Threat and Error Management

Tactical and Strategic Perspectives

November 2nd 1pm – 2pm

PRESENTED BY:

JR Russell
jrrussell@proactivesafetyinc.com
ProActive Safety Systems, Inc.
Threat and Error Management

• History
• Define terms
• How it works
  – Tactical
  – Strategic
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History

• Threat and Error Management (TEM) evolved from Line Operation Safety Audits (LOSAs)

• LOSAs were done with the help of University of Texas Human Factors Research Project
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Threats

• Operational events or concerns that occur outside the influence of crew members

• Increase operational complexity

• Require crew member attention to maintain safety margins
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Threats

- Threat management can be defined as how crews anticipate, identify, and respond to threats
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Threats

Threats can be anticipated or unanticipated…

- Terrain = anticipated
- Adverse Weather = anticipated
- Deferred Maintenance Item = anticipated
- System Malfunctions = unanticipated
- Medical Emergencies = unanticipated
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Errors

• Crew members’ actions or inactions which lead to deviations from expectations

• Threats come at the crew, while errors come from the crew
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Errors

• *Errors must be detected before they can be managed*

• An error that is detected and effectively managed has no adverse impact on the flight
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Undesired Aircraft States

• Defined as a position, speed, attitude, or configuration of an aircraft that:
  – Results from flight crew error, actions, or inaction: and
  – Clearly reduces safety margins

• UAS is a safety compromising state that results from ineffective error management.
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Undesired Aircraft States

• As with errors, UAS’s can be managed effectively – returning aircraft to optimally safe flight

• UAS’s can be mismanaged, leading to additional error…or worse
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How TEM works…

Let us begin with THREATS:

**Identify and Prepare**

- Threats must first be *identified*
- Crew members will *prepare* for identified threats
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The pilot monitoring...

- Early identification of threats requires effective monitoring skills
- Crew members will have the opportunity to prepare for identified threats
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Moving on to ERRORS:

Identify and Repair

• Errors must first be identified
• Crew members will repair the error once it has been identified
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What is likely to happen if an error is not identified?

• The error will lead to an UAS
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Undesired Aircraft States

• Results from *ineffective error management*
  – *Crossing a fix at 17,500 when clearance is to cross it at 17,000*
  – *Approach is unstable at 500 feet AGL*
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Undesired Aircraft States

• Must be identified in order to return to optimally safe flight
  – Good monitoring skills are vital to effectively managing UAS’s
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From a Strategic Perspective…

• The concept of TEM can be employed for your organization as a whole

• TEM principles provide organizations a proactive approach to managing safety
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*From a Strategic Perspective*…

- TEM concept is the “meat and potatoes” of your SMS…

- TEM addresses two SMS Pillars…
  - Safety Risk Management
  - Safety Assurance
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*Tactical and Strategic Similarities*

- Threats must be identified before they can be managed…
  - Tactical = the pilots (PF and PM) will identify the threats
  - Strategic = are threats to your organization identified? How?
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**Tactical and Strategic Similarities**

- Errors must be identified before they can be managed…
  - Tactical = the pilots (PF and PM) will identify the errors
  - Strategic = does your organization have a process to identify the errors that have occurred? How?
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_Tactical and Strategic Similarities_

• Results must be monitored
  – Tactical = are you back on course, etc.?  
  – Strategic = is our mitigation strategy producing the desired results?
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TEM from a strategic perspective...

- TEM addresses 2 of the 4 SMS Objectives
  - Safety Risk Management ("meat and potatoes" of SMS)
  - Safety Assurance
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*In Closing*...

- TEM is relatively new to the industry
- Proving to be an effective HF tool
- The concept is to “stay ahead of your airplane” from the tactical perspective
- The concept is to “stay ahead of your operation” from the strategic perspective
Thank you

• JR Russell
• ProActive Safety Systems, Inc
• jrrussell@proactivesafetyinc.com
• 720-201-7744