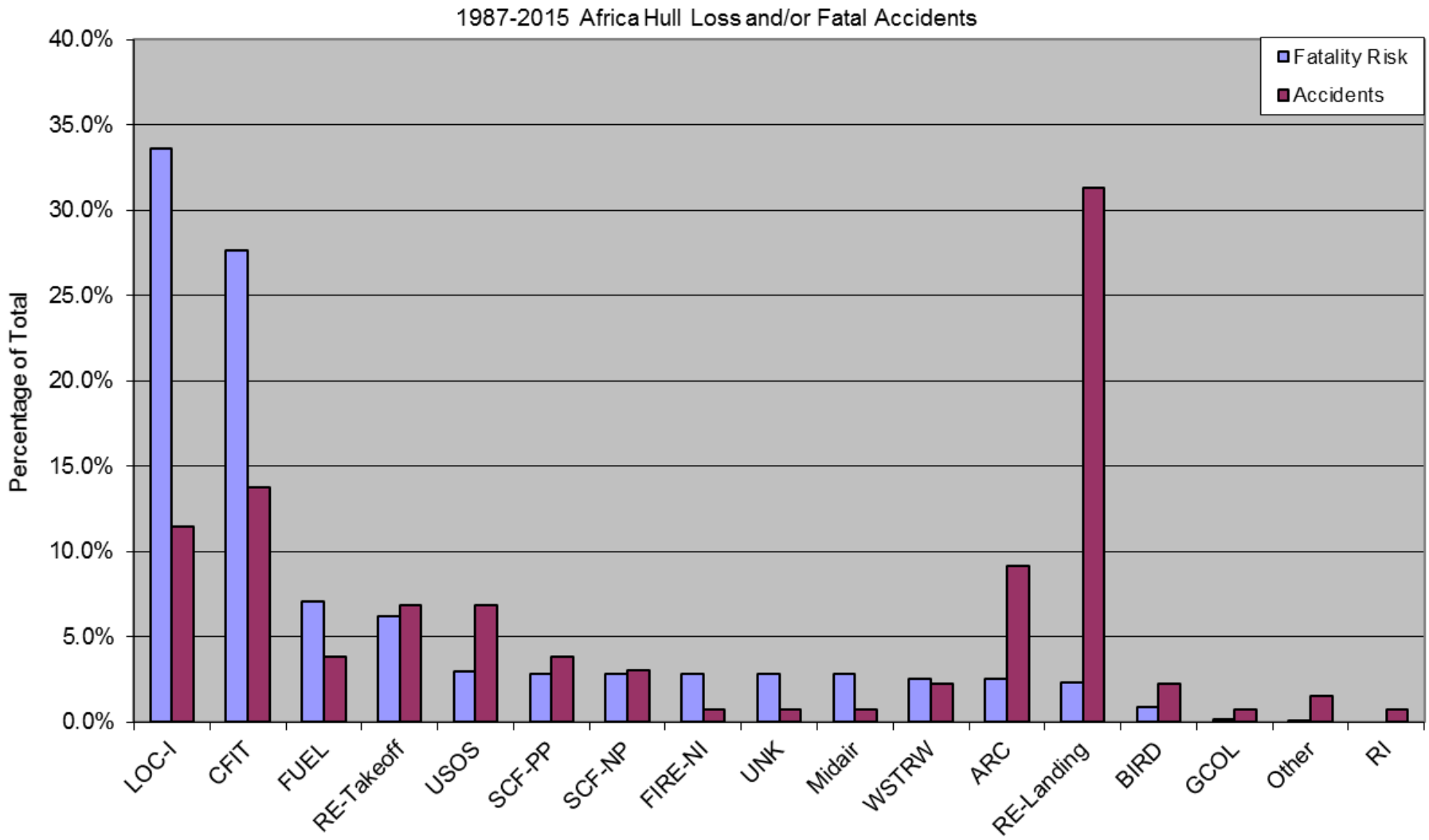
Outline:

- Leading Safety risks
- Safety Enhancement CFIT
- Safety Enhancements LOC
- Safety Enhancement RE



*Western built airplanes, Part 121 equivalent operations: 131 accidents; 35.6 Full Loss Equivalents

Safety Enhancement| CFIT

Controlled Flight Into Terrain

- Install and use Terrain Awareness and Warning System (TAWS) equipment
- Airlines establish flight crew Standard Operating Procedures (SOP's) that fit that operator's particular operation
- Airlines institute SOP training, and encourage operators to use SOP's in all normal operations
- Emphasize the use of SOPs in Crew Resource Management (CRM) Training
- Discontinue the use of step-down or "dive-and-drive" non-precision approach procedures as soon as, and wherever, possible
- Develop and deploy Required Navigational Performance (RNP) approach procedures to lower approach minima

Safety Enhancement| CFIT

Controlled Flight Into Terrain

- Ensure ground-based radars provide the necessary levels of terrain avoidance protection
- Ensure air traffic controller Minimum Safe Altitude Warning training is adequate and appropriate
- Develop initial and recurrent CFIT training for controllers
- Install Visual Glide Slope Indicators (VGSI) at each runway end
- Install Distance Measuring Equipment (DME) at airports where significant numbers of older air carrier aircraft are expected to operate

Safety Enhancement| CFIT

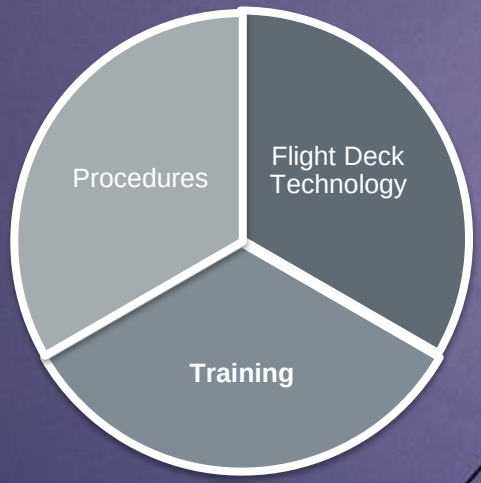
Controlled Flight Into Terrain

- Use de-identified Flight Operations Quality Assurance (FOQA), information to identify safety-related issues, trends, institute corrective actions and monitor effectiveness
  - Give operators the tools to initiate corrective actions prior to an accident
  - Allow air carriers to share safety information
- CFIT prevention training and procedures that emphasize:
  - Pilot situational awareness
  - Escape procedures in the event of a terrain warning indication

Loss of Control

Significant Themes

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



- SE192: Airplane State Awareness - Low Airspeed Alerting
- SE193: Airplane State Awareness - Non-Standard/Non-Revenue Flights
- SE194: Airplane State Awareness - Standard Operating Procedures Effectiveness and Adherence
- SE195: Airplane State Awareness - Flight Crew Training Verification and Validation
- SE196: Airplane State Awareness - Effective Upset Prevention and Recovery Training
- SE197: Airplane State Awareness - Policy and Training or Non-normal Situations
- SE198: Airplane State Awareness - Scenario-Based Training for Go-Around Maneuvers
- SE199: Airplane State Awareness - Enhanced Crew Resource Management Training
- SE200: Airplane State Awareness - Virtual Day-VMC Displays
- SE201: Airplane State Awareness - Bank Angle Alerting and Recovery Guidance Systems
- SE202: Airplane State Awareness - Bank Angle Protection
- SE203: Airplane State Awareness - Features for Current Production or In-Development Fly-by-Wire Airplane Designs
- SE204: Airplane State Awareness – Features for Existing non-Fly-by-Wire Airplane Designs
- SE205: Airplane State Awareness - Features for Out-of-Production Airplane Designs
- SE207: Airplane State Awareness - Attitude and Energy State Awareness Technologies (R-D)
- SE208: Airplane State Awareness - Airplane Systems Awareness (R-D)
- SE209: Airplane State Awareness - Simulator Fidelity (R-D)
- SE210: Airplane State Awareness - Flight Crew Performance Data (R-D)
- SE211: Airplane State Awareness - Training for Attention Management (R-D)

Safety Enhancement| LOC-I

Loss Of Control - Inflight

- All airline operators publish and enforce clear, concise, and accurate flight crew SOPs. These SOPs should include expected procedures during all phases of flight:
  - Simulator training
  - Checklists
  - PF/PNF duties, transfer of control, automation operation, rushed and/or unstabilized approaches, rejected landings and missed approaches
  - In-flight pilot reports of icing
  - Airline instructors and check airmen should ensure these SOPs are trained and enforced in their aircrew proficiency and standardization programs.

Safety Enhancement| LOC-I

Loss Of Control - Inflight

- Identify, develop and implement methods for operators, regulators and manufacturers to prioritize safety-related decisions by improving methods of risk assessment for operational issues (basic SMS)
- Operating manuals and training programs for pilots include safety information and operational procedures generated by airplane manufacturers
- Continuously improve pilot performance and proficiency using information from non-punitive programs such as FOQA (Flight Operation Quality Assurance), AQP (Advanced Qualification Program), LOSA (Line Operations Safety Audit)
- Adopt consensus policies and procedures relating to mode awareness and energy state management

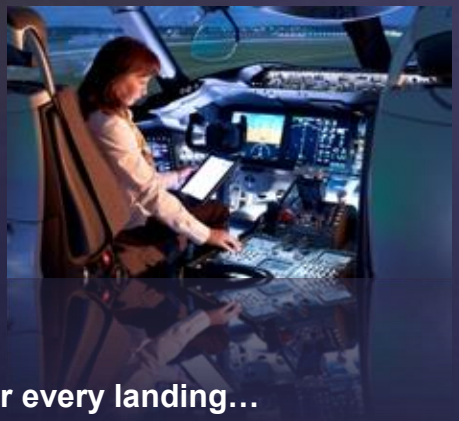
Safety Enhancement| LOC-I

Loss Of Control - Inflight

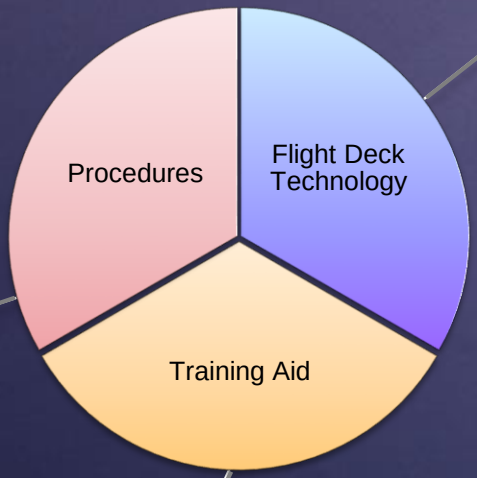
- Implement Advanced Maneuvers Training (AMT) to prevent and recover from hazardous flight conditions outside of the normal flight envelope or from inappropriate energy state management conditions. Emphasis should be given to stall onset recognition and recovery, unusual attitudes, upset recoveries, effects of icing, energy awareness and management, ground proximity and wind shear escape maneuvers and other causal factors that can lead to loss of control
- Improved display and alerting systems in new airplane designs
  - New airplane designs (jet and turboprop) should include angle-of-attack/low speed protection, thrust asymmetry compensation, and bank angle protection using hard or soft limits.

Safety Enhancement| RE Boeing's overrun solution

Runway Situation Awareness Tools



For every landing…
- Perform a landing distance calculation
- Calculate and brief a go-around point
- Utilize appropriate Speedbrake/Thrust Reverser callouts



Technology…
- Enhanced approach planning tools
- Aural and visual runway positional awareness and alerting
- Stability guidance and alerting
- Predicted runway stop location display
- Overrun alerting

***Approach and Landing Training Aid* video…**
- Flying a stable approach
- Runway contamination or friction
- Checking runway length available versus required
- Reported conditions that vary from actual
- Approach speed additives and effect
- Proper, timely use of all deceleration devices

Safety Enhancement| RE

Runway Excursion

- Make CEOs and other key officers of commercial airlines more visible and more effective in promoting a safety culture
- Director of Safety shall ensure the establishment of a process to identify, analyze, review and include appropriate safety information in training programs and manuals
- Ensure altitude awareness and accomplishment of checklist items.
  - Automatic aural altitude alert call-outs on final approach or other such altitude alerting systems.
  - Automated or mechanical checklist devices to provide a positive means for checklist completion
  - Research and assessment of existing technology in flight deck smart-alerting system design.

Safety Enhancement| RE

Runway Excursion

- Re-emphasize current maintenance rules, policies, and procedures
- Train and evaluate aircrews on stabilized approaches, unusual attitudes, and upset recoveries
  - Crew resource management, go around criteria, approaches with system malfunctions, non-normal conditions, emphasis on basic airmanship, approach briefings, approach and missed approach procedures
- Correcting and elimination the underlying reasons/causes for procedural noncompliance

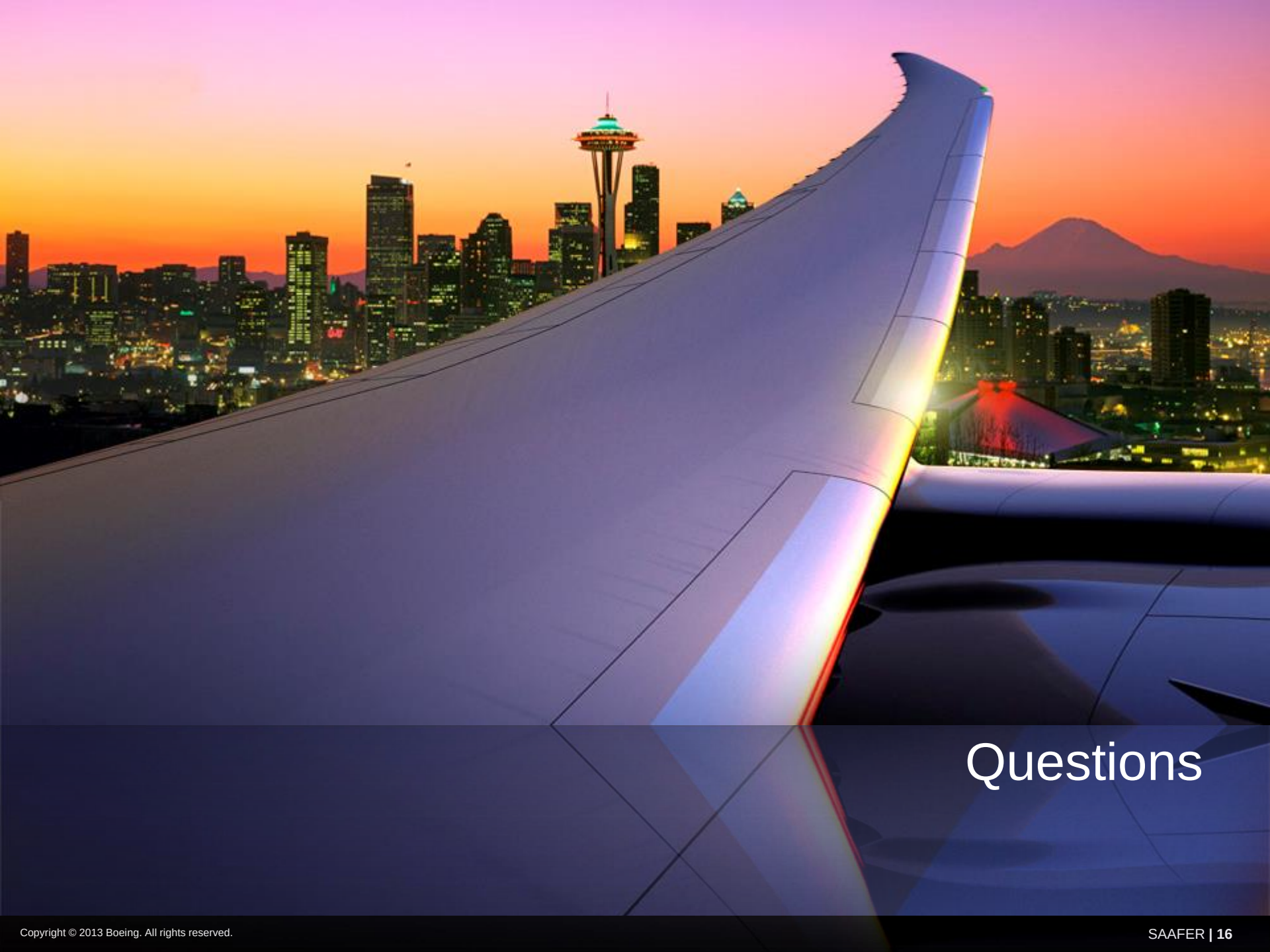
Safety Enhancement| Themes

CFIT, LOC and RE

- Accountability of workers, managers and regulators
- Standard Operating Procedures (SOP)
- Training and manuals (pilot, controller, mechanic, etc.)
- Ground and aircraft equipage, both existing and new technology
- Safety Information (FDM, Reports, Observations)
  - Objective (what, where, when)
  - Subjective (why)
- Risk assessment and prioritization

CAST SEs on SkyBrary:

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



Questions