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focus

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Contents

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FOCUS is a quarterly subscription journal devoted to the promotion of best practises in aviation safety. It includes articles, either original or reprinted from other sources, related to safety issues throughout all areas of air transport operations. Besides providing information on safety related matters, **FOCUS** aims to promote debate and improve networking within the industry. It must be emphasised that **FOCUS** is not intended as a substitute for regulatory information or company publications and procedures.

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Front Cover Picture: Wiltshire Air Ambulance's Bell 429 helicopter lands at the Emergency Services Show at Cotswold Airport, Kemble last year. The helicopter has just returned to the skies after the charity received its Air Operator Certificate from the Civil Aviation Authority.

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focus ON COMMERCIAL AVIATION SAFETY

Regulation at a crossroads

by Dai Whittingham, Chief Executive UKFSC

We live in interesting times. Aviation, particularly in the UK, is at a regulatory crossroads. The outcome of Brexit is still unclear and the Government, at least the one in power running up to the ongoing General Election, appears to be rowing back from previous assurances that in the long term we would be remaining in lock-step - if not fully engaged - with EASA. That said, the Brexit process includes provision for shifting the entire acquis of EU aviation law onto the UK statute books. The CAA is doing its best to make sense of a Brexit-inspired partial policy vacuum at a time when the focus of effort within the Department for Transport is on the General Aviation community, and is also working to set up a State of Design/ State of Manufacture organisation to deal with the certification issues that will arise once we leave the EASA fold. Licensing too becomes a national responsibility in a post Brexit environment.

Institutional capacity, once lost, is not easy to regenerate because that capacity is inherently bound up with people and the intellectual capital they bring to the table. When those people have moved on, for whatever reason, they are not likely to come running back when called for. Sir Charles Haddon-Cave (now Lord Justice Haddon-Cave) in his seminal review of the 2006 Nimrod accident in Afghanistan drew attention to the need for those involved in airworthiness, design and certification to be 'suitably qualified and experienced personnel' (SQEP).

The suitability caveat refers to qualification and experience, so where are we to source people with experience of (eg) certification? The courts can take a hard line on what is suitable and what is not. For example, some years ago, a major UK supermarket was fined heavily after an accident in a warehouse. The Health and Safety officer was NEBOSH qualified, but she was a nurse and all her experience related to hospitals and not to an industrial setting; the court found that she was not suitably experienced. This suggests the CAA will need to be ultra-cautious in who it hires and what work can sensibly be taken on in the short term.

Bilateral agreements are in place to ensure that there is no cliff-edge when the UK leaves the EU (assuming this remains the case after the Election). It would clearly be a nonsense for a component manufactured under EASA rules to be compliant one day and non-airworthy the next. Nonetheless, the longer arrangements drift during any transition period, the weaker those arrangements and their underpinning logic will appear. We cannot afford to have cost added to the industry simply to prove that what worked yesterday is unchanged and therefore works today, or to start from scratch with certifying systems that are already fielded.

The same arguments hold true for licences and medicals. The notion that a type-rated, current and medically fit pilot would be unable to fly legally the same airframe he or she had flown the day before simply because of its registration is laughable. Unfortunately, that is where the regulatory framework takes us, and we must rely again on bilateral agreements for however long those hold up.

It should therefore come as no surprise that several thousand UK ATPL holders have chosen to transfer their licences to other EASA Member States in recent months. Whilst such a move might improve one's employment prospects in Europe it also possibly reflects an appreciation that, while the CAA may take a flexible and pragmatic view, the European environment is less predictable and more vulnerable to political interference from those outside the aviation system. The same might also be said of the UK – it is not beyond the bounds of possibility that political posturing could yet have unintended consequences for us. We need to make sure that any actions to re-set the regulatory landscape are well thought through, because there will be no easy route to revert to the status quo ante; as we have seen with the MAX, once you have grounded something it is very difficult to un-ground it.

Which brings us to the MAX, which was the elephant in the room at a recent international safety conference. We have now had sight of the final report into the first accident involving Lion Air, and the outcome of the Joint Authorities Technical Review (JATR), neither of which make for good reading. In broad terms, the accident report pointed to shortcomings with design and manufacture by Boeing, FAA oversight, operator maintenance lapses and pilot training. The Florida-based company that reconditioned the faulty AOA sensor identified in the Lion Air accident has since had its repair station authorisation revoked by the FAA.

The JATR looked at flight control system performance and certification, and made 12 recommendations. These included: "Revise and require a top-down approach evaluation from a whole aircraft system perspective for the FAA's "Changed Product Rules""; "Consider changes to the FAA oversight process involved with delegating some of the aircraft certification authority aircraft design changes"; and "Develop a new documented process that will determine what information is featured in the airplane flight manual, flight crew operating manual and the flight crew training manual."

A parallel NTSB review, based on its involvement in the Annex 13 investigations into both MAX accidents, made 7 generic safety recommendations. NTSB Chairman Robert Sumwalt said: "We saw in these two accidents that the crews did not react in the ways Boeing and the FAA assumed they would. Those assumptions were used in the design of the airplane and we have found a gap between the assumptions used to certify the MAX and the real-world experiences of these crews, where pilots were faced with multiple alarms and alerts at the same time."

The seven recommendations issued to the FAA covered three areas:

- Ensure system safety assessments for transport-category airplanes that used certain assumptions about pilot response to uncommanded flight control inputs, consider the effect of alerts and indications on pilot response and address any gaps in design, procedures, and/or training.

- Develop and incorporate the use of robust tools and methods for validating assumptions about pilot response to airplane failures as part of design certification.

- Incorporate system diagnostic tools to improve the prioritization of and more clearly present failure indications to pilots to improve the timeliness and effectiveness of their response.

A separate US Department of Transportation special committee investigating the FAA certification process has yet to report, and it remains to be seen what recommendations emerge from the investigation into the Ethiopian accident.

Mindful that nobody sets out to make poor decisions, and that we are all looking at the MAX accidents with the benefit of hindsight, perhaps the one issue that should be of immediate concern to us all is enshrined in the JATR recommendation: "Develop a new documented process that will determine what information is featured in the airplane flight manual, flight crew operating manual and the flight crew training manual." Whatever level your professional skills as a pilot may have reached, you are poorly placed to fight an enemy you cannot see or whose presence you could not have anticipated. There is a well-established principle applied to maintaining the security of information, called 'Need to know'. If you don't actually need to know about something, you should not have access to it. While that typically applies to 'classified' information, exposure of which could be damaging in the wrong hands, there is another side to the equation. Sometimes there are things that you really do need to know about. Whilst there can be few (if any) B737 pilots who are now unaware of the existence of MCAS, the decision that they did not need to know about the system or be trained on it will inevitably come under serious scrutiny in the months ahead.

Finally, whatever the outcome of the various MAX reviews and investigations, the international regulatory system must do what it can to remain aligned. Alignment and acceptance of common standards has been a central pillar of safety over many years, and we move away from that position at our peril.

focus ON COMMERCIAL AVIATION SAFETY

Thinking About Error Management

by Jacky Mills, Chairman UKFSC

Let's start by looking at the factor that safety professionals spend so much time discussing – Human Error – we must face the fact that it is inevitable - human fallibility can be moderated but it cannot be eliminated. However, we must also remember that without errors we would not learn or improve skills, which are vital for safe operations.

So, having realised that we cannot change the human we have to concentrate on the conditions in which humans work. Each situation is very different, as is their individual capacity for provoking unwanted actions. It is recognising the characteristics and identifying these error traps which are the essential starting points for effective error management.

It is important to recognise that everyone can make mistakes – no one is immune however much experience they may have. A safety investigator may tell you that they very frequently hear the phrase 'I never ever thought this could happen to me' whilst debriefing a crew member.

So begs the question how do we educate that errors and mistakes can indeed happen to anyone, never mind how experienced or 'on top of their game' they feel they are? Sharing Serious Incident investigation reports may not hit the spot, as such perceptions do not lead to recognition that this story of 'oh my goodness…' could indeed be them next week. This is in no way to criticise our professional operators, this is a natural human trait, which catches people out on a regular basis.

It is now widely accepted that blaming people for their errors is pointless from a remedial point of view, and actually harmful psychologically, as people cannot avoid those actions which they did not mean to commit. Acknowledging errors (and learning from them) however, will help to avoid recurrence.

We know that the error is the result of the action, and of the importance of finding the cause and circumstances, so that mitigations can be explored, and the chances of recurrence limited. Often errors will fall into patterns which recur and looking at these types of errors can be an efficient use of our resource.

Safety significant errors can occur at all levels, so it is important for our error management techniques to be applied across the whole system. What we need to remember is managing errors is actually about only trying to manage the manageable – not forgetting that human nature may not be. We can look at managing systems and situations – those technical, procedural and organisational aspects which we can have an effect on.

Proactive operators will regularly practice and prepare themselves for challenging situations by rehearsing how they would respond to various scenarios – thereby they can constantly improve by practicing their skills in error management – aware that error detection is important.

Let's also recognise that different types of human error occur at different levels of organisations and understandably require different techniques for management. There will be different cultures involved which require different techniques – what works in one area will often not work in a different one.

Whilst we need to learn from what has gone wrong in our own organisations, trying to fix the whole problem of error by focusing on what has just gone wrong, can only be partially effective. Trying to fix individual problems will not be effective if the real cause of the error is not found and addressed. So we must not forget that we have to keep focused on continuous improvements, not reactive ones. Whole groups of errors need to be addressed rather than just the individual ones.

So once these have been addressed, they must be continually monitored to ensure that they remain effective with evolving activities. It just does not work to put in mitigating measures and think they will always continue to be effective. 'Continuous Improvement' should not be words bandied about as buzz words…. but vital for continued safe operations.

This is why the job of 'addressing safety' will, quite simply, never be completed. The first, and very important, thing to do when undertaking an investigation is to really listen to what is being said by those involved without judging. Is there anything in the culture which may have contributed to the event, especially that which is accepted as the norm? What are the everyday obstacles that the crew have had to deal with – and are probably used to accepting – that may have contributed to this event?

Put pieces of the jigsaw together to make up an accurate picture of what was really going on which may have played a part. Whilst looking for the simple or obvious explanation is again human nature, it is important to look 'outside of the box' to delve into the REAL reasons of the WHY.

Facts and evidence are the most important starting points – it is important to remember that 'hear say' is not evidence and may be wildly inaccurate, but may suit someone's battle… Every investigation is an opportunity to promote and role model a Just and Open Safety Culture, putting these building bricks in place is so important for the future culture of the business.

We need to use everything gleaned from each of these investigations to improve the organisational safety intelligence, so that resource can be appropriately allocated to promote future safety robustness. It is from the small details gleaned at the coal face, that informed identification can be made to assess the various threats accurately, which can then be passed upwards to allow the best decisions for future barriers to be made.

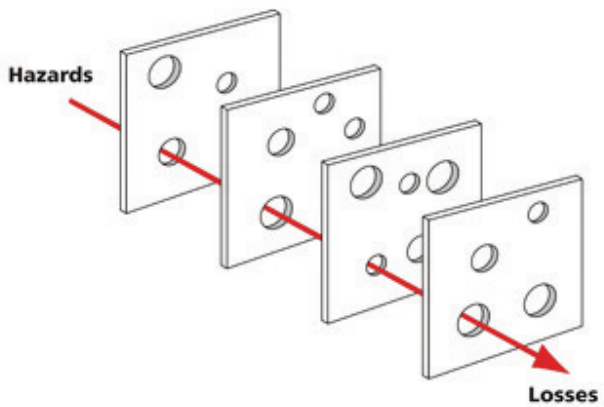
Supporting the human endeavour has long since been recognised as vitally important in aviation safety. Crew Resource Management training has been mandatory for about 30 years in the industry, with the benefits having been recognised time and again.

The importance of smooth interoperability between human and machine should not be underestimated – the importance of ergonomics is pretty much taken for granted nowadays – and the appropriateness of particular ergonomics for particular humans. It is very hard to adapt to a new layout in the flight deck – this is borne out time and again. Errors are reported of incorrect switch selection often, but often not, by operators new to type. Inadvertent TOGA activation is an example where a simple erroneous press of a button can significantly destabilise the approach.

So this all adds up to showing the importance of having as many safety barriers as possible in place for each part of the operation. How many barriers were left in situ between the event and the potential accident, is a very important part of the investigation. As we know that human performance cannot be entirely predicted, it is important to have some degree of variability and flexibility to adapt performance without it failing immediately.

Events will add up and conspire to join up to lead to the failure point; the very familiar notion of the Swiss Cheese model comes up time and again when looking at causal factors for the incident.

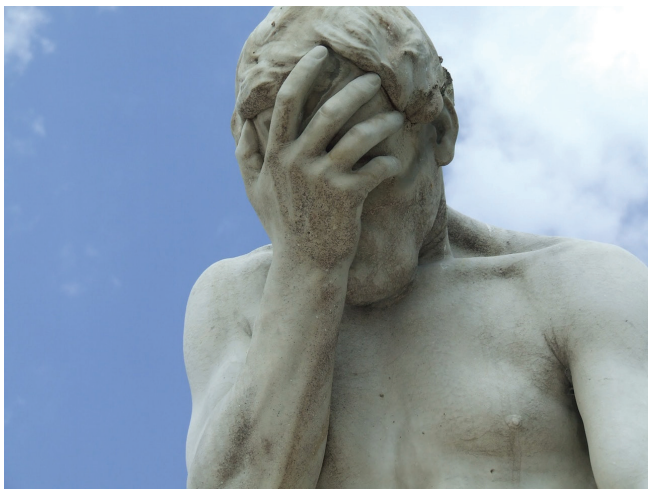
Swiss Cheese Model



This illustrates that although many layers of defence lie in the path between the hazard and the accident there are gaps in each, which if joined up, will allow the event to occur. The risk of a threat becoming reality is mitigated by the layers of defences, and a weakness in one of these should not result in an event. The weaknesses in each defence are signified by the holes, and only if, or when, these all line up would the failure occur (and unfortunately often does).

It is important to consider both the direct and indirect factors, those which directly contributed to the event, and those which have lain dormant – that is the weakness in the barrier - but have on this occasion contributed to the event.

A positive mindset is surely better than avoiding the negative mindset – so let's look at how procedures can be implemented to actually encourage the right outcome, rather than looking at more procedures to avoid things going wrong, a subtle but important difference ...



Do the Safety Risk Assessments look at those areas which may be rather unpalatable? Such as the potential influence either direct or indirect, that seemingly unconnected teams within the business – and not necessarily those with a commercial influence - may have on the Risk Picture? Is there just an acceptance that this is how things are, although not ideal? Importantly can anything be done to acknowledge this and mitigate it?

Commercial reality is of course an important fact of life, and if the business does not make money then it will simply not continue. Opportunities for expansion will be explored – and seized upon, often only asking as the second question HOW can this be achieved. That is business reality just as much as Human Error is inevitable and is all good with the safe management of these future operations being carefully considered.

Try to think outside the box with honesty – facing up to the reality of the future plans – and we are a lot better prepared. Peel back the layers and expose where the weaknesses are – then mitigations can at the very least be considered, and hopefully, implemented. The Safety Space between financial viability and operational safety must always be considered – one will simply not flourish without the other.

It is so much easier to look at those factors which directly affect the operation – those areas which are commonly addressed in the Risk Assessment, the ones on which the business assures itself that safety concerns have been adequately addressed. But those are the obvious risks which industry is well versed in addressing; the more subtle risks – including the ones the business does not necessarily want to face up to – are the ones which could hold the key to safer operations.

So where do we find the clues to the more subtle risks? Firstly encourage those on the front line to tell the business what is going on – those that see first-hand where the risks are. But we already work hard on our safety culture to encourage open reporting – so start asking difficult questions – don't be afraid of what could be lurking. We will at least then have a better idea of the risks we are exposed to, even if there is not an immediate answer. Knowing the perils is half the battle – with knowledge mitigations can – in time – be developed – and meantime there is often some temporary workaround which can help to some extent.

Work hard to maintain knowledge in the workforce – by retaining personnel as far as possible – time in role gives expertise that cannot easily be trained. Experienced personnel can be so valuable – they can have a significant influence on the safety of the operator – a lower experience base in all areas of the business – not necessarily just the front line – is to increase the risks it is exposed to. It is worth investing in people. Small potential outlay for a significant bolster to the robust operations of the business. Experts and expertise should not be undervalued or taken for granted.

It is also important not to label all that goes wrong as Human Error; by labelling a safety breach in this way the real problem is hidden and mitigations will not be developed. Ensure that the real reason for what looks like Human Error is carefully explored – again even if it is difficult, uncomfortable or unpalatable to do so. What was the wider environmental influence on the event we are looking at? By 'environmental' don't just look at the immediate environment – try to dig deeper.

Can something – however small – be done immediately to address the event? And have we looked at potential unintended consequences of making any changes – the more tweaking is done to procedures the more risk can be introduced.

It is important to be always smarter and smarter. It is not safe enough today – it never will be safe enough – we have to keep on looking for the real failure points.

And don't discount gut instinct – this is so often the pointer to what is not quite right. The operator may be industry compliant but is that good enough or do we want to do more? It may just be a simple tweak or addition that could make a big difference and make operations more robust. Are we confident that the weakest link, in the worst circumstances, on the worst day will be good enough? That is all it takes for it to go wrong...

And remember that people DO care ... no-one sets out to not do the best job they possibly can in their part of the operation – if there were any of those personnel, they would quickly become exposed. So WHY WHY WHY did the error occur is the question that needs to be answered. Don't waste an opportunity to find the correct answer to that question and the opportunity to consider further mitigation in place.

So in the investigation – or risk assessment – or any meeting – encourage open communication from anyone we are engaging with – don't let others become anxious about the exchange and end up being defensive – they will shut down and not give us the information we need. Give them the confidence to be open and informative and let them give us some answers.

Just as people don't set out to get it wrong, most people actually do want to be the 'good guy' and do want to engage and make things better – and most people will have at least one suggestion of how that could be achieved. So we should set out to make everyone we engage with feel safe and comfortable.

We choose how we behave everyday – we can be curious and inquiring – we can be approachable and nurturing. Being hierarchical, directive and controlling will not lead us to the results we need to improve the robustness of our operations. Remember others will always have some nugget of information that we need – it is up to us to make the environment comfortable for them to divulge it.

Of course we won't be able to find all the answers, but I do firmly believe that we do need to be asking the right questions, so we at least know what the problems really are, which gives us the opportunity to put the right mitigations in place.

Don't Be A Superhero:
Recognising Stress And Building Resilience

by Dr Thomas Hellwig

Key Points

- 'Change' is among the top underlying reasons for stress in the workplace, along with workload pressure, interpersonal relationships and changes at work, and managerial support.
- Early signs of stress are often overlooked: The 'Stress-APGAR' concept outlines five dimensions of early signs of stress.
- Manage your energy, not your time.

Change is the 'new normal'. As an air traffic controller or a senior executive, we all face stress and need to find ways of handling stress and building resilience. Thomas Hellwig, Professor of leadership at the INSEAD Business School and a medical doctor, shares some of his research findings and reflects on a high-profile business case.

António Horta-Osório is one of those 'magicians' working in the financial district known as 'The City of London', an environment full of strong personalities working constantly under high stress. After his education in a top school and an impressive career at Bank Santander, he became the CEO of Lloyd's Bank. He had an impressive track record: Whatever he touched on his way to the top, he turned into a success story. If you want someone in the cockpit of your organisation, it should probably be someone with a track record like him.

However, in the midst of the financial crisis, pressure was mounting. He ignored this for a long time. His doctors finally diagnosed extreme fatigue and stress due to overload at work. One billion pounds of shareholder value was wiped off the books overnight when he had to stop working in November 2011. The unthinkable happened even to this overachiever. The untouchable became a victim of one of the biggest challenges of the modern world of work: extreme stress and burnout.

Employees at all levels in organisations often feel overloaded and out of control. In this article I focus on two areas:

- How to recognise early signs of stress in ourselves and others.
- How to build resilience, an antidote stress.

Stress

When analysing this highprofile business case, certain dynamics can be seen in many stressful professions such as doctors, teachers, emergency services, as well as air traffic controllers and professional pilots: pressure, change, relationships and management support are key. These factors are common to large scale surveys (e.g., the UK Labour Force Survey) and studies involving general practitioner doctors (see Health and Safety Executive, 2018).

From a neuroscience point of view, change can trigger in us the same kind of fight-or-flight reaction as physical pain. So we should question whether all change initiatives are really necessary within organisations, including changes to working patterns.

In the leadership centre at INSEAD, one of the top-ranked business schools in the world, we have investigated and interviewed many people in different industries and at different hierarchical levels. We also tested our initial findings with experienced executive coaches.

It appears that there are often similar patterns of early signs of stress that we tend to overlook.

After an in-depth analysis we have identified the following five dimensions which we regrouped and published as 'Stress-APGAR'. Stress-APGAR is based on the original APGAR, as used in neonatal medicine to assess the vital symptoms of new-born babies. We have adapted the APGAR concept to stress research. The following five dimensions help to identify early signs of stress:

1. Appearance: Any form of physical appearance of stress, such as sleep deprivation, extreme weight loss/ gain, chronic pain, etc.

2. Performance: A drop in performance can be a sign of stress.

3. Growth: When we strive to achieve and grow, we can handle more challenge. But the opposite is also true: when employees stagnate and stop growing, this could be a sign of overload and stress.

4. Affect control: Psychologists have recognised for a long time that stress is often related to a loss of control over one's emotions, both in professional and private contexts.

5. Relationships: Stress can be associated with a decrease in the quality of relationships in the workplace. Before going into chronic stress – or burnout – we often observe some form of social isolation.

Although there might be other symptoms to diagnose stress, we recommend managers in certain at-risk professions to look out for these five dimensions in the work context in order to pick-up early signs of stress in the workplace.

Resilience

It is essential to counteract stress, especially in professions like air traffic control and piloting. One important way is to design out sources of inappropriate stress and manage organisations so that stress is not excessive. This is the duty of the organisation and mostly under management control. Another way is by building resilience in individuals and teams. This needs management support, but is also in control of staff. Over the recent years, a simple framework has gained huge popularity focusing on energy: *manage your energy, not your time* (see Schwartz and McCarthy, 2007). Whereas many people in high-stress environments focus on the management of their time (and fail, over and over again), the focus on managing our energy better seems to be far more promising.

According to this framework, we have four resources of energy available to us:

- IQ (mental)
- EQ (emotional)
- PhQ (physical)
- SpQ (spiritual).

We all have our preference within these four elements, but a balance in the four dimensions is helpful for surviving and thriving in high-stress professions. From our experience in INSEAD, the mental and physical dimension are often the unique focus when under stress, while the emotional and spiritual dimensions are often overlooked.

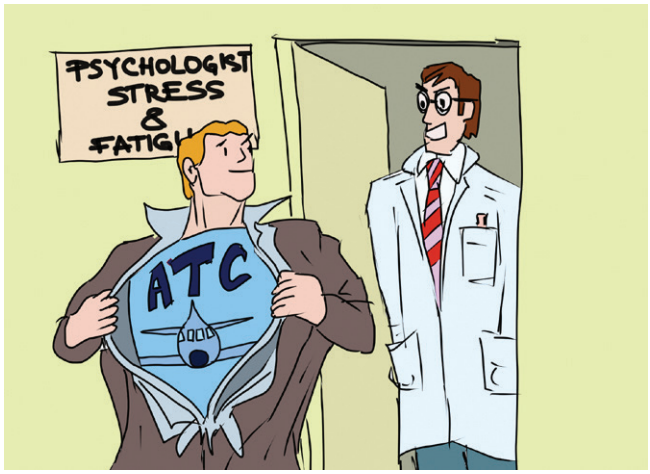
So here are two simple pieces of advice for high-stress professions to build your resilience and your energy. Focus on your sleeping pattern and start to practice relaxation. Even 10 minutes of relaxation (e.g., mindfulness meditation) three times a week could change your brain structurally and functionally after only 8 weeks. If this were a drug, we would call it a 'blockbuster'.

It's good to talk

The trouble with high-stress professionals is that, often, they don't talk about stress. But it is increasingly recognised that talking is not only a good thing, it is essential. António Horta-Osório, recently wrote an article in *The Guardian* newspaper entitled, "It's time to end the workplace taboo around mental health". He acknowledged *"fundamental changes to our working lives during the past decade – flexible working, the end of the nine-to-five working day, an 'always on' culture and the rapid evolution of technology."*

António has written openly about his personal experience and mentions the need for a new mindset that recognises that we all have mental health just as we all have physical health. We can experience physical and mental ill-health and need treatment and support for both. He admitted that, *"I thought I was Superman. I felt I could do everything."* He was not used to asking for advice or showing emotion. But in the end, he learned: *"I was not Superman. And I became a better person, more patient, more understanding and more considerate. It was humbling but you learn."*

António is still the CEO of Lloyds, where he helps to spread good practice to try to ensure that employees don't have to learn the hard way. Here are perhaps three key lessons to learn from his case for all of us: Firstly, we need to break the taboo around stress and talk about it not naively, but openly. Secondly, the risk of extreme stress and burnout is shared by all professionals, even – or especially – those that seem 'superhuman'. Thirdly, we can make it to full recovery, and help others to do the same.



"Now remember, you're not Superman."
"Superman? Pah! I'm an Air Traffic Controller!"

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Check out the new EUROCONTROL IANS course 'Energy Management [HUM-EM]' on the Training Zone website.

Dr Thomas Hellwig works as a professor, programme director and coach for INSEAD in the field of organisational behaviour. He is a trained medical doctor with 20 years of experience (emergency, cardiology, and cancer medicine) in hospitals in three European countries. He has a doctorate in psychotherapy and an MBA from INSEAD. His special interests are in the areas of executive teams, leading change, organisational culture, and health and stress.

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CHIRP Reports for FOCUS

Pilots not making their level restrictions

Report Text: I have been a controller for nearly 14 years and I have noticed a trend that pilots are not making their restrictions. I have submitted a report and I feel that the airlines may not be disseminating the information promptly or even at all. Someone recommended me to contact CHIRP as there are a lot of pilots that read this forum.

I would like to make pilots aware that when ATC give a 'level by' restriction, it is not only for Continuous Decent Approaches (CDAs). I appreciate that a subsequent clearance overrides the previous clearance but in most cases, I know that a subsequent clearance has not been given and the 'level by' restriction is being treated more and more like a nice thing to achieve. I know that flying into London airspace, there are what some may think of as harsh descent 'level by' restrictions. However, they are there for a reason – separation from other aircraft - and with more and more traffic flying, it is imperative that those level restrictions are met (as long as they are reasonable requests). If pilots cannot make the 'level by' then it is important ATC know about it.

Guild of Air Traffic Controller Officers (GATCO) Comment: We have also seen this as a rising trend- and not just with descending traffic - aircraft climbing on different profiles (high speed/ low rate of climb) have also caused significant problems. As the reporter states, 'level by' instructions are vitally important and ATC need to know if an aircraft is 'unable' as soon as possible.

***CHIRP* Comment:** "Level by" restrictions are a common ATC tool to ensure aircraft are separated. The UK's airspace, particularly in the South East, leads to constraints that are not evident in less congested airspace elsewhere. There are also level restrictions that are almost 'standards', applying on virtually every occasion, yet these are not written on approach plates or publicised so that pilots would know. From the pilot perspective, it would help enormously if ATC could tell pilots in advance that a reduced speed will be required during descent. Suddenly calling for a reduction to 250Kts – e.g. due to delays into a destination – changes the descent profile which may then be problematic. It would help pilots if they could be made aware a few minutes earlier. Controllers do understand such factors but sometimes have no choice.

As with all ATC instructions, if a pilot finds they are unable to comply, they should inform ATC immediately.

CHIRP would be interested to hear from pilots on any issues with respect to how they respond to "level by" instructions. Where a perceived inability to comply is driven by company policy and not aircraft performance limitations, unless the policy forms an explicit instruction in the Operating Manual crews should comply with the restriction and inform their company afterwards.

This report and comments will be passed to Eurocontrol and to CHIRPs international partners in the International Confidential Aviation Safety Systems (ICASS) Group for publication worldwide.

Commercial aircraft landing with Rescue and Firefighting Service (RFFS) Level 2

Report Text: Whilst listening in to the tower frequency at [ ], ATC announced a degraded RFFS to Level 2. The crew of a [twin-engine airliner] acknowledged the downgrade and confirmed they were happy to continue to land. I am not aware of the exact company procedures and their operations manual as to the minimum landing RFFS level. However, I consider it likely that it should be a minimum of level 4 or 5 so was surprised to hear the pilots content to land with only level 2 available. I was expecting the aircraft either request how long the delay would be and hold or request a divert rather than take the increased risk of landing at an airfield with degraded fire services. The aircraft continued to land whilst the airport still had RFFS level 2.

***CHIRP* Comment:** The operator is a non-UK EASA airline. An investigation revealed that its Ops Manual requires RFFS 7 for this type of aircraft but under certain circumstances, e.g. when a reduction of RFFS occurs after an aircraft has been despatched, the aircraft may continue to land provided the RFFS is not lower than Level 5. It is not clear why the crew continued their landing several minutes after the reduction to RFFS Level 2 was announced but it seems possible that they did not assimilate the information passed by ATC during a busy approach phase. Crews must be aware of the minimum RFFS for normal circumstances and act accordingly. The report has been passed to the CAA.

Basic mistakes due to burnout

Report Text: Rather than a single event I felt the need to report a lapse in the general standard of my flying which I felt have been caused by mild burnout or some kind of long-term fatigue.

We have a new rostering system at [Operator] which over the last 3 months has not given me sufficient days off nor stability to maintain a healthy work life balance. I find my mental health deteriorates when I am not kept busy, but it also deteriorates when one has no roster stability and single days off between blocks of work.

In the past week or so at work I had started to make basic SOP errors which I would never normally do. None of these errors warrant their own CHIRP report or ASR but the sum of them and the cause I feel warranted a CHIRP. Additionally, I have felt tired and run down and my mental health has been suffering.

I also feel the need to say that I did not report this to the company because they would look at my roster and say that it's not fatiguing. Indeed, the last few days taken standalone might not be considered fatiguing but as a whole the last 3 months which include 2 x 21day reserve blocks definitely has contributed to long term fatigue.

I have since taken some time off to recover. Fortunately, I have a long block of leave coming up so hopefully this will help too.

***CHIRP* Comment:** We are grateful for this honest report which highlights the insidious nature of cumulative fatigue: how do you identify the point when you should no longer operate or need to think clearly about how to recover. In addition to submitting a fatigue report, pilots in a similar position may consult their Company's Pilot Support Network if there is one or visit their GP/AME. This reporter is commended for going to his GP, who stood him down for 2 weeks, and for contacting his Company's health services.

The report also highlights the importance of operators managing fatigue in the long term and not simply the current roster period. How many operators do this?

EU261: A price beyond the balance sheet?

by Matt Rickett & Ashleigh Ovland, Holman Fenwick Willan LLP

Regulation (EC) No.261/2004 (EU261) provides fixed compensation to passengers when a flight is either delayed for more than three hours, or cancelled. It has played a controversial role in the regulation of commercial air travel for more than 13 years. This controversy is only set to increase with the recent publication of a new study on the effects of EU261 by the European Regions Airline Association (ERA).

The study, published on 9 October 2019, focuses on the impact of EU261 on its members, the majority of which are small and medium sized airlines providing regional and intra-European flights. While the study provides an in-depth look at the financial burden of EU261 claims, its most significant finding is the potential effect that this burden can have on flight safety.

The study included a confidential online survey of more than 300 'front-line staff' who were required to support their answers with examples. One of the survey's most striking findings was that as many as 67% of respondents felt that EU261 had a 'negative impact on aviation safety'. A similarly concerning 49% of respondents believed that EU261 had a 'negative impact on their organisation's safety culture'. For an industry renowned for prioritising safety above all else, these results make worrying reading.

The case that EU261 puts an unreasonably large financial burden on smaller airlines is an easy one to make. The grounds for bringing EU261 claims have expanded dramatically over the last decade and with each seemingly endless development in this direction, airlines have had to divert more of their revenues into paying compensation.

Smaller EU carriers are more heavily burdened by EU261 than others because their flights tend to be short haul and therefore relatively cheap. As EU261 compensation does not correspond to ticket price, carriers can end up paying out many times the value of the tickets sold for a flight in compensation for its delay or cancellation. By contrast, large intercontinental carriers may face claims for long haul flights up to the €600 maximum, but their ticket prices are usually high enough to offset or at least mitigate this.

Defending EU261 claims has also become increasingly difficult as the Court of Justice of the European Union (CJEU) has narrowed its interpretation of the 'extraordinary circumstances' that allow carriers to avoid liability for these claims. EU261 provides carriers with this defence if the delay or cancellation could not have been avoided even if 'all reasonable measures' had been taken, but the evidential burden of proving 'reasonable measures' is high.

In recent years the CJEU has decided that unexpected technical problems that were not attributable to poor maintenance would not constitute extraordinary circumstances and so result in liability for compensation. Airlines have argued that these situations would not be within their control to prevent and are therefore unfair.

There is an argument that, by permitting compensation in circumstances of technical faults, the CJEU has contradicted the wording of EU261. The regulation clearly states that extraordinary circumstances may occur in cases of 'unexpected flight safety shortcomings... that affect the operation of an operating air carrier'. Many in the industry are concerned that the CJEU's willingness to disregard this provision means that every safety-related delay will result in a bill for compensation, which could discourage airlines from erring on the side of caution where safety-related operational decisions are taken.

The lack of a prescribed limitation period for EU261 claims means that airlines are exposed to claims from as long ago as the limitation periods of the relevant member states permit. This means carriers could receive claims from six years ago in the UK and from as long as ten years ago in countries like Spain. Thanks to aggressive "claim farm" companies, who have built very lucrative businesses encouraging passengers to seek compensation, the volume of claims is getting ever larger.

A point in question is the notorious Sturgeon case, as a consequence of which airlines now have just three hours to resolve any flight safety or other issues before the obligation to pay compensation kicks in. At €250 per passenger on an Airbus A320, that is a potential compensation bill of €45,000 per delayed flight. Many aviation professionals argue that, despite this time pressure, they will never compromise on safety standards. However, it is easy to see how the cost of delays for smaller airlines could make it tempting for staff not to give safety procedures as much time as they might have otherwise, particularly if – to give but one example – they are up against a night curfew.

EU261 has also had a direct impact on the time available to operations and engineering professionals to spend on flight safety. Many of these highly trained personnel are now required to spend significant amounts of time compiling the evidence needed to defend EU261 claims. This time would be much better spent elsewhere.

This study brings flight safety risks to the fore in the debate on this controversial piece of legislation. Amendment of EU261 has been on the cards for some time without much progress. Until further legislative action is taken, it is difficult to see how this issue will be resolved. Perhaps a focus on safety is the incentive needed to persuade legislators to move things forward.

Concerned about the safety of drone flight? Now you can CHIRP about it!

by Karen Bolton, Manager Future Safety at NATS

For more than 15 years, NATS has been closely involved with CHIRP, an organisation set up in 1982 to provide a totally independent, confidential reporting facility for members of the aviation and maritime community, with the aim of contributing to the enhancement of safety in these industries.

I have had the pleasure of representing NATS on CHIRP's Air Transport Aviation Board since 2009 and during that time I have been part of the evolution of this organisation's unique and well-respected confidential reporting programme. Over the years, I have enjoyed playing my part in CHIRP's expansion as its reporting facility has grown to encompass aviation safety-related reports from flight crew, the General Aviation community and air traffic controllers, as well as licensed aircraft maintenance engineers and cabin crew.

Now, once again, CHIRP is embracing change and adapting to meet new requirements by expanding its online confidential reporting system for use by drone pilots and enthusiasts, secure in the knowledge that their personal details will remain confidential.

Increasingly, drones are a key part of the UK's aviation industry, and the sector is expanding rapidly – and it is important that drones, or small unmanned aircraft, have the same levels of support as other types of aviation so that the SUA community can continue to foster the culture of safety first that is essential if drones are to be safely integrated into UK airspace. CHIRP's free and easy-to-use confidential reporting facility is a valuable channel providing access to a level of independent professional scrutiny for drone operations that can help commercial drone operators and hobbyists alike better understand a wide range of real issues, explore a range of potential solutions, and benefit from the experiences of their peers.

Over the years CHIRP has become a central focus for the type of honest and open confidential reporting that forms the bedrock of the aviation industry's strong safety culture, and NATS believes it is essential for the safe growth of the drones industry that a similar safety culture becomes second nature to all drone owners, operators and pilots, from hobbyists to commercial SUA operators.

By providing an open forum for the drones community to report drone safety concerns, CHIRP is helping pave the way towards non-judgemental lesson-learning and safety improvements – for airspace users in general and drone industry operators in particular. By identifying areas for improvement and focussing on finding collaborative solutions to drone-related safety concerns, CHIRP's confidential reporting can help us all benefit from others' experience, helping us work together to make our skies even safer.

With the use of drones so rapidly on the rise in recent years and so many high-profile drone-related incidents disrupting flights at airports around the world, CHIRP hopes that by establishing a forum for open and non-judgemental discussion and lesson-learning, its free and accessible reporting facility will help embed a Just Culture ethos in the drones community similar to that found in other aviation sectors.

Professional drone operators and drone pilots using their drones for commercial purposes should continue to report drone misuse to the CAA by filing Mandatory Occurrence Reports in line with current regulatory procedures although, as for other aviation professionals, CHIRP's drone reporting facility is available to commercial drone pilots in circumstances requiring confidentiality. Members of the public who spot drones being flown irresponsibly should contact the local police.

The safety of our skies and fair access for all airspace users are top priorities for us at NATS and we're committed to supporting CHIRP in this new drones initiative, which is aimed primarily at leisure users and hobbyists to enhance safety and promote best practice. We're hoping that CHIRP will become an important port of call for sharing and reporting drone-related incidents and events.

More information about CHIRP can be found on the website: https://www.chirp.co.uk/ and CHIRP's confidential reporting service can be accessed here: https://www.chirp.co.uk/submit-a-report/ online.

About NATS

NATS is a leading air traffic management and solutions company, established in the UK in 1962 and now operating in countries around the world.

NATS handled 2.4 million flights in 2016, covering the UK and eastern North Atlantic from its centres at Swanwick, Hampshire and Prestwick, Ayrshire. NATS also provides air traffic services at 14 UK airports; at Gibraltar Airport and, in a joint venture with Ferrovial, at a number of airport towers in Spain.

Building on its reputation for operational excellence and innovation, NATS offers aerodrome, data, engineering, capacity, efficiency and environmental performance solutions to customers worldwide, including airports, airlines air traffic service providers and Governments.

For more information visit the NATS website at www.nats.aero

Social Media - Friend or Foe?

by Richard Lotinga

For the last 10-15 years mobile phones have become part of our lives. Not just mobile phones but smartphones with a myriad of apps, Facebook, Instagram, Tweets, Whatsapp and of course cameras. Not just ordinary cameras but High Definition lenses with video recording.

They have supplanted many compact cameras and lens manufacturers have long been supplying their goods to the likes of Apple, Samsung and many, many others. With the advent of large capacity micro storage cards and 'the Cloud' storage a vast amount of video can be taken. I only have to look at my own phone with seemingly thousands of pictures of friends, my children and grandchildren.

From an aviation perspective 2 major points come from the use of smartphones. Distraction and job security.

If you examine yourself before flight or on turnaround down-route I am sure that you will view or use your mobile phone. As a Captain you will, probably, have the Company phone to hand to allow communication with Operations, local agent etc. That is sensible to speed slot allocations and other Company communications but do you have your personal phone to hand as well? Depending on your age and personal circumstance there are so many reasons to be contact with the outside (outside the confines of the fuselage) world. You might be interested in the cricket/football scores or commentary. You might be in a new relationship that is teetering on total commitment or total loss. A close relative or friend might be in difficulty. You might not have enough likes on your latest posting on one of the social media platforms. Indeed, recent social issues have emphasised the effect of trolling on social media platforms to a devastating level. In addition, a recent incident with a major airline was almost certainly created by distraction.

The problem from all of the above is obviously Distraction and your ability to safely continue your professional job. Depending on the information extracted from your phone you might want to race back home creating a 'press-on-itis' situation or the exact opposite, falling into depression that you really don't want to return home to face what you are expecting. Before social media you left home and went to work and effectively had no communication with home until you opened the front door. Today's world is somewhat different.

Before coming back to the above let's consider another aspect of social media, job security. You Tube has become a goliath of video publication. It is difficult to imagine the amount of storage space that is occupied by You Tube videos. The videos are sometimes useful, puerile, funny, informative and often connected to advertising. Instagram videos often display products connected to the self blogger, earning many thousands but arguably perpetuating sweatshop clothing manufacturing and tremendous waste. Only now are some people realising that buying second-hand or not buying a new item of clothing every other day isn't such a bad idea. Apart from that aspect everyone seems to want to video everything rather enjoying watching 'live' what is in front of them. Sports and concerts are particular to that craze but more often videoing any incidents of any nature, particularly life threatening.

Any incident on an aircraft seems to be videoed. An altercation between passengers or passengers and crew are seemingly the most popular. The unfairness to cabin crew (CC) can be that the initial altercation will not be videoed but by the time a cabin crew gets involved and has to be verbally strong to calm the situation you can guarantee the mobile phones will be out filming. Of course, CC training on pacification and conflict resolution can make the CC look highly professional but with a little bit of editing the situation could be sent to You Tube and the media and the CC could be viewed in a totally different light. The videos can then be the basis of an action against the individual or the Company by the passenger who created the problem in the first place. The incident can put the relevant company in a difficult situation defending their crew against the public when the crew were only doing their job.

Pilots are not immune to the modern craze. Any pilot standing up to make an announcement to passengers, in the terminal or on the aircraft is bound to be filmed. PAs are less likely to be recorded, partly because the sound quality can be pretty awful at the best of times. However there is usually a phalanx of aircraft spotters and those videoing at runway thresholds to film the more exciting landings. At a recent meeting an airline acknowledged that one of their aircraft was a little low at Skiathos, the airfield compared to St Maarten as one of the scariest, to onlookers, to effect a landing. It took place in July this year and the aircraft touched down on the piano keys which for a medium-sized jet, an Embraer, is somewhat short. The on-board data recorder would not have noticed and the pilots, probably after an inspection would have said nothing, but the recording went viral and the management then became involved. Without video-recorders it would have gone un-noticed. The military do not escape the videoers as a Hawk landing at RAF Valley touched a wingtip in a strong crosswind which was later analysed. These recordings are, of course, not really a bad thing as they can be useful in diagnosing an incident or accident. Where terrorist incidents occur the onlookers' recordings can be extremely helpful in identifying the perpetrators and bringing them to justice. It seems a shame in that all of these recordings, wherever made, are usually made for financial gain.

Another affecting pilot's is the situation where an issue occurs mid-flight whether technical or social. With airborne Wi-Fi the issue can reach the public and media before the aircraft has landed and reached an airbridge. Meanwhile management is being berated by the media for not providing information when they know nothing of the truth of the event or even knowledge of the occurrence.

The summer meeting of the UKFSC was held at the AIG building in Fenchurch Street. The hosts, AIG, were represented in the meeting and the gentleman made a valid point for management at all levels. If a social media accusation is made or legal action is taken by a passenger the management should not reply directly but always use the legal department of their insurance company to reply. It is easy to go off track and cause the Company and yourself a lot of hassle. Politicians do it all the time.

Is there a solution? Job security can be secured by doing the best one can for the passengers and crew and it being recognised as such. Truth and honesty hopefully, will win out. Distraction is a little more difficult. Distraction only applies to the crew so perhaps a ban on the personal use of mobile phones until all the pre-flight duties are complete would be a start and I suspect that a fair percentage of senior supervisors would have this as their policy anyway. Once the passengers have arrived at the aircraft then crew phones will be stowed along with all other non-professional activities.

Being professional is probably the only way to combat one of aviation's 7 deadly sins and fortunately most crew are highly professional.

Happy Christmas and safe flying.

Golden years at Fairoaks...

by Dai Whittingham, Chief Executive UKFSC

By the time this edition of FOCUS is distributed, there will have been a very significant 50 year milestone passed in the Fairoaks office. June Cox and Lisa Rush will have completed 30 years and 20 years of service respectively, a Golden Anniversary indeed. Such lengthy commitment to the UK Flight Safety Committee is a notable achievement by any standard, but the more so as we now live in an age where mobility is normal and employment longevity is not.

June was recruited in December 1989 when the office moved from Redhill under the leadership of Roy Humphreyson, and in the ensuing years she worked for the late Ed Paintin and, more recently, Rich Jones. Never one to mince her words or brook feeble arguments, she has made it quite clear that she has neither the interest in nor the patience for bringing a new Chief Exec on board and pointing them in the right direction, so it seems you will be stuck with me for another year or two!

A font of corporate knowledge, June has kept our constitutional business on track, managed the office and the accounts, organized FSO courses and SIEs, and spent countless hours chasing membership subscriptions. She has also been the driving force behind FOCUS over many years and, whilst it is officially my name over the door, it is perhaps June who could more accurately be described as 'Editor'.

Lisa joined us in September 1999 to handle the administrative tasks without which we would flounder. She manages the database that allows us to connect with you all (June and I are not allowed to touch it...), including all the addressing and management of the FOCUS distribution, and she looks after the website content and a myriad of smaller tasks. She will be best known to many of you for the weekly update messages giving you details of all the latest information across the industry, and for the emails you get regarding SIE agendas and attendance details. She is also a very skilled proof-reader for FOCUS, spotting all the typos and inconsistencies that have escaped me.

June and Lisa work wonderfully well together – I have never heard a cross word exchanged between them, even though they are clearly now close friends. More importantly, without their efforts the Committee could not run in the way it does, and I could not do my job without them. You and I owe them a great debt of gratitude for all that they do, so please take the time to tell them so if you call the office. Sadly, both ladies have ticked the 'no publicity' box, so there is no celebratory photograph to go with this short and probably inadequate tribute. Suffice it to say that we will be recognising their contribution in a more tangible form in the coming weeks.

June, Lisa, congratulations from all of us on your significant UKFSC birthdays!

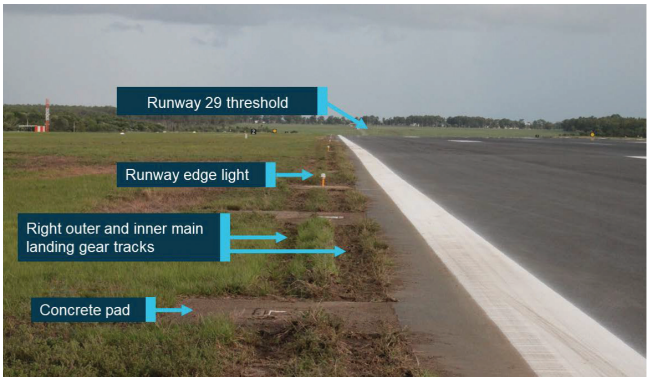
Lighting the Path

by Linda Werfelman

An informal review of runway veer-offs – side excursions – in conditions of reduced visibility shows that "a disproportionate number" occurred on wider-than-normal runways, especially those without centerline lighting, the Australian Transport Safety Bureau (ATSB) says.[1]

The ATSB's conclusion was included in its final report on the Dec. 6, 2016, veer-off of a Virgin Australia 737-800 while landing in a nighttime rainstorm at Darwin International Airport. No one was injured in the runway excursion, and minor damage was reported to the airplane.

In its investigation, the ATSB found that the 737, after a scheduled passenger flight from Melbourne, was on approach to Darwin's Runway 29. Thunderstorms were nearby, and the airplane flew into heavy rain before reaching the runway threshold; the 22,500-hour captain told investigators he had experienced such conditions only once in his career - about 30 years earlier on a flight into Darwin that ended in a hard landing. During this 2016 approach, there was a light crosswind, which increased in strength as the airplane moved over the runway, and "the aircraft drifted right without the flight crew being able to discern the extent of the drift," the report said.



The right main landing gear dropped off the runway surface soon after touchdown. Source: ATSB

The airplane touched down 21 m (69 ft) to the right of the centerline. Soon afterward, the right main landing gear left the runway surface; it destroyed six runway lights before returning to the runway.

Accident investigators determined that the relatively slight crosswind had nevertheless resulted in a significant deviation from the runway centerline and that visual cues were not adequate to enable the flight crew to detect the deviation and correct it.

The report said one of the inadequate visual cues was the runway lighting, which did not include centerline lights.

ICAO Guidance

The document noted that the International Civil Aviation Organization (ICAO) says, in Annex 14, *Aerodromes*, that runway centerline lights and touchdown zone lights *shall be* provided for runways with a Category II or Category III precision approach. ICAO also recommends that centerline lights be provided for runways with Category I precision approaches, "particularly when the runway is used by aircraft with high landing speeds or where the width between the runway edge lights is greater than 50 m [164 ft]." (Annex 14 does not include a recommendation for touchdown zone lights for Category I runways.)

Additional ICAO guidance included in Document 9157, *Aerodrome Design Manual*, describes the purpose of centerline lighting: "to provide the pilot with lateral guidance during the flare and landing ground roll or during takeoff."

The document adds, "In normal circumstances, a pilot can maintain the track of the aircraft within approximately 1 to 2 m [3 to 7 ft] of the runway centreline with the aid of this lighting cue. The guidance information from the centreline is more sensitive than that provided from the pilot's assessment of the degree of asymmetry between the runway edge lighting. In low-visibility conditions, the use of the centreline is also the best means of providing an adequate segment of lighting for the pilot. The greater distances involved in viewing the runway edge lighting, together with the need for the pilot to look immediately ahead of the aircraft during the ground roll, also contribute to the requirements for a [well-lighted] runway centreline."

Related Occurrences

ATSB investigators reviewed the bureau's database and found that between 1997 and 2017, Australian airports reported three veer-offs, including the 2016 Darwin occurrence, that involved an air transport and met a specific set of conditions:

- *The airplane lost runway centerline alignment before and during touchdown;*
- *There had been no difficulty with relevant aircraft or airport equipment that contributed significantly to the veer-off; and,*
- *The flight crew had experienced no significant problems with height or airspeed stability during the approach.*

All three events involved runways without centerline lighting, and two were on Runway 29 at Darwin.

The first event involved another 737 at Darwin on Feb. 19, 2003, also at night and during rain and reduced visibility. In that event, the airplane was at about 200 ft, on the localizer and glideslope, when the captain disengaged the autopilot. Seven seconds later, the airplane began deviating right, and the approach lighting was no longer visible from the cockpit.

The 737 touched down near the right edge of the runway, about 520 m (1,706 ft) from the threshold. The right main landing gear ran off the runway about 590 m beyond the threshold, and the left main gear, about 760 m (2,494 ft) beyond. When the airplane was 1,300 m (4,263 ft) past the threshold, all wheels were back on the runway.

In that case, the report said that the investigation determined that "the flight crew may have encountered an abnormal situation where few reliable visual cues were available for determining the aircraft's position relative to the centreline of the runway." Investigators noted the potential for visual illusions during that approach, considering the wide runway, lack of centerline lighting and weather conditions.

The second event, also in 2003, occurred at Emerald Airport in Queensland during the nighttime landing of a Bombardier DHC-8-200 that veered partially off Runway 24 at the end of a nonprecision approach. Heavy rain - and the accompanying sudden, near-zero visibility - left the pilots with virtually no external visual references. The 45-m (148-ft) wide runway had no centerline lights.

The ATSB also identified two related runway occurrences at Darwin - the 2002 runway overrun of a 737, which occurred at night under clear skies, and a 2008 hard landing involving a 717, also at night. The ATSB said the 2002 overrun occurred in an operational environment that was "conducive to visual illusions." In the case of the 2008 hard landing, the ATSB said the lack of runway centerline lighting limited the available visual cues.

Veer-Offs in Canada

ATSB researchers also examined veer-offs reported in Canada, which has a greater proportion than most countries of runways that are at least 60 m (197 ft) wide.

Seven veer-offs between 1997 and 2017 at Canadian airports met the same criteria used in the Australian review - all occurred at night on 60-m wide runways without centerline lighting. Each event also involved weather-related factors that reduced visibility, the report said. None of the events resulted in injuries; most resulted in damage to the airplanes and all destroyed runway lights or signs, or both.

The report cited 2017 data from civil air navigation service provider Nav Canada, which showed that, of 115 of the country's busiest airports, 57 percent had runways with no centerline lighting, including 31 percent of airports with runways wider than 50 m and 26 percent of those with runways 50 m wide or narrower.

"It is statistically very unlikely that seven veer-off occurrences in 20 years with similar characteristics took place on these types of runways without any having occurred on the narrower runways or on wider runways with centerline lighting," the report said.

The document cited the final report by the Transportation Safety Board of Canada (TSB) on a 2017 runway excursion at Toronto Lester B. Pearson International Airport, which reached conclusions similar to those outlined in the ATSB report on the 2016 Darwin event.[2]

"On runways without centreline lighting, as the distance between runway edge lights increases, it becomes more difficult to judge lateral movement solely by assessing the degree of asymmetry between the runway edge lights — especially when the aircraft is close to the ground and the flight crew's attention is focused directly ahead of them," the TSB report said.

"If the distance between runway edge lights is greater than 50 m and runways are not equipped with centreline lighting, there is a risk that visual cues will be insufficient for flight crews to detect lateral drift soon enough to prevent an excursion while operating aircraft at night during periods of reduced visibility."

Using the same search criteria for the same time period in several other countries, the ATSB identified five veer-off events involving

runway misalignment – two in the United States and one each in Finland, Sweden and the Solomon Islands. All five events occurred during nighttime instrument approaches in reduced visibility to runways without centerline lighting. Two were on 60-m wide runways, and three were on 45-m wide runways.

Summarizing all 15 events, the report noted that all occurred in reduced visibility at night on runways without centerline lighting, 11 occurred on runways wider than 50 m, and 13 occurred during a Category I instrument landing system approach.

Earlier Studies

The ATSB also report cited two earlier studies, including a 2009 report by the agency that reviewed 141 runway excursions involving commercial jets from 1998 through 2007. About 40 percent were veer-offs, occurring either on takeoff or landing, and weather was deemed a significant factor in many events. In that report, the ATSB observed that "appropriate lighting of the runway centreline and edges has the potential to provide pilots with better spatial awareness at night or in poor visibility conditions and may reduce the likelihood of veer-offs."[3]

A report released by Flight Safety Foundation, also in 2009, said that an examination of 548 runway excursions, including 230 veer-offs after landing, found that runway contaminants were a significant risk factor, as were rain, crosswinds, gusting winds, low visibility and other weather conditions.[4]

A 2015 report by Airbus said that runway excursions (both veer-offs and overruns) accounted for an increasing proportion of aviation accidents and that the rate of runway excursion accidents had not changed significantly over the 20 previous years – a period in which many accident types experienced declining accident rates.[5]

The Airbus report, which contained an examination of 25 reported veer-offs involving Airbus airplanes, found three primary environmental factors – a wet or contaminated runway, turbulence or a crosswind, and reduced visibility – were often associated with the events. Nineteen of the 25 veer-offs involved at least two of the three factors, the report said.

Recommendations

As a result of its investigation, the ATSB recommended that ICAO review the provisions of Annex 14 that recommend, but do not mandate, the installation of centerline lighting on Category I precision approach runways wider than 50 m.

The ATSB also recommended that Darwin International Airport "address the risk of very limited visual cues for maintaining runway alignment during night landings in reduced visibility that arise from the combination of the absence of centreline lighting and the 60-m width of Runway 11/29."

After the event, Virgin Australia began providing additional guidance to flight crews for the approach to Darwin, including notes about the runway width and lighting; and the En Route Supplement Australia, which publishes aeronautical information, incorporated new material about runway lighting and the possible loss of visual references during reduced visibility at Darwin.

Notes

1. ATSB. Aviation Occurrence Investigation AO-2016-166, "Runway Excursion Involving Boeing 737, VH-VUI." Dec. 6, 2016. Adopted May 2019.

2. TSB. Investigation A17O0025, "Runway Excursion; Air Canada, Airbus Industrie A320-211, C-FDRP; Toronto/Lester B. Pearson International Airport, Ontario; 25 February 2017." April 23, 2018.

3. Safety Management Specialties. "Report on the Design and Analysis of a Runway Excursion Database." A special report prepared for Flight Safety Foundation. May 26, 2009.

4. ATSB. Aviation Research and Analysis Report AR-2008-018 (1), Runway Excursions, Part 1: A Worldwide Review of Commercial Jet Aircraft Runway Excursions. 2009.

5. Airbus SAS. "Lateral Runway Excursions Upon Landing: A Growing Safety Concern?" Safety First Volume 20.

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CHIRP - The UK Confidential Human Factors Incident Report Programme for Aviation

CHIRP, a registered charity, dates from 1982 and is the UK's response to ICAO's requirement for states to have a confidential reporting programme; it is the second oldest such programme in the world. Preserving the confidentiality of reporters is central to CHIRP's work and is engrained in every process.

By providing a reporting avenue for those who are not comfortable with submitting reports either through their company systems or direct to the regulator, CHIRP generates information that makes a valuable contribution to work to assess and manage the risks being carried across the aviation enterprise in the UK.

Whilst CHIRP now has an additional maritime programme which is funded by maritime industry sponsorship, the aviation programme is wholly funded by the CAA. Crucially, both programmes operate under the direction of a Board of Trustees and act independently of their funding sources; although the CAA is necessarily involved in aviation the corporate relationship is one of 'arm's length', the regulator having no ability to intervene in CHIRP processes or outputs.

What CHIRP does:

- Gathers safety information that would not otherwise be available to regulators or industry, and uses this information for safety promotion activities.
- Engages with operators and regulators to challenge regulations, policies and processes that are seen as unhelpful in the context of aviation safety.
- Takes an impartial and informed view of the issues reported to it.

What CHIRP does not do:

- Breach the confidentiality of reporters.
- Deal with anonymous reports.
- Automatically support the line taken by companies, regulators or reporters.
- Become involved in industrial or contractual disputes or contractual issues.
- Direct outcomes with companies and regulators - CHIRP has no executive authority.

How does CHIRP operate?

When a report is received it will be reviewed by a CHIRP staff member who will then open up a dialogue with the reporter. The regulatory framework will be clarified to confirm whether company or individual actions are compliant; this step is not an endorsement of the relevant regulation, merely a check that the circumstances of the report have arisen from a documented and accepted process.

If CHIRP believes it necessary to contact an operator for comment, this is only done with the full agreement of the reporter, as there are times when any contact is likely to breach confidentiality. For example, if Capt X had already been in debate with crewing or management about a particular city pair, it would be readily apparent to the operator that information about this issue passed to CHIRP was likely to have come from Capt X. However, when reporters refuse permission for CHIRP to approach the operator it often limits CHIRP's response.

Reports are de-identified before being referred on a confidential basis to one of the Advisory Boards – Air Transport, Cabin Crew, Ground Handling and General Aviation; a drone programme is also being established. Board members act as individual expert advisers and not as representatives of any sponsoring organisations. The CHIRP Trustees ensure that the Advisory Boards contain a suitable mix of experience and skills, which in turn ensures that advice emanating from the Boards is on a sound professional footing.

Advisory Board Discussions

All new reports are reviewed individually by Board members and then discussed in plenary session with a view to advising CHIRP on the best course of action. This action may involve seeking comment from the operator and/or the regulator. The identity of the reporter is never revealed to Board members under any circumstances; on those occasions where an operator or location might be inferred from reports, members remain bound by a duty of confidentiality, the terms of which they agree to at every meeting.

The Boards also agree on whether reports are suitable for publication in FEEDBACK. Some reporters do not wish to have their report made public and others prove impossible to de-identify without losing their meaning. Reports are published verbatim, so intemperate or extreme language can sometimes prevent publication if the reporter does not wish to change their input. Some reports clearly relate to industrial disputes, which means that CHIRP is unable to intervene without compromising its impartiality and so those reports will not be published. Board members collectively agree

any CHIRP comment for those reports selected for publication, the comments thus reflecting a consolidated Board position rather than an individual view.

The views and comments of the Advisory Boards are not always welcomed at all levels, but they are nonetheless a distillation of independent expert opinions expressed without fear or favour.

CHIRP Follow-on Actions

Based on the advice from the relevant Board, CHIRP will typically contact an operator or regulator either to seek comment or to inform them of the view the Board has taken. As a recent example, a pilot felt that his company was ignoring his concerns about fatigue for a particular element of his roster, as he had been advised the roster was, "legal (EASA FTL-compliant) and therefore could not be fatiguing". CHIRP was able to remind the operator that legal rosters could still be fatiguing and that the rostering team were mis-interpreting the role of the software used to assess the fatigue potential of rosters.

The CAA is represented on the Advisory Boards and so some issues will be taken for action directly during the discussions; on other occasions, a more formal communication will be required, normally in the form of a letter from the head of the CHIRP aviation programme. Where recommendations or comments are directed at EASA, CHIRP will communicate directly and inform the CAA in parallel. CHIRP receives a number of reports stemming from foreign operators; these are either passed to the CAA for handling under the State Safety Programme or directly with the relevant NAA.

FEEDBACK is the primary mechanism for disseminating reports and the comments and actions that arise from them, and this is core to the safety promotion effort. CHIRP welcomes comment from FEEDBACK readers who either do not agree with the Advisory Board/CHIRP comment or who wish to provide amplification. It all helps to shed light on the problems facing the aviation industry.

Confidentiality

Confidentiality underpins the entire CHIRP system – it is a fundamental principle of business, hence CHIRP's IT system is provided by a company that is security accredited by the Ministry of Defence. CHIRP does not accept anonymous reports because they are impossible to verify or clarify. There are occasions when reports are not suitable for publication, or an industrial or contractual dispute is in play, or contact with the operator has been inappropriate because of confidentiality concerns, but where there is Board disquiet about the nature of the report. These cases are often very sensitive and so any activity will necessarily be invisible to most of the community. Suffice it to say that it would not be unreasonable for the CAA to ask the relevant inspector or surveyor to take a discreet look at an entity to see whether there was any evidence to support a reporter's complaint. Should there be fire to go with the smoke, it will have been uncovered by the regulator, thereby protecting the confidentiality of the reporter. There are also avenues for tackling a problem by referring it in generic form to another agency or by lobbying and other influencing activities. It doesn't matter who gets the credit – it is the outcome that is important.

The above all stems from the fact that CHIRP has no executive authority – it cannot direct action or force change. Those involved in the aviation programme are frequently frustrated with the inability to effect change directly, or where the duty of confidentiality precludes an intervention. Happily we can point to many issues where we can identify CHIRP's intervention as having had a demonstrable influence.

Lastly, once a report has been through the full system, CHIRP has closed the loop with the reporter and is satisfied that there is nothing further to be done on the particular case, the report itself is further de-identified. Correspondence is redacted or deleted to ensure that there is no information remaining that could link report and reporter. The de-identified report remains on file to ensure the safety information within it is not lost.

Conclusion

CHIRP exists to provide a means of reporting for anyone who is uncomfortable with submitting reports through formal company or regulatory channels, or for those who have submitted formal reports but are dissatisfied with the outcome. Protecting the confidentiality of reporters is central to all processes. Published comment from CHIRP represents the collective and agreed views of groups of industry experts acting independently of their parent organisations.

CHIRP has no statutory authority but instead relies on its credibility to influence regulators and operators. Through the information it gathers and the views it expresses, CHIRP makes a valuable contribution to the risk assessment and management across the UK aviation enterprise.

CHIRP became a charity in 1996; governance arrangements and supporting information can be found on the website https://www.chirp.co.uk/.

Mode-Switching In Air Traffic Control

by Miguel Aulet & Zsófi Berkes

Key Points

- Mode switching, and mode confusion are not commonly associated with air traffic control, but are increasingly becoming issues of interest.
- There are two types of mode-switching: change-related and in-service. Both happen when an operator uses more than one mental model to perform the same task.
- There are a number of risks and factors that affect mode-switching.
- Mitigations for mode switching include design and changing practice to accommodate effective mode-switching.

In striving for a more efficient, resilient and safe operation, we continuously develop new ATC tools, procedures and airspace. Operational staff are required to switch between new procedures and different technologies, during testing, in the simulator, and with live traffic. In this article, Zsófi Berkes and Miguel Aulet describe how NATS deals with mode-switching.

Imagine you are the first officer on a Boeing 737-700. You first flew the 737-500 as a first officer. The pilot in command has left the cockpit and is requesting to return. You confirm on your screen that it is indeed the captain attempting to enter, reach out your left hand and operate the door lock control.

It's not working, you get frustrated, so you do the obvious thing in this situation: you repeatedly operate the same button, but nothing appears to be happening. What you don't immediately realise is that you have just turned the aircraft upside down and the aircraft will have lost 6,300ft before you recover it. The investigators establish that you operated the rudder trim control instead of the door lock control. They also establish that the rudder trim control of the aircraft you were flying (737-700) was similar to the door lock control of the first aircraft you have flown (737-500) in its positioning, shape, size, and operability. This is thought to have led you to confuse the two switches.

What you have experienced is mode confusion and as you may have guessed, this was a real-life example. The same sort of thing happens in everyday life. You may have had experience of moving from a country where you drive on the right to another where you drive on the left, or vice versa. Or perhaps you have tried to use different key combinations or shortcuts on an unfamiliar computer. When you change modes, the same input (or what looks and feels like the same input) will have different results.

What is mode-switching?

Mode-switching has been a known issue for some time for pilots with multiple type ratings, but it is not commonly associated with air traffic control. For a long time, the task of a controller was relatively consistent across radar operations, with a radar screen and paper strips setup. But this is changing. In recent years new systems have moved on to electronic strips or trajectory-based (stripless) systems.

At NATS, we refer to mode-switching when an operator uses more than one mental model to perform the same task (with a mental model for each component). This can happen when an operator is required to perform the same or a similar task using different technical systems, operating environments, airspace, procedures, etc., and transitions are required between these. In recent years, we have been managing an unprecedented rate and scale of change in our business. We have been continuously introducing airspace changes (e.g., systemised airspace) and increasingly automated technology (e.g., our trajectory-based system, iTEC). With these changes, we are creating more frequent mode-switching situations. At Prestwick Centre in Scotland, a number of controllers operate both our electronic flight data (EFD) system with electronic strips on lower level sectors as well as iTEC with medium term conflict detection (MTCD) functionality to control upper airspace. We have identified that switching between these two systems may lead to mode-switching errors.

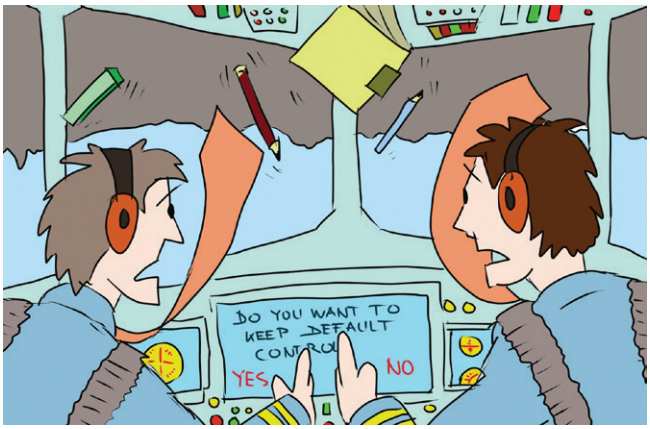
We consider two types of mode-switching: change-related and in-service.

- **Change-related mode-switching** takes place as we develop new tools, procedures, or airspace. Controllers operate a new tool (e.g., electronic strips) or new airspace in the simulator, and then afterwards have to plug back in the ops room on live traffic, operating the current tool (e.g., paper strips) or existing airspace.

- **In-service mode-switching** occurs when controllers switch between systems (e.g., electronic flight strip to trajectory-based systems) in live operations. It also happens when controllers switch between sectors or roles (tactical/executive or planning controller, or combined tactical and planner).

So what is the risk and how can we manage it?

One factor is awareness of mode-switching and related errors. For example, we have been in situations where we asked controllers whether they had ever experienced mode-switching issues and their reply was: *"Of course not! The two systems are completely different."* However, when we asked them if they had ever tried to use the mouse in the 'iTEC way' whilst operating the other system, almost everyone said *"yes"*. People regularly make small mistakes and they might not even be aware that some of these are due to mode-switching.



We design systems to be forgiving so that small errors are easy to correct and recover from. A wrong click should be recoverable and shouldn't cause a surge in workload or any other unsafe outcome. But small errors, whether due to mode-switching or something else, can lead to undesirable outcomes.

It's not just mouse clicks that are different between systems. Cognitive tasks and workflows are different too. Our iTEC trajectory-based system presents controllers with predicted conflicts that they have to resolve, whereas on the EFD electronic flight data system, controllers must proactively spot conflictions by scanning strips and radar. Therefore, a controller moving from one system to the other must adapt their mental model.

A potential risk could arise when the controller goes from a more automated to a less automated system. Here's an example of what could happen: John has just unplugged from iTEC where the system provided conflict detection. He now plugs in on EFD. It's been a couple of days since he last controlled on EFD. For a few seconds, he sits there waiting for an alert to pop up telling him about a conflict. Suddenly, he realises that he is on EFD and it's him who needs to do the conflict detection as automated conflict detection support tools are not available. Nothing bad happened. He caught it in time. But he was annoyed at himself.

To understand the mode-switching risk, we start with highlighting the differences between the two systems and examining the worst-case scenario when switching in either direction. This helps us understand if there are any risks. If we identify a hazard, we can conduct a formal risk assessment.

Our aim is to agree on a course of action to manage any risk. We frequently create checklists that highlight the differences in human-machine interfaces (HMIs), procedures, or functionality. These aim to help the controller get into the right mental model before plugging in. Other mitigations we have put in place include limiting the amount of switching and introducing mandatory breaks between switches. Our aim is to limit the exposure to mode-switching errors, but we always try to introduce tailored solutions that we continuously update. We also do not want to hinder the operation by imposing unnecessary constraints.

What affects our mode-switching performance?

There are a number of factors that affect mode-switching performance. One of these is the similarity of technical systems, procedures, airspace, etc. Having just spent a day on the simulator testing a small change in procedure for a specific sector, a controller may forget to switch to the current one when they plug back in during live operation on the same sector.

Currency and recency play a role as well. If a controller has spent the majority of the previous week or month working on only one of the systems and then has to control on the other one, they may report that they feel 'rusty' on the other system, and we find that mode-switching errors tend to increase. Then there's fatigue; a fatigued person is more likely to make mistakes. Various other factors – controller competency, experience, current task load, type of sector, traffic complexity – can affect our ability to cope with mode-switching. It's not always clear cut when and why mode-switching errors happen.

Mode-switching in ATC – final considerations

Whenever mode-switching is required, one key focus is awareness and changing practice. We teach controllers about mode-switching so they can incorporate techniques to minimise related errors – for example by getting into the right mind-set when taking over a sector using a different system. And, similar to unsafe procedures being reported and improved or eliminated, mode-switching issues can be reported through our reporting system.

In the same way that our ATC manuals don't prescribe for every eventuality, we cannot predict or design out every issue that operational staff may encounter. So we need collaboration between controllers and everyone else involved in designing for safety to gain insight and develop effective mitigations.

Reference

Japan Transport Safety Board (September 25, 2014). AI2014-4. Aircraft serious incident investigation report. Boeing 737-700, Ja16an. Nosedive from upset (LOC-I) at an altitude of 41,000 ft, approx. 69nm east of Kushimoto, Wakayama Prefecture, Japan around 22:49 JST, September 6, 2011. Available at: http://www.mlit.go.jp/jtsb/eng-air_report/JA16AN.pdf

Example of mode-switching error	Possible mitigation(s)
The same mouse is used for all the systems, but the buttons perform different actions. *"I clicked right button on an aircraft expecting a vector line and instead a menu appeared."* *"I inadvertently changed the range while trying to rotate a label."*	System design allows for quick/easy recovery of errors *"I clicked the menu away and remembered to use the middle button to get the vector line."*
"I went from plugging in with the 'automated' system to the 'manual' one… I found myself waiting for a system prompt to show a conflict, to then realise I had to actively spot them."	Consult aide-memoire prior to plugging in; training.
"I spent half of my shift testing the new procedure in the simulator… When I plugged in to control live traffic I mistakenly used the procedure I had been testing… and had an embarrassing phone conversation apologising to the approach controller."	Introduce a break before switching.
"Lately I have been using the new kit a lot and it's been weeks since I used the old equipment… I have asked for a support controller as an extra pair of eyes for a few minutes because I wasn't confident I was up to speed."	Raise awareness and create a culture where controllers recognise the issues and feel comfortable making this call.
"I had to go from a 'low-level' sector with a small range where lateral separation is about 3cm on the screen, to a 'high-level' sector where the same separation is about 2cm…I got worried I may have lost separation between two aircraft on parallel headings when I actually had 8nm between them (when I only needed 5nm)."	Consult aide-memoire prior to plugging in; training.

Table 1: Examples of mode switching errors and mitigations

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