Evidence Based Training for Airline Pilots.....
from inception to implementation

Patrick Murray
Evidence Based Training

➢ What are the issues with current training?

➢ What does the evidence say?

➢ The way ahead
Does one size fit all?
Mandatory Items

- Flight Preparation
- Before take-off checklist
- Engine failure between V1 and V2
- Rejected take-off before reaching V1
- Instrument departure and arrival procedures
- Engine-out Precision Approach to minima
- Non-Precision approach to MDA
- Go-Around 1 engine inoperative at DA
- Landing critical engine inoperative
Issues

- Regulatory prescriptions for flight crew member training and checking are based on events, some of which are improbable in aeroplanes designed to meet modern standards.

- Training programmes are consequently saturated with items that may not necessarily mitigate the real risks, or enhance the safety of modern air transport operations.

- Actual events in modern aircraft indicate new & quite different risks.

- Automation control, flightpath guidance and monitoring not currently adequately considered in regulations.
“Black Swans”

When people and complex systems interact, there will always be an infinite number of possible outcomes....

Can we equip crews to be more RESILIENT?
Resilience: Coping with the unexpected in unstable systems

Knowledge driven

- Surprise "out of range" of foreseen incidents

Typical content of recurrent training

Expected

- Surprises within the range of foreseen incidents

Procedure driven

Rene Almaberti 2010
EBT Project Objective

Develop a new paradigm for competency based training and evaluation of airline pilots based on evidence

Phase 1
Recurrent

Phase 2
Type Rating

Outputs
ICAO Doc 9868 PANS-TRG
ICAO Manual of EBT
IATA EBT Implementation Manual

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Methodology

- An analysis of analyses
- Individual studies
- Integrating the evidence to draw global conclusions
Results from the individual analyses are distilled into singular declarative sentences, entered into the Findings Database & linked to:

- Flight phases
- Competencies
- Objectives of the study
- Training Topics
- Context of the evidence if relevant
- Factors analyzed in the Accident-Incident Study
- Sources
- Keywords associated with the conclusions of the report
- Applicability to aircraft generations, if determined
Findings Database enables:

- Partitioning the data in various practical ways.
- Managing multiple results from different sources.
- View clear support of conclusions.
- Traceability from conclusion back to source data and vice versa.
Western Jets
June 2011

Hull Loss per million departures

Years Of Operation

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% of accidents & incidents with each factor - Last 15 years

- Adverse Weather/Ice
- Mis A/CState
- CRM
- Syetmal
- Ground manoeuvring
- Compliance
- Poor Visibility
- Fire
- EngFail

Legend:
- Gen1
- Gen2
- Gen3
- Gen4
Generation 4 “A List” *(alphabetical order)*

- Adverse Weather Management
- Automation Management
- Go-Around Management
- Manual Aircraft Control
- Monitoring, cross checking, error detection
- Non – Compliance issues
- Unstable Approach (recognition and management)
Training Priorities

- One size does not fit all (Major differences across generations)
- Priorities considered across aircraft generations
- Prioritisation validated by evidence
- Threat & Error Management = potential training scenarios
# Generation 2 vs Generation 4
## Training Priorities

<table>
<thead>
<tr>
<th>Gen 2</th>
<th>Gen 4</th>
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</thead>
<tbody>
<tr>
<td>Adverse Wx (Poor Vis)</td>
<td>Adverse Wx (Crosswind)</td>
</tr>
<tr>
<td>System malfunction</td>
<td>Compliance</td>
</tr>
<tr>
<td>Eng Failure</td>
<td>Flight-path Monitoring</td>
</tr>
<tr>
<td>Fire</td>
<td>Mismanaged Systems</td>
</tr>
<tr>
<td></td>
<td>Runway/Taxi Management</td>
</tr>
</tbody>
</table>

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8 Areas of Competency
Total systems approach

- Application of Procedures
- Communication
- Flight path management-automation
- Flight path management-manual
- Leadership & teamwork
- Problem solving & decision-making
- Situation awareness
- Workload management

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Threat and Error Management

- Threats & Errors considered across Flight Phases and specific to aircraft generation

- “Trainability” a key feature in surveys & analysis
  - “Surprise” is significant factor
  - Need to develop more effective monitoring and intervention
  - Simulator training can be much more effective
  - “In–seat” simulator training by instructors in certain exercises
Typical Recurrent EBT Module

1. Evaluation Phase
   - Assess competence
   - Identify training needs
   - Validate training system performance

2. Manoeuvres Training Phase
   - Train maneuver skills to proficiency.
   - Validate system performance and skill decay.

3. Scenario Based Training Phase
   - Manage the critical threats according to evidence
   - Improve competency to manage foreseen & unforeseen threats

Objective
- Line orientated
  - One or more occurrence
  - Assessment of one or more KSA Competency Elements

Conduct
- Sequence of deliberate actions to achieve a prescribed flight path
  - E.g. RTO, EF V1, OEI APP, OEI GA, Emer. Descent

- Line orientated flight scenarios
  - One or more predictable or unpredictable threats

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EBT Program Implementation

Baseline EBT Programme

- Off the shelf solution
- No analysis or design work by the operator required

Source: EBT Manual Appendices

Enhanced EBT Programme

- Data collection
- Aircraft type analysis
- Risk and training analysis
- Guidance development
- Program definition

Developed by the operator according the principles laid down In the EBT manual

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Implementation

- Adoption of EBT principles – Step 1 (existing rules)
- Baseline or Enhanced Programs
- Phase 1 (Recurrent)
  - Emirates (Feb 2011) – GCAA
  - Cathay Pacific (Dec 2011) - HK CAD
  - Dragonair (April 2011) – HK CAD
  - Qantas (2012) – CASA & NZCAA
  - Virgin Australia (2012) CASA
  - Air France (2012) – DGAC
  - Air Transat (TBD) - Tspt Canada
  - Qatar Airways (TBD) - GCAA
- Phase 2 (Type Rating)
  - British Airways – UK CAA

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Total System Approach

- MPL Ab-Initio Program
- Evidence Based Type Rating Program
- Pilot Pre-selection
- DE Pilot selection
- Evidence Based Recurrent Training Program
- Output system training data
- Continual program development
- Determination of remediation in training, feedback to training system
- Operations Data: FOQA; LOSA; ASR
  Global Data: EBT; LOSA; OEM events
  Validation of system improvements
Thank you for your attention

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to represent, lead and serve the airline industry