PUSHING THE MARGINS

Threat & Error Management (TEM)

WHAT IS TEM?

- The Threat & Error Management framework assists in understanding, from an operational perspective, the inter-relationship between safety and human performance in dynamic and challenging operational circumstances.
- There are three basic components in the TEM framework: threats, errors and undesired (aircraft) states.

WHAT IS TEM?

- The framework proposes that threats and errors are part of everyday gliding operations that must be managed by the participants, since both threats and errors carry the potential to generate undesired states.
- Undesired states carry the potential for unsafe outcomes, so undesired state management is an essential component of the TEM framework, as important as threat and error management. It is the last opportunity to avoid an unsafe outcome and thus maintain safety margins in gliding operations.

WHAT IS TEM?

- Threats are generally defined as events or errors that occur beyond our influence, increase operational complexity, and which must be managed to maintain the margins of safety.
- Errors are generally defined as actions or inactions by the pilot that leads to deviations from organisational or operational intentions or expectations. Unmanaged and/or mis-managed errors frequently lead to undesired states. Errors in the operational context thus tend to reduce the margins of safety and increase the probability of an undesirable event.

WHAT IS TEM?

- Undesired states are generally defined as operational conditions where an unintended situation results in a reduction in margins of safety.
- Undesired states that result from ineffective threat and/or error management may lead to compromised situations and reduce margins of safety.
- They are often considered the last stage before an incident or accident.

IN A GLIDING CONTEXT…

Threats are events or errors that:

- occur outside the influence of the pilot:
  - EXTERNAL: Weather, other gliders or aircraft,
  - INTERNAL: Fatigue, complacency;
- increase the operational complexity of the flight; and
- require the pilot's attention and management if safety margins are to be maintained.

IN A GLIDING CONTEXT…

Errors are pilot actions or inactions that:

- lead to a deviation from intentions or expectations;
- reduce safety margins; and
- increase the probability of adverse operational events on the ground and during flight.

IN A GLIDING CONTEXT…

Typical errors in gliding include:

- inaccurate flight planning.
- non-standard communications.
- incorrect performance calculations (e.g. final glide).
- misapplication of flight controls.
- incorrect systems configuration.
- checklist errors.

IN A GLIDING CONTEXT…

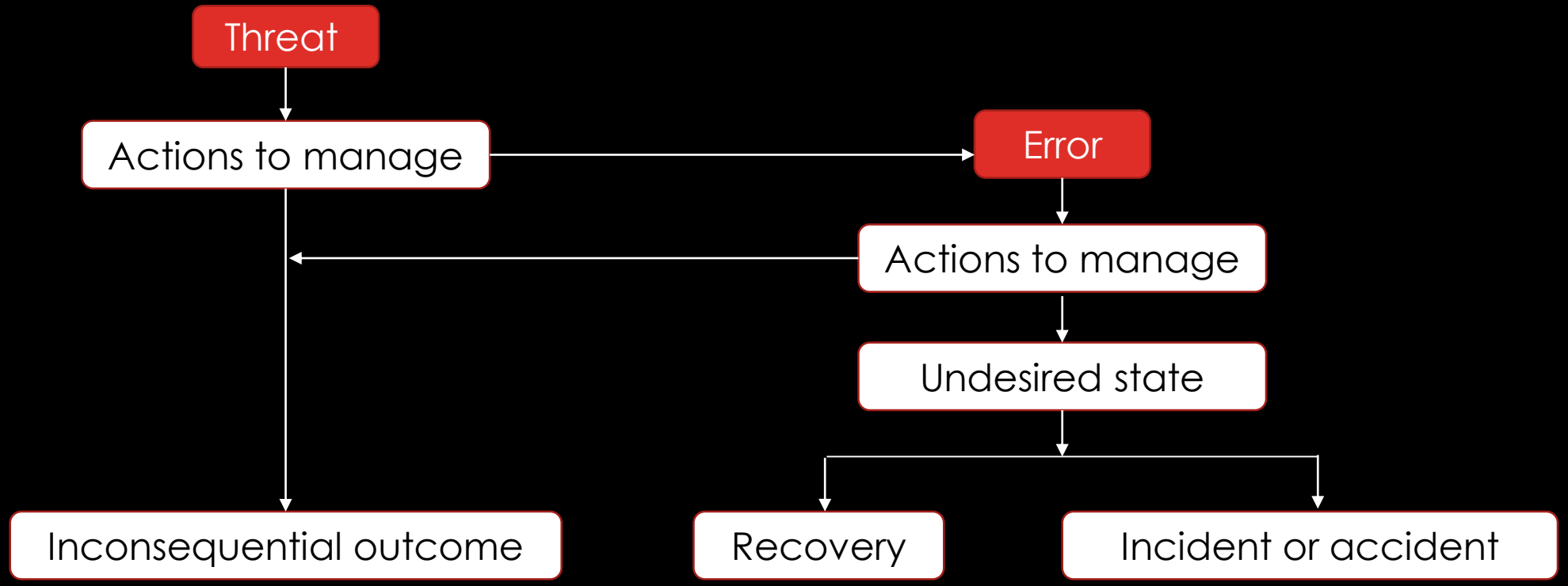
An undesired aircraft state results from:

Pilot induced aircraft position or speed deviations, misapplication of flight controls or incorrect systems configuration associated with a reduced margin of safety.

IN A GLIDING CONTEXT…

- One common false assumption is that errors and violations are limited to incidents and accidents.
- This is incorrect - errors and violations are quite common in flight operations, and many are identified and corrected by the pilot (e.g. through the use of check lists).

THREAT AND ERROR MODEL



SOME EXAMPLES…

- Cross-Country Flying
- Competitions

CROSS-COUNTRY FLYING

By its very nature, cross-country flying has a significant number of threats:

- Risk of outlanding;
- Weather changes;
- Unpredictable lift;
- Different terrain with changes in height above sea level;
- Partly unlandable country, or flat but very small paddocks;
- Navigational challenges;
- Physiological factors, such as fatigue, dehydration, hunger and hypoxia.

COMPETITION FLYING

Competition flying shares the same threats as Cross-Country Flying. However, by its very nature competition flying has a number of other threats:

- Unfamiliar airfield;
- Time pressure - on the ground (including Launch delays) and in flight;
- Flying with other gliders;
- Additional psychological factors, such as impatience, frustration, optimism bias & Overconfidence;
- Pressure to get home; and
- Final glides.

TEM STRATEGIES

It is the presence of these threats that form part of the challenge and satisfaction of cross-country and competition flying.

However do not underestimate the risks that these challenges present.

All these threats increase the likelihood of making an error that could lead to reduced safety margins, or may contribute to an incident or accident.

Most pilots can very easily recognise all threats if they think about it, but a superior pilot will implement a strategy to prevent an error resulting from any of these threats.

Self awareness and peer feedback assists in knowing your vulnerabiliy to different types of errors, decision styles and biases

TEM STRATEGIES

- Follow normal operating procedures diligently.
- Don’t succumb to time pressure.
- Always fly the glider first.
- When fatigued be more careful and conscientious.
- After interruptions, say “Where was I?”
- Always carry out a Situation Awareness review after a period of high workload.
- Set limits and stick to them – particularly with respect to outlanding decision making.
- Don’t “see what you expect to see” – look for errors.
- Listen to “that little voice” that questions what you are doing.
- Take advice from other pilots, especially experienced glider pilots.

SUMMARY

Acknowledging your vulnerability to mistakes is actually a sign of strength.

In flying, you never stop learning. Every flight, whether you have 50 hours, 500 hours, or 15,000 hours, presents us with the same threats that must be recognised and managed.

On every single flight you need to ask:

- What are my threats today?
- Am I taking unnecessary risks here?
- How will I manage and mitigate the threats I identify?

QUESTIONS?

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