HindSight 09

The ability or opportunity to understand and judge an event or experience after it has occured

EUROCONTROL

Are You responsible for safety?

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Summer 2009

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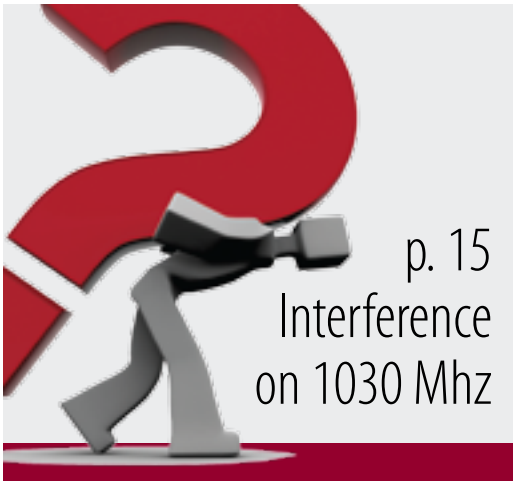

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The success of this publication depends very much on you.
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A letter to aviation prosecutors

"This is my letter to the world, That never wrote to me"
Emily Dickinson

Tzvetomir Blajev
Editor in Chief of Hindsight
Fellow of the Flight Safety Foundation

I am writing to prosecutors who get involved or may become involved in cases of human error in aviation.

I respect your difficult duty to seek justice and protect society. I understand that your duty is to seek justice, not merely to convict. That it is crucial for you to protect the innocent as well as to identify the guilty, to respect the rights of the accused as well as to recognise the interests of the public.

As you are a quintessential public-interest lawyer, I would like to tell you how we learn and improve aviation safety for the same public, the same society you protect.

> The observer cannot be external or neutral but becomes a part of the observed system.

Accidents in aviation are fortunately rare, so rare that sometimes we cannot learn sufficiently only from them. To learn, we need also to ask pilots, controllers, technicians – operational people often trying to balance multiple goals under time pressure – to tell us their stories, to pass on their insights, their experiences – what went wrong and what went right, what may be worth changing and what should not be touched, where the gains are and where, if we act, we will produce more side effects than benefits. When we punish these people, these valuable intelligence officers working on the front line, for their honest mistakes, we cut our information sources, we obstruct our capability to improve safety, we deny our society, you and I, our children... an opportunity for safer flights. This effect is also extended to the wider community of colleagues when one of them is 'victimized'. By doing this we put a bomb in the works of our delicate improvement machine. Ironically, in this case, one can learn how not to make bombs from someone who never made one.

Werner Heisenberg was tasked with making an atom bomb, a task he never accomplished, but he is also known for his uncertainty principle. The uncertainty principle which Heisenberg formulated for quantum physics states that one of the properties of a microscopic particle is that it is impossible to know both its exact position and its exact velocity at the same time. In other words, if you want to know more about the world, the act of studying it already changes the world and it is no longer the world you think you know. The observer cannot be external or neutral but becomes a part of the observed system.

Your involvement with aviation systems also never leaves them the same as they were before. Aviation safety will be changed because of your effect on it. A look behind you is not what you have seen on your way to where you are now. Therefore, whether you like it or not, you are becoming a part of the aviation safety system, a part of the fragile safety improvement machine. When you seek to examine the case for a prosecution, I ask only that you consider the widestpossible definition of 'the public interest' before deciding that a prosecution for a breach of aviation safety standards for which you have assembled credible evidence should go ahead.

In our ninth edition of HindSight magazine we asked the authors to explore the theme "Are you responsible for safety?" The question is examined by top aviation psychologists, safety and human factors experts, pilots, trainers and controllers. Some look beyond the front line operator to areas of designers and managers. Some look at training. But it seems that their "jury" is unanimous – we are living in an interdependent world and we are all responsible for safety.

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You are also responsible!

And you have a difficult task. The task of balancing the interventions you make now and the effects you will leave after them. The responsibility for obtaining retribution and responsibility for supporting prevention; justice for today vs justice for tomorrow. It is a fine balance to strike, I know, but you should not be left alone in this work.

We would like to help you. There are professionals around the world, dedicated to aviation safety, spending their professional life time studying the system; they can bring you their valuable knowledge. Flight Safety Foundation is organizing these professionals in an easily accessible network. We can help you find trained and experienced technical experts with an international reputation for competence and impartiality. They can help you navigate in the ultra safe aviation world where events happen because of cascading failures and errors, where human error is often inadvertent but is rarely the entire explanation, where blaming humans for making human errors will never make them become reliable machines. Ask us and we will try to help.

We can try together, leaving the aviation system safer after your interaction with it. ■

Front Line Report:
I separate therefore I am safe

The controller population in Europe can roughly be divided into two groups: those who believe that safety equals 5NM/1000ft, and those who believe that safety equals 3NM/1000ft.

Both groups are wrong, of course.

By Bert Ruitenberg

Separation is not the same as safety, separation is merely a means to achieve a desired level of safety at a given place at a given time. The easiest way to prove this point is to remind you that until January 2002 one of the aforementioned controller groups strongly believed that safety equalled 5NM/2000ft.

Bert Ruitenberg

is a TWR/APP controller, supervisor and ATC safety officer at Schiphol Airport, Amsterdam, The Netherlands.

He is the Human Factors Specialist for IFATCA and also a consultant to the ICAO Flight Safety and Human Factors Programme.

Before January 2002 in Europe the vertical separation minimum above FL290 was 2000ft. After the implementation of Reduced Vertical Separation Minima (RVSM) this minimum now is 1000ft. Yet I don't think there's a strong feeling among area controllers in Europe that safety was reduced by 50% after the introduction of RVSM. They happily apply the new standard as their current safety paradigm in the fading knowledge that the change was only introduced after a lengthy process (that is, if you wish to call three decades a long time) during which many safety studies and analyses were made to demonstrate that it was safe to do so.

I can think of many ways to categorise European ATC managers, but for the sake of this article I'll restrict myself to just this one: there's an impressive number of them out there who believe that safety in aviation can be adequately managed by regulating traffic capacity. Newsflash, ladies and gentlemen: wrong again. Regulated traffic volumes and numbers per sector are not the same as safety; at best they are an attempt at risk management and/or workload management – but no more than that.

> Regulated traffic volumes and numbers per sector are not the same as safety

To illustrate this latter point, picture a busy motorway with four lanes of traffic in both directions travelling at speeds of 100+ kilometres per hour (yes, I accept that with this example I may have moved away from Europe as it is today). Now imagine a pedestrian who wants to cross that motorway. I think we're all in agreement that crossing the motorway under such conditions is not safe. Then what if we propose that the pedestrian crosses the motorway at night, when there's only 50% of the traffic on the road compared to daytime – does that make it safe? I hope we're still all in agreement that it's still not safe, despite the reduction in traffic volume. And some of you would probably be quick to rightfully point out that conditions at night time are not the same as during day time, which means that aspects other than just traffic volume apparently play a role as well.

By painting a pedestrian crossing point over the motorway and augmenting it with traffic lights, a situation can be created where the pedestrian may cross with "an acceptable level of safety", i.e. assuming all parties know the rules, play by the rules, and that the technology involved (e.g. traffic lights, but also car brakes) work as expected. There still may be the odd catastrophic result when a pedestrian attempts to cross, but the outcome should be uneventful in most of the cases. Note that statements like this look good in a cost/benefit analysis, but they are absolutely no consolation to the relatives of a pedestrian that didn't make it to the other side.

Yet there are ways to make it totally safe for pedestrians to cross the motorway: dig a tunnel, or build a bridge to

the other side. By opting for one of these solutions the pedestrians are segregated from the traffic on the motorway, and all risk of collision is removed. Of course there are other aspects of each of the proposed solutions that will require further analysis (e.g. is access to the tunnel/bridge a safety hazard; can people fall off the bridge onto the motorway?) but they basically are sound and safe solutions, regardless of traffic numbers and/or environmental conditions.

From a safety engineering perspective the solutions with the tunnel or the bridge can be labelled "safety by design", which I submit is something that has not always been the number one priority in aviation. And when I say "aviation", I'm referring to the industry as the sum of its individual parts – parts that in their own confines strive for "an acceptable level of safety" but that in combination may actually fall short of that desired goal by bringing the systemic safety down to that of the lowest part in the system.

All too often the human operator is used as a mitigating factor in the aviation system. Construct a terminal building on the other side of a runway? No problem, the controllers and pilots surely can handle all related runway crossings safely under all conditions, so no need to construct a perimeter taxiway. Periodically activated danger areas, prohibited areas or other restricted airspace? No problem, the controllers surely always will avoid those areas when active, and pilots surely won't attempt to fly there because a NOTAM was published in which the activation of the area was announced. No need to revise the airspace design. Shortcomings in the human-machine interface of an automated ATC system? No problem, just train the controllers to work around the shortcomings or prohibit them from using certain features of the system. No need to revise the system design.

The strong point in relying on the human operator as a mitigating factor is that humans don't always perform in a similar way. Paradoxically, this is also the weak point in relying on the human operator as a mitigating factor. If an aerodrome controller successfully manages to have an aircraft cross the runway with a landing aircraft at 3NM from touchdown, he/she may not hesitate to issue a crossing clearance another time with a landing aircraft at 2.9NM from touchdown. Or 2.8NM. Or 2.7NM. And every time a crossing is handled successfully between consecutive landings the airport managers will see their decision confirmed that there was no need to construct a perimeter taxiway, right up to the time when there is an incident or even an accident.

As air traffic controllers we pride ourselves in our skills, and our understanding of rules and procedures, that enable us to deliver the best of service to our clients.

As air traffic controllers we pride ourselves in our skills, and our understanding of rules and procedures, that enable us to deliver the best service to our clients (pilots, passengers, airlines – see Frontline Report in HindSight 8). We've become accustomed to working in an environment where separation is almost a synonym for safety. Yet there's more to safety than we (well, you, rather) may realise.

For example, can you answer the following questions:

- Do you know what happens to entries in the watch log? Does any of that safety information leave your organisation, and if so, where does it go and with what purpose?
- Is individual feedback provided in your organisation on safety-related reports?
- Does your organisation have an internal safety publication, e.g. a safety magazine, and do you receive it and read it?
- Are you familiar with the Safety Policy of your organisation? And with the organisation's Safety Management System?

And although technically speaking "no" of course also is an answer to those questions, I suggest that if that was indeed your answer there may be a need for you and/or your organisation to invest in more knowledge in the operations room about contemporary views on safety! ■

For want of a nail

"For want of a nail, the shoe was lost.
For want of a shoe the horse was lost.
For want of a horse the rider was lost.
For want of a rider the battle was lost.
For want of a battle the kingdom was lost.
And all for the want of a horseshoe nail."

By Professor Sidney Dekker

I have often joked that the best way to make clear who is responsible for safety is to abolish all safety departments, immediately, overnight. After all, having a safety department sends the wrong message to everybody else in the organization. It would suggest that safety issues are things that you can lob over some bureaucratic wall, for a specialist department to take care off. That's a wonderful way to abdicate responsibility. You have the safety department take care of safety in the way that you have, say, the customer services department take care of a customer complaint. What nonsense.

My first problem is that safety departments seldom have the authority to do anything meaningful with the problems they are informed about, other than telling others to do something (like controllers, line managers, the board, the CEO). So even if we'd like to think a safety department is responsible for safety, it doesn't amount to much if that department doesn't have any real authority that allows it to live up to that responsibility.

My second problem is a finding that research keeps returning: safety (as well as risk) is created by everybody, as a normal by-product of normal work, at all levels of an organization. People in all kinds of positions juggle multiple goals, try to meet deadlines, assuage regulators, battle for scarce resources. In safety-critical work like air traffic control, work done by everybody both inside the organisation as well as in the organisation's immediate surroundings can affect how front-line operators are given or denied the opportunity to work safely. Even if it is the controllers who interface directly with the risky process, they wouldn't be there and doing what they were doing if it weren't for the people who designed the scopes, managed their schedules, played simulator-pilot, devised their recurrent training, cleaned their canteen.

This, interestingly, is where models of organisational functioning (and failure) are going in the early-twenty-first century too. They try to get away from simple causal models inspired by Isaac Newton, in which one cause leads to one effect (of equal size and in the opposite direction), and recognise that the effect itself can become another cause (the domino idea of accidents). The nail-horse-rider-battle-kingdom sequence doesn't really abide by Newtonian logic because the "effects" of each "cause" grow exponentially with each step. That, if anything, contradicts Newton's third law of motion.

Rather, models that have my attention today are those that are taking complexity seriously, that try to figure out how an infinitesimally small change in conditions can lead to huge events later on. Of course, such models of failure have animated folklore for a long time. For want of nail, the kingdom was lost, as the rhyme goes (which dates back, in its earliest forms, to the 14th century). These models do mean, however, that the question of "who is responsible for safety" (or any effort to pinpoint accountability for safety (or for a failure) becomes infinitely more complex and diffuse.

This doesn't mean that, in the wake of failure, we don't want to find the culprit who didn't make sure there was a nail when one was needed. Never mind the fact that the horse was an uncooperative pestilence that wouldn't have been great in battle anyway (I have vague images of some mid-term conflict detection tools here, but never mind), that the rider was a hapless government-appointed apparatchik who couldn't find his behind with both his own hands (no comment), that the battle had to be fought against absurd odds (it's early in the morning, the break is a long time away, traffic is mounting, there's no manpower to open another sector), and that the very structure of the kingdom had been rotting for years under the pressure of production demands and cost cutting (well, you get the picture).

It's soothing and comforting, when the battle is lost and the kingdom collapses (or at least suffers a dent to its reputation), if we go on the hunt for the one who should have supplied the nail. Because they, we tell each other jubilantly, will be the one who was responsible for safety.

Really? For want of a nail, the kingdom was lost.

Think about it again. Who was responsible for the defeat in battle and the loss of the kingdom? Or, for that matter, in this whole cascade of escalating, mushrooming events that led to the kingdom's collapse, who wasn't responsible? If you can answer that question, you can answer the question who is responsible for safety.

And oh, good luck. ■

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He gained his Ph.D in Cognitive Systems Engineering at the Ohio State University in the US.

His books include "The Field Guide to Human Error Investigations" and "Ten Questions about Human Error". His latest book is "Just Culture: Balancing Safety and Accountability".

He flies as a First Officer on B737NG.

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REQUEST FOR SUPPORT MESSAGE SUMMARY

Increasing range of speeds

Published 06/06/2008

The problem

One ANSP reported currently experiencing an increasing range of speeds during climb and descent between different aircraft operators of the same aircraft type.

ANSPs providing ACC service have no basis to predict aircraft climb and descent speeds except their general past experience of the way operators in their airspace fly the aircraft type.

Historically, variation in operator policy on speeds for the same aircraft type has mainly been in cruising speeds, which are required to be filed in the flight plan and are therefore apparent for ATC tactical planning purposes (speed changes of more than 5% from that indicated in the FPL must be reported to ATC).

Since the reported diversification of flight parameters is believed to be a consequence of increased fuel prices and a varying focus on cost control between operators, it seems likely that this problem will continue.

This is an issue that may have safety implications because it changes the operational environment by requiring ATC not to assume a speed profile. It was noted that cost index flying was becoming a concern, especially for ATC in oceanic environments.

Support requested

Aircraft operators and ANSPs were invited to share experience and good practice

Response

A wide range of views were received. The recent rapid rises in the cost of aviation fuel seems to have increased both the number of operators looking more closely at the relationship between aircraft operating costs and the way their aircraft are flown and the degree of attention being given to this issue by operators who have already begun the process of embracing it. There has been recognition among ANSPs that the range of speeds being used by a given aircraft type during climb and descent has recently increased.

Certain operators believe that some ANSPs may be unfamiliar with the rapidly spreading practice of cost index based flight planning. Many respondents noted that the recent rise in fuel prices had resulted in significant changes to cost index based flight planning in general and to actual climb and descent speeds in particular.

Some ANSPs and operators accepted speed variation as a safety issue which might prejudice tactical planning for safe separation by ATM, whilst others were inclined to the view that it is just an operational reality for ATC which can be managed without serious prejudice to safety.

The current absence of ATM controller training simulators with sufficient sophistication to represent realistic traffic performance with respect to varying forward and vertical airspeeds during climb and descent was noted.

It appears that a complete transition to 250KIAS below FL100 would be helpful

to ATM operational safety in those terminal airspace areas which do not already require it and that few operators would have any difficulty with this.

ATM speed control of climb above FL100 does not currently appear to be very prevalent but operators seem willing to accept general speed control if it is considered necessary to maintain safe separation. ATM speed control in descent seems more widespread but entirely tactical and operators express the wish for timely pre-advice of ATC intentions so that they can plan an optimum descent within such constraints.

Certain operators believe that some ANSPs may be unfamiliar with the rapidly spreading practice of cost index based flight planning.

It was pointed out that an increasing range of forward airspeeds in climb and descent had also been accompanied by a similar increase in the corresponding range of vertical speeds, which could represent a similarly important tactical consideration for ATM operational safety.

Operators note that optimum climb and descent airspeeds generally depend mainly upon aircraft weight but that the prevailing head/tail wind component remains a lesser factor. The extent to which minimum-fuel vertical profiles are preferred will often be affected by actual versus schedule performance of a flight on a particular day. One operator also noted that variation in forward and vertical speeds for short periods could sometimes be associated with the minimisation of air turbulence and the rules relating to cabin service which may be restricted until above cloud. Another noted that alternative power plants on the same aircraft type can result in different optimum speeds under otherwise similar circumstances.

Some operators of long-haul aircraft note that variable climb and descent speeds have long been a feature of their operations. However, it is apparent that many more short-haul operators are now becoming cost-conscious and that this has increased the extent of the issue for some ANSPs, particularly those managing periods of high traffic density.

It appears that the habit of operating on an RPL which gives a particular cruise speed which on a particular day is then planned to vary from this quite considerably has become a widespread practice tolerated by ANSPs except in the NAT region, where higher traffic densities have required a greater degree of both ATM control and operator compliance. Acceptance of this by ANSPs because it is of little actual concern may have indirectly encouraged operators to use wide tactical variation in climb and descent speeds, which can become much more of a issue in busier airspace.

Some operators report that the ICAO requirement to advise ATC of any variation of more than 5% from the declared FPL cruise speed is widely ignored and that this is mainly because ANSPs have shown no interest or concern at the increasing prevalence of variation outside the 5% 'allowance'.

Appreciating that the trend towards widely varying forward speeds might cause difficulties in busy ATM environments, operators are prepared to compromise on optimum cost vertical profiles to the extent necessary to maintain ATM operational safety.

As the proportion of aircraft with more sophisticated FMS capabilities increases, operators are more easily able to systemise their tactical flight planning and remove some of the decision-making from individual crews.

It was noted that flight crew are not always able to provide accurate responses to ATC queries on whether they will be able to achieve certain fight levels by given positions. Whether this difficulty can be generally attributable only to aircraft with legacy navigation system capability or whether this is not a factor is not reported.

Whilst many airlines are now using cost-index based tactical flight planning, one respondent noted that business jet operators are, subject to meeting landing slots, tending towards fuel efficiency as the sole driver.

It appears that cost-index based flight planning using generic tables is beginning to be superseded by 'dynamic cost index' planning, which significantly increases the variation in desired climb and descent speeds for any particular aircraft type and operator on a day-to-day basis. ■

SAFETY REMINDER MESSAGE SUMMARY

Coordination in respect of aircraft in state of emergency

Published 3 November 2008

The problem

A European ANSP reported that difficulties had been encountered in establishing the full circumstances of aircraft handed off from transferring units which had declared a state of emergency. Cases included traffic diverting or requiring priority handling for technical or medical reasons and it was advised that the effect of this had sometimes been to significantly reduce the efficiency with which useful assistance from both ANSPs and airports could be provided to the aircraft involved, including priority over other aircraft.

ICAO PANS-ATM states that unless differences are published in the national AIP "the R/T distress signal (MAYDAY) or urgency signal (PAN PAN) preferably spoken three times shall be used as appropriate. Subsequent ATC action with respect to that aircraft shall be based on the intentions of the pilot and the overall air traffic situation" and also that "where an aircraft is experiencing an emergency or has declared minimum fuel, or in any other situation wherein the safety of the aircraft is not assured, the type of emergency and the circumstances experienced by the aircraft shall be reported by the transferring unit to the accepting unit and any other ATS unit that may be concerned with the flight"

As a result of a supplementary request for specific comment on practices relating to the advice of and response to low fuel status, some useful feedback was subsequently received on this scenario.

Response

A review was made of the feedback both in general and with particular reference to differences in the handling of low fuel status:

- Problems for ANSPs in communicating information between each other about aircraft which have been afforded emergency status generally arise from a lack of standardisation in the way priority treatment is gained. Lack of initial clarity on status often leads to considerable difficulty in establishing the actual situation and therefore the actions needed to ensure a safe outcome. This can make communications between ANSPs about an aircraft with 'priority' status more difficult than they need to be.

- In the case of fuel status, flight crew frequently allude to low fuel state but are often reluctant to declare an emergency even if ATC invite them to do so. The majority of ANSP respondents only provide priority and assistance if an emergency is declared. However, many routinely use a certain amount of discretion in determining whether an emergency should be assumed and only a few necessarily expect the obvious clarity which formal declarations prefixed by PAN / MAYDAY bring.

- The ICAO PANS-ATM Doc 8444 definition of 'minimum fuel' is felt to be sufficiently vague that if it is used, it

fails to meaningfully communicate useful information to ATC much as any similar phraseology might fail. However, most ANSP respondents do pass on whatever they have become aware of in respect of 'minimum fuel' or other indications of potential emergency but generally, neither originating nor receiving units afford any priority until actual emergency status is determined.

ICAO PANS-ATM states that unless differences are published in the national AIP "the R/T distress signal (MAYDAY) or urgency signal (PAN PAN) preferably spoken three times shall be used as appropriate.

- Many aircraft operators either do not include adequate guidance to flight crews on this subject in their standard operating procedures or fail to ensure that such procedures are applied if they do. The reluctance of some flight crew to declare abnormal status using the available ICAO standard of PAN / MAYDAY may be due to the absence of a 'just culture' within their organisation evidenced by the reaction which follows the formal declaration of abnormal flight status for whatever reason. None of the flight operations respondents stated that they had specific provisions for 'minimum fuel' to be 'declared' in the way that PANS-ATM seems to envisage or had further defined this phrase in a way which would standardise its use, if permitted.
- It was noted that 'Final Reserve Fuel' is expressly defined under EU-OPS as the minimum fuel required to fly for 30 minutes at 1500 ft above the alternate airport (or the destination airport if an alternate is not required) at holding speed in ISA conditions. Under EU-OPS 1.375, if this Final Reserve Fuel is reached whilst airborne, "an emergency shall be declared".
- It was also noted that under FAR 121, Final Reserve Fuel is similarly defined for non-domestic flights (those beyond the continental US which is defined as excluding Alaska) but the specification of communications with ATC about low fuel status is not defined in the regulations but is instead dealt with during the FAA operator approval. The approvable 'minimum fuel on landing' is in the range 30-45 minutes with the same conditions as in EU-OPS.
- Whilst flight crew always have the discretion to declare 'PAN' or 'MAYDAY' status due to low fuel, PANS-ATM does not preclude other ways of declaring an emergency and the phrases 'fuel emergency' and 'medical emergency' are widely used and accepted as equivalents to formal declarations of emergency status by many, but not all, ANSPs even though the relationship of the declaration in relation to Final Reserve Fuel is invariably unclear.
- The current ambiguity for an ANSP in respect of determining aircraft emergency status and eligibility for priority handling could be removed by universal adoption of the procedure used by one responding aircraft operator. This is to require crews to declare a 'PAN' if they believe that they **may** land with less than Final Reserve Fuel and a MAYDAY if they **will definitely** land with less than Final reserve Fuel. A MAYDAY call made in these circumstances is in accordance with the requirements of EU-OPS and likely, in most cases, to be also in accordance with aircraft operator procedures approved under the FAA process. A PAN call used in this way has an unambiguous meaning for ATC, which is preferable to the 'minimum fuel declaration' envisaged in PANS-ATM and which is not recognised in many aircraft operator procedures. ■

SAFETY REMINDER MESSAGE SUMMARY

Distance to touchdown

Published 6 August 2008

The problem

Some European airlines reported occurrences concerning the provision of distance to touchdown (DTD) information to aircraft being vectored for a pilot-interpreted final approach aid.

Distance to touchdown information enables pilots to manage their descent profile and energy/fuel efficiency. This is especially important when there is a deviation from the STARs during vectoring and cleared shortcuts.

Pilots expect accuracy of estimated DTD to increase as distance to go reduces. Unexpected reduction in DTD can cause problems with energy management and an overly 'ambitious' offer might encourage some crews to 'can-do' themselves into an overload situation.

Significant increase in DTD requires early reduction in Rate of Descent (ROD) to avoid the high fuel burn associated with longer maintenance of the assigned altitude (level flight).

Crews expect to be advised of significant changes to DTD as soon as possible and, if tactical assessments change and speed control cannot resolve matters, the solution should be to increase distance rather than reduce it.

ICAO Provisions in PANS-ATM (DOC 4444)

- 8.6.5.1 b) when an aircraft is given its initial vector diverting it from a previously assigned route, the pilot shall be informed what the vector is to accomplish, and the limit of the vector shall be specified (e.g. to ... position, for ... approach).
- 12.4 ATS SURVEILLANCE SERVICE PHRASEOLOGIES
- 12.4.2.2 VECTORING FOR ILS AND OTHER PILOT-INTERPRETED AIDS
- b) YOU WILL INTERCEPT (radio aid or track) (distance) FROM (significant point or TOUCHDOWN). ■

SAFETY REMINDER MESSAGE SUMMARY

Missed approach RTF communications

The problem

An ANSP at a busy international airport experienced successive similar incidents involving commercial transport aircraft in which aircraft on final approach acknowledged, but did not action, instructions to go around issued because they were catching up the traffic in front. Repeated instructions were necessary before the required go-around commenced. Pilots' acknowledgements to the initial go-around instructions were neither given in the prescribed format, nor in any way which could provide assurance that they had been understood.

Although the national language at the place where the incidents occurred is not English, all ATC communications, including those with operators based at the airport concerned, are conducted in the English language. The incident aircraft flight crews were also not native English-speakers and their native languages belonged to a distinctly different language grouping to that of the native language spoken at the inci-

SAFETY WARNING MESSAGE SUMMARY

Interference on 1030 MHz

The problem

A European ANSP reported a number of occurrences where surveillance data was lost for some aircraft within a particular geographic area. Analysis of the available data indicated that the cause was probably interference sources transmitting on 1030MHz. Cases of similar interference in the past have been attributed to either military or TV systems.

This particular ANSP system has, in case of surveillance loss, a functionality that generates system tracks based on the flight plan data.

ICAO Provisions in PANS-ATM (doc 4444)

- 8.6.2.1.1 Before providing an ATS surveillance service to an aircraft, identification shall be established and the pilot informed. Thereafter, identification shall be maintained until termination of the ATS surveillance service.
- 8.6.2.1.2 If identification is subsequently lost, the pilot shall be informed accordingly and, when applicable, appropriate instructions issued.
- 8.7.2.1 … the separation minima specified in 8.7.3 shall only be applied between identified aircraft when there is reasonable assurance that identification will be maintained.

The solution

In cases of interference on 1030 MHz, EUROCONTROL recommends that the ANSP or the NAA contacts the State authorities responsible for frequency spectrum management and both assist those authorities in locating the source of the interference. This can be achieved by plotting the misses on a chart. The State authorities responsible for frequency spectrum management can subsequently use a 1030MHz receiver to try and locate the source(s) of interference. ■

Published 21 April 2009

dent location. As a result, the English language accents of the two parties in each incident were understandably different.

Analysis of the circumstances in the recorded incidents suggests that the inclusion of plain language explanations of the reason for instructing a go-around, which in each reported case immediately preceded (without a break) the actual instruction, may have caused the flight crews to fail to appreciate the content of the transmission even though they understood that it had been for them. Their non-specific acknowledgements of the initial go-around instructions were taken as 'message understood' by ATC whereas it appears that the initial messages had not been understood.

Whilst actual safety standards were not impaired during these incidents, the potential for breach in separation is clear.

ICAO Provisions in PANS-ATM (doc 4444)

- 12.3.4. Phraseologies for use on and in the vicinity of the aerodrome
- 12.3.4.18 Missed Approach
  a) GO AROUND;
  b) GOING AROUND*.

* Denotes pilot transmission. ■

BSA or Triumph?

By Bengt Collin

The releasing controller

Six o'clock in the evening they passed the last turn. The sound from the engines formed a distinct contrast to the peaceful village they entered, a typical small northern highland village with a church, a B&B plus two pubs.

A man was standing on a small open area behind the bed and breakfast, obviously he was the landlord but he made no effort to welcome them. Perhaps he hasn't noticed them; hard to believe he missed the sound from the motorcycles.

Bengt Collin

works at EUROCONTROL HQ as an Senior Expert involved in operational ATC safety activities.

Bengt has a long background as Tower and Approach controller at Stockholm-Arlanda Airport, Sweden

They opened the gate and walked towards the man. *"Hello"!*

The man looked up, slowly inspecting them from left to right, from top to toe. They felt like the Vikings might have felt – but this was 1,100 years later. He answered with a loud voice:

- *Hi there, how ye daein´.*

- *Äääähhh…yes, the weather is nice, is it possible to park our motorcycles behind your house, they are more protected there? it was more of a formality, but they did not like to drive in without permission.*

- *Aye, ye cun park them roon the back, nae borra. Whit dae ye huv, BSA or Triumph?*

- *Äääähhh…we have Yamaha.*

- *Ah well, ye can lea´ that jap crap oot in the street!*

The operational manager described the results from the recently finished safety case on a new departure procedure, everything being safe as usual he understood – he would pay more attention at the next briefing.

He used the elevator together with the other controllers on the afternoon shift to go up to the tower. He should release one of the runway controllers.

The vehicle driver

He got the phone call from the tower supervisor at five past two. The pilots on a recently landed aircraft had reported "something lying on the right side of the runway just where we vacated". The supervisor added with a laugh "the pilots said it looked like a little horse". Of course the fog was increasing. The LVP rules stated that no vehicle was allowed on the runway except under exceptional operational circumstances. This was such a case.

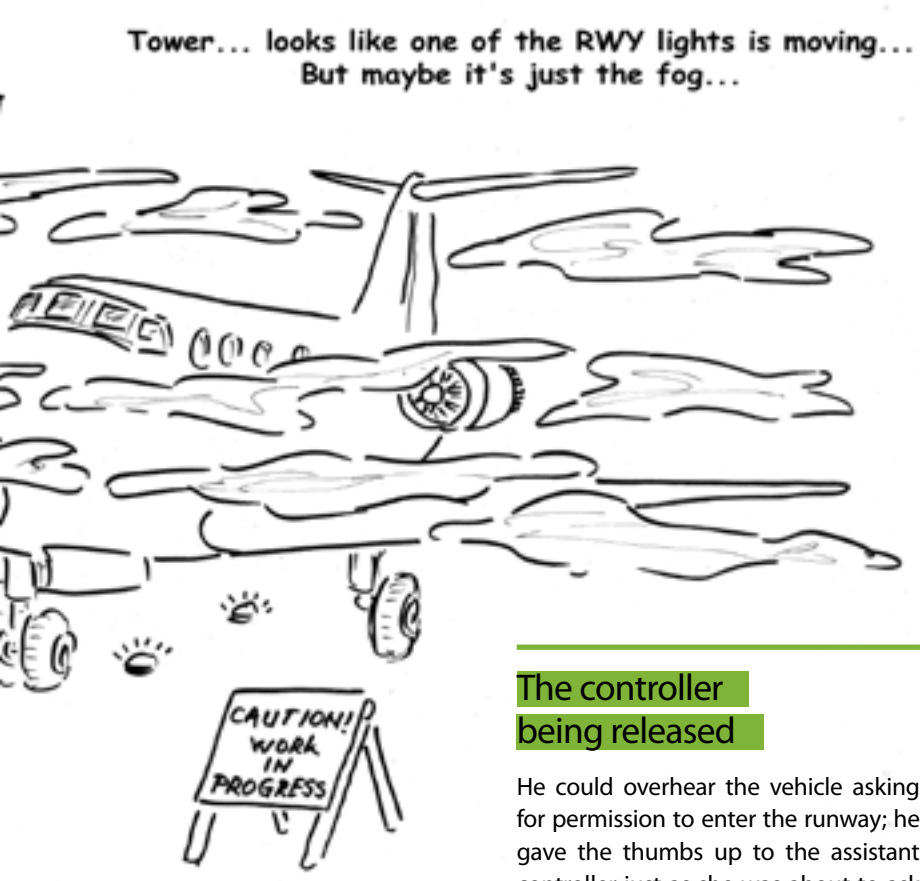
The controller being released

He did not like the ground controller next to him, who was relatively old in the game. He kept it to himself. After all, this ground controller was an exception. His daily complaints about everything, especially the management, created a negative feeling. He remembered him once on an extremely hot and humid day complaining about the air conditioning system saying that it was too effective…But worse was the way he tried to "teach" pilots how to taxi and use the frequency. Embarrassing! Himself, he loved the job.

Outside the fog was gathering and for the moment almost everything was at a temporary standstill. They needed to locate suspected FOD on the runway and besides that, the traffic was always slow at this time of the day. He quickly returned to reality when he overheard the vehicle "Environment 42" calling. This was the "humorous" nickname given to the vehicle by the ground personnel, but being equipped with a four litre V8 engine, it was not at all as environmentally friendly as the call sign indicated. The vehicle traffic was handled by an assistant controller on a separate frequency.

The supervisor

The afternoon supervisor supposed to release him had phoned at a quarter to two saying that he had overslept. How can you oversleep at two o'clock in the afternoon? He had to leave as soon as possible, he had promised to advise his wife on buying a new dress which was an important job and impossible to can-



cel. Why do women always need such advice? Giving an opinion different from hers guaranteed a conflict. Over the years he had become smarter, always asking for her opinion first, but now she had adopted the same strategy. He knew she loved controlling the situation just quietly smiling at him, waiting for his first move; he hated it. He could hear the new shift approaching from downstairs.

The releasing controller

Check the new incident reports before you release anybody, the supervisor instructed them. I need to leave, XXXX is coming in an hour or so, he's overslept. The supervisor said the last part of the sentence slowly and very distinctly; no one could mistake his sarcasm. I will wait downstairs for him, the supervisor added, at least for a while.

He looked at the new incident reports, airspace infringement, handover takeover, runway incursion; he ticked his signature at the front of them, he could read them later he thought; he knew this was not true but he was an experienced controller, he did not need all this paperwork.

The controller being released

He could overhear the vehicle asking for permission to enter the runway; he gave the thumbs up to the assistant controller just as she was about to ask him for permission, instead she smiled at him giving the vehicle the clearance. He liked it when she smiled. She was blond, tall and very attractive and for a moment he thought about asking her out, but he knew that she already had someone else. It was a nice thought anyway. The controller taking over approached him from the right.

The releasing controller

He walked towards the runway controller. Nothing much going on. He quickly looked at the flight progress board and then looked out of the window. This endless foggy weather would never end. The ground controller to the left instructed an aircraft to taxi out for departure. The young controller he was to release started to say "nothing on the frequency….." he interrupted him. I have the situation, you can leave now. Drive carefully and remember full speed saves time! The other controller did not answer, he simply unplugged his head set and started talking to the blond assistant controller who was also about to leave.

He had no strips, nothing so he temporarily left the position to grab a cup of coffee. As he returned to his working position, the ground controller handed over the departing flight, "Wind calm, runway xx cleared for take off".

The vehicle driver

He entered the runway, the fog was really thick. He started at the far end of runway xx driving towards the intersection; better to inspect all of the runway he thought as he looked out of the window for "small horses" He saw something dark lying to the right. He stopped his car at the side of the runway, opened up in the back, and walked towards the FOD. The outside loudspeakers would alert him if the Tower called him.

The controller being released

He drove his car carefully, trying to keep to the speed limit. He planned to stop to buy spaghetti and ketchup, his favourite standard dinner. Perhaps I should vary my dinner more he thought, perhaps replace the standard white spaghetti with the full grain version? He felt suddenly very warm, his heart started beating. The vehicle – he had forgotten to mark it as on the runway. He grabbed his mobile phone and dialled the number to the tower. Seconds became hours. Answer, please answer…

The vehicle driver

Instinctively he turned his eyes towards the sound, although he couldn't see anything in the fog. The noise was becoming louder, it was definitely an aircraft. He started running towards the vehicle, fast. The aircraft passed invisible, like a ghost aircraft that did not exist, somewhere in the fog above him. He looked at the vehicle still standing in front of him, solid and reliable. Better call the Tower he thought and jumped into the driver's seat. ■

Comment on the Case Study by Dragan Milanovski

"I developed mixed feelings as I was reading this story. Another unbelievable chain of events and at the same time it felt so common and realistic, as if I was there when it happened."

One can say that the direct cause of this incident is rather poor handover/takeover of position that took place during the morning/afternoon shift change in the tower and it will not be too far from the truth. As usual, everybody involved could have altered the unbelievable chain of events, but no one did. Why? Were they acting strange?

Dragan Milanovski

is ATC training expert at the EUROCONTROL Institute of Air Navigation Services in Luxembourg.

Most of his operational experience comes from Skopje ACC where he worked for a number of years on different operational posts.

Now, his day-to-day work involves ATC training design as well as Initial Training delivery for Maastricht UAC.

Here comes the scary part: No, they were probably acting just as they did normally. They made a few mistakes, but nothing out of the ordinary. This kind of mistake happens all the time, but they are always corrected well before it is too late.

The controller being released was anxiously waiting for the afternoon shift, he was not busy at all, and he had plenty of time to think of other things. He was sitting next to a guy he did not like (the ground controller), but he was still able to work efficiently with him. He kept the dislike to himself. Sounds familiar so far? Those of you who have spent a few years in operations will remember that this happens to everyone. Then, there was the beautiful assistant with a smile (I hope this still sounds familiar to you too!) and the supervisor who had other "important" thoughts on his mind.

The releasing controller was a typical "old school" experienced controller who likes speed and does not need all the paperwork and the boring stuff. After all he's been doing this job for a while and he knows it inside out. He did not show interest in the safety case ("we did not have them in the past and we were still safe"), nor did he show any interest in, or take time to read, the incident reports. Nothing unusual so far, every place has a few controllers acting in the same way. Some of them are good colleagues and even friends. Others are popular and people enjoy working with them.

All set, here we go…

The first "small" mistake happened when the controller being released overheard the vehicle asking for permission to enter the runway; and he gave the thumb up to the assistant controller just as she was about to ask him for permission. Most of you are probably thinking "What is wrong with that? We do it all the time". Yes, we do it, and most of the time we have a clear picture of something we overhear, but not all the time. Did he really understand the request? We can only guess.

Then the next important moment was when he did not use a strip on the flight progress board to indicate the vehicle presence on the runway. Again, you might be thinking "Oh, common… this is okay; he had nothing else on the frequency". The mistake was not getting ready for a handover, where you try to put everything in a simple order and stick to official procedures so that it is easier for the next controller to understand.

The experienced releasing controller cut the long story short. He could see what was going on and he certainly did not need the boring "blah, blah…" from the young controller being released. In the heat of the moment the controller being released forgot that there was an item that needed to be mentioned or maybe assumed the releasing controller knew about it.

In the end the phone called back to the tower… sounds so realistic and familiar. I have witnessed a few after similar handover takeovers, luckily without similar outcomes. Why do we keep thinking about the situation after leaving a position? Is it our conscience?

What could have altered the outcome? Well…

The supervisor could have remained in his position until the handover takeover process was completed. After all it is his job to ensure the process is done properly and without unnecessary distractions.

The controller being released could have used a strip for the vehicle on the flight progress board. Its presence on the runway was not an ordinary situation and therefore deserved extra attention, no matter how quiet the traffic was. He failed to prepare a "clean" situation before handover. When his handover briefing was interrupted, he could have insisted on continuing and passing on all the details. Finally, he did not make sure the releasing controller was completely in control before leaving. He simply left the tower too fast.

The releasing controller did not take enough time to familiarise himself with the traffic situation. He could have listened to the young guy's briefing or he could have asked questions. Instead, he underestimated the situation and the time it takes to settle in a position and advised the controller being released that "full speed saves time". Unfortunately this does not apply to handovers/takeovers.

MY RECOMMENDATION… hmm… it goes back to training. In most places it is only late on during the on-the-job training that student controllers are trained to do handovers/takeovers; and in some cases this topic is not explicitly addressed in the training at all. The organization in question needs to look back and analyse whether awareness of the handover/takeover process needs to be raised and maybe introduced earlier in the training, or included in the refresher training. Also, consider the use of checklists to structure the briefings during handovers/takeovers and ensure items are not forgotten.

No matter how familiar you are with the unit, position and airspace, and no matter how experienced you are in your job, appreciate the importance of the handover/takeover process. Follow the recommendations and good practices, use a checklist if required or if you think you are forgetting things. Remain focused until the end, allow sufficient time for it, and do not leave until the next controller is completely in control.

"Ye wanna bet" the releasing controller will read the incident reports next time. After all, he is starring in one of them. ■

Comment on the Case Study by Captain Ed Pooley

"For once no flight crew role in this scenario! But plenty of food for thought. The vehicle driver? Just a victim? I think so…."

But turning to the ATC team, we can see how the overall effect of many individuals in the extended team not actively 'thinking safety' as they go about their routines really can build the perfect foundations for precipitating an error by one of them.

Of course, we all recognise the leading 'villain' here – the controller about to be released. He has some personal 'baggage' which he keeps to himself – he really doesn't appreciate the 'style' of his colleague at the ground control position. In contrast, he is considerably more 'at ease' with the attractive female who is at the assistant ground controller position and responsible for running vehicle movements. In fact, he's so at ease with her that he'd like to come across as a 'cool guy' for whom a thumbs-up rather than the required (and recorded) exchange on intercom is enough. And what about getting the strip for the vehicle? Completely overlooked? Then, before he has time to think twice, his afternoon shift replacement arrives alongside him. His attempt at a handover of his position is at best uninspired and at worst unprofessional. Instead of starting with the interesting bits – the fog and especially the recent FOD report due to be investigated, he encourages the similarly uninspired/unprofessional style of the older and much more experienced releasing control-

Captain Ed Pooley

is an experienced airline pilot who for many years also held the post of Head of Safety for a large short haul airline operation.

He now works as an independent air safety adviser for a range of clients and is currently acting as Validation Manager for SKYbrary.

Comment on the Case Study
By Captain Ed Pooley (cont'd)

ler by beginning with "nothing on the frequency"…….

The releasing controller appears to be a little complacent in his role – the effect being perhaps similar to the effect of distraction on the performance of the released controller. Time to go and get that coffee I should have collected on the way in…even though he knows there's an aircraft taxiing out for departure. And what about making the time to read the paperwork before taking his seat? Signed as read when not is a poor show of responsibility for safety awareness.

What about the ground control team? At least they weren't both on handover. But the controller in charge apparently has a rather 'clever' attitude to his radio communications. That isn't likely to go down too well with some of the pilots. But perhaps even more importantly, it isn't likely to support an ideal professional relationship with his probably younger and less experienced assistant controller. He should have been at least aware of the vehicle movement – that could have added another layer of protection which might have helped stop the releasing controller accepting the departing aircraft onto the runway. As for the assistant controller, she couldn't really do much about the 'informal' verbal acceptance of the vehicle by the departing TWR controller, but she should have made sure the vehicle 'strip' was passed on to complete the transfer of control.

Time to consider the example being set to the team. Unfortunately, the supervisor doesn't come across as remotely inspirational….. He's made a domestic arrangement straight after the official finishing time for his duty and certainly doesn't intend to stay upstairs to keep a supervisory eye on things until his overdue colleague arrives whether LVP are in force or not. He seems to have virtually 'signed off' as the scheduled end of his shift approaches – arguably the very time he needs to oversee a series of handovers.

Which brings us to the one of the two key activities which seems to figure routinely in ATC incident reports – handover and OJT. At least there wasn't any OJT taking place. But everything was wrong as the handover took place. **Nobody** involved was really interested in a safety-first approach. For the most part, the older and more experienced people were **complacent** and the younger and less experienced ones were **distracted**.

By the way, we haven't mentioned the unseen managers who organise the way ATS is provided, sign off the procedures and stay aware of what they manage. A couple of obvious points arise. Firstly, had an adequate risk assessment been carried out for vehicles on runways in LVP? What exactly were 'exceptional operational circumstances' and how had the additional risk in LVP been mitigated? Secondly, was this a routine 'style' of handover for this unit which just happened, co-incidentally, to involve an incident? Managers too need to be aware of their own responsibility for safety. Most of us would say that this includes both providing the right framework and making sure that they stay in touch with what actually routinely goes on so that they can help fix it if necessary – preferably before an incident like this occurs.

I hope it is easy to see how widely responsibility for this safety lapse was shared. And also how the chances of this incident could have been greatly reduced if everyone had put safety first – proactive safety. Ultimately, none of us want to be a part, even a small shared part, of the accident outcome which can so easily follow on quickly from any operational human error. But as we certainly can't prevent all such errors, we need to work collectively on their context. That way we reduce their number and 'trap' the remainder.

A SINGLE RECOMMENDATION? It has to be to the 'unseen managers' who have responsibility for providing a system of, in this case, procedures, which work and ensuring that they are properly applied. I don't know if the handover process which lies at the heart of this incident had the benefit of effective procedures so my recommendation comes in two parts. Were existing handover procedures followed? If not, the first action is to rectify that. If they were (or are now) being followed, then the second action is to look carefully at them to see if they are adequate. Those on any 'front line' need to be working within a framework which supports safety if they are to deliver it. ■

Comment on the Case Study by Ulrika Svensson

"This case study raises two questions which need to be answered."

Ulrika Svensson
is an engineer and a pilot with experience from regional jet carrier operations as well as aerial work. Today she works as a senior flight safety analyst at the Swedish Transport Agency.

First, can this be identified as a runway incursion since the vehicle had clearance to be on the runway? The ICAO definition is "Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take off of aircraft", but since there was a vehicle on the runway without the releasing controller's knowledge, this could well be a runway incursion.

Secondly, could this have been avoided and if so, how? If you compare the situation in the tower with a crew on board an aircraft you would probably start to think about crew resource management, CRM. In the "old days" CRM stood for cockpit resource management and only involved the pilots and possibly an engineer or a navigator. The definition expanded, since communication with the cabin crew was necessary for a safe flight. Today, CRM involves everyone who is working with the aircraft. For instance, correct fuelling procedures and dispatch are vital parts of a safe flight.

The recurrent training for transport pilots involves both CRM and an evaluation of non-technical skills during the proficiency checks that take place twice a year. This means that three times a year pilots will be evaluating and discussing their abilities to interact with both people and systems.

When the controller being released did not make any note about the clearance to the vehicle driver it is easy to blame the controller as the cause of the incident. But there will always be errors, since we are human. A system that is prepared for mishaps will be able to deal with them. The releasing controller and the controller being released had a few seconds of interaction where the issue could have been identified.

However, was this system thinking about safety or just about ticking the boxes? The controllers were both skilled and experienced, but as they were not communicating they missed the advantage of the other person's observations.

Every now and then we need to look to ourselves and think about our ability to communicate with our colleagues. This is something we all need to do, reminding ourselves about the advantages of reliable communication. In aviation there are regulated intervals for training in CRM or human factors so that everyone will be able stay in the loop. However, if a person is a leader, his or her responsibility goes further. A leader who signals the importance of communications will be implementing a base line for everyone else to follow. The safety culture needs to be set from above, both in management and in personal skills.

RECOMMENDATION – In this case, shorter intervals between human factors recurrent training would benefit this organisation. A suitable interval would be annual training combined with an evaluation regarding the non-technical skills needed in each position at training or assessment sessions. ■

Comment on the Case Study by Bert Ruitenberg

Twenty-five years ago a foggy morning at the airport where I work meant there was little to do for ATC. We kept a deck of playing cards in the Tower for just such days, to keep ourselves entertained until the fog would clear up...

Bert Ruitenberg

is a TWR/APP controller, supervisor and ATC safety officer at Schiphol Airport, Amsterdam, The Netherlands.

He is the Human Factors Specialist for IFATCA and also a consultant to the ICAO Flight Safety and Human Factors Programme.

Twenty-five years ago a foggy morning at the airport where I work meant there was little to do for ATC. We kept a deck of playing cards in the Tower for just such days, to keep ourselves entertained until the fog would clear up. The only traffic that would interrupt our card game was the odd British Airways Trident, or sometimes a Swissair DC-9, that somehow miraculously was able to land despite the fog. In my memory there wasn't any maintenance or other activity at the airport during periods of low visibility, but I could be wrong about that.

Nowadays however Low Visibility Operations have become widely accepted. Most operators routinely perform Cat II landings, and quite a few of them are able to make Cat III approaches too. This in fact has become so common that people working in the aerodrome environment have perhaps become a bit too comfortable with it. Operations at the airport continue almost as normal, even though the weather conditions are not normal at all. This often includes construction and/or maintenance work on runways, taxiways or aprons that is ongoing at nearly every airport in Europe.

The controllers in the case study appear to consider the low visibility situation as a nuisance rather than a critical condition. They are casual about the staffing in the Tower, just like they're casual about the position handover. Furthermore they are VERY casual about keeping track of runway occupancy by a vehicle at a time when they can't visually ascertain the status of the runway surface.

The vehicle driver seems to have some awareness about the risks of runway operations during low visibility: he knew no vehicle was allowed on the runway except under exceptional operational circumstances. Yet after he had convinced himself that FOD removal was such an exceptional operational circumstance, he continued business as usual. He apparently had no second thoughts about leaving his vehicle unattended on the runway while working on foot, and not informing the Tower about this. Just a little too comfortable with working like normal during foggy conditions…

People at the airport in the case study were lucky. The incident did not cause any damage or injury, so it can be used as a "free lesson" or a wake-up call for all parties involved. Low Visibility Operations are safety-critical operations that deserve full concentration and dedication from the airlines, air traffic control, the airport authorities and any other airside operator in order to prevent accidents. If it's foggy outside and you think everything is going well at your airport, you're obviously overlooking something!

EDITORIAL COMMENT:
BERT PROVIDES A GOOD REMINDER THAT IN LVP, THE TWR IS NOT RUN FROM A REAL 'VCR'! ■

Next HindSight

- special **Level Bust Edition**

What's happening out there

The first thing that an ATCO learns – and most probably remembers it for all his life – is that the objective of ATS is to provide a safe and expeditious flow of air traffic.
I learned this in my primary course and still remember it.
As an ATCO I knew how to apply this – 5nm or 1000 feet.
By Anthony Seychell

Then I got promoted, moved into ATC management and found a slight problem, because I could no longer apply 5nm or 1000 feet. I reasoned then that if my controllers applied the right separation, my unit was meeting the objective of safe ATS. However, I was starting to realise that this correct application of separation might not be enough. My misgivings were confirmed when I decided to take up safety management and found out that there was more to safety than just the correct application of separation. After all I realised that, although the ATCOs are in the hot-seat, there is a host of support staff helping them provide a safe service. Certainly these people – such as ATSEP[1], ARO[2], MET and ATS management, cannot apply 5nm or 1000 feet!

> I was starting to realise that this correct application of separation might not be enough.

This situation caused me to ponder on the question 'Who's responsible for safety?' and I found out that the answer was very simple – it's everybody involved in ATM.

1- Air Traffic Safety Electronics Personnel
2- ATS Reporting Officers (who receive reports concerning air traffic services and flight plans before flight departure)

I pick up again the story from the ATCO point of view as this is the area I'm most familiar with, having spent a large part of my career in the hot seat. What can an ATCO do beyond the application of correct separation to ensure safety? Surprisingly, the answer is that there are many other things that can be done even at ATCO level. The most important, in my view, is reporting.

In his recent book[3], Prof Dekker notes the existence of 'Omertá'[4] between controllers. Often the significance of reporting is not explained to staff and in the past, with all the investigations seemingly following the 'bad apple' theory, there could have been some very slight justification for Omertá. However, we now know that the real purpose of reporting and investigation is to find out what went wrong and how in order to learn lessons and prevent re-occurrence. Regrettably there are still States, Units and Managers who have not grasped this significant point in ensuring a safe service. I know that it's hard to break down the perception of a blame culture and credibly declare that an organisation has adopted a Just Culture. But my opinion is that reporting an occurrence, particularly where there is a Voluntary Reporting Scheme or a Confidential Reporting Scheme, is not a betrayal of colleagues, it is a moral obligation to help ensure a safe service.

For me, however, reporting goes beyond the filling of occurrence reports. Both ATCOs and all other staff can do more. Reporting can also be used to raise concerns about safety issues such as inadequate procedures, inappropriate airspace design, uncomfortable ambient conditions and excessive overtime. As secretary of the ATCO Association, I often reported – or rather complained or whinged about, as my boss used to say – such issues!! I am sure that there will be many who disagree with me on this subject as they will not consider such concerns as potential 'safety issues'. In my mind, though, it is quite clear. Anything that prevents the ATCOs or their support team from providing a safe service is a safety issue. Remember we say that 'everybody is responsible for safety'.

Where to stop with reporting? Frankly, I don't have an answer. My recommendation is 'if in doubt, report it'. After all it takes only a few minutes to jot down a note to your supervisor / manager / safety representative to draw their attention to a possible safety concern. That action may well prevent your colleague from filling an occurrence report later and facing an investigation.

To conclude, we need to know more about what's happening out there. Without this information it is almost impossible to ensure a safe service.

By the way do you know what happened behind the cloud to the two aircraft in the picture? I leave the answer to your imagination. All I can say is that nothing was reported!

Anthony Seychell

is an experienced ATM safety expert who has both an ATC operational and an ATC engineering background.

He worked previously at Malta Air Traffic Services in a variety of posts, the last being that of Safety Manager.

He joined the EUROCONTROL in 2007 and currently works for the ESP where he is coordinator of the Programme to support ANSPs in SMS Implementation (SASI) and provides support to other ESP activities.

3- Just culture : balancing safety and accountability, Aldershot, 2007
4- A strict code of silence in which disclosure is seen as self-destructive conduct

Lessons from (the) Hudson

By Jean Pariès

Interview of Captain Sullenberger by US presenter Larry King

"You knew you were gonna crash"?

"I wouldn't put it quite that way. I would say that I expected that this was not going to be like every other flight I'd flown, for my entire career, and it probably would not end on a runway with the airplane undamaged."

"Are you saying this as calmly as you were then?"

"I was not this calm then, but I was very focused, talking to air traffic control, and I quickly determined that we were at too low an altitude, at too slow a speed, and therefore we didn't have enough energy to return to La Guardia, because it's too far away and we headed away from it. After briefly considering the only other nearby airport which was Teterboro in New Jersey, I realized it's too far away, and the penalty for choosing wrongly, and attempting to make a runway I could not make might be catastrophic for all of us on the airplane plus people on the ground.

We have all watched, again and again, the breathtaking images of US Airways Flight 1549: the floating airliner, the passengers on the wings, the merry-go round of the ferries. And for days after, we read the emphatic words making the front pages of our newspapers. "Owe Lives to Hero". "Miracle on the Hudson River". A gentle kiss of a landing on the Hudson River has overshadowed hiking on the waters of Lake Tiberiade. Undisputable signs of modernity... And the entire crew was awarded, among other honours, the Master's Medal of the Guild of Air Pilots and Air Navigators (GAPAN). "This emergency ditching and evacuation, with the loss of no lives, is a heroic and unique aviation achievement" the GAPAN citation read.

All kidding aside, it was indeed unique. There have only been very few documented occurrences of controlled ditching by commercial public transport aircraft. In May 1970, Overseas

National Airlines Flight 980 from New York Kennedy to St Maarten in the Caribbean ran out of fuel after several unsuccessful attempts to land and diversions due to bad weather. The DC9 was forced to land in shark infested waters, 30 miles off the coast of St. Croix, resulting in 23 fatalities and 40 survivors. In 1996, a hijacked Ethiopian Airlines Boeing 767 was forced to ditch off the Comoro Islands in the Indian Ocean after it ran out of fuel. Of the 172 people aboard, 127 died. And it appears that prior to our recent US Flight 1549, only one known ditching of a passenger jet had been managed without fatalities: in St. Petersburg, Russia, in 1963, an Aeroflot Tu124 jet ran out of fuel during an emergency and landed on the Neva River. All 52 people aboard survived and the jet was towed to shore.

But is the Hudson River case a miracle? Or is it a heroic achievement? Or is it something else?

In the 1990s the US Bird Strike Committee estimated that there is a 25% chance in any decade that birds could cause a major airline crash. Taking into account the bird population growth and the adoption of twin-engine jets as the standard worldwide, the odds of a total thrust loss have probably increased even further. So it is worth considering whether only providence or heroic skills saved the day. Can we fish some ordinary safety lessons from the Hudson River? Yes, I believe we can. I believe that what happened is in some sense the opposite of a miracle: something fundamentally engineered into the aviation system.

Let's begin at the beginning. Jet engines are designed to withstand bird strikes. They must demonstrate their ability to cope during a series of certification tests in which two-kilogram chickens are shot out of a cannon at their blades while running at full power. In fact, engine blades are incredibly tough, and aircraft engines routinely ingest birds without a hiccup (tens of thousands of encounters every year). But all tests have limitations, and these tests do not consider weights of four kilograms or more, not to mention a multiple ingestion of birds of this size. So when the US Airways Airbus A320 carved into a flock of Canada geese about two minutes after takeoff, what happened clearly exceeded the engine designers' worse case scenario. Several of these huge birds were almost simultaneously sucked into both engines. And both engines promptly quit.

In the 1990s the US Bird Strike Committee estimated that there is a 25% chance in any decade that birds could cause a major airline crash.

Did all of our safety protections quit as well? No. True, the first (and main) line of defence was penetrated at this point. Yet because no twin engine aircraft has been made immune to dual engine failure, especially when flying through a flock of Canada geese, a total loss of thrust has been anticipated in the aircraft certification principles. Several systems (e.g. Auxiliary Power Unit, Ram Air Turbine) and procedures are available to ensure that the crew can continue to maintain some aircraft control, even if, in the case of vertical speed, this control is limited. Since this thrust loss scenario can happen over water, ditching has also been anticipated. Landing a large jet on water is highly unusual, but it's something pilots occasionally train for, even if simulation has obvious fidelity limitations in this case. So, the superb landing on the Hudson is the compound result of excellent pilot judgment on the day and the applica-

Jean Pariès

Jean Paries graduated from the French National School of Civil Aviation as engineer, and then joined the DGAC for several positions dealing with air safety regulations.

He was a member of the ICAO Human Factors & Flight Safety Study Group since its creation in 1988. In 1990, he joined the Bureau Enquêtes Accident as Deputy Head, and Head of Investigations, where he led the technical investigation into the Mont Saint-Odile Accident, 1992. Currently Jean is CEO - of Dédale SA.

He holds a Commercial Pilot Licence with Instrument, Multi-engines, Turboprop, and Instructor ratings and a Helicopter Private Pilot Licence.

Lessons from (the) Hudson (cont'd)

tion of skills developed from previous flight experience and training, excellent aircraft behaviour mainly thanks to the Airbus fly-by-wire design and its embedded stability and stall protection, and quite a large dose of luck. It was daylight, there was a clear sky and good visibility, there was a river rather than the open sea nearby, the water surface was smooth with only a light surface wind and the crew was familiar with the area. The A320's ability to float long enough for all of Flight 1549's passengers and crew to be safely evacuated was not a miracle, but a result of intentional design (including a "ditch button" closing all valves to make the cabin watertight, apparently not used in the incident), as well as a result of cabin procedures for ditching and evacuation (including the routine lifejacket briefing that most of us pay no attention to while settling back into our seat...) very professionally implemented by the entire crew. There was also more than a touch of providence – no boats were hit, but many were readily available at the scene to assist with the rescue.

And what about the contribution of air traffic control? I am not an ATC expert, but listening to the communication record available on the web, I believe the controller did a superb job, responding quickly and efficiently, being both strong and flexible, staying calm, asking for intentions without inquisition, offering solutions without insisting. When the crew asked if they could attempt an emergency landing in New Jersey, he quickly contacted Teterboro' and obtained permission for a landing on Runway 1. Was he also an exceptional controller, a kind of a hero? Maybe he was. Or maybe he wasn't. Maybe he was just an "engineered hero": well selected, well trained, well managed, well motivated in his job, and definitely taking his full share of responsibility for flight safety, regularly asking himself and colleagues questions about "what they would do if…", keeping informed about safety, reading about safety. Exactly like US Airways Captain Chesley Sullenberger who left the book he was currently reading behind in the A320's watery cockpit. And guess what book? "Just Culture: Balancing Safety and Accountability" by my esteemed friend and colleague Sidney Dekker! And he might very well have left behind a book by another of my friends and heroes: the great Jim Reason, who began to set the scene for modern safety thinking about twenty years ago, or ironically – but then nobody would have believed him – a book by Patrick … Hudson, someone who has spent years exploring the notion of Safety Culture, and who understands that Safety Culture is more than statistical answers to a Safety Culture questionnaire.

The magnificent, dramatic and ironic lesson of the Hudson(s) is that we can, and we should, prepare to be unprepared.

These books, amongst several others, would all convey the same essential message: safety is something emerging from an organisation as a whole. Safety is not about flying "on a wing and a prayer", not about heroes and miracles, not about super pilots or super controllers commanding the impossible, not even about super CEOs speaking the super truth and managing the unmanageable.

Safety is created when an organisation generates properly selected and trained people who use their relevant skills to implement properly designed processes on well-designed and procured equipment to reach reasonable goals, while feeling responsible for safety whatever their level in the hierarchy, and recognizing that they may screw up sooner or later, and still keeping in mind that Canada geese can fly too. Safety is about the collective will to be safe, a collective comprehension of what makes your system safe, and a collective feeling of being exposed to hazards and mishaps. Safety is about building, day after day, good reasons to be confident, while keeping, as a form of modesty, a touch of fear embedded into your professional pride.

The magnificent, dramatic and ironic lesson of the Hudson(s) is that we can, and we should, prepare to be unprepared. Because, as Scott Sagan wrote, "Things that have never happened before happen all the time". Indeed, things happen, just like that, as they did over New York City, in just a handful of seconds. Things that we will never be able to anticipate in detail, and at the same time, things that we will only be able to cope with if we have anticipated them to some extent. The future is unimaginable, so please, try again. Think, mentally simulate, discuss, read, then read again, challenge yourself, challenge your team, challenge your organization. Because when it is time to ditch, it's you, your team, your company at the controls, nobody else. As National Transportation Safety Board (NTSB) Member Higgins put it at a press conference after the accident: "These people knew what they were supposed to do and they did it, and as a result, nobody lost their life."

One of the small differences between a pant-wetting splash in the Hudson, and a dive into disaster. ■

Safety Culture in ATM: through a glass darkly

There are two points in the title which are central to this topic. Firstly, safety culture is a consideration for the whole air traffic management organisation, not just the operational staff. Secondly, safety culture is a complex phenomenon.

By Anne Isaac and Magnus McCabe

As Don Quixote proclaimed (whilst charging at windmills) truth, sanity and madness are merely a question of perspective. In other words, we humans have an imperfect perception of the world we can see – our perception of abstract phenomena such as 'culture' is even less perfect.

Nothing in safety culture is clear-cut, black or white, true or false, which can make this topic a controversial area to discuss.

Early Work

As with the concept of situation awareness, safety culture is a process, not an outcome. Organisations therefore need to evolve a strategy which enables the teams and groups to develop their attitudes and behaviours towards safety rather than dictating what these will be.

The earliest development in aviation safety culture was at the Flight Safety Foundation's 37th seminar in 1984. Redding and Ogilvie gave a paper on the 'Cultural effects on cockpit communications in civilian aircraft'. Their work was based on the research of Geert Hofstede, whose influence in the cultural influences in aviation would be pivotal. This discussion was followed by the seminal works of Wiener, Kanki and Helmreich in their book on 'Cockpit Resource Management' (CRM). In this book Neil Johnston, from Aer Lingus, introduced a compelling case about the relationship and influence of culture on CRM training, particularly on system safety performance. This approach complimented the approaches of Frank Hawkins' SHELL model and James Reason's accident causation model in dealing with system performance.

Cultural Factors

These approaches also need to be viewed within the context of several fatal accidents to fully realise the impact of a coherent safety culture approach.

Those in aviation safety will be well aware of the corporate cultural influences in the 1989, Air Ontario, Fokker F28 crash at Dryden, Ontario following from the merger of two quite different airline companies. In 1992, the Airbus A320 crash into Mont St. Odile alluded to the issues of corporate culture which shaped flight crew performance as well as the influence of social context in shaping organisational performance. A third air accident a year later in Australia – a Piper Navajo which crashed while conducting a night circling approach at Young, New South Wales – also concluded that the organisational, corporate

Safety Culture in ATM: through a glass darkly (cont'd)

and cultural factors of both the operator and Civil Aviation Authority were considered to have had a bearing on the accident.

These accidents, and the considerable academic debates which have followed, have been clear in their assertion that safety culture is a tripartite concept; one which is based on national, organisational and professional aspects. This can be demonstrated in the following figure:

Figure 1: A model of the intersection of cultures and their outcomes (adapted from Helmreich and Merritt, 1998)

These elements have been highlighted in flight crews by their behaviours and from this analysis the following cultural influences can be demonstrated.

Safety Attitudes

There has been a large amount of research data which has been generated from the Crew Resource Management (CRM) programmes in various airlines, but what have we found from the ATM environment? Several years of data gathering has certainly demonstrated, although rather difficult to prove statistically, that exposure to Team Resource Management (TRM) has influenced the attitudes and behaviours of operational staff in particular with regard to team working, reliance on challenging colleagues when required and improved understanding of communication. In terms of incident events the data also suggests that those operational groups who have experienced TRM reduce the number of team-related incidents by half.

It is clear that the relationship between attitudes and behaviours is greatly influenced by safety culture and that safety culture is a product of attitudes and behaviours.

It is clear that the relationship between attitudes and behaviours is greatly influenced by safety culture and that safety culture is a product of attitudes and behaviours. This is an iterative process which takes time to develop and more time and effort to maintain. The figure 3 demonstrates this relationship.

Cultural Differences

In terms of **National Culture**, those behaviours which have demonstrated an increased probability of an unsafe flight are associated with non-compliance to rules and procedures and poor leadership.

With regard to **Organisational Culture**, those behaviours which demonstrate a commitment at all levels to lesson learning, whether it be from adverse events or near misses, are characteristic of a sound and mature safety culture. This can be demonstrated in terms of individuals' responses to error by the following figure.

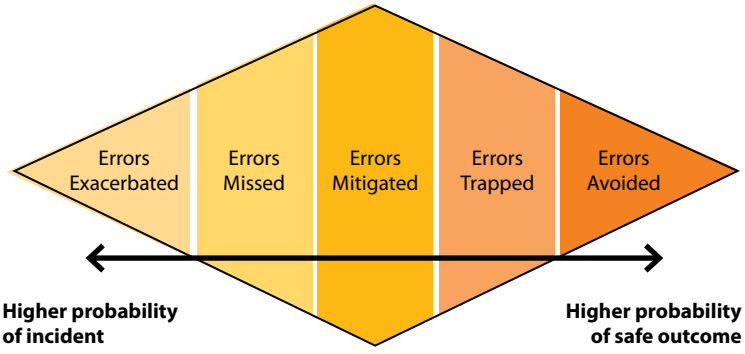


Figure 2: Operator responses to error (adapted from Helmreich and Merritt, 1998)

With reference to **Professional Culture**, the probability of a safe operation is linked with professional pride and motivation as opposed to behaviour demonstrating invulnerability and disregard for the team.

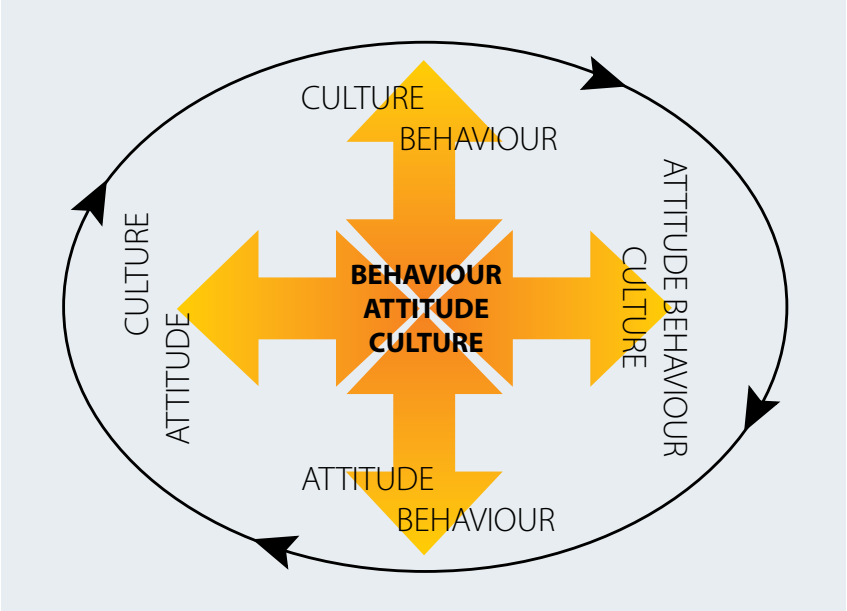


Figure 3: The inter-relationship between attitudes and behaviour and safety culture

Cultural Elements

Since the important first steps in developing an awareness of Safety Culture were taken, our understanding of the constituent components of Safety Culture has become more sophisticated. We now talk about – and can describe in terms of 'good' and 'bad' – such elements as Just Culture and Reporting Culture. Indeed, the inter-reliance of the building blocks of a Safety Culture have been accurately described by many, among them Prof. James Reason.

Just Culture

The foundation of a good Safety Culture is a functioning Just Culture – one in which members of an organization, from CEO to frontline assistant, controller, or engineer, understand that genuine errors will not be punished but investigated and understood. At the same time, however, a clear line is drawn between behaviours which are acceptable and those which are not. Crucially, where that line is drawn and the reasons why it is drawn there must be clearly understood by all.

Reporting Culture

One of the results of a strong Just Culture is that a healthy Reporting Culture will develop. When the members of an organization have confidence that their errors and/or safety concerns will be treated justly, they are more likely to become engaged proactively in safety and report things *before* they lead to an incident or accident rather than waiting until the incident has occurred and a report is mandatory.

Learning Culture

Such open reporting in turn leads to a far stronger and broader Learning Culture. Learning lessons is, after all, the flip-side and major benefit of an incident: once the reasons for the incident occurring have been identified and lessons have been learned, the chances of the incident repeating itself are greatly decreased.

Imagine then the exponential benefit of learning preventive lessons from reports *before* an incident has even occurred. Sr. Quixote would never have had to expend all that energy tilting at windmills – those who had previous experience would have warned him to look for giants elsewhere.

Safety Improvement

This is the overarching lesson to be learned by every level of an organization: that the organization's demonstration of a commitment to Just Reporting and Learning Cultures will shape the perceptions, attitudes, and behaviours of individuals within that organization. This will, in turn, drive an improvement in safety performance. That, surely, must be the ultimate goal of a good Safety Culture in ATM – to increase the awareness of all stakeholders through proactive lesson-learning and turn the organization's Safety Culture into the strongest safety net in its armoury. ■

Anne Isaac

Anne Isaac leads the Human Performance development work in the pilot/controller interface in NATS, UK. She gained her PhD in Cognitive Neuropsychology at Otago University in New Zealand. Her previous work has been in the development of incident investigation tools and techniques in European ATM, the introduction of TRM into the ATC environment and the introduction of Day to Day Safety Surveys techniques into NATS. She has written several book chapters, academic papers and the book Air Traffic Control: the human performance factors.

Magnus McCabe

Magnus McCabe joined NATS 20 years ago. He has worked in many operational areas including ATC Training, Operational Procedures Design, TRM Training, ATM Incident Investigation and Human Factors in ATM. He is now works in the Division of Safety at NATS HQ where, as part of the Safety Improvement Team, he leads work on Safety Culture, Safety Leadership and Safety Training.

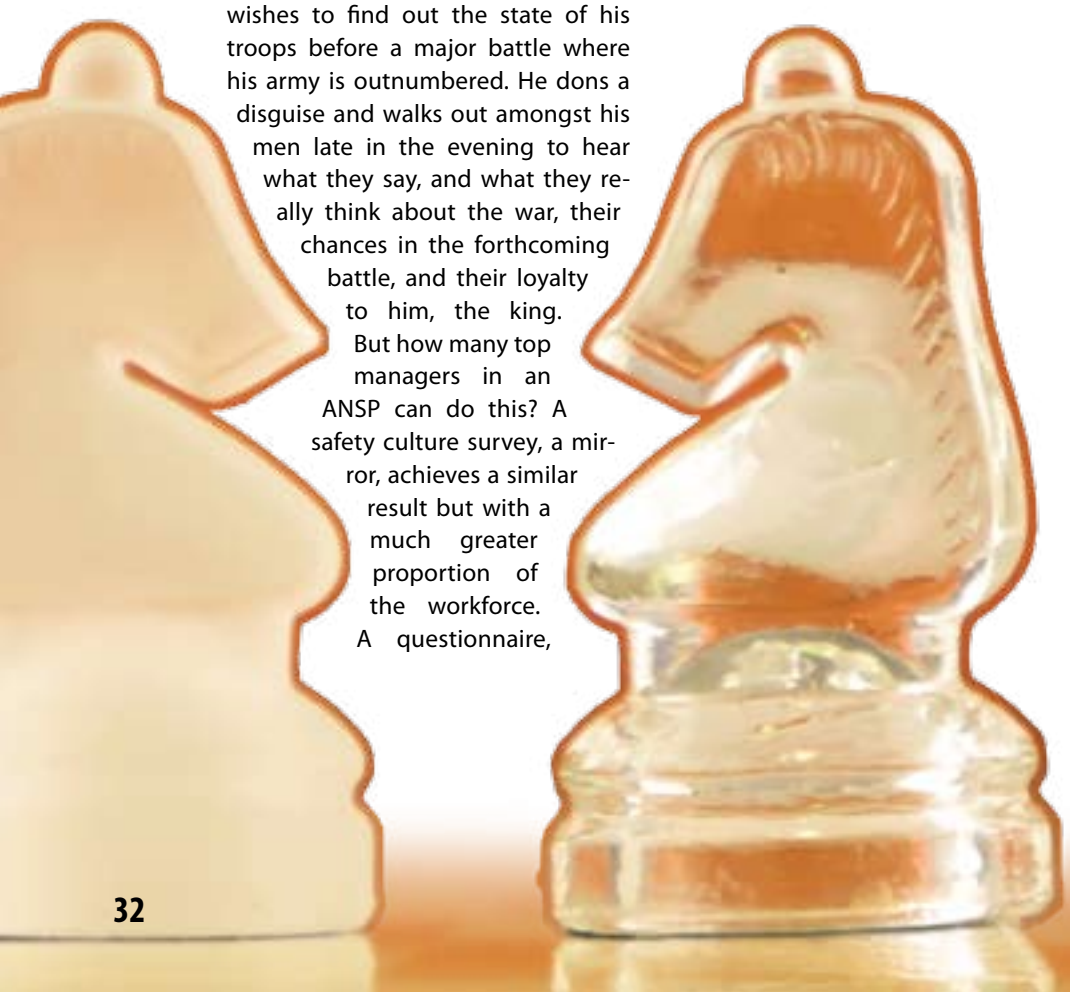
Through the looking glass: inside ATM safety culture surveys

In Europe in the past half-decade, twelve ANSPs have gone through a safety culture survey process, eight of them with EUROCONTROL. This process is about finding out where safety culture is strong, where it is weak, and how to improve safety culture in the weak areas.
By Barry Kirwan

The process is basically one of reflection, assisted by an outside agency. A safety culture survey is therefore something like a mirror – it is an opportunity to see your organisation the way an informed outsider might see it. So, how does it look so far from the other side of the mirror? `

Mirror, mirror, on the wall…

In Shakespeare's Henry V, the king wishes to find out the state of his troops before a major battle where his army is outnumbered. He dons a disguise and walks out amongst his men late in the evening to hear what they say, and what they really think about the war, their chances in the forthcoming battle, and their loyalty to him, the king. But how many top managers in an ANSP can do this? A safety culture survey, a mirror, achieves a similar result but with a much greater proportion of the workforce. A questionnaire, anonymously filled out by at least thirty per cent of the target audience of an ANSP, followed up by a series of workshops and focus groups, equally anonymous, where people are allowed to voice their opinions, but also are asked for supporting evidence by way of examples, can lead to a rich picture of an organisation's safety culture. However, as we all know, particularly as we get older, everything we see in a mirror is not always to our liking.



Most organisations nevertheless react positively to the picture they receive. This is helped by the fact that every ANSP so far analysed has had strong safety culture 'assets', in particular a sincere commitment to safety running throughout the organisation; effectively the whole industry appears to be permeated by a professional commitment to safety, irrespective of national cultural traits. This is something ATM should be proud of, because not all industries see this in their surveys.

There are inevitably blemishes in the reflections which ANSPs see. Some common ones are not that surprising given the pressures on ATM at the moment:

- a conflict between 'productivity' (shifting aircraft; delivering an excellent service to pilots) and safety risks;
- difficulties in keeping on top of safety during periods of significant change and system upgrades;
- problems in learning from incident reports fast enough;
- concerns over the right allocation of resources for safety,
- difficulties in dealing with regulatory authorities, many of which are relatively inexperienced with ATM regulation.
- safety in teams being handled in uneven or non-optimal ways

Barry Kirwan

Ppsychologist, formerly Head of Human Factors both in the UK nuclear industry as well as at UK NATS, he is currently leading Safety Research at EUROCONTROL.

He leads the Safety Culture Enhancement programme for the European Safety Programme (ESP). He is supported by a small but dedicated team of safety culture practitioners who are helping ANSPs enhance their safety culture in practical ways.

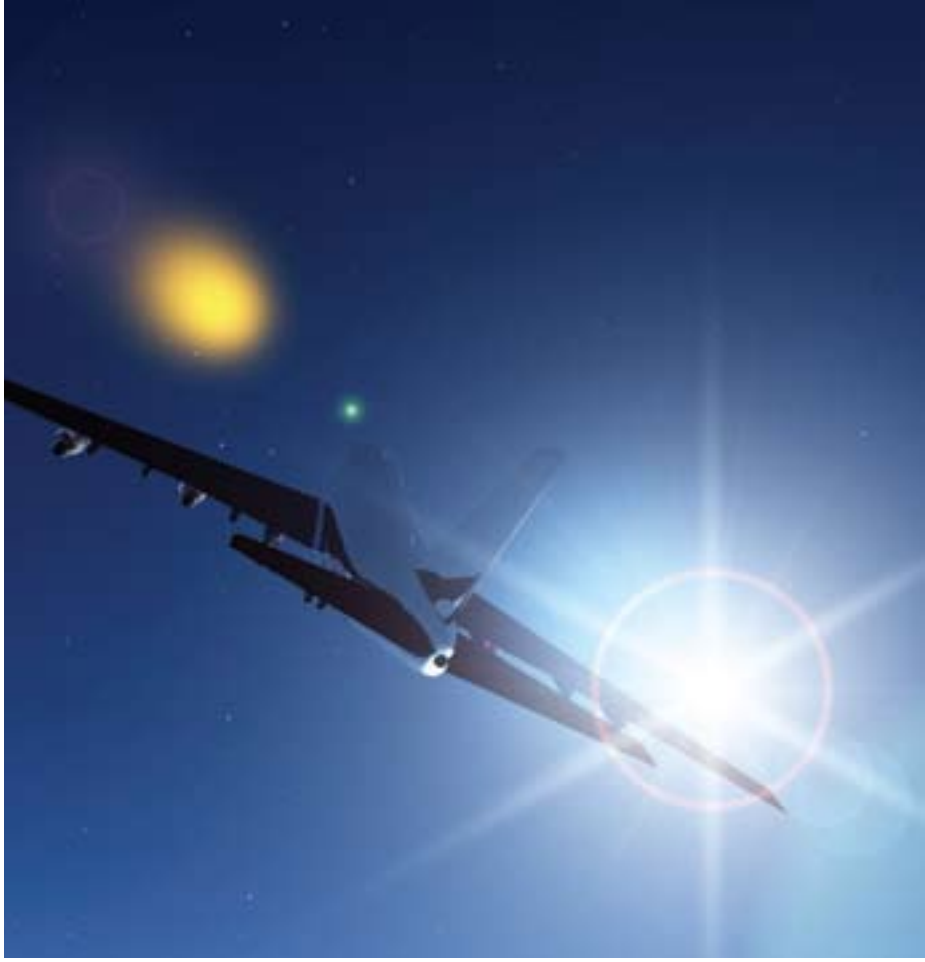
Additionally, there are typical issues that arise in most organisations, whether inside or outside ATM: issues of trust between the 'shop floor' (Operations and Engineering) and management; and also perceived communication problems. Sometimes this is actually too much information, so that key messages are lost or diluted; alternatively communication can be seen as too uni-directional (top-down) without the reciprocal bottom-up channels.

So what? These are just perceptions, right?

It is important, when considering such results and insights to answer the 'Well, so what?' question; after all, these are just perceptions, right? Let's tackle the second one first. Everything we do is based on perceptions, and our interpretation of them. . If you are in a meeting and being told something by someone, but the way they say it – their body language the language they use, things you've heard from others, and your entire experience up to this point in time – makes you think they are lying, do you take what they say at face value? Which do you trust more – your own perception and judgement, or what someone says? Let's take a non-ATM example: during a difficult and potentially dangerous technical problem a nuclear power plant control room operator shuts down the reactor to be on the safe side. After the event, it becomes clear that there was not really a serious risk. What happens to the operator? Does he get fired for costing the company in excess of a million euros during the week-long shutdown? This scenario played out some years ago in the UK. Everyone held their breath in the day after the expensive, unplanned shutdown, waiting to see what would happen to the understandably nervous operator. Eventually the CEO sent a message to the operator. Did he fire him? No. Did he admonish him? No. He actually thanked him for taking the safe course of action. Cynics (aka realists) will point out that this was a smart CEO. But does it matter? If he had fired the operator, a negative safety culture message would have shot through the company, and next time there was a similar situation with real risk, the operator could well have made the wrong decision.

'Everyone knows about some accident just waiting to happen'.

Now back to the first question – *so what?* This can be elaborated as follows: do these identified issues, assuming we believe them, lead to actual safety risks, e.g. the increased likelihood of a mid-air collision or runway collision? This is something that the EUROCONTROL people doing surveys focus on a lot, particularly in the workshops, and also in the final write-up of the report to the ANSPs when specifying recommendations for improvement. One of our questions, actually borrowed from the FAA's safety culture approach, is as follows: 'Everyone knows about some accident just waiting to happen'. First thing we do is check with the focus groups, if this one had more than 25% of people agreeing with it, what did they actually mean, because sometimes they mean simply that they are aware of the risks – it's part of their job. However, sometimes they mean, yes, we think an accident is imminent.



Through the looking glass: inside ATM safety culture surveys cont'd)

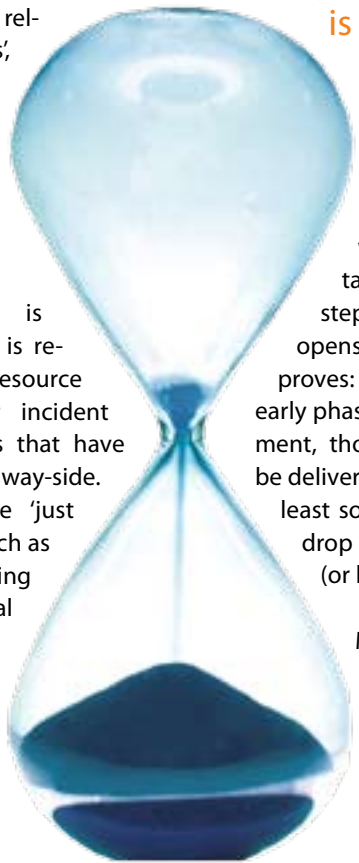
There's a hotspot they're very nervous about. So we ask the obvious questions: *what type of accident? Where would it occur? How would it occur? What is being done about it?* The 'evidence' we get back is anecdotal, but the ANSP can at least judge whether it sounds reasonable, and then check it out.

Conflicts between productivity and safety are common, but again we ask for examples, e.g. short-cuts in procedures or minor rule violations, or controllers working without any effective 'plan B', so that if anything deviates they are on a fast-track to a separation loss. Equivalent issues can arise with engineers, who are often under significant schedule pressures, and so they sometimes cut safety corners accordingly. Similarly, problems in learning fast enough from incidents mean that incident patterns will recur, and more generally incident investigators and safety sections will be kept on the 'back foot', always reacting to incidents and trying to play 'catch-up', rather than being able to stay ahead of the game, anticipating events and putting in measures before nasty trends are allowed to manifest as accidents. Again, problems of (mis)trust between different layers or departments, or between different regions in a country, lead to ineffective transfer of (safety) information and learning in the organisation. Imagine if different parts of your own body decided not to get along – just how difficult would that be?

Okay, but you can't change safety culture, can you?

The second implication of the 'so what?' question is definitely harder to answer, and can be paraphrased as follows: so what, you can't change an organisation's safety culture! Well, I'd have to admit that compelling evidence for successful changes in safety culture is thin on the ground, and what evidence exists suggests this is no overnight process, taking long time-scales, possibly years to have a major change. But are we looking for a major change? Usually not. Some of our recommendations following surveys – and they differ for each ANSP, though there are commonalities – can offer relatively 'quick wins', items which can be addressed or corrected in a timescale of months rather than years.

Communications is one of these, as is reinstating Team Resource Management or incident learning sessions that have fallen by the way-side. Where there are 'just culture' issues, such as supervisors varying in how they deal with controllers have had an incident, re-training and peer focus groups can lead to rapid results. Similarly, confusion over the role, scope and working arrangements of safety groups (a common issue, incidentally) can be addressed fairly quickly. Safety reporting can usually be improved within a year if there is management will to do so.



Okay, so how long is this going to take?

The more thorny issues, such as perceived imminent accident threats, productivity-safety conflicts, and lack of trust within the organisation may take longer, but once the first steps are taken – once dialogue opens – the picture already improves: intent is all-important in the early phase of safety culture improvement, though tangible results must be delivered within about a year on at least some issues, or else trust will drop back to its previous levels (or lower).

Most ANSPs develop a strategic safety action plan

Our formal agenda is to help another sixteen ANSPs go through the process in the next four years

to address the safety culture issues raised, whether they adopt the recommendations arising from the survey, or decide to implement alternative solutions. Then comes the 'long haul' of maintaining the momentum and commitment at all levels in the organisation (particularly the top level, as the management board hold the 'purse strings'). The next brave step, after having implemented improvement measures for a few years, is to carry out a second survey to see if safety culture has improved. Of the EUROCONTROL-analysed ANSPs, the first one has now reached this point, and has improved, and a second ANSP will go through its second round at the end of the year.

The good news is that we've just (June 09) got the results of an ANSP who has now done the survey twice, and put a lot of effort into safety in–between the two surveys. There have been large improvements in key areas. We're still working on the data, but it looks really promising.

On the bright side…

All the organisations we've worked with so far have been professional and accommodating in making these surveys work. People have also been honest, surprisingly so in some cases. We never know what we will find when we start these surveys, but usually by the time we reach the workshops we are sure that we are getting to the hot-spots in safety culture, sometimes resulting in 'hot discussions' where people argue passionately about safety. We see people already committed to safety wanting to do a better job of safety. This passion for safety is always rewarding in itself, and we try to help the organisation see how best to channel it to get the best results.

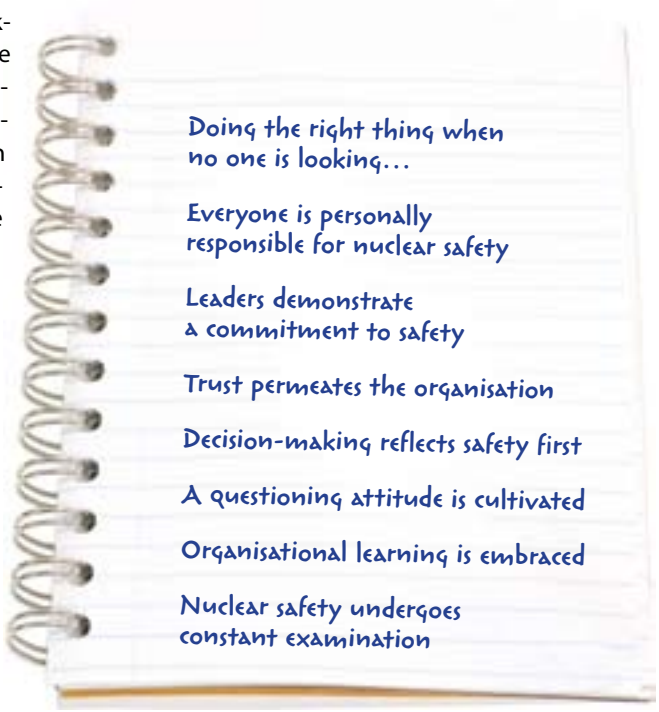
Our formal agenda is to help another sixteen ANSPs go through the process in the next four years, and ideally, we'd like to see (as would CANSO, by the way) every European State undertake a Survey, with or without EUROCONTROL.

One more thing…

If anyone says *'maybe with this current economic crisis, now is not the right time to look at our safety culture'* – please correct them, because economic pressure challenges even good safety cultures, so it is exactly the time to address an organisation's safety culture.

Someone else's mirror…

I recently visited a nuclear power company (safety culture 'started' in nuclear power, following the Chernobyl accident in 1986), and I spotted a safety culture poster on the wall. Below is what I had time to write down. Food for thought… ■



Trust or doubt?

Earlier this year, an Airbus A340-500 operated by Emirates Airline nearly failed to take off when departing Melbourne, Australia for Dubai...

By Gilles Le Gallo

The Preliminary Report of the Investigators[1] says that the takeoff was planned as a reduced-power takeoff with the First Officer as the handling pilot for the departure. When the Captain called for the First Officer to rotate at the calculated airspeed, the attempt to do so was initially unsuccessful. After a repeat of the call, the First Officer applied a greater nose-up command and as the aircraft nose was raised, the tail made contact with the runway surface, but the aircraft did not begin to climb. Only when the Captain then selected maximum take off thrust did the aircraft begin to climb, achieving a positive rate of climb 300 metres past the runway end.

Whilst preparing to return to Melbourne, the crew noticed that they had inadvertently entered an aircraft take-off weight which was 100 tonnes below the actual take-off weight of 362 tonnes when completing their pre departure take-off performance calculation using the on-board EFB[2]. This had led to the calculation of a thrust setting and take-off reference speeds that were much lower than the ones required for the actual aircraft weight.

The aircraft subsequently landed without further event at Melbourne. The tail strike was found to have caused substantial damage to the tail of the aircraft and also damaged some airport lighting and the airport instrument landing system.

1- Aviation Occurrence Investigation AO-2009-012 Preliminary Report by the Australian Transport Safety Board see http://www.skybrary.aero/bookshelf/books/666.pdf

2- EFB is the accepted abbreviation for the 'Electronic Flight Bag' often now carried on the flight deck; think 'laptop'!

Although the Investigation into how this error came to occur is ongoing, we can already see that output from the calculation was so different from the sort of figure that should have been expected that it might seem surprising that it wasn't noticed.

How come experienced pilots did not spot such an error?

Crucially, there might be seen to have been over-reliance and/or over-confidence in the latest EFB system. A focus on the process of obtaining 'magic' parameter figures for take-off rather than questioning the results. Second thoughts about the results output would have triggered a remark such as "sounds like pretty slow take off speeds for our aircraft on this kind of leg" based upon an order of magnitude of difference to figures from previous experience.

We learn to work out the order of magnitude of figures at school even though at the beginning this might not be necessarily obvious. When my daughter was at that stage I used to check her homework. One day the maths exercise was about calculating the surface area of the kitchen floor. She had worked out that the kitchen was 10 square millimetres. When I looked at her work I immediately said "This is wrong" and she replied without delay "How can you say that, you did not do the exercise!" On that day she learned the concept of the order of magnitude of figures. We must all have had this experience somewhere on the way through our general education.
ATM is a system and like any system it is composed of equipment, procedures and humans. The tail strike event above shows that equipment (the aircraft) should not be trusted blindly. What about the other elements of the system, say the human part?

We need to trust in our capability to do our work. An ATCO should not go to work telling himself "Gosh no way I am going to make it today". Conversely would it be a good idea to think "I am so good that I need no help to do a perfect job – not the procedures worked out by those useless people in the offices neither my colleagues – aren't they all dumb"? Well not really.

ATCO should not go to work telling himself "Gosh no way I am going to make it today"

What is needed is a good balance between trust and doubt in all elements of the system, handing-over/taking-over without following a structured process leads to a poor start of shift quite often….just like getting rid of cross-checking procedures for data entry may not be a good idea.

Editorial Comment

Sadly, the recent example which Gilles has chosen to illustrate his very important point is just the latest in a long list of similar occurrences involving the lack of any flight crew 'gross error check' to disclose mistakes in data input or manipulation using EFBs. Unless there are serious actual consequences, many events of this sort are not publicly investigated. That such things can happen in a well-respected operation like Emirates as well as to freight charter operators with an arguably rather less secure operational foundation reminds us that human performance is no respecter of your operational environment or circumstances. At least flight crew making pre-flight performance calculations – and there were four of them in that particular flight deck for take off – have the opportunity to cross check each others actions as well as to independently review the results. Sometimes everyday life for a controller can be rather more solitary, making cross-checking a more self-contained affair! ■

Gilles le Gallo works at EUROCONTROL. He has an extensive experience in operational Air Traffic Control, Safety Management System approaches, procedures and practices and Operational Safety improvements.

Who needs safety nets?

Are you responsible for safety? That's an easy question to answer today, for we all (or most of us anyway) understand that everyone in the aviation industry, from the top to the bottom, is responsible in some way for safety. But it was not always so.

By Ian Wigmore

I remember the managing director of an airline I worked for not so many years ago who insisted that safety was the responsibility of the chief pilot and had nothing to do with him. In the end, the Civil Aviation Authority warned him that the airline's air operator's certificate would be withdrawn unless responsibility for safety was exercised at a very senior level. Nowadays, this is the norm in most countries.

Further down the scale, safety in the air is ultimately the responsibility of the aircraft commander, but individual crew members, in the cabin as well as on the flight deck, have a duty to assist him/her in exercising this responsibility. At one time, however, crew members were not encouraged to offer advice or to question the commander's decisions, sometimes with catastrophic results. After a number of avoidable accidents the problem was addressed by the introduction of Crew Resource Management (CRM). CRM training programmes are now mandated in Europe and most other parts of the world.

Similar considerations apply to aerodrome management and in air traffic control. It is now well understood that airport authorities are responsible for ensuring that their airports are equipped and maintained in accordance with international standards, and that air traffic control units are supported by adequate equipment and training to ensure safe standards of operation. Following the example set by CRM on aircraft, Team Resource Management (TRM) training programmes are now conducted to improve co-ordination within the ATC team.

So we are all responsible for safety. Our team members are our first line of defence – our first safety net – but they are not infallible. The real question concerns the manner in which we exercise our responsibility for safety. Are we conscientious and proactive, or do we, like the controller in Bengt Collin's "Friday the 13th is on a Thursday" published in the last edition of Hindsight[1], sit back and wait to see what happens?

In the early days of commercial flight, aeroplanes were unreliable machines that failed frequently. Consequently efforts to improve safety concentrated on improving component reliabil-

1- see http://www.skybrary.aero/bookshelf/content/bookDetails.php?bookId=574

Ian Wigmore

spent thirty years flying with the Royal Air Force and then commenced a career in civil aviation working for two airlines before joining ERA as Air Safety Manager.

He subsequently worked as an aviation consultant specialising in airline safety and was the first Editorial Secretary of HindSight and the first Editor of SKYbrary.

Our team members are our first line of defence – our first safety net – but they are not infallible.

ity, providing fail-safe mechanisms and later, providing redundancy so that there was back-up to deal with the occasional failure. Later still, efforts turned to improving check lists, standard operating procedures and training.

At the same time, safety nets were gradually introduced in an effort to prevent disaster when all else had failed. At first these were fairly primitive, limited to innovations such as landing gear warning lights and over speed horns. Later, many other devices such as stall and take off configuration warnings were introduced.

Over the last 20 years, safety nets have become more sophisticated. Ground Proximity Warning Systems (GPWS) tell the pilots when proximity to ground may be a hazard and Minimum Safe Altitude Warning (MSAW) systems are gradually appearing to give a similar message to controllers. TCAS shows the pilots where nearby traffic is flying and if it gets too close, tells them how to manoeuvre the aircraft so as to restore safe separation. Short Term Conflict Alert (STCA) provides a similar warning of traffic confliction to the controller. The coverage of these safety nets is being extended to embrace more aircraft and air traffic systems.

New safety nets are under development. Area Proximity Warning (APW) will warn the controller that an aircraft appears to be about to enter controlled or other restricted airspace and Approach Path Monitor (APM) will warn the controller if an aircraft deviates from an instrument approach glide path. In the future, we may expect the appearance of more and more sophisticated safety nets.

At the latest reckoning, the Terrain Awareness and Warning System (TAWS), now mandated for many aircraft, has saved at least 30 and possibly as many as 100 aircraft from crashing into the ground. TAWS is a development of basic GPWS which identifies aircraft position over the ground using an on-board database containing an accurate computer terrain mapping of the world to give more timely warning of a potential ground impact. TCAS has also been extremely successful and has exposed to pilots how often they fly extremely closely to other aircraft, even in good VMC, often without realising it!

There is no doubt that these safety nets are effective but what needs to be clearly understood is how they must be used. Safety nets are intended as a last resort to prevent an accident when all else has failed. In theory at least, our normal operating procedures should make most of these safety nets unnecessary. For example, pilots should know where obstacles on the approach path lie and conduct their flights accordingly And controllers should clear aircraft so that they will not come into conflict with others and should monitor flight progress to ensure that the prescribed separation is maintained. And of course they do – well, most of the time…but what about the following events?

[1] In a series of articles published in 'Aero Safety World', Dan Gurney has described a number of TAWS successes. For example, in the December 2006 edition of the magazine[2], we learn how the pilots had planned for an ILS approach but the ground equipment failed a few miles before the initial approach fix. They were re-cleared for a straight-in non-precision approach on the same runway. The aircraft was 6 NM from the runway threshold descending through 500 ft above ground level when the TAWS generated a "TERRAIN, PULL UP" warning. The crew responded immediately and climbed to a safe altitude. The incident would probably not have occurred had they delayed commencing the procedure until they had briefed thoroughly.

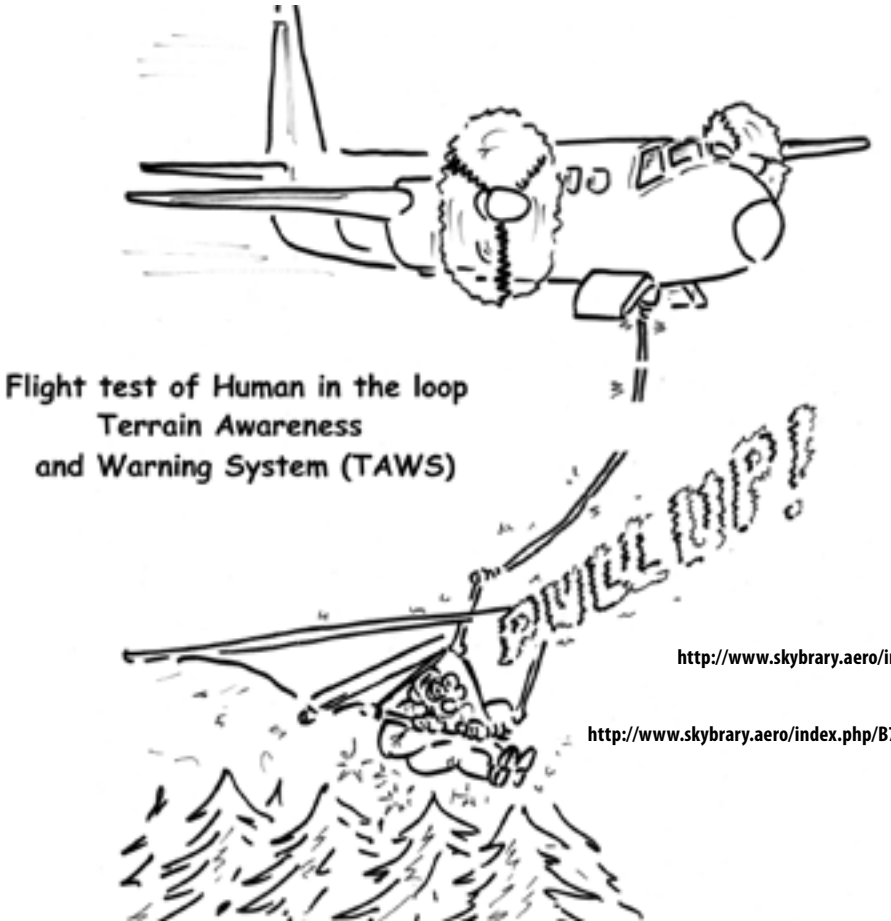
2- see http://www.flightsafety.org/asw/dec06/asw_dec06_p47-49.pdf

Who needs safety nets? (cont'd)

[2] We all know what happened over Überlingen[3] in July 2002. All 71 people aboard the two aircraft involved in this mid-air collision tragically lost their lives. Almost as notable, in the aviation world at least, is the fact that the pilots of one of the aircraft involved reacted incorrectly to the TCAS Resolution Advisory (RA) received on the flight deck. If they had followed the RA correctly the collision would have been avoided.

After this accident, ICAO reacted quickly to stress that pilots must always follow a TCAS RA even when ATC has issued contrary instructions. OK, you may say, it should never happen again, but that is not the point. The collision did not take place only because of an incorrect response to the TCAS RA. The primary cause was a breakdown in Air Traffic Control which allowed the two aircraft to come into conflict in the first place. I have deliberately said "it should never happen again." You may think I should have said "could not," but I am not prepared to bet any money on it! History tells us that truly unique events are extremely rare.

[3] Another accident involving safety nets which has hit the headlines recently is the September 2006 collision over Brazil between a Boeing 737 and an Embraer Legacy. According to the accident report, at the time of the collision the TCAS on board one of the aircraft was not on. It is probable that the collision would have been avoided if it had been. But once again, it must be stressed that the aircraft did not come into conflict because the TCAS was switched off but because the aircraft were flying on reciprocal tracks at the same flight level. The conclusions of the accident report[4] are complex and worthy of study but are not relevant to this discussion.



Yet another one in a million chance you may say, but also another situation that should never have occurred. Certainly, there is no room for complacency. TCAS, GPWS and the like are invaluable aids – true life-savers. But we are a long way from being able to rely on them as our first line of defence – and I do not think we ever will.

In spite of the very welcome introduction of more and better safety nets, and their increasingly widespread use, we must make sure that we do not drop our guard and become complacent. Responsibility for safety must never be delegated to technology. ■

3- see the official accident report at http://www.skybrary.aero/index.php/B752%2C_Uberlingen_Germany%2C_2002_(LOS)

4- see the official accident report at http://www.skybrary.aero/index.php/B738%2C_Gol%2C_Amazon_Brazil%2C_2006_(HF_AGC_LOS)

The airline passenger
a partner in the safety management system or an obstacle to it?

The passenger is a key partner in the safety management system. We depend on them to inform the crew of anything they see or smell which is unusual, to influence the behaviour of fellow passengers by their own behaviour and response to safety instructions and, in an emergency, assist the crew in the safe evacuation of the aircraft.

However, the cooperation of the passengers is not something that we can take for granted even though they have a direct stake in the safety of the flight.

By John Barrass and Professor Robert Bor

John Barrass discusses the issue of passenger compliance with safety instructions.

" Ladies and Gentlemen, welcome to Paris Charles de Gaulle airport... please remain seated until the aircraft has come to a halt and the seat belt sign has been switched off"

A fairly typical and clear announcement, or so you would think. The captain was informed by the cabin crew that all the passengers were standing up and opening the overhead lockers despite their announcements. He brought the aircraft to a halt and informed the passengers over the PA system that the aircraft would not continue to the gate until they all sat down. The passengers were surprised, looked at each other, but did nothing. The captain put the parking brake on and went personally into the cabin to repeat his instructions face to face with the passengers. Slowly, reluctantly, with indignation, and not a little surprise, the passengers took their seats.

In a survey conducted for the Australian Transport Safety Board (ATSB)[1], 92% of passengers considered the primary role of cabin crew to be "to

1- "Public Attitudes, Perceptions and Behaviours towards Cabin Safety Communications" ATSB Research and Analysis Report, July 2006. http://www.atsb.gov.au/publications/2006/pdf/B20040238.pdf

John Barrass

served for 20 years in the UK Royal Air Force and Canadian Forces in a variety of flying, instructional, and command appointments before becoming an aviation consultant.

John has worked on most of EUROCONTROL's safety enhancement initiatives and is the current editor of SKYbrary.

The airline passenger a partner in the safety management system or an obstacle to it? (cont'd)

assure passenger safety". Strange then, that so many passengers ignore safety instructions.

On a recent flight into Los Angeles, as the aircraft descended through scattered cloud, and the city became visible below, I listened to the cabin crew making their pre-landing announcement which included a reminder not to switch on mobile phones. Even while the crew were making their announcement, the cabin was full of the noise of mobile phones. I looked around and saw people busy sending texts to announce their arrival. I thought about saying something but I was with my wife and didn't want to embarrass her – that's my excuse and perhaps part of the problem. Now, while I've never experienced problems associated with mobile phones, except for the annoying sound of the phone transmission bursts in the headset, I'm aware of the potential for interference with aircraft systems, I'm also aware of developments to allow airlines to offer mobile phone services using onboard base stations linked to a satellite link, and I'm aware that there are going to be continued restrictions on the use of mobile phones below 10,000 feet if such systems are installed and approved for use – but do the people around me, busy texting, have any understanding of the safety issues? I doubt it – so why do people who know nothing about these issues ignore the specific instructions of crew that they acknowledge have responsibility for safety?

Of course, the majority of passengers do indeed listen to and obey the safety instructions, but it is easy to come to the conclusion that the design of procedures and aircraft systems must not assume that passengers will fully comply with safety instructions.

> The challenge is to minimise the threat posed by passengers AND engage with them in promoting and enhancing safety

The passenger can be a safety barrier as well as a safety threat. The challenge is to minimise the threat posed by passengers **and** engage with them in promoting and enhancing safety. A great deal of research has been conducted into the effectiveness of passenger safety announcements and safety demonstrations. This has been driven by a concern that, because of inattention of passengers to the safety communications, they are not adequately prepared for any subsequent emergency, specifically the location of emergency exits, the opening of doors and the operation of the emergency slides. However, it cannot be said that passengers are not aware of the restrictions on the use of mobile phones and personal electronic devices, prohibition of smoking, and the requirement to remain seated when the seatbelt sign is illuminated. Nevertheless, many of the factors which influence attention to safety communications also influence behaviour and compliance with safety instructions.

For many people, air travel is a stressful experience, with physical and psychological effects. They may not show obvious signs of anxiety or discomfort but their behaviour will nevertheless be affected by the experience. The crowded cabin environment, the feeling of confinement, means that many people are relieved to reach the destination and get off the aircraft as quickly as possible. I suppose, in that context, it is not surprising that people stand up before the aircraft has come to a stop – they are "in a hurry". Of course, since many, especially on long haul flights, will end up waiting by a carousel for their luggage, there is no real hurry to get off the plane is there? But for most of us, the desire to breathe fresh air (or light up a cigarette!), get moving and just get away from the cramped conditions on the plane is a powerful motivator. For the same reasons, it is also perhaps understandable why people are anxious to inform their loved ones that they are about to land. However, in both cases, the actions of passengers are contrary to safety instructions. How can we improve compliance and turn the passenger into a partner in the safe management of the flight rather than an obstacle?

We can of course make greater efforts to ensure that passengers are attentive to safety communications. The ATSB study mentioned earlier resulted in the following relevant recommendations:

- "Airlines should develop tailored cabin safety communication strategies for frequent flyers that account for the unique challenges of effectively delivering safety messages to such passengers.
- That additional factual safety information and resources about air travel and cabin safety be made available to passengers at airports by airlines and safety authorities.
- Carriers refrain from providing passengers with reading materials (such as newspapers and magazines), amenities and non-essential information, regardless of class of travel, until the conclusion of the safety briefing and where possible, after take-off.
- Carriers vary the content or creative format of safety briefings on a regular basis, notwithstanding regulatory requirements, to increase passenger attention. Such variation should not result in dilution of, or cause confusion in regard to, core safety messages.
- That beyond the extent of current requirements, passengers be provided with an explicit direction that additional information exists in the safety card that is not contained in the briefing and that the card should be read."

Passengers should perhaps be reminded of the penalties for non-compliance and crews should challenge and be seen to react to non-compliance. Airlines might support this publically by taking legal action against those who flagrantly ignore safety instructions. Conditions of Carriage are also a useful legal tool to enable airlines to deny boarding to disruptive and non-compliant passengers. But while such punitive measures might go some way to addressing the problem, airlines are unlikely to use such powers in the majority of cases.

What else can be done?

One of the most important factors in passenger compliance is their perception of the importance of that compliance to the crew. Therefore, the crew must be seen to place a great importance on the safety information, encouraging attention.

As usual, we need also take a broader view of non-compliance and examine how we can better create an environment in which the passenger is well informed and whose attitude to safety, safety instructions, compliance, and the authority of the crew, is positive and contributes to system safety. It is important to accept that non-compliance with safety instructions by someone who is normally law-abiding, may well be the result of environmental and cultural factors that we, as an industry, have created and can therefore change. We need to understand better why passengers choose not to comply with safety instructions.

Finally, **South West Airlines have a novel way of improving passenger attention to safety briefings – Flight Attendant David Holmes delivers the briefing as a Rap act with passenger participation: http://www.youtube.com watch?v=fiVcnJ5iLqs**

and, **for a more humorous view of how to give a passenger briefing, you can always follow the example of Yorkshire Airlines: http://www.youtube.com/ watch?v=QJxzDYJ4C3Y**

The airline passenger
a partner in the safety management system or an obstacle to it? (cont'd)

Robert Bor provides the following observations concerning the reasons why some passengers ignore or deliberately flaunt safety instructions:

Lack of awareness as to WHY certain procedures should be followed

Most people know where to find their life jacket but have no clue as to why it shouldn't be inflated in the a/c; or have little understanding of why they shouldn't stand up until the seat belt sign has been switched off (I know it is common sense but then not everyone is so insightful!)

The routine nature of safety demonstrations

Because most people regard air travel as routine, banal and utterly safe, they no longer associate safety with something they need to attend to. Also, most safety demos or the captain's briefing are scripted. I have just taken four flights with the same airline and the captain's announcement regarding safety and of course the video are identical. People can't be blamed for switching off and we need to find more effective ways of delivering the message.

Have we overplayed safety?

We know air travel is extraordinarily safe. It is something that passengers know is 'there', but is apart from them, on a dusty shelf, so to speak; flying has become too safe and too routine in their eyes. They also don't want to know about risk and safety because it arouses anxiety and we know from research that up to 40% of passengers would prefer not to be on the plane and are suppressing some anxiety. Safety issues increase anxious feelings.

"Accidents don't happen to me"

That is a normal reaction or response, and like the comment above, a reason why people show no attention. Again, they may have knowledge of the safety demo (my four-year old nephew can recite one regularly seen brief verbatim) but have little understanding of the 'why'.

Inclusion

Compliance works best when people feel that they are collaborating in the process and are not being 'spoken at' as though they were naughty or ill-informed.

Protest?

This is a bit of a long shot, but I wonder whether this is a way in which people can vent their frustration with modern air travel. They are tired of security checks, long queues at airports, poor food and service etc. and inattention to the safety briefing is a reflection of annoyance and apathy. It is also a slightly hostile way of communicating to the crew 'it's your issue and you will know how to save me if things don't work out'. It is a part of a sense of entitlement that some passengers carry with them.

Communication

Lastly, communication needs to be personalised. For some reason, most of the safety demo goes over people's heads – literally. Countless bits of psychological research have confirmed that giving information is insufficient to effect behavioural change. We need to do something more interactive and engaging.

Professor Robert Bor

is an aviation clinical psychologist based at the Royal Free Hospital, London, with a special interest in passenger behaviour and crew mental health.

He has published widely and his recent books include 'Passenger Behaviour', 'Aviation Mental Health', and 'Psychological Perspectives on Fear of Flying'.

Editorial Comment

Plenty of challenges here! And a few thoughts arising too…

- Perhaps it's also worth reflecting directly on the two rather different reasons that passengers might consider that safety briefings – and other safety precautions they encounter – are worth their attention. Firstly of course there is always a risk of an individual personal injury during a 'normal' flight – sudden turbulence when not secured in one's seat, a poorly stowed (by someone else of course!) bag falling from an overhead bin. There's also a remote chance that a sudden cabin depressurisation might occur at a high altitude after which there won't be any further help from cabin crew on oxygen mask use as they secure themselves during the accompanying emergency descent. There's also a remote chance that the flight will end, probably without prior warning, in an accident in which their very survival may depend upon a speedy and effective evacuation of the cabin.

- The reasons why particular passengers might ignore safety briefings can be split neatly into two groups: those who really **do** know it already (and on that particular aircraft type too) and those who don't appreciate the importance of them. The old argument that the former should pretend to pay attention so that the latter can see them doing so is understandably unpopular with a lot of regular travellers.

- Most established airlines, in Europe at least, would probably be less than keen on the notion that the 'standard' pre-flight safety briefings could be made more 'interesting' by a 'creative' and by implication 'variable' approach. Their cabin crew are trained for all their 'core' duties to act prescriptively and they are likely to set the application of 'initiative' in briefings against their responsibility for ensuring that key aspects of the briefing are **always** delivered.

- Compliance is not always a good way to engage everybody willingly. Especially when one size clearly doesn't fit all. Robert Bor makes possibly one of the most important points on this thorny subject when he says that people need to feel they are collaborating in safety…… ■

SKYbrary downloads

If you need to find out something about aviation safety, we suggest you go first to **www.skybrary.aero**. It doesn't matter whether you are a controller, a pilot or a maintenance engineer, SKYbrary aims to have either the answer you are looking for or a direct route to it.

If by any chance you can't find what you want, please remember that **SKYbrary** is a dynamic work-in-progress which needs continuous user feedback and benefits from user support. Be sure to tell the **SKYbrary Editor** about any difficulty you may have had making it work for you. If you can directly help us by identifying material we could use or even fill a gap by writing some content yourself then please tell us too!

We aim to provide wide coverage through both original articles and, especially, by hosting the best of what's already been written so that a wider audience can access it more easily in one place.

SKYbrary is also the place where you can access:

- all the documents of the **Flight Safety Foundation Operator's Guide to Human Factors in Aviation**
- the largest collection of selected **accident & serious incident reports** from around the world anywhere in one place online
- an expanding facility to **search ICAO document text.**

In future, we will be reprinting a **SKYbrary** article in each issue of **HINDSIGHT**. This time we have chosen something which can affect us all – **Complacency**.

Complacency

Use of the term complacency in aviation safety is sometimes disputed.

Definition

A state of self-satisfaction with own performance coupled with an unawareness of danger, trouble, or controversy.

Description

Critics of the use of the term "complacency" often refer to the lack of a precise definition. It is a topic which has not yet been adequately conceptualized and any use of the term contributes to an illusion of understanding what causes risks.

Article Information

Category: Human Factors and You

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The use and definition of **complacency**, is referred to in folk modelling. Folk models share the following characteristics:

- Folk models substitute one big term for another instead of defining the big term by breaking it down into more little ones (we call this decomposition, or deconstruction). So instead of human error, you would simply say "complacency". But you still don't explain anything.
- Folk models are difficult to prove wrong, because they do not have a definition in terms of smaller components that are observable in people's real behaviour. Folk models may seem glib; they appeal to popular (supposed) understandings of difficult phenomena.
- Folk models easily lead to overgeneralization. Before you know it, you may see "complacency" and "loss of situation awareness" everywhere. This is possible because the concepts are so ill-defined. You are not bound to particular definitions, so you may interpret the concepts any way you like.

SKY brary

Critics often also refer to the variety of "substitution" definitions in the literature, where one label is used instead of complacency. Here is what a good sample of the literature has equated complacency with:

- Overconfidence
- Self-satisfaction
- Trait that can lead to a reduced awareness of danger
- State of confidence plus contentment
- Low index of suspicion
- Unjustified assumption of satisfactory system state
- Loss of situation awareness, and unpreparedness to react in timely manner when system fails

For example, self-satisfaction takes the place of complacency and is assumed to speak for itself. Looking for "self-satisfaction" in a controller's behaviour is not any better or more convincing than looking for "complacency". There is no explanation (or breakdown) of a psychological mechanism that makes self-satisfaction emerge, and which in turn produces a lack of vigilance.

It can be argued that if the literature can't provide ways in which you can start to define and identify the phenomenon in question, then it is easy to argue for its existence in real situations. To be complacent, some argue, an observer must be shown to sample a variable less often than is optimal, given the dynamics of what is going on in the system at that time. But it is very difficult to rigorously define the optimal sampling rate in supervisory monitoring. This can also be tested against particular situations in ATC.

Another criticism is that we cannot claim that somebody was complacent because he or she missed a piece of data (that we, in hindsight, find important). Complacency, after all, is about under-sampling or defective monitoring (which is impossible to establish because you can't define the optimal). It is not about whether people detected signals. Detectability is a function of signal-to-noise ratio and somebody's response criterion (as in, when to I have enough evidence to do something), not of sampling strategy.

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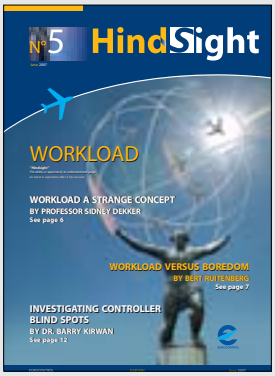

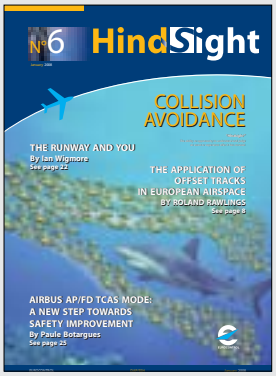

EUROCONTROL

Putting Safety First in Air Traffic Management

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