Evidence-based Training
Today’s menu?
Excellence
Today’s menu

- Flight preparation
- Before take-off check
- Engine Failure at V1
- Rejected take-off
- Instrument arrival
- Engine-out approach
- Non-precision approach
- Engine-out landing
Does one-size fit all?
Masterful Job

plane intact — like it was sheared off,”
Quirin said in a telephone interview
from his home. He runs Mellowdent
Braman said he was in a restaurant
at the terminal and about a half-mile
from the runway where the plane tried

failure” just
lost an engine
spokesman:
John Ley
Federal Av
hydraulic f
primary con
control sur
engine airl
A plane’s
cannot
wings and
cases of the airplane on the wings and

developing problems over Iowa.
Core competencies

Application of Procedures
Communication
Flight path management – automation
Flight path management – manual
Knowledge
Leadership & teamwork
Problem solving & decision-making
Situation awareness
Workload management
EBT Working group
Develop a new paradigm for competency based assessment and training of airline pilots based on evidence.

Phase 1
Recurrent

Phase 2
Type Rating

1. ICAO Doc 9868 PANS-TRG
2. ICAO Doc 9995 Manual of EBT
3. EBT Implementation Guide
4. Data Report for EBT
Comparison by aircraft generation
Fatal accident rate – 4Q 2011

Sources: Ascend, Airbus

2nd generation: 2nd jet generation
3rd generation: Glass-cockpit, Nav display, FMS
4th generation: FBW, Flight Envelope Protection

Further improvement?
Evidence example

<table>
<thead>
<tr>
<th>TEM indicator: Average number per flight</th>
<th>Outstanding leadership and communication</th>
<th>Good leadership and poor communication</th>
<th>Poor leadership and communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threats</td>
<td>4.9</td>
<td>4.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Mismanaged threats</td>
<td>0.3</td>
<td>0.7</td>
<td>1.1</td>
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<tr>
<td>Errors</td>
<td>2.3</td>
<td>5.6</td>
<td>7.0</td>
</tr>
<tr>
<td>Undesired aircraft states (UAS)</td>
<td>0.4</td>
<td>1.4</td>
<td>1.8</td>
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</table>
EBT – data analyses

- Training Criticality
- Pilot Survey
- Training Data AQPI/ATQP
- Accidents/Incidents
- Flight Data

1962-2010 n > 3,000

2 reports n > 9,000

n > 1,000

n > 2,000,000

2 reports n > 9,000

Losa

IATA
**Training topics-Gen3**

**EBT Baseline Programme**

ICAO Doc 9995
Training topics - Gen4

<table>
<thead>
<tr>
<th>Gen4 Jet Training Topics</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>Adverse weather</td>
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<td>Adverse wind</td>
<td>ATC</td>
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<tr>
<td>Automation management</td>
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<td>Aircraft system malfunction</td>
<td>Engine failure</td>
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<td>Competencies non-technical (CRM)</td>
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<td>Aircraft System management</td>
<td>Fire and smoke management</td>
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<td>Compliance</td>
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<td>Approach, visibility close to minimum</td>
<td>Loss of communications</td>
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<td>Error management</td>
<td></td>
<td>Landing</td>
<td>Managing loading, fuel, performance errors</td>
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<tr>
<td>Go-Around management</td>
<td></td>
<td>Runway or taxiway condition</td>
<td>Navigation</td>
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<tr>
<td>Manual aircraft control</td>
<td></td>
<td>Surprise</td>
<td>Operations or type specific</td>
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<tr>
<td>Mismanaged aircraft state</td>
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<td>Terrain</td>
<td>Pilot incapacitation</td>
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<tr>
<td>Monitoring &amp; cross-checking</td>
<td></td>
<td>Workload, distraction, pressure</td>
<td>Traffic</td>
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<td>Unstable approach</td>
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<td>Upset recovery</td>
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<td></td>
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<td>Windshear recovery</td>
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EBT Baseline Programme
ICAO Doc 9995
Competency development

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<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
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Tasks

Competencies tool shop

66 Performance indicators
Instructors

Aggressive, abusive and intimidating
Superior, arrogant and know it all
Don’t listen and talk too much
Cannot observe objectively
Do not have an open mind
Leave student guessing
Instructors

Manage Safety
Prepare the Training Environment
Manage the Trainee
Conduct Training
Perform assessment
Perform course evaluation
Continuously improve performance

Patient and has a positive attitude
Encourages and is honest
Non-judgmental and shows empathy
Supportive, respectful and honest
Good knowledge

ICAO Doc 9868 Ch6
Example performance indicators

Example Workload Management

Is calm, relaxed, careful and not impulsive
Plans, Prepares, prioritizes and schedules tasks effectively
Manages time efficiently when carrying out tasks
Offers and accepts assistance, delegates when necessary and asks for help early
Reviews, monitors and cross-checks actions conscientiously
Ensures tasks are completed
Manages interruptions, distractions, variations and failures effectively
The pilot *managed* the workload in an exemplary manner, by *always* demonstrating *all* of the performance indicators when required, which *significantly enhanced* safety effectiveness and efficiency.
New references for EBT
Applicability 3rd May 2013
EBT – Current status

✓ ICAO Doc 9868 PANS-TRG Applicability 3rd May 2013
✓ ICAO Doc 9995 Manual of EBT Applicability 3rd May 2013
✓ IATA EBT Data Report July 2013
✓ EBT Implementation Guide June 2013
✓ FAA Endorse transition from AQP
   EASA SIB Q1 2015
   EASA Rulemaking task 2015
   CAAC CCAR 121 R4
EBT Implementation
EBT Training Phases

**Objective**
- Evaluation: Assess competence, identify training needs
- Conduct: Line Orientated Evaluation

**Manoeuvres Training**
- Train manoeuvre skills to proficiency
  - e.g. "V1 cut"
  - All engine Go-around (New)

**Scenario Based Training**
- Develop resilience, learning by exposure
- Line orientated training
EBT characteristics

Enhanced

Baseline
EBT characteristics

- Approach type clustering
- Malfunction clustering
- Surprise
- In-seat instruction
Malfunction clustering

- Immediacy
- Loss of instruments
- Complexity
- Consequence
- Degradation of control
Steps to implementation

- Instructor training
- Competencies
- Assessment & grading
- Instructor standardization
- Program development
- Mixed implementation
In a breakthrough that I would not have expected for years, the International Civil Aviation Organization (ICAO) has approved provisions for evidence-based training (EBT) in ICAO Standards and Recommended Practices…

“Credit goes to some extraordinary work done by a range of people and organizations that came together faster and better than anyone expected…”

Bill Voss (2013) President Flight Safety Foundation
Failures are less likely with modern, reliable technology …

When humans and technology interact, there are a huge number of possible outcomes …

Develop resilience to events through exposure …
Summary

- Continually examine the evidence
- Learn from the positive
- Measure performance effectively
- Learning through exposure
- Reinforce key learning

Resilience
EVIDENCE-BASED TRAINING
Foundation
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