Understanding and Managing Human Error

Kathy H Abbott, PhD, FRAeS
Captain Robert Sumwalt
Prof. Scott Shappell
Overview of Tutorial

- Human error – an overview
- Error and aviation safety
- Human Factors Analysis and Classification Scheme
- Threat and Error Management
- Regulation for design-related flight crew error
- Closing remarks
Knowledge About Human Behavior & Performance

Regulatory Processes

Human behavior/performance knowledge and principles

Organization

Design

Training

Procedures
Perspective

• Two thirds to three quarters of all accidents have human error cited as a primary factor
• Changes in technology fix some issues but may introduce new ones
Many studies cite pilot errors as primary factors in a majority of accidents.

To improve safety, ask *why* errors occurred.
Reason’s Swiss Cheese Model (2008)

Some holes due to active failures

Losses

Other holes due to latent conditions

Hazards
Error Management

• It is not possible to prevent all errors
  – “Error is the down side of having a brain”
  – ”Learning does not occur without errors”

• Experienced pilots make just as many errors as less experienced pilots *but:*
  – they make different types of errors
  – they manage them differently

• The number of errors tends to decrease in more demanding situations but recovery from errors also decreases

• Error prevention, detection, and recovery
Types of Errors – One Classification Scheme

- **Slips** - meant to do the right thing but incorrect action
- **Lapses** - omitted an item
- **Mistakes** - Intention was incorrect
- **Violations** - intentionally deviated from SOP or accepted procedure *note: not necessarily a legal violation*
Courtesy Aeromexico
Error-Provoking Factors

- Hurry
- Primacy effect
- Inadequate feedback from systems
- Insufficient situation awareness
- Workload - low or high
- Mismatches in tasks
- Cognitive biases
- Organizational policies
- Non-standardized interfaces
Error-Provoking Factors (continued)

• Inconsistencies
• Distractions/interruptions
• Insufficient knowledge and skills
• Fatigue
• Something that differs from cultural norms
• Language issues
• Many others…
Accident Rates by Years Following Introduction
Hull Loss and/or Fatal accidents - Worldwide Commercial Jet Fleet - 1959 through 2003

- First generation
- Second generation
- Early Widebody
- Current Generation

Accident rate (accidents per million departures)

Years since introduction
Overview of Tutorial

• Human error – an overview
• Error and aviation safety
• Human Factors Analysis and Classification Scheme
• Threat and Error Management
• Regulation for design-related flight crew error
• Closing remarks