



NTSB National Transportation Safety Board

The Role of Data in Enhancing Flight Safety

Flight Safety
Monitoring From the
Ground Up

Miami, Florida
May 12, 2015

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NTSB Mission

The NTSB is an independent US federal agency charged with determining the probable cause(s) of transportation accidents, making recommendations to prevent their recurrence, conducting special studies and investigations, and coordinating resources to assist victims and their families after an accident.

Keynote Topics

- Flight Safety - Role of Data
 - Acquisition of Data
 - Application of Data
 - Users of Data
 - Paradigm shift due to Data
 - Safety Culture shift due to Data

Acquisition of Data

- Operational data
 - Flight Data Recorder
 - Quick Access Recorder
 - Aviation system data
- Event data
 - Cockpit Voice Recorder
 - Self-reported events
 - Aviation system data
 - Serendipitous data

Application of Data

- Accident investigation
 - Traditional Fly-Crash-Fix-Fly cycle
 - Reactive
- Incident investigation
 - Predictive
 - Proactive
 - Risk identification and reduction
- Operational Quality Assurance
 - FOQA/FDM

Users of Data

- Commercial Air Carriers
 - Operational
 - Event
- General Aviation
 - Wide range of users
- Manufacturers
 - Design decision support
 - Design verification and validation

Paradigm Shifts Due To Data

- Historical Applications
 - Reactive Accident Investigations
 - Flight Data Records
 - Flight Data Monitoring
 - Flight Operations Quality Assurance
- Progression
 - From individual event to aviation system-wide application

Paradigm Shifts Due to Data

- AQP, Advanced Qualification Program
 - Systematic training program development
 - Data-driven QC
 - Move from hours to proficiency
 - Encompasses both individual & crew
 - Encourages innovation
 - Methods
 - Technology

Paradigm Shifts Due to Data

- LOSA, Line Operations Safety Assm't
 - Proactive, observational data
 - Peer observations in normal ops
 - Anonymous, confidential, non-punitive
 - Systematic observation instrument
 - Joint labor – management sponsorship

Paradigm Shifts Due to Data

- ASAP, Aviation Safety Action Program
 - Encourage employees to voluntarily report safety events and issues
 - Surfaces events that might otherwise have been unreported
 - Events & issues reviewed by ERC
 - Management, labor, regulator
 - Intended to be non-punative
 - Rich source of data for risk assessment



Paradigm Shifts Due to Data

- FOQA, Flight Operations Quality Assurance
 - Routine collection and analysis of flight data
 - Identify and correct operational deficiencies
 - Proactive use of recorded flight data
 - Aggregated data useful for identifying training, procedural, system and other issues



Paradigm Shifts Due to Data

- ASIAs, Aviation Safety Information Analysis and Sharing
 - Broad aviation community involvement
 - Leverages numerous data sets
 - FAA, airline, manufacturer, NTSB
 - Fuses data sets to identify trends and assess results of safety changes
 - MITRE Corp safeguards de-identified data

Paradigm Shifts Due to Data

- CAST, Commercial Aviation Safety Team
 - Government, operators, labor, manufacturers
 - Achieved 80%+ accident rate reduction 1998-2008
 - Initially accident data driven
 - Moving to proactive pursuit of unsafe events – risk management

Paradigm Shifts Due to Data

- GAJSC, GA Joint Steering Committee
 - Joint government, GA community activity
 - Use processes adapted from CAST
 - Focus on
 - Data-driven risk reduction
 - Enabling new safety equipment
 - Education & training

Paradigm Shifts Due to Data

- SMS, Safety Management System
 - Based on *safety can be managed*
 - Consists of four corner posts
 - Safety policy
 - Safety risk assessment & management
 - Safety assurance
 - Safety promotion
 - Two posts heavily dependent on data
 - Results in safety culture enhancement

Paradigm Shifts Due to Data

Changes to safety culture

Reactive & forensic

- Whack-a-mole management
- Crisis safety management
- Silos of knowledge
- “Off with their heads”

Risk-based & predictive

- Risk management
- Change management
- Data analysis and information sharing
- Just culture

Paradigm Shifts Due to Data

Changes to safety culture

Reactive & forensic

- Safety organization responsible for safety
- Regulator is dictatorial and despised
- Safety expected by regulations

Risk-based & predictive

- Everyone responsible for safety
- Regulator is collaborative and respected
- Safety enhanced via voluntary initiatives

Wrap-up

- Data acquisition
- Data applications
- Data users
- Data related safety changes

The value of data depends heavily on well defined questions which the data are intended to answer



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