Outcome or Process?
- The Focus in Training for Safe Operations

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Air Canada 759
The Role of Training

Session

Cannot → Can

Not sure...
Nah... → Yes...

Cannot → Can

No way! → Absolutely!
US Air 1016

"The airplane could have overcome the windshear encounter if the pitch attitude of 15 degrees nose-up had been maintained, the thrust had been set to 1.93 EPR (Engine Pressure Ratio) and the landing gear had been retracted on schedule."

(NTSB report on US Air 1016, 1995, p. 119)

It is all about … (fill in)!!!

“Pilot Error”
“CRM”
“Loss of SA”
“Startle”
“Monitoring”
Counterfactual Statements

- “They should have seen...”
- “An earlier decision would have...”
- “If the crew would have considered...”

A statement saying what a crew could have done to prevent a certain outcome

Thoughts?

Digging for "Root Cause"

Did they see?
What did they see?
Did they understand?
How did they understand it?
Did they know what to do?

Answering the “Why”?
Understanding what happened…

WLM \(\rightarrow\) SA \(\rightarrow\) DM \(\rightarrow\) Accident

PROCESS \(\rightarrow\) PROCESS \(\rightarrow\) PROCESS

Label \(\rightarrow\) Explanation

Assessment: “Lost SA”, “Lack of communication”, etc.
Competent = Know what they are doing

Expert = Also know how they are doing – while doing

Proficient = Know what they are doing and why

Training ➔ Understanding ➔ Capacity

Competent = Know what they are doing
Singapore Airlines 368

Process and Regulations

(c) The assessment should be based on the following principles:

i. only observable, repetitive behaviours are assessed,

ii. the assessment should positively reflect any CRM skills that result in enhanced safety,

iii. assessments should include behaviour which contributes to a technical failure, such technical failure being errors leading to an event which requires debriefing by the person conducting the line check,
Process and Regulations

(5) Methodology of CRM skills assessment

The assessment should be based on the following principles:

(i) only observable behaviours are assessed;

(ii) the assessment should positively reflect any CRM skills that result in enhanced safety; and

(iii) assessments should include behaviour that results in an unacceptable reduction in safety margin.

Way Forward
How to train then?

Cognitive Thinking

Artefacts Things

Cognitive Artefacts = Things to think with

(Krakauer, 2016)

Complementing and Competing Cognitive Artefacts

Complementing
Leaves a supporting structure

Competing
Leaves no supporting structure

(Krakauer, 2016)
ATC Exercise

Workload Exercise
You have changed career, grown a hipster beard and now you are the manager of a supermarket…

Call from the supermarket:

“The automatic temperature control in the cold storage room has failed, you must come and sort out the temperature manually!”
"Phases of Learning"

- Chaos
- Exploring
- Expertise

"Reactive"

"Incremental"
Emergency Descent Simulation

*** DEPRESSURISATION DIVERSION ***
DP N3826.8 E04322.2 - BONAM PLUS 080 NM
BEFORE DP - TURN RIGHT AND DIVERT DIRECT TO OIT
AFTER DP - TURN RIGHT AND DIVERT DIRECT TO UDVZ
M/S Antwerpen

Mid-Fidelity Simulation
- A project with Boeing
Focus on Process

- Develop understanding
- Apply self-monitoring

The Role of Training
Some things we may never understand…

Summary

• **Success** = Process + Outcome

• **Competence** = Applying Process

• **Proficiency** = Understanding Process

• **Expertise** = Understanding and Monitoring Process

• **Training** = Focus on Process

• **Improved Process → Safety**
Thank you!

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