Case Study - The garden party

By Bengt Collin, EUROCONTROL

One hour after the time announced in the invitation, late visitors kept dropping in. Irritating! Why couldn't people show some respect? He was a well respected man in his best years, known for his strict principles. He was dressed in rather formal leisure clothing. Although the weather had stayed warm and dry, the sky was as blue as the water in his swimming pool. He would never dream of wearing shorts, shorts are for boy scouts, not real men he thought, overlooking his large mansion with a stiff upper lip.

Alberto, his butler, barbecued. After some mild persuading he agreed to use the new barbecue sauce found in a glossy magazine, olive oil, garlic, soy sauce and black pepper, all topped with a large glass of Jack Daniels. Why should Alberto always have a different opinion? "It is unnecessary to use that barbecue sauce, it's too expensive", Alberto moaned before giving up. The visitors seemed happy, he especially noted Anne, dear old Anne. Instead of bringing her usual boyfriend, she had brought a compact dog named Davidic. For the moment Davidic was lying on the grass enjoying life, eating a Chorizo sausage. At least the dog liked the new barbeque sauce! "He understands everything I say to him", Anne explained. "He even understands French". She was abruptly interrupted by the noise from a big aircraft passing straight over them on a very low altitude. They are not allowed to fly over here, it is forbidden. He would call the airport immediately and complain!

The airline had a restricted budget, not that this was unusual, a lot of companies were suffering this way. Most of the aircraft were legacy types, not necessarily unsafe, just old. He did not really think much about it, he had been flying for the company for so long that he'd got used to the minor snags that were more of a routine than surprises out of the blue. Finally, following a delay caused by a problem with closing one of the cargo doors, they got airborne. They made a right turn northbound. "Gear up" he called, but they could still hear noise from outside. The gear is still down, his First Officer said, even though it was very obvious. The Captain started picking up the emergency abnormal check list at the same time

as he was talking to his First Officer. They had never trained for situations like this in the simulator; it was always landing aids out of service, TCAS, engine failures, but never this.

"Recycle the gear". This did not help, the gear remained down, by how much they did not know. He could read his First Officer's mind like an open book. "No, we do not need to return, we can continue with reduced speed and at a lower altitude. Tell control we request flight level one one zero initially and with lower speed. We don't want to end up back at an airport with no engineering support". The First Officer received the clearance. They'd better contact their company about the now-necessary transit stop, it was obvious they couldn't reach the final destination without refuelling.

He was an experienced controller; after passing his final tests ten years ago, he'd always thoroughly enjoyed his job. Now it was even better after he'd met Sandra, another controller, a dark-eyed beauty with an impressive intellect. He spent the first two hours of his shift in the radar simulator; it was years since they'd had a full day's periodic training. The shortage of controllers was more or less permanent and the increase in traffic didn't make things better either. This year they were being trained for radar failure. Yet again, he thought; it had been the same last year too. Might as well be trained in the kitchen, one of his colleagues commented; if you have no radar picture, why not sit somewhere comfortable with a nice cup of coffee and a sandwich, after all it's only a simulation, isn't it?

The pilot of the diverting aircraft called him, requesting an immediate turn and direct route to his new destination, "Control E-line 123 fuel at minima".

He was working the South sector. The Planner informed him of a revision. One of the aircraft heading northbound, instead of passing at high altitude, would be diverting to an airport in his FIR. It would enter at a much lower flight level than normal. His work went on like it always did while he kept this information stored somewhere deep inside his brain. Suddenly he started thinking about the time when during a holiday he'd visited a bar in beautiful Leyton, a picturesque part of east London. A tall, enormous scary looking guy had come up to the bar on his right-hand side, and ordered a small bottle of Babycham (a light sparkling perry). Why was he thinking about things like that? Better not mention this to Sandra. The pilot of the diverting aircraft called him, requesting an immediate turn and direct route to his new destination, "Control E-line 123 fuel at minima". Although the aircraft was still in the airspace of the adjacent FIR, he approved the request straight away. Long afterwards he thought about why he had done that; nothing had forced him, nothing had indicated that something was seriously wrong. He certainly wasn't allowed to do so without prior coordination, after all the aircraft wasn't in his own airspace. He had just felt he should approve the direct route, without really knowing why. Perhaps it was his old training to react to trigger words, who knows? When he heard the word fuel, he definitely reacted. Today students were instructed to ask whether or not the pilots had declared an emergency, strict and time consuming he thought.

The First Officer calculated the fuel using the FMS; "we'll be below minima if we continue", he quietly informed his Captain. "We're actually already below the fuel level where the book says we should divert to the nearest suitable airport. But company ops has chosen this for us, they initially thought we could continue even further to one

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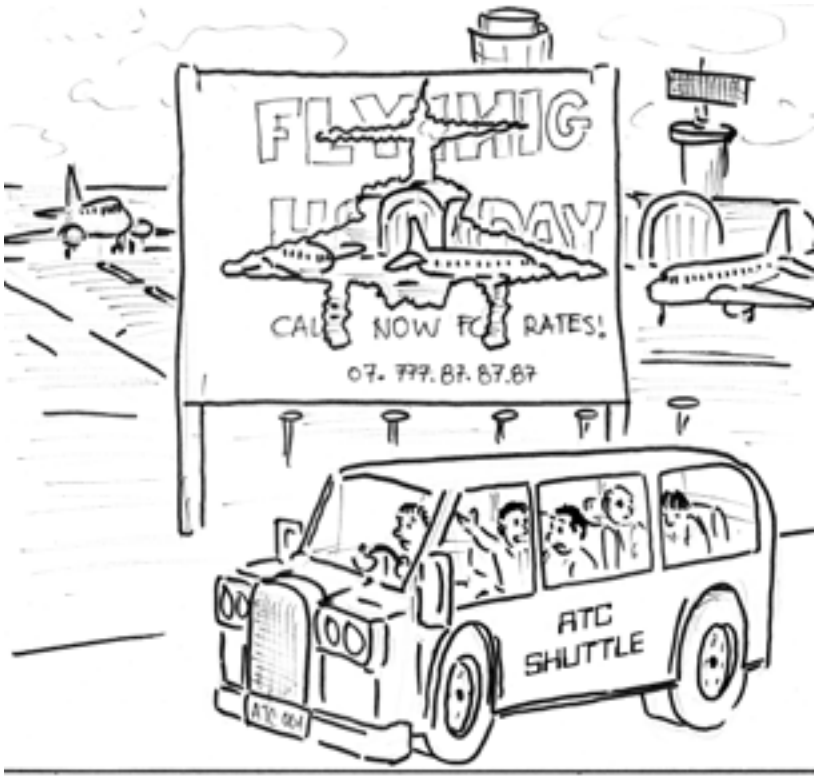
Case Study
The garden party (cont'd)

of our standard airports", the Captain replied. They were handed over to the next frequency, this time in the FIR of the destination airport and the exchange stopped. "Ask for a direct route", the Captain instructed the First Officer. "We could always have Bollibompa airport as a final alternate". They received the direct route immediately; on box two, the Captain called on the approach frequency for the airport and, in an extremely modest and humble way, advised that if a direct approach to the closest runway wasn't possible, they would have to divert to Bollibompa. Six minutes later the Fuel Low Level warning light came on. They'd never seen that warning before; of course they understood what this was – it was a far from ideal situation. "How could we have used this much fuel?" the captain complained, whilst still maintaining a calm and relaxed demeanour, "you checked the fuel consumption in the FMS didn't you?" They still had more than 100 nm to fly.

The approach controller got the aircraft on his frequency. It was heading 340° towards a short final for runway 03; he needed to turn the flight slightly to the left to avoid a Restricted Area just south of the airport. This area had been introduced because of political reasons some years ago, at least that was what the rumours said. The wealthy house owners living in this exclusive area didn't like to be disturbed. How, he always wondered, had they missed noticing that there was an airport close by? After all, the airport had been there long before they'd started building their houses. He instructed the aircraft to turn 30 degrees left, nothing happened. "Control E-line 123 we'd like to continue on present track" one of the pilots replied. What should he say, he had to turn. "E-line 123 turn left heading 310 now", he could still



That was a hell of a direct!

avoid the restricted area. "We cannot turn E-line 123". Cannot turn, why can't he turn? "We are short of fuel E-line 123". What a shock, "OK copied, continue on present heading". The Planner alerted the Supervisor.

"I still don't understand why the FMS gave us inaccurate information". The Captain started talking to himself more than to his First Officer; "we should make it anyhow, we've only got 25 miles to go". The First Officer descended the aircraft relatively slowly. "I can see the runway", the Captain pointed straight ahead, "should be OK. Is the cabin ready?"

"Cleared visual approach runway 03, contact tower 119,4". He looked at the radar screen; the aircraft was passing straight through the Restricted Area.

"Thank you, cleared to land runway 03, E-line 123". They turned final 2 miles from touch down, wheels down, all indications normal; one mile, the runway was waiting in front of them, a warm, happy welcoming runway. Touch down! Finally touch down – the engines stopped.

There were five persons sitting together in the warm meeting room – the Chairman of the investigation commission, himself, the area controller, a person from their union and a secretary.

"We have found two annoying discrepancies", the Chairman, dressed in a grey suit, a blue shirt and a green tie with a red big fish motif on it, spoke in a measured and formal way. He had a military bearing and exuded an air of 'Old Spice'.

"First we noticed", the Chairman continued, "that the aircraft was, without any coordination at all, allowed to proceed directly to the revised destination. Secondly, and this I find even more disturbing and annoying", he talked straight out into the room, keeping his eyes closed; "it was cleared to cross the Restricted Area south of the airport. I have to inform you that we have received some serious complaints which as I speak are reverberating around the top floor, so you'd better be prepared to face the consequences of your actions".

Case Study Comment 1 by Captain Ed Pooley

You have seen that this incident was a near disaster – how near we are not told but it doesn't matter. The analysis of the circumstances up to the safe landing is the same as if the aircraft had run out of fuel and crashed on short final.

So this was a 'Serious Incident' as defined by ICAO Annex 13 and in real life would have generated an independent inquiry conducted by the State Accident Investigation Agency. Of course when this happens, if the involved parties have any corporate sense, they carry out their own internal review and seek to implement any necessary corrective actions well before the Official Investigation Report is published. This allows their 'Safety Action' to be noted in the Official Report and the issue of any Safety Recommendations directed specifically at the agency involved to be avoided.

Here we are focussed on aspects of the internal response of the ANSP[1] and it's not a pretty sight! It should be clear to all that the attitude we see displayed by the 'Chairman' of this investigation represents an appalling way of dealing with the aftermath for the front liner who had to deal with it. No balance here! No context for the performance of the controller appears to have been considered. No just culture in sight…..No mention of the connection between what professionals do and the effectiveness of the training they are provided with. And on what documented basis was the penetrated Restricted Area established?

This knowledge-based decision-making got lost en route and only returned as things began to get critical and there was no longer any alternative plan left.

What seems to have happened from the flight crew perspective is a bad case of confirmation bias[2]. A perfectly reasonable decision by the pilot in command to press on in the direction of the original destination after the gear failed to lock up after take off then degenerates into an attempt to reach the 'ideal' en route diversion. The key violation is the failure to divert to an alternative airport when the fuel on board reached the level where a direct track to the nearest suitable airport was mandated by operator procedures. Once a direct route is approved, confidence that the doubtful will be possible is restored and later the controller is effectively obliged to approve penetration of the Restricted Area. The remark about the crew not being trained to deal with the precise 'gear not locked up' scenario is, by the way, not a factor with much bearing on the development of the event. The use of both the FMS and raw data manually checked to monitor fuel use when in an abnormal gear down flight condition is about professionalism in decision-making and flight management based upon basic system and aircraft knowledge. This knowledge-based decision-making got lost en route and only returned as things began to get critical and there was no longer any alternative plan left.

The featured controller is 'old school' – his career began before the days of institutional risk management and the panoply of procedures which have been universally introduced to allow safety standards in ATM to be

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1- Since a Regulator is not supposed to prejudice an Independent State Investigation by carrying out one of their own in parallel and then discussing their findings with regulated personnel, I am assuming that the reference to "CAA" here is in respect of their role as ANSP.

2- The state of mind in which you see what you expect to see rather than what is actually happening. In this case, a plan which had originally seemed practicable has subsequently become objectively risky to continue with, but this risk is countered by an unconscious interpretation of the current evidence as continuing to favour retention of the now-flawed plan.

Case Study Comment 1 (cont'd)

improved despite the concomitant growth in traffic. He certainly reacted inappropriately in granting the direct routing before the aircraft entered his airspace without coordination. He also ignores the absence of any declaration of urgency (PAN, PAN) or emergency (MAYDAY) from the aircraft in support of the successive requests for expeditious routing, and responds without the normal question on fuel endurance which would follow a PAN or MAYDAY declared because of concern about fuel endurance.

The Aircraft Operator doesn't come out of this saga too well either. However Operations Control seeks to assist their en route pilots in command by telling them what would be commercially helpful, this should not be able to be perceived as anything more than assistance given without knowledge of all the pertinent facts or their short-term forward projection.

But of course, the root cause of this incident is solely the pilot in command, who pressed on in the face of compelling evidence that it was foolhardy to do so. As often, not much notice was taken of the First Officer whose contributions were typically deferential – the oft-vaunted theory that a Co Pilot can readily influence the thinking of a pilot in command who has both much greater experience and individually carries all the responsibility for the safe and expeditious operation of the flight is a lot more complex than is often admitted.

Anyway, because the theme of this HindSight is how controllers can and should respond to aircraft in actual or potential difficulty, I'm going to focus on the actions of the featured area controller. Did they help avert an accident? Or did they encourage a dysfunctional flight crew to press on towards a potentially hazardous outcome? Actually, I'd say the controller's initial response was counterproductive to safety. Had he sought both a declaration of urgency or emergency and some more information from the crew before giving a direct routing, this might, just might, have jolted the crew into realising that what they were attempting was indeed a foolhardy violation. But of course nobody (except of course the Chairman of the ANSP Investigation!) would argue with the help given by the controller once there was no alternative, including allowing routing through the Restricted Area given that no actual hazard to anybody was created by allowing this….

A RECOMMENDATION

As I'm only allowed one, I'll go for a comprehensive and independently conducted review of how the ANSP conducts internal incident investigations predicated on a guarantee that the undoubted recommendations for safety improvement which it would generate would be adopted. But I'd also suggest the instant removal from the ANSP payroll in any capacity of the Investigation Chairman on the grounds that it's probably unrealistic to expect him to be capable of genuine attitudinal reform.

Case Study Comment 2
by Dragan Milanovski

A big plane at low altitude passing straight over the garden party spiced up the seemingly dull event. I also find it very difficult to understand why someone would complain about an isolated case, probably interesting for most of the people at the party, and how a barbecue sauce can be too expensive?

The fortunate outcome of this incident might lead us to believe that the actions taken by the two controllers were appropriate to the situation and that by exercising their best judgment and expertise they significantly contributed to it. Furthermore, the controllers had to face consequences for infringing "stupid" rules during the process, just because people with very little or no understanding of the job had powerful political influence. Typical… or maybe not.

Let's look at whether the controllers from the story could/should have taken a different course of action and rule out pure luck in combination with favourable weather conditions. More importantly, let's try to find out why they acted as they did. Was it just their personal negligence, ignorance, or perhaps something else?

The area controller in charge of the South sector received a revision for a flight about to enter at a much lower flight level than expected and divert to an airport in his FIR. When the aircraft called he reacted instinctively and approved the direct routing as requested without prior coordination. The argument that he had no time (which at the end proved to be crucial), and that he had to do it, is not entirely correct. Valuable time, from receiving the revision until the initial call, was not used effectively to understand the situation, evaluate different options and provide information later on. He could have asked the transferring controller for the reason for the diversion. An aircraft experiencing a landing gear problem (as described in the story) is likely to be short of fuel and ask for direct routing.

Was it just their personal negligence, ignorance, or perhaps something else?

With this in mind, asking the previous controller for a release for turn makes a lot of sense. Information about the suitable airports in the vicinity, which could have been essential to pilots for decision-making, was not provided (although it wasn't essential in this case). More importantly, prior coordination with the approach controller should have taken place well in advance and the pilots should have been informed about the restricted area and the expected distance to fly to touchdown.

The last opportunity was missed by the approach controller when he received an early call from the Captain. He also did not inform the pilots about the restricted area and the 30 degree-turn that the aircraft is expected to make later on to avoid it. After this the scene was pretty much set, and there were no other options. The story suggests that if this information had been available to the pilots, they would have decided to divert to another airport (Bollibompa) where the risk of running out of fuel before landing would have been a lot lower than in this case.

I have to rule out the stress/pressure of having to deal with an unusual/emergency situation, especially for the area controller, as well as inexperience in the job. A bit of ignorance from the approach controller probably played a very small contributing role in the event (restricted area established due to political reasons – according to his understanding), as well as a bit of negligence from the area controller (allowing his mind to wander to

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thoughts of his new girlfriend while in position). However, we have to look "at the top floor" for the main reason and possible consequences.

The situation required immediate reactions, but as explained above, the reason why the controllers had to rely on their instincts is probably lack of appropriate knowledge and skills. It appears that it has been several years since they received a full day of periodic refresher training. In addition, the controllers did not think the two hours they had was relevant content-wise or effective.

The ANSP from the story has to ensure that periodic refresher training, as appropriate and as effective as possible, is delivered to controllers unless… the managers prefer to deal with a military bearing and an "Old Spice" odour.

A RECOMMENDATION

Despite the story being fictitious, the situation with the refresher training is definitely not. We can learn a valuable lesson and understand that providing periodic refresher training is about a lot more than just ticking boxes to meet regulatory requirements (if any). The training has to ensure that the controllers possess enough knowledge and skills to deal with unusual/emergency situations whenever they happen. I understand that this is a big challenge, not just from a resources point of view, but also from a training design aspect. However, economic crises, tight performance targets and lack of staff cannot be used as an excuse not to deliver refresher training at a frequency and in an amount which are considered appropriate to the job and with relevant content.

Case Study Comment 3 by Eileen Senger

Communication seems to be good between the pilots but not between the flight crew and company ops...

Ops make it clear what they want and there does not seem to be any attempt to overrule that decision. Although it should always be the Captain who has the last word when it comes to the safety of his plane. Still, the two pilots do not even discuss whether or not they should press ops for a diversion to the nearest suitable airport, as probably recommended in their checklist. They just accept the decision that is made for them and try to improve it by asking for a direct with ATC. But, just like Ops, they underestimate the gravity of the situation. A contributing factor may be that such an abnormal situation was never trained for in the simulator. Simulator time is valuable and expensive but it should be possible as well to have input from the pilots as to what emergencies and situations they want to train for rather than always just sticking to the required minimum simulator time per person. Wishful thinking in difficult economic times like these, especially for aircraft operators, I know, but again a lost chance to learn and another missed opportunity for communication.

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The South Sector controller is informed of an imminent diversion but not of the reason why. He does not ask. So when the aircraft concerned finally calls in and surprises him with the reason, "fuel at minima", precious time has already been lost. Had the fuel status been known to the controllers earlier, they could have already begun coordination to shorten the track and save time – for both themselves and the aircraft. When the pilots informed the previous ATC unit of their diversion they must have sounded relaxed. Maybe they mitigated their situation a little bit ("small technical problem" maybe?). Enough to make that ATC unit feel that there was no need to treat them as a priority. Did they ask for the reason for the diversion? They should have! Did they get an honest reply or just the usual "company instruction" answer? Did they pass the revision with the reason or without it? Or did the planner just not inform his radar controller? There are so many places where valuable information can get lost!

Apparently, the reason for the diversion was not passed on from the South Sector to Approach. So, for the second time, the pilots are talking to a controller who has no clue to the real situation they are in. Then again, there is room for improvement in their communication to the approach controller as well. The pilot is described as calling in an extremely modest and humble voice for the direct routing rather than giving the facts and communicating urgency. Later on, when the controller instructs them to turn to avoid the

restricted area, at first the pilots do not reply and then first try to talk their way out of complying with the instruction without giving any information before eventually revealing the real reason. Once they have done so, the controller immediately helps and does all he can to get them on the ground as swiftly as possible. All he can do is react. Only then is the supervisor alerted.

Managers and supervisors should be there first and foremost to protect their staff, provided they acted with good intentions and followed their best judgment.

It is a pity to see that the "top floor" of the ATC provider does not seem to be interested in the story the people who were working that particular aircraft have to tell. On the basis of only a few facts, the staff are threatened and intimidated. There is one-way communication – top down: "You acted wrongly! Prepare for the consequences!" With such behaviour there will never be open and honest communication about what was going on and what could be learnt from it. Managers and supervisors should be there first and foremost to protect their staff, provided they acted with good intentions and followed their best judgment. There are always going to be situations where you have to act first and ask questions later. The South Sector controller later remembers his instant reaction to the trigger words "fuel at minima" instead of thinking coolly about the situation and getting the necessary release first. But had he not done so, the landing of the aircraft would have been delayed even more and aggravated the circumstances which were already underestimated by everybody involved. Only when the Fuel Low Level warning light came on was the gravity of the situation clear. So in the end his training led him to do the right thing to help the aircraft. The approach controller could only react as the real situation revealed itself bit by bit. He is the last one in the chain and he is the one who has to suffer from the accusations made by the Investigation Commission. The aircraft crew might have backed him, but I doubt that there will ever be any exchange about the incident between the pilots and the controller. As long as the aircraft landed safely there is nothing to talk about – that is how many people think. Exchanging experiences usually implies admitting one's mistakes or revealing operational procedures you would rather keep inside the company or both, so it hardly ever happens.

And finally: The neighbours of the airport have to understand that there are certain situations in aviation where noise abatement is no longer important. Maybe they could have been informed that the ATC provider would stick to the noise abatement procedures in normal operations. But an aircraft low on fuel is no longer "normal operations" and in any case, I'm sure that, at the end of the day, the neighbours would prefer a safely landed aircraft to one which crashed in the vicinity but on the noise abatement track. They should be able to complain and be told what was going on, perhaps via a hotline, but if a reasonable explanation is then given, they should accept it. If such events were to happen every week of course, it would be a different story.

A RECOMMENDATION

Communicate! Talk and ask. Ask again until you have understood fully. Involve other people, colleagues, supervisors, hear their opinion and get their help. Then in the end no one is confronted with an unpleasant surprise.

Case Study Comment 4 by Sami Laine

This story is a great example of how the aviation system is formed and affected by various expectations from various domains.

The aviation playground is open, e.g. as regards the political, economic and operational perspectives, which are spiced up with unexpected events. The framework is a combination of multi-level and multi-dimensional decision-making processes. The high-end players are added to the playground to comply with the social, technical and economic constraints. It would be possible to consider many perspectives in this story. In my comment I will focus on a single safety issue, which could have had a positive impact on the event.

We know that aviation is a complex system. When the unusual happens, it is typical that things start to pile up. In many incidents and accidents it is possible to see – especially in hindsight – a continuous chain of events. In the story here, the situation was similar. Dominos were falling down and the situation was moving fast towards the conclusion. Or was it?

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Seen more closely, it seems that the events described were often independent and that the causal connection was rather loose for the actors involved. Also the possibility of different people controlling the factors governing the actual situation was not obvious. The captain failed to respond rationally to the reducing fuel endurance, the controller was not aware of how bad the situation was in the aircraft and his attempt to avoid the restricted area was rejected by the pilots.

It can be said that the situation could have been clearer for everyone. The outcome was fortunate – a catastrophe like the New York accident in 1990 where an aircraft burned all its fuel without declaring an emergency was avoided.

Communication plays an essential role in every abnormal situation. In an American study the most prominent communication problem in accident cases was recognised as communication never starting. Another big issue was unclear or incomplete communication.

According to EU OPS, the pilot in command is allowed to deviate from the rules and regulations if necessary for safety reasons in an emergency. That gives a lot of freedom to the Captain, but what exactly is an emergency? Was the plane in the story in an emergency situation, or was the situation merely escalating towards an emergency?

By declaring an emergency, all the players are on the same wavelength. After a MAYDAY call there should not be any doubts that the flight concerned may not be able to comply with all clearances, restrictions or limitations. Without a declaration of emergency, the controller needed to help the aircraft based on his gut-feeling and professional assessment. At the end of the day it may be that his "mistake" averted a catastrophe.

It may be that pilots are not very keen to declare an emergency if it seems that the situation can be managed without it. Use of a MAYDAY call may be avoided even it would clarify many things in the handling of abnormal situations.

Avoiding the use of MAYDAY may have deep roots in aviation history. It is a known fact that culture is not changed overnight – sometimes not in decades. The clear declaration of an emergency is not just a pilot-ATC communication issue. It is also an important CRM issue inside the cockpit. Efficient communication is essential for the modern aviation system and appropriate use of emergency communications should be a top priority in the industry-wide safety debate.

A RECOMMENDATION

The aviation community should initiate cultural discussion of abnormal and emergency communications and the use of MAYDAY and other distress or emergency communications.