Aerospace Strategic Study Centre
“Safety Through Education and Research”

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Evidence Based Training
Evidence Based Training

Dakota DC-3 Rand Airport South Africa
Evidence Based Training

Ilyushin IL-18 Moscow
Evidence Based Training
Sud SE-210 Caravelle III Zurich July 1961
Evidence Based Training
Evidence Based Training

Continental Airlines Boeing 757-200
Evidence Based Training
Evidence Based Training

Qantas A380
Evidence Based Training
Evidence Based Training

Does one size fit all?
Are existing prescriptions evidence based?

**JAR-FCL 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
- NDB/VOR/LOC approach to MDA
- Go-Around engine-out
- Landing critical engine inoperative
The Problem

- 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 some new & quite different risks.
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
Is our training as good as it can be?

Is this a risk?
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
Data can mislead

- Risk management based on statistics
- “We should train for the statistically likely...”?
- We can anticipate 95% of events
- The BIG problem is the other 5%
Some Issues “Black Swans”

- The majority of data are reactive
- Accidents are difficult to predict
- Pilot behaviour is difficult to predict

When people and complex systems interact, there will always be an infinite number of possible outcomes
Sioux City – “Black Swan”

If every failure can be predicted – we can design them out of the system!
QF 32 A380 “Black Swan”

“The pilots were inundated with 54 computer messages alerting them of system failures or impending failures” during the two-hour airborne drama with more than 450 passengers aboard, said Capt Richard Woodward of the Australian and International Pilots Association.

Capt Woodward said

“I don't think any crew in the world would have been trained to deal with the amount of different issues this crew faced”

Evidence

- LOSA
- AQP (Advanced Qualification Program) ATQP
- Accidents & Serious Incidents
- Flight Data Monitoring (FOQA, FDA, FODA etc.)
- STEADES
Statistics are split into four generations of aircraft:

1st generation = early jet airplanes
Comet*, Caravelle*, CV880*, CV990*, B707, B720*, DC8, Trident*, VC10*
• *No longer in commercial service

2nd generation = 2nd jet generation
A300, BAC111, B727, B737-100/200, B747-1/2/3, DC9, DC10, F28, L1011, Mercure

3rd generation = glass cockpit / FMS equipped A/C
A310/A300-600, B737-300/400/500, B737-600/700/800 (NG), B757, B767, B747-400, B717, BAE 146, MD11, MD80, MD90, F70, F100

4th generation = fly-by-wire, flight envelope protected airplanes
Evidence Based Training

Hull Loss per million departures

Includes western built jets
Excludes training, flight test, war, terrorism

Hull Loss rate – June 2009

1st generation: Early jet

2nd generation: 2nd jet generation

3rd generation: Glass-cockpit Nav display FMS

4th generation: FBW Flight Envelope Protection

Years Of Operation

Evidence Based Training PACDEFF 2010
Evidence Based Training

- Repetitive and foreseeable
  - Historical Evidence
  - What we know

- Unique and unforeseeable
  - No evidence
  - What we don’t know

Reinforce application of the same skills to manage the foreseen and unforeseen
Phew... glad that’s over for another 6 months

What does the present system of recurrent training & check rides achieve?

That wonderful post – check feeling!!!

Comfort? Complacency? Safety?
Evidence Based Training

EBT Development Process

- KSA Elements
- Threats
- Risk Matrix
- Training Priorities

Guidance for evaluation & training
  - Evaluation
  - Manoeuvres
  - Event Training
  - Evaluator
  - Instructor

Data Validation

Generation Specific Training Guidance
- Jet 1\textsuperscript{st}
- Jet 2\textsuperscript{nd}
- Turboprop 2\textsuperscript{nd}
- Jet 3\textsuperscript{rd}
- Turboprop 3\textsuperscript{rd}
- Jet 4\textsuperscript{th}
EBT Recurrent Phase

- Evaluation
- Manoeuvres Proficiency Training
- Event Management Training
Regulatory Activity

Active Participation in ITQI and EBT

Ongoing discussions - proof of concept activity

Evidence Based Training  PACDEFF 2010
Proof of Concept Phase

• Adoption of EBT principles – Step 1 (existing rules)
• Airbus, Boeing, FAA, EASA, ICAO, IATA support to develop specific EBT programmes
• Data fed to validate EBT
• Airline partners
  – Emirates
  – Qantas
  – Cathay Pacific
  – Dragonair
  – British Airways
Evidence Based Training

- Improved design & reliability
- Train skills to manage real threats
- Examine the Evidence
- New Paradigm for Training
- Train to competency
Edward John Smith, 1907, Captain of the RMS Titanic

"When anyone asks me how I can best describe my experience in nearly forty years at sea, I merely say, uneventful".

"Of course there have been winter gales, and storms and fog and the like. But in all my experience, I have never been in any accident or incident of any sort worth speaking about"

"I have never been wrecked nor was I ever in any predicament that threatened to end in disaster of any sort."

DOES OUR CURRENT TRAINING ADDRESS CURRENT RISKS?
Thank You

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