



A SIMPLE GUIDE

THREAT
ERROR
MANAGEMENT

“A superior pilot uses his superior judgement to avoid situations that would require his superior skills”

Anon

A foundation of Threat Error Management (TEM) is the acceptance that threats will occur and errors will be made. Therefore, TEM is not an attempt to eliminate threats and errors, but is directed towards the management of them.

THREATS

A threat can be regarded as a problem that can be anticipated, one that occurs unexpectedly or one that goes unnoticed.

TYPES OF THREAT

ANTICIPATED THREATS	Some threats can be anticipated since they are known to the crew. For example consequences of forecast thunderstorms can be briefed in advance as can NOTAMS warning of restrictions on airspace.
UNEXPECTED THREATS	Some threats can occur unexpectedly. For example, an in-flight aircraft malfunction such as an engine fire that happens suddenly and without warning. In this scenario the pilot must apply the relevant competencies acquired to deal with the threat.
LATENT THREATS	Some threats may not be obvious or apparent to the pilot who is immersed in their task at the time. These are called latent threats of which examples include equipment design issues or pilot fatigue.

A pilot's ability to identify and assess a potential or impending threat and to select an appropriate course of action is directly related to a sound application of their competencies. Those competencies could include Communication, Knowledge, Application of Procedures, Manual Flying Skills, Use of Automation, Problem Solving & Decision Making, Situational Awareness and Workload Management.

ERRORS

An error can be regarded as an action or inaction that leads to a deviation from the intentions and/or expectations of the pilot.

TYPES OF ERROR

AIRCRAFT HANDLING ERRORS	Errors associated with the flight path and configuration of the aircraft. For example, incorrect speed, heading, altitude etc
COMMUNICATION ERRORS	Errors associated with misinterpretation/omission of important information. For example, incorrect read-back to ATC, missed ATC calls, misunderstanding between pilot and passengers or ground crew, failure to effectively notify a recommendation/concern/flight safety issue.
PROCEDURAL ERRORS	Errors in the execution of operating procedures. - Procedural Execution: A pilot intends to follow correct procedures but executes them incorrectly, For example, incorrect switch setting, incorrect flap setting, altimeter setting, navaid misselection etc - Intentional Non Compliance: Violation or intentional deviation from operating procedures. For example performing checklists from memory, omitting weight and balance calculations etc.

MANAGEMENT OF THREATS AND ERRORS

TEM is a conceptual framework that assists with understanding the relationship between safety and human performance.

TEM should be applied by pilots daily to identify any potential threats and errors and in turn explore ways to avoid, trap or mitigate that threat or error.



THREAT MANAGEMENT

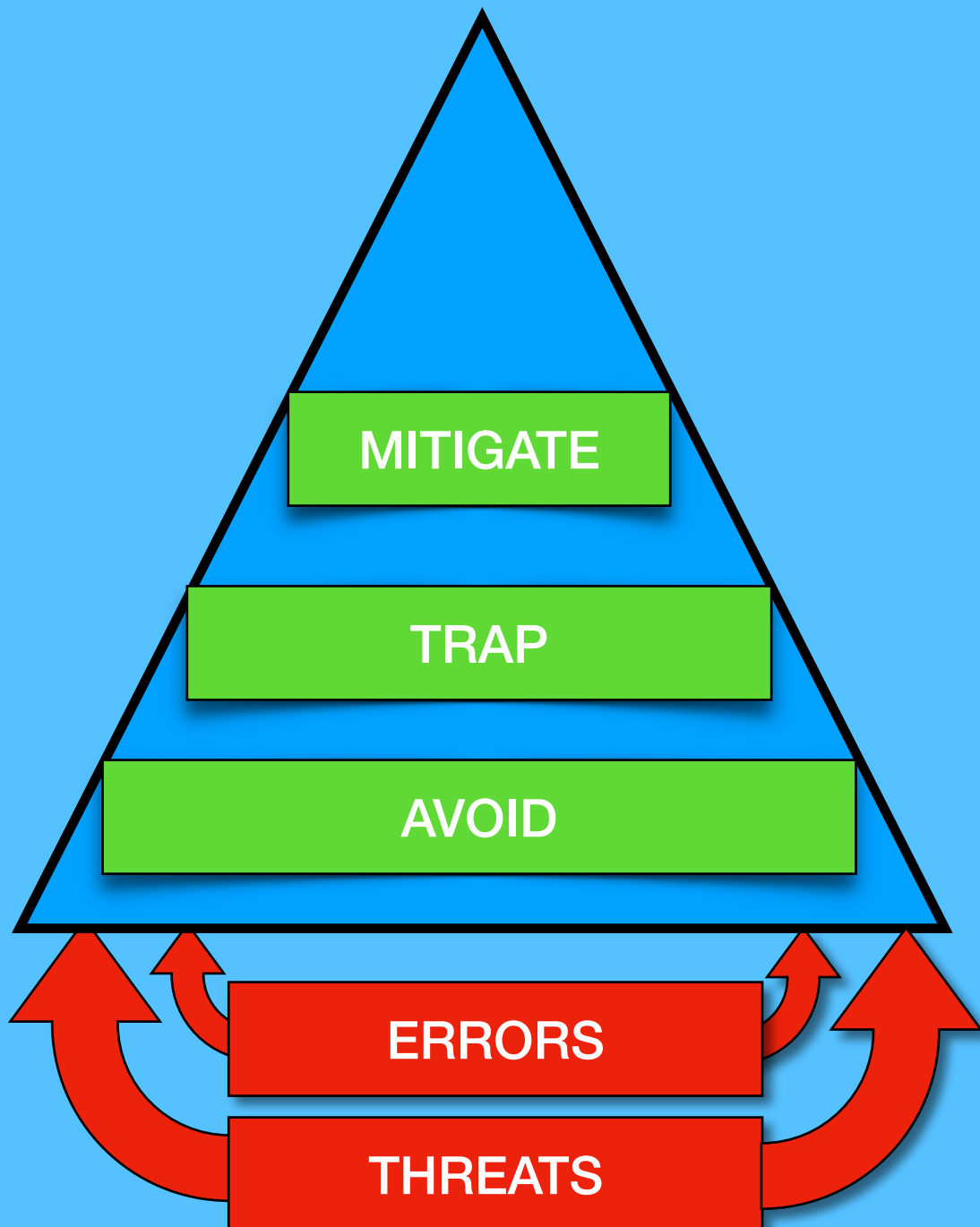
Threat management can be considered to operate at three levels:

AVOID THREATS	PRIOR PLANNING: For example check weather forecasts and actuals, check notams, check aircraft serviceability and defect history etc. <i>The aircraft defects log shows a history of a faint fuel smell in the cockpit with no fault found.</i> <i>Prior to flight, pilot checks all potential signs of any fuel leak and briefs passengers that there may be a faint smell of fuel. Throughout flight the pilot monitors fuel quantity and for abnormal indications</i>	FIRST LINE OF DEFENCE
TRAP THREATS	IDENTIFY AND MANAGE: For example, recognise a reducing fuel quantity in one tank so manage it by selecting the alternative tank. <i>The pilot is aware of a strong smell of fuel and a decrease in fuel quantity.</i> <i>As there are no visible signs of the leak, the pilot declares a PAN and diverts to a nearby airfield</i>	SECOND LINE OF DEFENCE
MITIGATE THREATS	IMMEDIATE ACTIONS TO DEAL/HANDLE: For example, experiencing an engine failure over the sea the pilot would fly the aeroplane then follow the relevant emergency ditching checklist. <i>With a strong fuel smell, smoke enters the cockpit and flames are seen emerging from the area around the engine.</i> <i>The pilot flies the aeroplane choosing somewhere to land and completes the emergency checklist. Time permitting he declares a MAYDAY</i>	THIRD LINE OF DEFENCE

ERROR MANAGEMENT

Just as threats can be mitigated at three levels, the same can be said for errors:

AVOID ERRORS	APPLY PROCEDURES AND MINIMISE POSSIBILITY Use the protective mechanisms built into procedures, calculations, checklists, briefings <i>The pilot elects to use SkyDemon to fly to another airfield.</i> <i>Prior to flight, pilot completes a manual PLOG using calculations from a slide rule with the route plotted on a chart. This is cross checked against the data produced by the tablet.</i>	FIRST LINE OF DEFENCE
TRAP ERRORS	RECOGNISE AND CORRECT BEFORE THEY BECOME CUMULATIVE OR CONSEQUENTIAL. Crosscheck, monitor, check understanding etc <i>During flight it is recognised that SkyDemon is not displaying controlled airspace as depicted on the latest chart.</i> <i>Pilot recognises that he has failed to update the database and therefore it does not reflect the new airspace. The pilot reverts to the manual plog and chart for navigation with SkyDemon as backup.</i>	SECOND LINE OF DEFENCE
MITIGATE ERRORS	REDUCE THE EFFECT OF ERRORS THAT HAVE NOT BEEN AVOIDED BY CHANGING YOUR COURSE OF ACTION <i>The tablet fails and the pilot has become uncertain of position.</i> <i>The pilot commences an orbit and unable to identify his position contacts 121.500 to obtain assistance</i>	THIRD LINE OF DEFENCE





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