Threat and Error Management Revisited

March 17th, 2016
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Outline

References and Acknowledgements
A Brief History of TEM and LOSA
Implementation of CRM
The Threat and Error Management Model
Implementation Issues
Next Steps

Defensive Flying for Pilots: An Introduction to Threat and Error Management – Ashleigh Merritt, Ph. D and James Klinect, Ph. D – The University of Texas Human Factors Research Project, The LOSA Collaborative

Threat and Error Management – Captain Dan Maurino
Special Thanks

James Klinect – The LOSA Collaborative.
Alan Bradbury – Air New Zealand
Captain Adrian Amaladoss – Singapore Airlines
Captain Chris Chan – Singapore Airlines
A Brief History of TEM

LOSA Concept – University of Texas and Delta Airlines – 1994
First TEM based LOSA – Continental Airlines – 1996
ICAO endorses LOSA – 1999
138 LOSAs across 78 Airlines
I still see it being used in every airline that I go to in varying degrees.
Some present TEM only as a training module while many others are more entrenched touching many different parts of an airline.
Some airlines like Air France, Delta, and United are huge supporters of the concepts and use it for many things from briefings to line check evaluations.
Cockpit Resource Management (CRM)

A component of an organization's safety efforts.
Needs to be driven with valid data.
Proactive information on crew behavior.
What is CRM?

Good programs do have a measurable, positive effect on crew performance, and, hence, safety.

Falls at the interface between safety departments, flight training and flight operations.

Not a one time intervention but a critical and continuing component of a safety culture.
CRM Skills

Primary line of defence against threats to safety.
Primary line of defence against Human Error.
Focus should be based on accurate data on prevailing organisational strengths and weaknesses.
The Threat and Error Management Model

Data is most valuable when they fit within a theoretical or conceptual framework.

A strong organisational understanding of the model facilitates better analysis of training data as well as incident and accident investigations.
External Threats

Expected Events

Unexpected Events / Risks

External Error

Internal Threats

CRM Behaviours

Outcomes
Threats

Expected Threats
- Terrain
- Predicted Weather
- Airport Conditions

Unexpected Weather
- ATC Pressures
- System Malfunctions
- Operational Pressures

External Error
- ATC
- Maintenance
- Dispatch
External Threats

Internal Threats

CRM Behaviours

Expected Events

Unexpected Events / Risks

External Error

Flight Crew Error

Outcomes
Flight Crew Error

Intentional noncompliance errors.
Procedural errors.
Communication errors.
Proficiency errors.
Operational decision errors.
Threat Recognition and Error Avoidance Behaviours – Capt. Dan Maurino

Hard Resources
• Terminal Collision Avoidance System (TCAS);
• Enhanced Ground Proximity Warning System (EGPWS),
• Standard operation procedures (SOPs);
• Checklists;
• Briefings;
• Training;
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• Planning Countermeasures:
  • SOP Briefing
  • Plans Stated
  • Workload Assignment
  • Contingency Management
• Execution Countermeasures:
  • Monitor Crosscheck
  • Workload Management
  • Automation Management
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• Review Countermeasures:
  • Evaluation/Modification if Plans
  • Inquiry
  • Assertiveness
External Threats

Internal Threats

CRM Behaviours

Expected Events

Unexpected Events / Risks

External Error

Flight Crew Error

Error Detection and Management Behaviours

Threat Recognition and Error Avoidance Behaviours

Outcomes

Safe Flight
Error Response

Trap
Exacerbate
Fail to Respond
Examples of Good Implementation

• TEM elements in all CRM training.
• TEM is the cornerstone of MPL training.
• Policy Guidance in Policy Manual.
• Detailed guidance in Training Manual.
• Clearer and more valuable information from LOSA.
• Clearer indication of improvements across LOSAs.
Implementation Issues

One liner policies.
Management through policy.
TEM by Rote.
Trainers not practitioners.
Do it when you need to – Checks.
No mitigation acceleration.
Best Practice

- Clear and detailed guidance in the policy manuals.
- A CRM program that uses TEM across all the traditional CRM teaching points.
- Leadership in the organisation frequently include TEM elements in the company wide communications.
Best Practice

• A training department that embraces TEM in it’s training and checking protocols.
• Evidence that pilots practice TEM throughout the flight and not just during briefings.
• Non operational airline employees also use TEM principles to manage Risk (SMS process)
Summary

• Detailed guidance out there, perhaps under used.
• Some operators have advanced implementations of TEM, others may not.
• An advanced implementation facilitates better data analysis and incident investigations.
• Lets not dumb it down, people can have an intimate understanding of TEM.
• TEM shouldn't stand alone, it’s a part of all Pilot training.
• Trainers must be convincing in their TEM.
Next Steps?

Regional Cooperation Matters. There a Cultural Pool we can take advantage of. What can IATA, ICAO, AAPA and the FSF do? Large worldwide groups have limitations. Time to take to the next level.
Thank You

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