Lessons Learned From Aviation Accidents

Creation of a Web-Based Knowledge System

Presented to: International Fire and Cabin Safety Research Conference

By: Daniel I. Cheney, Manager, Safety Programs
Transport Airplane Directorate
Federal Aviation Administration

Date: October 25-28, 2010
Atlantic City, New Jersey
Background

- During the 1990’s and early 2000’s, several large transport accidents occurred which prompted examination of the consistency of:
  - The **design** programs
  - The **operational** programs
  - The **maintenance** programs

  and the **organizational interfaces** connecting these programs
Organizational Interfaces

Lessons Learned From Aviation Accidents
International Fire and Cabin Safety Research Conference
October 25-28; Atlantic City, New Jersey
Organizational Interface Accidents:

– Trans World Airways Flight 800
– Swissair Flight 111
– American Eagle Flight 4184
– Alaska Airlines Flight 261
At the NTSB accident hearing in 2000, the FAA committed to undertake a detailed review of its certification and operational processes.

- In March 2002, the Certification Process Study (CPS) was issued.
Commercial Airplane Certification Process Study

• Study co-chaired by FAA and industry, supported by experts from several major companies and organizations

CPS Report Finding #8:

“Adequate processes do not exist ... within the commercial aviation industry... to ensure that the lessons learned from specific experience ... are captured... and made available to the aviation industry...”

Mistakes can be linked to failure to apply past lessons
“Those who cannot remember the past are condemned to repeat it.”

George Santayana
Professor of Philosophy
Harvard University
The Life of Reason, Volume I
1905

Nearly all large transport accidents are enormous human tragedies. A second tragedy is to not learn from them.
Current Situation

• Lessons from major accidents are not being consistently captured, retained, or applied
  – Reliance of “On the Job Training” (OJT)
  – Intended to be captured by requirements, specifications
  – “That’s an old accident. Why do I need to know anything about that?”
  – “Not my job”
Barriers to Creating an Accident Knowledge System

• Fear of litigation, negative publicity
• Lengthy Investigation/Resolution
• Continual workforce turnover
• IT tools only recently available
Accident Life Cycle

Investigation Process

- Airplane certified
- Operations begin
- In-service incidents
- Initial corrective actions
- Investigation
- The Accident
- Research & Development
- Proposed rules change
- Proposed policy change
- Changed regulations & policies
- Reports & Recommendations

Resolution Process

- Lessons Learned Identified

Lessons Learned From Aviation Accidents
International Fire and Cabin Safety Research Conference
October 25-28; Atlantic City, New Jersey
Current Initiative

• In response, the FAA has developed a web based “Lessons Learned from Transport Airplane Accidents” library
  – Structured; threat based
  – Comprehensive search-sort capability
  – Can be integrated with other safety systems
Library Content

What the Library IS:

– An orderly assemblage of available accident information
– Investigation AND resolution content
Library Content

What the Library is NOT:

– Re-investigation of any accident
– Assessment of *fault* or *blame*
– A collection of all accidents; only those with high lesson value
Accident Causes

- multiple factors

• Often accidents require several factors in order for the accident to happen
  – All the factors “line up” on a given flight
Accident Causes

-usually not new cause

- Rarely do today’s accidents occur for causes never experienced before
  - Most accidents involve circumstances similar, if not identical to previous accidents or incidents
Precursor Recognition

- Timely and appropriate accident precursor recognition can aid in accident prevention
  - Those involved in the safety delivery process are now able to gain knowledge of accident causes
Accident Intervention

- Strategic removal of one of the key factors can break the accident chain before all the factors “line up”
  - Effective intervention begins with knowledge
  - Training of these factors is now possible
Purpose of Accident Library

• Stop and reverse the loss of costly lessons
• Maintain and improve the safety of an already very safe international aviation system
  – Training modules are possible using library content
Accident Library Arrangement
Lessons Learned From Aviation Accidents
International Fire and Cabin Safety Research Conference
October 25-28; Atlantic City, New Jersey
Threat Categories (18)
Common Themes (5)
Lessons Learned From Aviation Accidents

Federal Aviation Administration

International Fire and Cabin Safety Research Conference
October 25-28; Atlantic City, New Jersey

Plans

Prototype   Library Release   Ongoing

Accidents Library Total Content

<table>
<thead>
<tr>
<th>Year</th>
<th>Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>10</td>
</tr>
<tr>
<td>2008</td>
<td>30</td>
</tr>
<tr>
<td>2009</td>
<td>50 accidents +</td>
</tr>
</tbody>
</table>

Federal Aviation Administration
Summary

• A web-based Accident Library is now available to enhance the safety of an already very safe international aviation system

  – Currently available at: http://accidents-II.faa.gov/
Demo of the LL Library

- At tomorrow’s conference workshop, the accident library, and related lessons, will be reviewed in the areas of:
  - Uncontrolled Fire
  - Cabin Safety/Hazardous Cargo