

THE PROBLEM WITH THREATS AND ERRORS

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Editorial

While threats can be predicted, errors can creep up on you...

Everyone's talking about Threat and Error Management (TEM) these days but what's it all about and how do we do it? Put simply, TEM is all about thinking ahead and anticipating what might go wrong. To cut a long story short, threats (and hazards) are the adverse things that might come along and bite you on the bum as you go about the business of aviation, whilst errors (and mistakes) are the things that you yourself might do wrong for any multitude of reasons. Threats can often be predicted if thought about enough (e.g. weather, busy airspace, poor aircraft performance) but errors can creep up on you from seemingly nowhere as part of the human condition where we can all get distracted, make mistakes, miss vital information or lose capacity and situational awareness for any number of human factors reasons.

Threats are often situation-dependent in that certain things apply to certain flight regimes, but

some are universal to all elements of flying and that's why we spend so much time training ourselves to be situationally aware of the aircraft and our surroundings. Some threats are latent and unpredictable, (e.g. a worn engine component that's about to fail or an equipment design feature or fault that you might not have seen before), and some are a real and present danger that can be anticipated (e.g. that deteriorating weather forecast that we're flying towards). It's impossible to list all the threats in aviation because the list is pretty much limited only by your imagination (but if you want to look into threats and hazards further then there's a thing called 'bow-tie' analysis that safety experts often use to review safety risks in particular areas – see the CAA website link [here](#)). The key thing to do for day-to-day operations is to think about the likelihood of things that might conceivably happen to you and the aircraft and then form a contingencies plan that allows you to either deal with them or avoid them all together. In risk management theory this is framed in what's called the four Ts of **'Treat** – do something to reduce the effect of the threat'; **'Tolerate** – accept the threat is there but have a plan to deal with it if it occurs'; **'Terminate** – stop doing what you're doing or were planning to do if the threat is too great'; and **'Transfer** – get someone else to deal with the threat if you can't!'. A good old 'what if' session will reveal what's important to your flight on that day by focussing on the existential things like keeping control of the aircraft; having enough fuel to fly; having options to land somewhere safely; keeping out of controlled airspace; avoiding other aircraft; and having a contingencies plan for what you might do if there are technical issues/emergencies such as if the engine stops at any stage.

As I mentioned previously, errors are somewhat more difficult to anticipate and are influenced by a whole host of things such as personal circumstances, mood, competences, distractions, capacity, arousal levels and task saturation that all influence our decision making capabilities and proneness to making mistakes and errors. For the purists, a mistake is doing the wrong thing by accident, whilst an error is doing the wrong thing due to lack of knowledge – for most of us the distinction is academic, you still get the wrong outcome! One thing that can help in identifying where we might make mistakes/errors is to think about human factors systematically and, at CHIRP, we have started to use the 'Dirty Dozen' as a way of characterising where we might 'fail' as humans on a day-to-day basis as we go about our flying activities. An honest and ongoing appraisal of these 12 aspects can go a long way to identifying areas of our personal weakness or susceptibility to making mistakes/errors.



The Human Factors 'Dirty Dozen'

In this edition we've started to experiment with giving our thoughts on relevant Dirty Dozen aspects for each report. These are intended to provoke discussion about what to think about in similar circumstances and are not intended as a critique of the performance of those actually involved. It's a work in progress so we welcome your thoughts as we try to introduce this without being judgemental of individuals.

TEM can be equated to 'good airmanship' in many respects; both are about thinking ahead and anticipating events rather than being reactive. As it says in the very last sentence of CAA Safety Sense Leaflet 1e '[Good Airmanship](#)', "*Pilots exercising GOOD AIRMANSHIP never sit there 'doing nothing', they always think 15 to 20 miles ahead*"; we could just as easily substitute 'GOOD TEM' for 'GOOD AIRMANSHIP' in the above, both when we're airborne and when we're planning the flight. And as a final thought, TEM doesn't end when you get out of the aircraft after the flight; take some time to honestly review your flight and your performance, and feed any lessons into your TEM assessment for the next flight so that you continuously improve your TEM awareness (and tell CHIRP if you have some lessons that you'd like others to benefit from when things didn't quite go as planned/hoped!).

Steve Forward, Director Aviation

I learnt About Flying From That (ILAFFT)

OMG!

Your recent ILAFFT about weight triggered a memory from the past that forever has left me very careful about weight and performance.

I had a share in a PA28 Cherokee Archer 181, which I was told would 'carry anything'. Came a big

adventure, I flew three well-fed priests from Blackpool to Tarbes-Lourdes for their Lourdes pilgrimage. Three days later, the amazing amount of luggage that piled into the Archer hardly registered. So there I sat at the northern end of the 3000m runway, full fuel, three fat priests and me at fifteen stones(ish), waiting 5 minutes after a large commercial departed from the other end – I was far too clever to get caught in wake turbulence on that calm day.

The altitude (1300ft), temperature (25 degrees) and wind (calm) caused no thought for me; well, 3km of runway, where was the problem? Off I went, lift-off no problem, but then...absolutely dismal climb rate, any faster than 70kt and we barely climbed at all. I then became acutely aware of the Pyrenees mountains five miles ahead. Suddenly to the front of my mind, in large letters, came 'Hot, High, Wind, Weight, Stall, Spin'. I did not dare risk more than about 5 degrees of bank, terrified of a stall, and the Archer came round, oh, so slowly. I actually considered putting it down on whatever was in front rather than stall-spin. It eventually came round with about a mile to spare, and very slowly climbed to the north over flat countryside.

It turned out that the priests had all bought several cast-iron statuettes to add to what was probably an already overloaded aeroplane. And to complete my feeling of incompetence, it eventually dawned on me that I could just as easily have taken off from the other end, heading into flat terrain. But then I wouldn't have learned as much...

Dirty Dozen Human Factors

CHIRP does not conduct detailed investigations into reports and so, although we do contact those associated with an event to try to gain as much understanding of the relevant background whenever we can, we are well aware that we may not have all of the information or context that might be applicable to a particular event. As such, CHIRP does not make definitive judgements as to any Human Factors aspects that may or may not have applied, and we do not associate any such assessments to individuals' performances. However, in order to provide food for thought when considering aspects that might be pertinent in similar circumstances, we offer our thoughts on the 'Dirty Dozen' Human Factors elements that were a key part of our discussions about individual reports. Individual reports now show these thoughts at the end of the CHIRP Comment.

The current CHIRP 'Dirty Dozen' taxonomy is as in the table below

Dirty Dozen Title	Descriptor	TEM
Stress	Feeling anxious or threatened by overbearing influences	Threat
Fatigue	Extreme tiredness from prolonged activity	Threat
Pressure	Compulsion or anxiety to satisfy demands	Threat
Resources	Lack of sufficient/suitable means for the task	Threat
Distraction	Attention diverted from task by external factors	Threat
	Attention diverted from task by internal mis-prioritisation	Error
Awareness	Inputs not available	Threat
	Inputs not assimilated or sought	Error

Knowledge	Information not available	Threat
	Information not obtained or understood	Error
Communication	Information flow or misunderstanding from others	Threat
	Information flow or misunderstanding to others	Error
Teamwork	Effectiveness of others	Threat
	Effectiveness to others	Error
Assertiveness	Indecisive, diffident or incurious	Error
Complacency	Disregard for risks, over-assumption of ability or habitual behaviour	Error
Deviation	Normalisation of divergence from formal procedures or taking short-cuts	Error



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