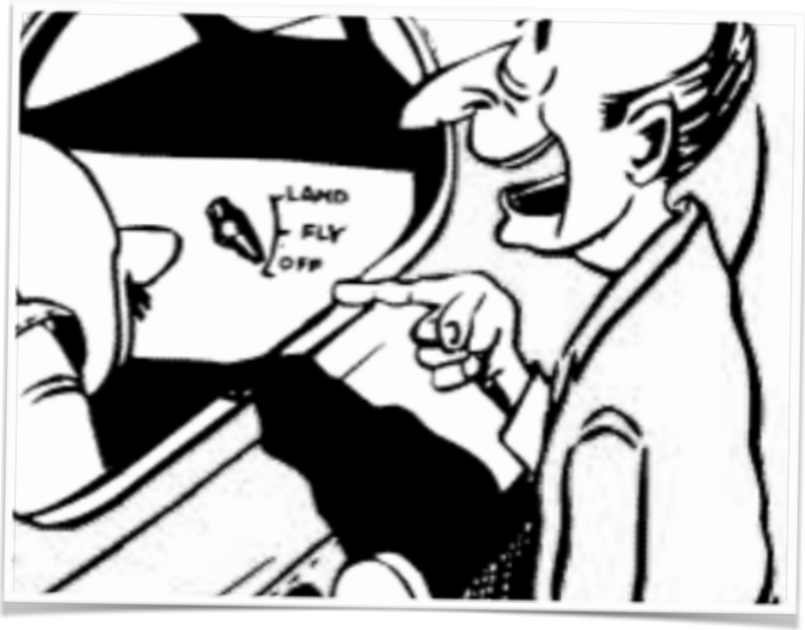
Human Fallibility and Decision Making.

By Captain Simon Lewis. BRS.



"Flight 1549 was routine and unremarkable for the first 100 seconds and then it instantly became an ultimate challenge of a lifetime for all of us. "

As pilots, due to the nature of the aircraft we operate, we are becoming more and more involved in monitoring automatic activities. Tasks involved in flying our aircraft today tend to be ordered and follow set routines and procedures. Sometimes referred to as SOP's!

Unfortunately as humans, our element is the most vulnerable, to the extent that human failing is still the significant cause of aircraft incidents.

So what can we do as pilots in such automated aircraft do to mitigate such risks?

In a changing and difficult environment, we are constantly having to review and make decisions that ultimately will decide the safe outcome of our flight. We must be prepared

to accept that decisions made at the briefing table may not now necessarily be the right ones.

On a Lufthansa A320 flight from Munich to Hamburg on the 1st March 2008, the TAF for the period 1000-1900UTC read as follows:

28025G45 9999 SCT015 BKN025 TEMPO 1019 SHRAGS BKN 008CB TEMPO 1117 29030G55KT.

The Captain had over 10,000 hrs of which 4,000 were on type. His First Officer had a total time of 579 hrs of which 327 were on type.

The Captain elected to let the First Officer carry out the landing onto runway 23 at Hamburg.

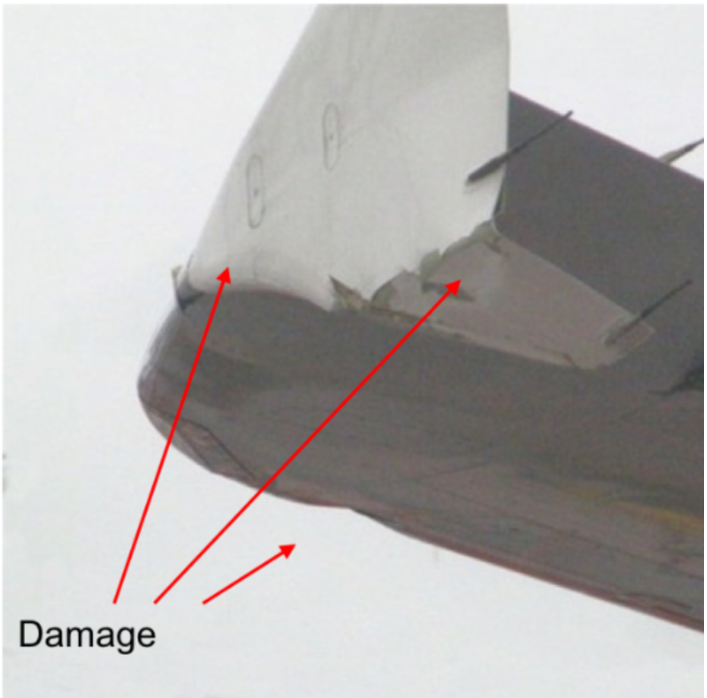
From a CRM perspective, the Captain felt that he was making use of all available resources and saw himself in the role of monitoring pilot.

There were still opportunities for the Captain to change the outcome of the flight.The wind on the approach was reported to the crew as 300/33 gusting 47kts, thus favouring runway 33, which was in turn offered by ATC.

This was declined as runway 33 was a non-precision VOR approach and the crew preferred the vertical guidance offered by the ILS of 23, even though a go-around should now have been the correct action.

The crew continued with the approach and as the first officer eliminated the crab angle with rudder, the right wing

lifted shortly before touchdown and the left wingtip struck the ground.



Diag. 12: Damage in the vicinity of the left wingtip

The Captain assumed control and an uneventful landing was then made onto runway 33.

Interestingly, from an automation view point, what made controllability even more difficult was the fact that as soon as the left main landing gear made contact with the ground, the aircraft switched from Flight Mode to Ground Mode and the maximum available aileron was reduced by 50% .

Just when the most response and controllability was needed, full side stick deflection produced only half of full travel response.

Those were two incidents where had the crew performed any form of Threat and Error Management, TEM, the problems and risks that they were faced with, might well have been mitigated.

In a recent easyJet notice to crew (NTC 102-1 10-06-2013), to enhance situation awareness and highlight operational threats, a Company NOTAM is now added to Flight Crew Briefing Packs.

As we have seen with the introduction of,TEM, threat and error management reduces the potential for pilot error. Persistently briefing specific and possibly changing threats is part of this management strategy towards maintaining a safe operation.

But what can a crew do, as in the case of the Hudson River ditching or the recent Qantas A380 engine explosion, where the crew have not had a chance to prepare or plan?

Was the successful outcome of both these incidents down to good fortune or had the crews actually prepared for such catastrophic failure?

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Following the explosion of their No.2 engine, the flight crew of the Qantas A380 flight recalled the following systems warnings on their ECAM :

• Engines No 1 and 4 operating in a degraded mode

• GREEN hydraulic system – low system pressure and low fluid level

• YELLOW hydraulic system – engine No 4 pump errors

• Failure of the alternating current (AC) electrical No 1 and 2 bus systems

• Flight controls operating in alternate law

• Wing slats inoperative

• Flight controls – ailerons partial control only

• Flight controls – reduced spoiler control

• Landing gear control and indicator warnings

• Multiple brake system messages

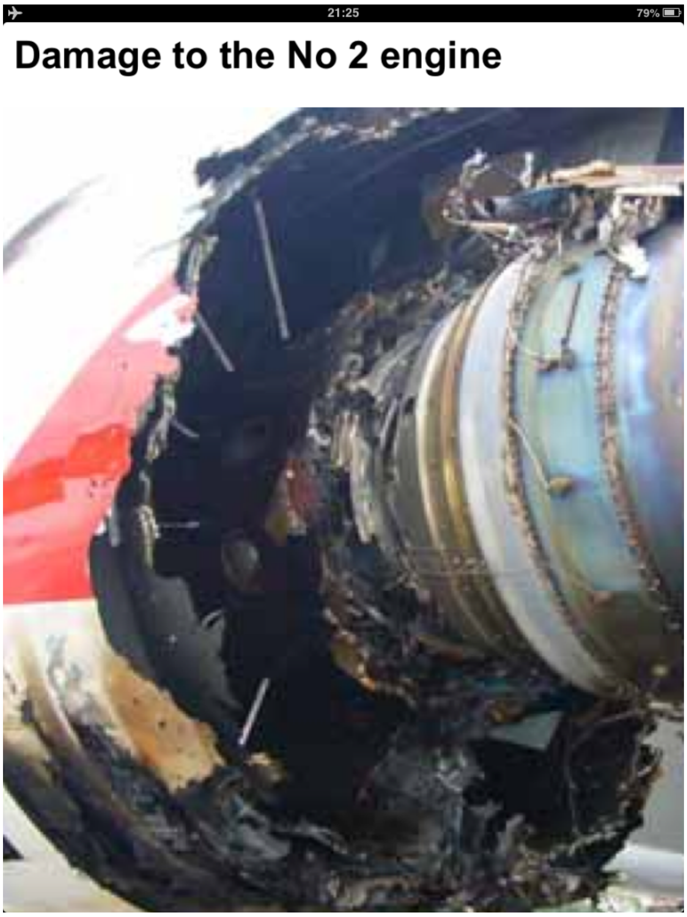
• Engine anti-ice and air data sensor messages

• Multiple fuel system messages, including a fuel jettison fault

• Centre of gravity messages

• Autothrust and autoland inoperative

Before the advent of glass cockpits and the ECAM technology, how would this array of failures been



highlighted to a crew and would it have made life easier or more difficult in this situation?

Of the 22 systems on the A380, 21 were damaged.

What did the Qantas crew when faced with this information overload do?

They levelled off immediately at 7,400, adjusted the thrust and then on realising the severity of the situation, turned back to Singapore and took up the hold.

They flew the aircraft, they navigated and they declared a "PAN" with Air Traffic Control.

The Cabin Manager attempted to communicate with the flight deck, including trying the EMERGENCY contact selection on the cabin interphone system, activating the warning horn in the flight deck. However, that selection had no associated ECAM message and the flight crew stated that they associated the emergency contact warning horn with the continuously-sounding warnings from the ECAM system and so cancelled the horn!

Fortunately the airframe then stopped shaking and the Cabin Manager realised he was going to have to manage the passengers without any initial communication from the flight deck.

The first communication with the cabin crew came when the second officer was sent back to the cabin to assess the damage and was able to update the rest of the crew.

After spending over an hour in the hold, working through over one hundred ECAM actions and checklist, the aircraft was finally ready for an approach.

Fortunately, unlike in the Hudson River incident, the crew had the time and the resources to work through all that was being thrown at them and come up with solutions.

Even so and with 3 Captains and 2 Co-Pilots, under intense pressure, they made mistakes. Mistakes that as a group, were picked up and corrected.

For instance, when calculating the approach speed required, they arrived at a speed of 145 knots.(3)

However, this was a speed with functioning slats and they did not have any slats. They were situationally aware to realise this was too slow and recalculated the correct speed, which was 168 knots and gave them a stop margin of 100 metres. They would have stalled flying at 145 knots.

Even with only half of their spoilers, no leading edge slats, on the left wing, and brakes reduced by 28%, a safe landing was made back into Singapore.

As a profession we have endured a lot of criticism over the changing nature of the skill sets required and our inability to cope with an emergency situation.

However, a number of high profile incidents have shown and highlighted some exceptional technical skills and non technical skills.

Maybe we aren't doing such a bad job after all?

Remember;

"Intelligence is not a prerequisite for safe flying but an acceptance of human fallibility is."

(1) Captain Chesley Sullenberger. US Airways.

(2) http://www.atsb.gov.au/publications/investigation_reports/2010/aair/ao-2010-089.aspx

(3) QF32 - Richard De Crespigny.

(4) Fly by Wire - William Langewiesche.