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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: Wizz Air UK A321-231 G-WUKJ at Luton Airport, ready for its next flight, Autumn 2022, by Capt Adam Deacon.

Wizz Air UK is a ULCC established in 2018, with its headquarters at London Luton Airport. From here, and from other bases around the UK, it operates all over Europe, flying a young, expanding fleet of Airbus A320/A321 CEO/NEO aircraft. Wizz Air UK's latest expansion beyond Europe includes destinations in Turkey, Egypt and Morocco.

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focus ON COMMERCIAL AVIATION SAFETY

Pressures and Leadership

by Dai Whittingham, Chief Executive UKFSC

In July this year the CAA published a Safety Notice (SN-2022/005) entitled 'Commercial, Organisational and Client Pressure in Flight Operations'[1] If you haven't read it yet, it is worth a few moments of your time, especially if you have any sort of management role. If you haven't even seen it, then you may have an internal communications problem because the CAA directed that "Recipients must ensure that this Notice is copied to all members of their staff who need to take appropriate action or who may have an interest in the information...".

The origins of this Safety Notice lay in a serious incident last year where perceived client pressures almost led to a CFIT accident when the crew tried to work through deteriorating flight conditions to get the job done. Since then, pressures – perceived or genuine – have continued to feature as our industry battles to recover from the pandemic. The publication of SN-2022/005 served as a timely reminder that small actions or the occasional poor choice of phrase (of which I can also be guilty) can have unintended consequences through the resulting behaviour of others.

Whilst some commercial, organisational or client pressures can be very direct, perceived pressures are perhaps the most insidious simply because they are an individual response to a set of circumstances. It is only a small step from a manager saying, for example, that "We need to get this sector done or we will have trouble tomorrow..." and someone interpreting this as meaning they should breach the FTL scheme because that is what is required to make it happen. The manager may have meant nothing of the sort, but that is irrelevant if their behaviours and company culture make such an interpretation likely. Even well-meaning messages of encouragement from the top of shop can be seen as a subtle form of pressure, so communications need to be carefully crafted.

More damaging than perceived pressures are those applied deliberately, or without real thought, in order to achieve a specific operational or financial goal. When someone issues an instruction that requires somebody else to cross regulatory or procedural boundaries, there is always a consequence. How that eventually plays out comes down to the people on the receiving end, who must decide whether to comply with the instruction and compromise safety barriers or, refuse and potentially compromise their own employment. It is a tough choice: profit and increased personal risk (which may extend to multiple 3rd parties) on the one hand, or personal and professional integrity plus loss of livelihood on the other.

When you start deliberately eroding safety barriers it immediately undermines the basis on which the regulator and the insurer assess risk for the operator. The aviation system relies on everyone doing the right thing as laid down in regulation, guidance and operating manuals. As the CAA puts it in its Safety Plan, one of its primary outcomes for Performance Based Oversight is that: "Key aviation safety professionals and organisations reliably deliver what is expected of them." You might therefore consider that 'reliably delivering what is expected' is, by definition, a duty; pressuring others to do something that does not meet that duty is itself a dereliction.

All this said, there are plenty of good leaders and managers out there, but it would be unusual to argue that aviation is the only industry where there are no weaknesses at the individual level. We should not forget that managers all have a job to do and targets to meet. They have the same vulnerabilities as everyone else, and they don't set out to get things wrong. The great majority of managers perform well but trouble tends to come from the minority. These difficulties may stem from a lack of familiarity with the sector, under- or over-confidence, a misunderstanding of the role requirements, or even an unfortunate style. What is likely to be a common thread is the absence of any training in how to lead and manage.

A recent straw poll of safety professionals in management roles, including a nominated post-holder, showed that none whatsoever had received any training when first promoted. Why do we expect people to lead teams – which could be crucial to safe operations - without equipping them to handle their new responsibilities? Without training, all you can do is rely on common sense while trying to mirror the behaviours you have seen others use, but that of course introduces the potential for using the bad examples as well as the good ones. There is always a settling down period which is hopefully recognised by line managers, and we learn from

our own experiences as we progress through each new role. Sadly, there are occasionally people who leave smoking ruins or broken staff behind them as they wind their way up the career ladder but, fortunately, they are normally also a small minority. Toxic or misguided leadership usually has a profound and unhelpful impact on safety culture.

Whatever the quality of more senior executives, much of the friction and sources of pressure can emerge from the middle-management layer. This might be because there is a lack of clear direction from above, or it could be that the first taste of positional power goes to their heads, or both (or neither). It may be that the desire to do a good job for the company leads people to make decisions that are not fully thought through, or which are plainly unrealistic. For example, deciding to shave 10 minutes off a turn-round time to save charges may be a perfectly reasonable idea for making savings, but not if you only had 10 minutes available in the first place or the result is a quadrupling of the ground damage incident rate.

When middle-managers pick up on signals from above, the danger comes when those signals are mis-interpreted or applied too zealously. There will normally be more progress from tackling wasted efforts than by reinventing the wheel (if reinvention was that simple, someone would have done it already). People are also more productive when given delegated tasks and allowed to get on with it – give them something to aim at but don't tell them how to get there. So, understanding and setting targets becomes a crucial element of success. Over-zealousness and reliance on positional power will push people towards hazard boundaries, will not win friends, and will markedly reduce people's willingness to raise safety concerns, i.e., it has a direct and unwanted effect on safety culture. It therefore behoves the next layer of management to see how their direct reports are managing the people in their teams, and what policies are being applied; this is not a question of interference with a delegated task but one of sensible oversight.

It is worth remembering that pressures, regardless of their nature, will push people and systems towards hazard boundaries. They erode safety margins and increase the prospect of a hazard being released. There will never be an operation without some sort of pressure within it, so managers need to recognise this and lead/manage accordingly. Can pressures be reduced or absorbed at more senior levels? When management decisions are made, is there careful consideration of any pressures that might result? Do people stop to consider the 2nd or 3rd order consequences of their decisions?

We saw during the pandemic that short-term decisions can have long-term consequences. Many operators were forced into decisions because of the financial situation in which they found themselves, but few would have predicted the staffing difficulties that characterised the 2022 summer season. In that light, the industry is facing multiple challenges resulting from the economic downturn precipitated by the war in Ukraine. The cost of living crisis will affect everyone but will be especially severe those on middle to low incomes. The probability is that reporting will suffer, especially where this concerns mistakes in the workplace, and there will be an obvious desire to reduce costs and improve efficiency. Time to review SN-2022/005 and its advice on commercial, organisation and client pressures?

[1] https://publicapps.caa.co.uk/docs/33/SafetyNotice2022005.pdf

focus ON COMMERCIAL AVIATION SAFETY

Ignore the weird stuff at your peril

by Rob Holliday, Chairman UKFSC

Last week I was fortunate to attend the IATA 2022 Safety conference, hosted by Emirates in Dubai. A wide range of topics pertinent to the industry today were covered.

The conference was opened by Emirates President Sir Tim Clark, emphasising that aviation's "relentless focus on safety" must never change. IATA predict passenger numbers to return to 4 billion in 2024. The forecast rate of growth means that 8 billion passengers per year is foreseeable, but the pace of future investment in infrastructure and skilled workforce to support these numbers remains a concern. When it comes to safety, we must all speak up and step up to the plate.

Billy Nolen, Administrator (Acting) FAA talked about the challenges that we face as we transition out of the jet age into an era of advanced air mobility. Here's the thing, he said, the future is happening now. The travelling public expect the same standards of safety, and that's why it is important we exchange best practices with safety stakeholders throughout the world. We have to anticipate new threats by using artificial intelligence and machine learning to move from preventive to predictive safety.

Mental health remains pertinent, with discussions on being fit for duty and an interesting perspective on the variability of mental resilience from a psychologist. Personal awareness and peer support were cited as effective.

Safety leadership is everyone's job, was the title of Sir Charles Haddon-Cave's talk, followed by the IATA safety leadership charter. Sir Charles emphasised the importance of leadership, the power of a top-down approach, 'when a 3 star is interested in safety, everyone is interested in safety'. Key take-away points included:

- 'Avoid the comfort blankets of complexity, compliance and consensus'
- 'Complexity is the enemy of safety'
- 'The 4 cultures advocated within an organisation include Reporting, Just, Flexible & Learning. However, a 'Questioning Culture' is also vital'.

Boeing presented their global aerospace safety initiative, as well as the safety management systems implemented.

The aviation skills gap was an essential element as the industry recovers and accelerates back to pre-pandemic growth rates. Safety critical worker recruitment and retention strategies were presented with ideas for inspiring the next generation of aviation professionals.

The implementation of competence, behavioural based training was an interesting discussion, including the use of flight data from simulators to not only provide training data for the trainee, but also used for trainer standardisation.

Airbus presented strengthening safety with a prevention mind-set.

Other topics included the transition from magnetic to true north, risk based IOSA audits, integration of future aircraft technologies, the future role of regulatory oversight and certification, and oversight in an automated environment. The predicted advanced air mobility traffic will be too much for a human air traffic controller, automated, artificial intelligence solutions will be required.

Overall the conference gave a positive outlook with many challenges, some old familiar ones and some new. How can we take the lessons from the conference to our day-to-day work?

Everyone taking responsibility and speaking up is fundamental. Especially in a time of rapid growth. Not everyone can see everything, so it is our individual responsibility to say something if we see something. We also have to be prepared to listen. The report may be via a standard open reporting channel, a confidential report or a whistleblowing report. Sometimes the report may be hard to believe.

As BBC investigative reporter, Gabriel Gatehouse says, 'ignore the weird stuff at your peril'. When investigating QAnon and MAGA he kept asking why their theories have become embedded deep in the American imagination. He went down a rabbit hole, as he put it, with some interesting findings. So, don't ignore the weird guy, there might be something useful to safety if you dig a little deeper.

Whistleblower, Edward Pierson, who raised concerns about the Boeing 737 Max was ignored. He claimed that the emphasis changed from 'let's make a safe aircraft to let's get it done on time'. Why is that a problem? Setting a superordinate goal to beat the competition galvanises people to collectively achieve the goal. It is a call to arms (Gary Latham, Goal Setting). John F. Kennedy set such a goal in his inaugural address: "Ask not what your country can do for you – ask what you can do for your country". This is inspiring leadership. In a safety critical industry, it requires caution to ensure that standards are maintained. The downside is that if the only measurement of success is the single, simple achievement of the goal, it can subordinate important values such as quality.

In the late 1960s the Ford Motor Company wanted a fuel-efficient car to compete with foreign competitors and the goal was set to produce a new car that would be priced under $2000 by 1970. The fuel tank safety check did not find the insufficient space that caused the Pinto to ignite on impact. The car was not recalled because the cost of lawsuits was less than the cost of the recall, so committed to the goal were they (Goals Gone Wild, Ordonez L, Schweitzer M, Galinsky A, Bazerman M).

Speaking up is not straightforward. The Challenger and Columbia accidents are examples where the engineering concerns were not heard, exacerbated by outsourcing which led to a 'silent safety system' (Mordaunt J.). There are issues for the whistleblower and the person who has to validate their claims. It is rarely clear where the cause lies (Jackall R.).

Key organisational attributes, to para-phrase Sir Charles Haddon-Cave, include the free flow of information, to encourage rock the boat questioning, to be prepared to learn and change.

Compliance is a 'comfort blanket' we must not be satisfied with.

Formulaic compliance is a risk. There's a quote from the documentary called 'Flight/Risk': 'If the only pressure on your profit margin is legal liability, and you remove the risk of legal liability because once it is certified you are no longer going to be sued by people killed or injured in your aircraft, there's no longer any motivation for the aircraft companies, designers nor manufacturers to design anything safely, only to design something certifiable. Then there is no safety for the flying public'.

All of the above is fine, but in the real world, getting buy-in for safety interventions is not always straightforward. We have all heard the response that 'we comply with the regulations'.

Sometimes we find that even after all our research to identify an issue and prepare a proposal for intervention, it does not get approved. Logical persuasion is fine, but sometimes it's not always the one with the best idea that wins the argument, it's the one who tells the best story.

We have to find a way to adapt the style, and tone of our presentation in order to appeal to the values and goals of the audience, and at all times maintain objectivity.

Choosing the right time and the right people to pitch our case to is important, as is maintaining a positive situation to keep the audience engaged in the conversation.

When there are no safety issues to communicate, we have to make sure that we build relationships with the stakeholders that we will need to influence on a safety issue at some point in the future. Always trying to be clear, succinct, and confident.

As we recover, grow and new entrants in advanced air mobility arrive, the values of aviation have to be passed to all people who will be part of the exciting future of aviation, which is 'happening now'. Compliance is a baseline that we go beyond, we listen, we share, we speak up, we question and challenge ourselves to learn and be better at what we do. We will listen and learn from our people and insights from new technology to not just react, but to have the foresight to prevent, predict and be safer.

All in the mind: a new era for psychological damages claims

by Ashleigh Ovland, Holman Fenwick Willan LLP

On a spring evening in 2019 an A320 bound from Stansted to Vienna suffered a contained engine failure[1] during takeoff roll. The flight crew heard a loud bang and felt the aircraft drift to the left. They brought the aircraft immediately to a halt. Confusion ensued amongst the cabin crew, who ordered an emergency evacuation without consulting the pilots. This mis-communication meant that the undamaged engine was left running for the first few minutes of the evacuation. Several passengers were knocked to the ground by gusts of up to 65mph from the jet exhaust of the engine.

This incident set in motion a chain of events which has now culminated in an October 2022 judgment which will have wide-reaching implications for global aviation law.

A brief history of mental injury claims

Liability of airlines for injury to passengers during carriage by air is determined by reference to international convention principles which date back to the 1920s. Both the Warsaw and the Montreal Convention state that the airline shall be liable for "bodily injury". The countries negotiating the Montreal Convention in 1999 had the opportunity to add "psychological injury" to the text but chose not to do so. One rationale for this was that events such as hard landings, runway excursions, diversions due to mechanical failure, severe turbulence and go-arounds are fairly common occurrences which only rarely result in physical injury, but can be very frightening, especially to nervous fliers. If it were possible to claim compensation for fright, insurance premiums would skyrocket and the litigation burden on airlines might become unsustainable.

However, a blanket exclusion of all claims relating to the psychological effects of aviation accidents was a rather blunt instrument which had the effect of denying redress in some ostensibly deserving cases, especially where the passenger had suffered a combination of physical and mental injuries. Over the years, lawyers found innovative ways to argue that compensation should be awarded for their clients' psychological injuries, but for the most part the claims failed.

Things moved on slightly in 2002 when the UK House of Lords (equivalent to today's UK Supreme Court) heard two of these cases together. Mr King was a passenger on board a helicopter which crash landed back on to an oil rig platform after attempting to take off in bad weather. He was uninjured but developed PTSD, which led to the onset of peptic ulcer disease. Ms Morris was a young woman who was indecently assaulted by a stranger as she slept on a long haul flight and developed depression as a result of her experience. The court held that a mental injury with no physical cause or origin could not fall within the convention concept of "bodily injury" but recovery could be made for physical manifestations of a mental injury or situations where injury to the brain could be demonstrated. Ms Morris was not compensated as her depression did not fall into either of these cases, but Mr King did recover for the effects of his stress-induced ulcer.

It is worth explaining at this point that convention case law is "shared" between jurisdictions. The reason for this is that it is a principle of international law that, for treaties to be effective, they need to be enforced as consistently as possible. In practice this means that a court in England & Wales must look at how similar cases were decided in other countries and take these other courts' reasoning into account when making their own decision. The judge can still disagree with the other courts' decisions, but they do have to explain why, especially if the court in the other country was a very senior one like the US Supreme Court or the Court of Justice of the European Union **(CJEU)**. The decision in *King and Morris* was based on a very thorough examination of all the international cases that preceded them.

Against this backdrop, the judgment in the 2017 US case of Doe v Etihad caused much controversy in the international aviation community. "Jane Doe" had the misfortune to prick her finger on a needle discarded in the seat-back pocket. The stress and anxiety of worrying about whether she had contracted a disease far outweighed the minimal effect of the finger prick itself. She spent a year in a state of extreme mental distress until, thankfully, she was given the all-clear. The New York Appeal Court awarded her damages, using reasoning that stretched the boundaries established in *King and Morris*.

Slowly, some other courts have started to make similar awards. However the question that remained was whether a claim for mental injury could ever succeed if there was no physical injury at all.

Laudamotion – the standalone question addressed

That brings us back to that emergency evacuation at Stansted. "BT" was one of the passengers who was knocked down by the jet exhaust. She wasn't injured but, unsurprisingly, found the experience terrifying, to the extent that she was diagnosed with PTSD. BT was Austrian, as was the airline, Laudamotion, so she brought proceedings in the Austrian court. Under Austrian law, standalone claims for psychological injury are perfectly possible. However international convention law must be applied in aviation accident claims. It was clear that the Austrian Court was uncomfortable with denying BT what seemed to be fair and just compensation. As the Montreal Convention was signed on behalf of all EU Member states by the EU Commission, the Austrian court was able to go to the CJEU for advice on how it should apply the Montreal Convention.

The EU and the CJEU have a long tradition of seeing things through the lens of consumer protection. Rather than paying too much attention to the long history of previous case law trying to clarify the scope and meaning of "bodily injury", the CJEU took a somewhat novel approach of pointing to the preamble of the Convention, which refers to *"the need for fair compensation based on the principle of reparation"*. (Most of the previous case law had been based on the Warsaw Convention, which did not include this same preamble.) They held that this required equal treatment of passengers who have suffered injuries, whether physical or mental, of the same gravity as a result of the same accident and pointed out that a mental injury may be just as serious as a physical one. It would therefore be unjust to exclude mental injury.

The CJEU did recognise that to open the floodgates to any and all claims based on fear and distress might be economically disastrous for airlines and their insurers, so they added a condition which limited claims to ones where the passenger had medical evidence of a diagnosed mental health condition that would not resolve without treatment.

What does this mean for the aviation industry?

The decision of the CJEU is binding not just in Austria, but also in all the other 26 EU Member States. As explained above, it must now also be considered by all courts worldwide which apply the Montreal Convention, including those in the UK. This means that there is now potential liability exposure for safety failures which are not serious enough to result in physical injury, but which do cause distress which results in a clinical mental health condition. (It should be noted that it is not relevant that the passenger was already mentally fragile before the incident, provided that there is medical evidence of a condition triggered by the incident.) More such claims are likely to be brought, which will mean closer scrutiny of less-serious incidents for claims response purposes.

[1] Caused by improper assembly of an Inlet Guide Vane lever arm

Building an Approach

by Mario Pierobon

A flight operational safety assessment is often a key element in developing an RNP AR approach.

A required navigation performance (RNP) authorization required (AR) approach is a particular type of approach to landing developed according to the performance-based navigation (PBN) concept. An RNP AR approach requires a higher level of performance, and it allows for a reduced protected area for obstacle clearance. In addition to implying specific qualification levels for the aircraft, the airport and the flight crew, RNP AR approaches often also require a flight operational safety assessment (FOSA) - a review of the aircraft, crew and operating environment to ensure all-around safety.

An RNP AR approach is implemented for a specific reason, such as to provide improved access, safety and efficiency, according to International Civil Aviation Organization (ICAO) Doc 9997, *Performance-Based Navigation (PBN) Operational Approval Manual*.

"The FOSA process helps to ensure that the operational needs, the limits of safe and efficient aircraft performance, the means of assuring repeatable and predictable flight operations, the means of safe flight operations when faced with aircraft failures and hazardous conditions, etc. are understood by all relevant stakeholders," ICAO says. "As a result, the aircraft operations, procedure design, contingency arrangements, training and maintenance will all be at the level necessary for flight and operational safety."

In Europe, for example, the European Union Aviation Safety Agency (EASA) says a FOSA is intended to provide a level of safety equivalent to the traditional target level of safety - that is, a risk of collision of 0.0000001 per approach - by using a methodology oriented to performance-based flight operations.

"Using the FOSA, the operational safety objective is met by considering more than the aircraft navigation system alone," EASA says in guidance material for Part SPA, Subpart PBN of the European Aviation Safety Regulations on Air Operations (EASA AIR OPS). "The FOSA blends quantitative and qualitative analyses and assessments

by considering navigation systems, aircraft performance, operating procedures, human factor aspects and the operational environment." During these assessments - conducted under both normal and failure conditions - hazards, risks and associated mitigations are identified.

"The FOSA relies on the detailed criteria for the aircraft capabilities and instrument procedure design to address the majority of general technical, procedure and process factors," the guidance material says. "Additionally, technical and operational expertise and prior operator experience with RNP AR [approach] operations are essential elements to be considered in the conduct and conclusion of the FOSA."

The safety risk assessment (SRA) principles associated with safety management systems (SMS) are similar to a FOSA, and the procedure for conducting a FOSA is typically part of an operator's SMS, an EASA spokesperson says, adding that the guidance "blends the safety assessment principles used in certification (i.e., Part-21) with SMS principles, as FOSA have to be conducted by air operators (not manufacturers)."

The FOSA criteria detailed in SPA.PBN must be used by any operator that wants to obtain the relevant PBN approval, regardless of whether the operator is required to implement an SMS, the spokesperson said.

Conduct of the FOSA

European Union operators are supposed to follow the SPA.PBN requirements, in particular the acceptable means of compliance (AMC) and guidance materials, which include the elements to be considered in the FOSA, according to EASA.

"Each operator decides how a FOSA is conducted," the spokesperson says. "Nevertheless, detailed guidance on how to conduct a FOSA is available in ICAO Doc 9997. Our experts contributed to drafting this guidance through their participation in the ICAO PBN Specific Working Group."

The FOSA may be supported by documents provided by aircraft manufacturers, such as the RNP Navigation Capabilities Document issued by Boeing, or the Airworthiness Compliance Document issued by Airbus. "Both documents are proprietary, aircraft-specific and only made available to operators selecting the RNP AR option on their aircraft," the EASA spokesperson says. "Ultimately, air operators' FOSA are confidential and are normally made available only to their approving authority."

A FOSA should be based on restrictions and recommendations published in aeronautical information publications, the flyability check, an assessment of the operational environment, the demonstrated navigation performance of the aircraft, and the operational performance, according to the AMC to EASA AIR OPS SPA.PBN.

"The operator may take credit from key elements from the safety assessment carried out by the ANSP [air navigation services provider] or the aerodrome operator," the AMC says.

ICAO says that, for operators, the level of depth and the associated level of resources for a FOSA are aspects to consider. There are three factors that influence the required depth of a FOSA. The first is how challenging the proposed procedure design is, relative to airworthiness approval/qualification. The second factor is the operational and obstacle environment, and the third one involves the experience of stakeholders and the availability of appropriate previous safety assessments.

A FOSA should ensure that all failure conditions are assessed and, when necessary, mitigations are implemented to meet the safety criteria for each specific set of operating conditions, aircraft and environment, according to ICAO. "The assessment should give proper attention to the inter-dependence of the elements of procedure design, aircraft capability, crew procedures and operating environment," ICAO says.

A FOSA is composed of a set of main steps that includes system definition, establishment of safety criteria, identification of hazards, consequence analysis, causal analysis and likelihood estimation, determination of potential mitigations, risk acceptability, and documentation of the assessment, ICAO says.

Organizations planning to implement RNP AR approaches will normally already have safety management practices in place; therefore, implementing a FOSA should be seamless.

Safety Criteria

According to ICAO, considerable information regarding a proposed RNP AR approach procedure - including flight management system coding issues, aircraft information, flight crew procedures and training, dispatch procedures and training, proposed minimum equipment list, special maintenance requirements, airport and airspace environment, navigation infrastructure, air traffic control (ATC) facilities and monitoring programs - must be gathered This information is used to put together a system description for the FOSA. "It should be ensured that all relevant elements are included (i.e., not just equipment hardware but human aspects, procedures, software, firmware and environmental aspects)," ICAO says.

The safety criteria for the conduct of a FOSA can be quantitative, qualitative or a combination of the two.

"Quantitative criteria work best in the airworthiness domain, where relevant data on equipment failure rates are available and where consequences can be precisely defined," ICAO says, adding that in assessing a proposed RNP AR approach, "potentially a useful criterion [is] to apply hazard by hazard to check that there are adequate mitigations in place to ensure no risk increase."

The choice of safety criteria is important, and air operators (AO) should consult with their regulators before undertaking a FOSA, according to ICAO. "Some regulators may be wary of an RNP AR approach that increases risk compared to an existing PA [precision approach], for example, even if the new procedure meets an AO's existing risk tolerability matrix," ICAO says.

Hazard Identification

A range of techniques can be used to identify hazards. "Some of these are based on analysis by a single person and others use a group of experts working as a team. Given the need for a FOSA to make use of a mix of disciplines, a group-based approach is likely to be the most successful," ICAO says.

The effectiveness of group-based hazard identification can be maximized by using an experienced facilitator to guide the group and gathering the required mix of skills and knowledge. Flight operations representatives, dispatchers, maintenance personnel and safety and quality representatives all could be valuable group members, according to ICAO. "Running an effective group session involves obtaining a balance of skills but also having a manageable size of group," says ICAO.

To identify hazards, risks, and mitigations relevant to RNP AR approach, a FOSA must consider several aspects of the operation. The first is normal performance, according to the EASA AIR OPS guidance material on FOSA. "Lateral and vertical accuracy are addressed in the aircraft airworthiness standards, aircraft and systems operate normally in standard configurations and operating modes, and individual error components are monitored/truncated through system design or flight crew procedure," the guidance material says.

The second aspect is performance under failure conditions, where lateral and vertical accuracy are evaluated for aircraft failures as part of the aircraft certification. "Additionally, other rare-normal and abnormal failures and conditions for ATC operations, flight crew procedures, infrastructure and operating environment are assessed," the guidance material says. "Where the failure or condition results are not acceptable for continued operation, mitigations are developed or limitations established for the aircraft, flight crew and/or operation."

Other aspects to consider are aircraft performance, navigation services, ATC operations, flight crew operations, infrastructure, global navigation satellite system (GNSS) satellite failure and operating conditions, the guidance material says.

Concerning flight crew operations, for example, it is important to highlight an erroneous barometric altimeter setting, which, according to the guidance material, may be mitigated by flight crew entry and cross-check procedures. The guidance material also says that another aspect to consider is incorrect procedure selection or loading, in relation to which flight crew procedures should be available to verify that the loaded procedure matches the published procedure, line of minimums and aircraft airworthiness qualification. Important aspects related to flight crew operations that need to be considered are incorrect flight control mode selected, incorrect RNP entry, missed approach and poor meteorological conditions.

Operating Conditions

Among the concerns in the area of operating conditions are tail winds, as excessive speed on radius-to-fix (RF) legs may result in an inability to maintain the track. "This is addressed through aircraft airworthiness standards on the limits of command guidance, inclusion of 5 degrees of bank manoeuvrability margin, consideration of speed effect and flight crew procedure to maintain speeds below the maximum authorised for the RNP AR APCH procedure," the guidance says.

Two other aspects to take in consideration related to operating conditions are wind conditions and their effect on flight technical errors (FTE), and the extreme temperature effects of barometric altitude. The guidance says that, in relation to wind conditions and their effect on FTE, possible mitigations include that nominal FTE be evaluated under a variety of wind conditions, as well as flight crew procedures to monitor and limit deviations to ensure safe operation.

According to the EASA AIR OPS guidance material on FOSA, the extreme temperature effects of barometric altitude on the vertical path (such as extreme cold temperatures, known local atmospheric or weather phenomena, high winds and severe turbulence) is mitigated through the procedure design and flight crew procedures, with an allowance for aircraft that compensate for this effect to conduct procedures regardless of the published temperature limit. "The effect of this error on minimum segment altitudes and the DA/H [decision altitude/height] are addressed in an equivalent manner to all other approach operations," the guidance material says.

Role of the ANSP

ANSP personnel may be asked to participate in a FOSA, in particular when a new RNP AR approach is being implemented. One role the ANSP may fulfil is in providing relevant information in "system definition," proposed procedure design, ATC facilities, procedures, intended controller training and navigation infrastructure. Another possible role is participating in safety workshops addressing hazard identification, consequences and causal analysis, and helping to determine appropriate risk mitigations. The ANSP may also be involved in reviewing and providing comments on the FOSA documentation, according to ICAO.

"Typically, an ANSP will supply procedure designers, controllers, ATC engineers, AIM [autonomous integrity monitoring] experts and airspace planners to carry out these roles," says ICAO. "In addition to participating in these formal steps of the FOSA, it is likely that the procedure designer will also liaise at an early stage with the AO to understand the key operational needs for the RNP AR [approach]."

The ANSP may also use many of the outputs from the FOSA performed by an operator. Where the main safety issues relate to separation from terrain, typically in low traffic density situations, FOSA outputs of use to the ANSP will include the impact of the procedure design on the flight crew; adequacy of ATC phraseology, including clearance for the RNP AR approach; adequacy of ATC procedures relating to constraints on any vectoring or "direct to" instructions; provision of local pressure data; and adequacy of ATC training, according to ICAO.

Staying Up to Date

According to EASA, FOSA should be revised whenever the conditions and assumptions on which it is based change.

"The operator's SMS processes (e.g., safety performance monitoring or management of change) could also trigger amendments to the FOSA. Emphasis should be put on elements affecting flight crew procedures and related training," says the EASA spokesperson. "The competent authority approving the operator may also require changes based on the outcome of regular oversight activities, such as flight/training inspections or SMS audits."

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Mario Pierobon, Ph.D., is a safety management consultant.

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The day that turned into a year:

Lessons learnt from providing human factors support remotely

by Courtney Jaeger and Rhian Williams-Skingley

With changes to air traffic controller working patterns have come changes for those who support effective operational performance. In this article, Courtney Jaeger and Rhian Williams-Skingley give an insight into providing human factors support at NATS in the new reality.

(Ed. This article was written in 2021 but has been reviewed by its authors to ensure the information is still valid).

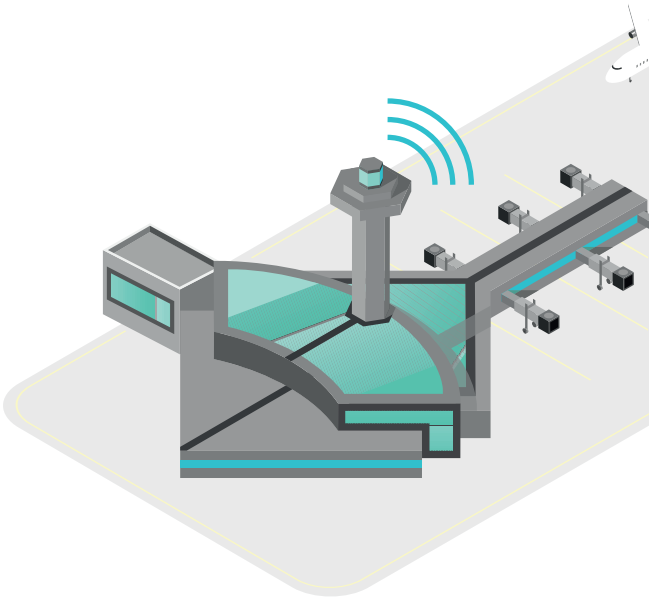
After what started as a 'test day' to see if employees could work from home, a year later we find ourselves having adjusted to a 'new norm'. As the day turned into weeks and months, it soon became apparent that it was more than the IT that needed to be considered in remote working. As human factors specialists, we couldn't support the operation in the same way we always had. We felt set apart from the operation, both physically and psychologically. This is the story of how we learnt and adapted to ensure that we continued to provide support to the operation.

New Territory

We are all experiencing the pandemic in different ways, with uncertainties and unknowns dominating our thought processes. We placed a heavy reliance on our contacts and networks within the operation early on to build a picture of what we could do to help, all while managing our own worries and concerns.

Initially we found ourselves reacting to the new operational working environment, which was changing daily. We published safety notices and provided information by email and the intranet system, which highlighted emerging risks and how to effectively manage the traffic situation from a human performance perspective. However, our operational contacts soon started feeding us observations they had made of themselves and of their colleagues that we could not have anticipated. This meant we had to be creative and innovative in our thinking and communication. It even led to the creation of new terms and associated analogies to help describe and articulate these new potential risks.

For example, the term 'underload drift' was coined when talking about low task demand over long periods of time. A boat in a river heading towards a waterfall was the imagery used to explain how we may feel like we are drifting along in these low workload settings, and can be caught by surprise by a waterfall, or in operational terms, by an increase or sudden demand to react to the traffic situation. The ability to resist the drift of performance, or cognitive inertia, is supported when the operational staff can prepare for their work session adequately, and a sufficient break schedule is implemented.



Low Workload Effects

Many of us are well versed in the potential risks associated with high workload and overload situations. The cues are obvious as our sense of discomfort grows. Operational staff and watch management are trained to spot the signs in themselves or others, where action might be required to manage a high workload or overload scenario. These signs are unique to the individual and can be the misperception of elapsed time, getting frustrated at small mistakes, or missing calls – asking pilots to "say again" more frequently. For those supervising, they may notice controllers sitting more upright and closer to the radar screen, or a change in their conversational tone and volume.

But what about low workload or underload situations? There is no comparable feeling of discomfort and the cue is largely the absence of traffic or activity rather than the presence of it – silence rather than noise. And yet, internal trend analysis has shown that low workload or underload situations can result in impaired human performance in the same way that high workload or overload does. Underload can reduce alertness and impair how well our memory functions – we might be more likely to forget something we need to do or have just done. Visual scanning also tends to be less thorough or frequent – we are more likely to tunnel our attention in one place that attracts our attention, resulting in the neglect of other areas. We are more susceptible to distraction from what is going on around us – especially conversations – and we are particularly vulnerable to the effects of fatigue and tiredness.

This phenomenon emerged in our operations room where controllers were socially distanced to reduce the risk of spreading COVID-19 and had to provide and receive remote telephone (sterile) handovers between watches at the beginning and end of duty. As a result of a joint activity with our operational safety colleagues, we

discovered that controllers were using less effective strategies for the handover task. When considering this phenomenon, controllers are not purposely using these less effective strategies for the handover task because of laziness or lack of attention. In fact, that the state of being 'complacent' and 'disinterested' has been recognised as having a strong link to the neurophysiological aspects of adaption. Put simply, the brain is adapting to the task load it is faced with, and because of the lack of cognitive demand, it will slow down its activation.

A Problem Shared is a Problem Halved

In those first few months, we found risks we could anticipate (e.g., the effects of low workload or underload), and those we couldn't (e.g., handover quality), so that we had to adapt our normal methods of supporting the operation. During the early part of Summer 2020, it appeared that aviation was opening up a little more, so we sought to understand how we could help operational supervisors to identify and communicate potential threats in their new working environment. During those early summer months, we focused our activity on running team resource management (TRM) sessions with all group supervisors at our centre in Swanwick, England. As well as reflecting on how the working environment and the air traffic control job had changed for them, participants were reminded of the framework around threat and error management (TEM), and how that could be applied practically. Given that it's the most unpredictable time we've been in, the TEM technique was something we reminded supervisors to do, and to share any hints, tips or watch-outs they had already noticed in the operation.

These workshops not only provided benefits to our operational supervisors, but also allowed us to gain further insight into the operation. Examples include the development of different ways of working due to watches not mixing, the effects of giving direct routings on planning and conflict detection (i.e., different 'hot spots') and a shift in individuals' different workload thresholds. This allowed us to provide relevant and tailored support, rather than making assumptions about the impact the traffic and the pandemic was having on human performance. Following on from this, the concern about so-called 'skill fade' was raised, and a communication piece was developed to advise supervisors to consider this for controllers returning from long periods of time off work, or as traffic levels start to pick up again.

In order to understand the operation's state, we carried out a 'human performance measurement' (HPM) survey remotely for our centres and airports where controllers completed short surveys about their workload, situation awareness and workload drivers after each live controlling session. This data-driven approach to understanding the human response to the shift in traffic levels allowed supervisors – with immediate access to the results of the survey – to manage operational workload of their staff in real time. We

analysed the data to determine at what workload levels awareness of the traffic situation began to fall.

Today's Quicksilver World

Upon reflection, thinking of the work we've done concerning underload, threat and error management and measuring human performance, the context could not have been anticipated or predicted. We used our networks to share information, we discussed, we theorised, and we tested what we thought we knew. As always, collaboration (albeit now different) is key to understanding any potential risks and communicating our knowledge of the human response to help mitigate around this. Ultimately, we've learnt to work well under uncertainty and to be flexible when plans or the situation does change – a key skill for practitioners of all kinds, and for our personal lives.

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Rhian Williams-Skingley is Principal Human Factors Specialist at NATS. She graduated from Glasgow University with an MA SocSci (1st Class) in Psychology, where she specialised in Cognitive Psychology carrying out eye tracking research examining visual and auditory processing in language comprehension. Her professional interests focus on the identification and mitigation of emergent human performance risks within the operation and the development of non-technical skills to enhance overall performance.

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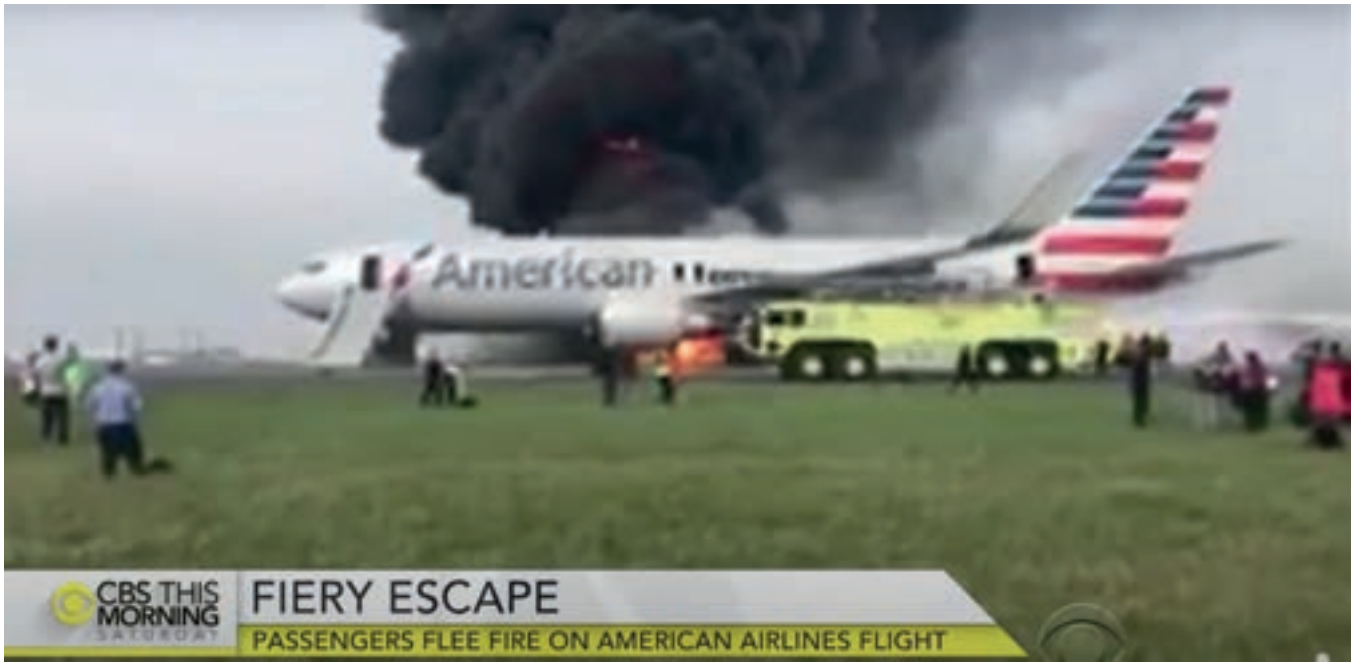
Gone in 90 seconds?

by Nicholas Butcher and Dr John Barnett



Airworthiness certification standards for larger aeroplanes require that all occupants can evacuate in 90 seconds. Yet there have been several evacuations when this time has been significantly exceeded. NICHOLAS BUTCHER FRAeS and Dr JOHN BARNETT FIET, FCILT, FIRSE of the RAeS Flight Operations Group (FOG) review the requirements of EASA/FAA 25.803 and question if these are still appropriate.

One of the most important criteria of EASA/FAA 25.803 is that only 50% of emergency exits are available and there are many examples of where, in spite of a catastrophic accident having occurred and with some pairs of exits being unavailable, a good rate of egress was achieved with evacuations taking 90 seconds or preferably less.

However, on 19 October 2012 a Boeing 737- 800 at Glasgow, UK, experienced a significant amount of smoke in the cabin prior to take-off and the commander ordered an evacuation. With 100% of the emergency exits having been operated by cabin crew and passengers, the evacuation took almost four minutes – an evacuation which potentially could have been achieved in some 45 seconds.

This document reviews the differences between airworthiness testing and the realism of an actual operational emergency evacuation, and considers what might be the variable factors, such as the location and availability of emergency exits, crew procedures and training and the co-operation of passengers in following crew instructions.

There is little doubt that passenger attitude to flight safety has changed over the years and that compliance with crew instructions in normal and emergency circumstances is less than it used to be.

The 90-second certification criteria

For aircraft having a seating capacity of more than 44 passengers, 25.803 requires that all occupants must be able to evacuate under the following conditions:

- Only 50% of emergency exits are active.
- The test participants (acting as passengers), as well as the aircrew, do not know which exits will be active.
- The demonstration is conducted in conditions of reduced lighting.
- Cabin baggage and blankets are positioned in the cabin aisles.
- All test participants must evacuate and be on the ground within 90 seconds without assistance from external safety personnel.

This requirement is usually demonstrated in testing by the aircraft manufacturer, although analysis and partial testing has been accepted by National Aviation Authorities (NAAs), and in some cases, credit has been given for earlier tests on aircraft or variants with similar types of exits and/or exit configurations.

For the A380 25.803 evacuation test, Airbus assessed the agility level of test participants (passengers). This was the first time that such an assessment had been made prior to such a test. While there is no doubt that this may be a reasonable approach to protect test participants from unnecessary potential injury, it cannot be said to reflect normal line operations.

Future aircraft types and variants might be assessed by analysis and partial testing rather than full-scale testing. It is obviously desirable that test participants are not unnecessarily placed in 'harm's way', but if there are shortfalls in the previous requirements of 25.803 then these shortfalls will be perpetuated in the certification of future aircraft.

Perhaps it might be questioned why the 25.803 requirements are only an airworthiness standard when actual evacuations are the responsibility of flight operations.

Possible shortcomings in the validation process

The 25.803 test criteria might, by default, result in a somewhat false emergency scenario, for example:

- The test participants know that an evacuation will happen and relatively soon after they have boarded the aircraft.
- Some test participants are employees of the manufacturer and will no doubt be well motivated to achieve a positive test result.
- The aircraft test crew may be from an operator (often the 'launch customer') who has ordered the aircraft and is likely to be similarly well motivated. They will have been specifically trained in evacuation techniques by the aircraft manufacturer shortly before the test.
- Although cabin baggage and blankets may be scattered throughout the cabin, the baggage is filled with low-density material and for which the test participants have no affinity – unlike their own cabin baggage.
- Historically, deactivation of the emergency exits has been such that there is always one of a pair of exits available. No 25.803 test has been identified where a pair of emergency exits has been deactivated.
- 25.803 tests are usually conducted in an orderly manner with passengers being co-operative rather than competitive.
- Given that such evacuation tests are conducted inside the controlled environment of a building, there are no weather conditions, such as wind, rain or snow that might have an adverse affect on evacuation slides.

The 25.803 test scenario also differs considerably from an actual emergency evacuation in which some or all of the following constraints may apply:

- The passengers will not be expecting or prepared for such an event.
- The aircrew may not have received their evacuation training shortly before an evacuation and it could be up to one year since their previous training check.
- The experience of a line cabin crew having to conduct an emergency evacuation might be less than a cabin crew specifically trained for a 25.803 test.
- In an actual evacuation where there is a perceived danger and threat to life, passengers are more likely to compete with each other to reach an emergency exit and, therefore, possibly to disrupt the flow of the evacuation.
- Passengers taking cabin baggage with them.
- Passengers taking photographic images.
- The number of usable emergency exits might be more or less than the 50% criteria and some pairs of exits will not always be available.
- The demographics of passengers in an actual evacuation will differ from those in a 25.803 test, such as children and infants, the elderly and those with reduced mobility.

Although some evacuations are subject to serious difficulties, such as unusable exits or evacuation slides, there are evacuations where most or all exits were available – but in spite of this the 90 second criteria was exceeded. There might be a number of reasons for this including:

- Delays in the flight crew, or, if necessary, the cabin crew, in commanding an emergency evacuation.
- Lack of communication between flight crew, cabin crew and passengers.
- Unserviceable communication equipment, such as public address and interphone systems.
- Crew not providing effective evacuation commands.
- Passengers not understanding the safety information they have been provided with.
- Passengers ignoring crew instructions, notably taking cabin baggage with them.
- Passengers experiencing panic and not being able to take appropriate actions.

Accident statistics demonstrate that, in a number of instances, either emergency exits were not usable or passengers took baggage with them or took photographic images during the evacuation or where the crew had no opportunity to specifically prepare the passengers for evacuation.

Pair or pairs of emergency exits not being available:

Aircraft type	Date	Location
Boeing 777-300	3/8/2016	Dubai, UAE
SSJ-100	5/5/2019	Moscow, Russia

Passengers taking cabin baggage with them:

McDonnell Douglas MD-83	27/1/2020	Mahshahr, Iran
Boeing 737-500	9/2/2020	Usinsk, Russia

Passengers taking photographic images during the evacuation:

Boeing 737-500	9/2/2020	Usinsk, Russia
Airbus A320- 271N	2/10/2021	Atlantic City, USA

Passengers not specifically briefed by the crew for an evacuation:

Airbus A320-200	1/3/2019	Stansted, UK
SSJ-100	5/5/2019	Moscow, Russia

Only the most recent accidents have been listed above, indicating that the problems are still prevalent. Indeed, especially in the case of passengers taking baggage with them in an emergency, they are in fact becoming more frequent – undoubtedly because of the increasing perceived value placed by passengers on the contents of their cabin baggage.

Injuries sustained in evacuations

In any evacuation there is a potential for aircraft occupants to sustain injuries. This is true both of actual evacuations and 25.803 evacuation tests. Most injuries sustained by occupants in an evacuation are of a minor nature, such as friction burns and sprains caused by using evacuation slides. However, more serious injuries have also been recorded, such as fractured bones and in one 25.803 test a participant (passenger) suffered a life-changing injury. Placing passengers and crew in a potentially dangerous situation simply for the purposes of a 25.803 evacuation test is surely questionable, especially when other options might be available. NAAs should now consider alternative methods which might already be available, such as mathematical modelling.

Mathematical modelling

Mathematical modelling has the potential to replace or partially replace the actual testing requirements of 25.803. This could have the following advantages:

- Reduce or eliminate injury to test participants.
- Study variable factors seen in actual evacuations, such as pairs of emergency exits not being available, passengers taking baggage with them, actions of elderly persons or those with reduced mobility, etc.
- Enhance cabin crew evacuation procedures, taking into account variable factors, such as exit availability.

While mathematical modelling has several potential advantages, NAAs would need to be satisfied that for each model there is empirical evidence for satisfactory correlation to each factor being tested.

Availability of emergency exits

Some operators might base their cabin crew emergency evacuation procedures on recommendations made by aircraft manufacturers for specific aircraft. If such procedures are based on one of a pair of emergency exits always being available then in actual evacuations where this is not the case, such procedures might be compromised.

Potential future options

NAAs should carefully consider possible shortfalls in the 25.803 criteria. How many previous 25.803 tests would have successfully met the 90 seconds criteria if actual scenarios had been included, ie unavailability of pairs of emergency exits and passengers evacuating with their cabin baggage? If such testing is inherently flawed what might be possible options for the future? One way might be for NAAs to review previous 25.803 tests, now using mathematical modelling to see where the problems actually are and to see how crew members might best be trained to deal with the situations presented to them in an actual accident rather than a controlled test environment.

Summary

In 2020 the RAeS Specialist Paper entitled, *Emergency Evacuation of Commercial Passenger Aircraft*, recommended that NAAs consider the feasibility of introducing a certification requirement for means of remotely locking the flight deck overhead bins for taxi, take-off and landing, as well as other critical phases of flight. Given the number of recent accidents where passengers have taken baggage with them in evacuations, perhaps it is time for NAAs to now consider such a proposal. Fortunately, many recent evacuations were conducted safely but in more catastrophic events requiring more urgent actions, different outcomes might well occur.

The US Department of Transportation's Office of Inspector General (OIG) has stated concerns "……about the validity of the assumptions that drive FAA's evacuation standards and industry tests and simulations for certifying new aircraft". The OIG urges the FAA to review whether passengers really can evacuate a packed aircraft in the required 90 seconds. The OIG is of the opinion that, in emergency evacuations, issues, such as passenger behaviour and demographics, seat dimension, cabin baggage, and smoke in the passenger cabin, are important factors, some of which have changed in recent years and are not necessarily reflected in the FAA requirements for certification in 25.803.

Some accidents might suggest potential shortfalls that exist in the 25.803 criteria and the need for NAAs to revisit the current requirements which were established many years ago with little amendment since. Of particular importance is the combination of the factors identified in this paper, ie. pairs of emergency exits not being available, passengers taking cabin baggage, the lack of crew and passenger readiness for an evacuation, compounded by passengers not understanding or ignoring crew emergency instructions.

NAAs need to consider how 'fit for purpose' the requirements of 25.803 actually are and in particular how passenger behaviour has changed in the intervening years since 25.803 was last amended.

Recommendations

In its Specialist Paper titled, *Emergency Evacuation of Commercial Passenger Aircraft*, the FOG made the following recommendation:

"NAAs should evaluate the use of computer-based mathematical modelling to facilitate different evacuation scenarios for initial aircraft type certification. Manufacturers, operators and cabin designers should use such mathematical modelling in the development of cabin crew evacuation procedures and whenever the number of required cabin crew is to be reduced from the number involved in initial aircraft type certification or where there is a significant change in passenger numbers."

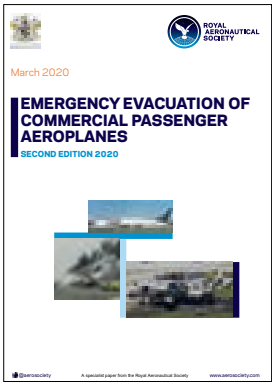
The FOG also makes further recommendations:

1. The FAA, EASA and other NAAs should review the requirements of 25.803, taking into account the issues addressed in this document and the relevance of such criteria with the way that passengers behave in actual emergency evacuations, including the taking of cabin baggage and non-compliance with crew instructions.

2. NAAs should review evacuations occurring on aircraft on their aircraft registers where the 90 second criteria has been significantly exceeded in order to determine the factors which might have delayed the evacuation.

3. NAAs should further investigate if, how and when mathematical modelling might be used to look at various evacuation scenarios, such as the deactivation of pairs of exits and passenger behaviour issues.

4. Additionally, NAAs should consider introducing a requirement for passenger safety briefings to include an instruction for passengers not to take photographic images during an emergency evacuation.



RAeS Flight Operations Group Specialist Paper "Emergency Evacuation of Commercial Passenger Aircraft" Second Edition 2020. Available Now.

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Report No.1 – FC5182 – Inexperienced cabin crew

Report Text: Taxiing out for departure, Number 1 cabin crew called the flight deck and advised a pax had been physically sick in the cabin and that they needed time to check on their wellbeing before departure. The Number 1 was attending the passenger and the three other cabin crew had limited experience (Number 4 was only recently on the line). Number 2 or 3 called the Number 4 via the interphone and asked them to turn on the cabin lights (as the cabin was in darkness prior to departure at night). Number 4 was unable to simply locate the cabin lights switch on the attendant panel. Unable to turn on the lights, the Number 1 then had to leave the ill passenger and return to the front galley to turn on the lights themselves to then go back and assist the passenger. My concern is that new cabin crew are unable to locate simple, yet critical equipment and switches used daily, and the experienced cabin crew (only the Number 1 in this case) was doing all the work themselves dealing with the passenger, communicating with the flight deck and managing the cabin environment. This was a simple medical issue; however, it could very well have had a disastrous impact given the level of experience in the cabin that day.

Operator's Comment: All crew complete initial and conversion training and a number of familiarisation flights prior to becoming part of the operating crew. Training does include operation of the cabin lighting system contained within the flight attendant panels onboard. The flight attendant panel and lighting is mainly used by the senior crew member so it is possible the crew member had only used this on a small number of occasions prior to this flight. There are 4 crew members onboard and, as such, tasks are delegated to each crew member so as to reduce the workload during a medical event. This is all delegated under the guidance of the SCCM. However, flight crew also need to be aware of the surprise and startle effect which can effect cabin crew when they are presented with an inflight event such as a medical. This can reduce reaction times for dealing with an event or task. A debrief with all crew at the end of the day will ensure effective communication of issues during the flight and will provide an opportunity for crew to learn from mistakes made during events. Crew are encouraged to report events internally where an additional debrief can take place for the crew involved.

CHIRP Cabin Crew Advisory Board Comment: All Cabin Crew receive initial training on how to use the cabin systems such as the forward attendant and the additional attendant panels. This information is also available in the Cabin Crew manuals. When new crew go on their aircraft visit as part of their initial training they would have been shown how to operate the lights at the attendant panels. Also, when the crew operated their first familiarisation flights, they would have had a checklist that probably included cabin lighting, amongst many other things to be covered on the day. Once the crew member is then online, often the SOP is that the crew complete their checks, sit down, pass on their 'secure' to the senior and, once the senior has the 'secure' the senior will dim the cabin lights for landing and take-off. The fleet structure of some operators can vary massively, crew can operate on different types and within those types there can be subtypes; even if the aircraft are all the same type, unless they are all the same vintage then the attendant panels can still vary from aircraft to aircraft.

CHIRP Air Transport Advisory Board Comment: In addition to the Cabin Crew Advisory Board's comments, we would add that junior cabin crew might not operate the associated panel at all in day-to-day operations and, although this may well have been a one-off event, there is a case for cabin crew to receive periodic recurrency/refamiliarisation training in all cabin equipment and its operation for the purposes of resilience should the SCCM become incapacitated or over-tasked. Although current cabin crew annual recurrency training covers safety equipment and they are encouraged to make sure that they are familiar with all equipment in the cabin, such familiarisation should be a formal requirement, not simply encouraged and relying on individuals' diligence. Also, procedures ought to be in place to give cabin crew regular opportunities to operate all routinely used equipment and panels; simply providing initial training by PowerPoint and reference to manuals is not sufficient – time is always pressing during flights we know, but more-experienced crew can also help here by taking inexperienced crew members 'under their wing' when possible and refreshing their familiarity with panels and equipment.

Report No.2 – FC5183 – Distractions at critical stage of flight

Report Text: The cabin was secured and the cabin crew seated. At 8nm final, the cabin crew called the flight deck with an emergency '[alert code]' chime. The Captain answered and was told a passenger had left their seat and was lying down in the aisle. The cabin was therefore not secure and we cannot land as it is. The Captain agreed and stated we are not landing and will go around.

The First Officer had less than 500 hours and so time was taken to execute the go-around as we prepared ourselves. I pressed TOGA at about 1400ft AGL. Cabin crew during the go around were continuously pressing '[alert code]', so much so that it was distracting for the flight deck crew to manage the go-around manually, talk with ATC, change frequencies and avoid a CB [Cumulonimbus thunder-cloud] at the time. The Number 1 had to be told during the go-around to stop pressing the intercom buttons. The Captain asked if the passenger was conscious to which the answer was yes so the Captain said he would call back once we had levelled off and it was safe to do so. The First Officer was left with controls and radio in a demanding situation whilst the Captain spoke with the crew to find out the nature of the emergency. The cabin crew said, "I don't know what to do, I have never done this before." and was very nervous and panicky on the interphone. Cabin crew managed to seat the passenger who was experiencing a panic attack and motion sickness for landing. Landing was made and medical assistance met us on the stand. More training is required to cabin crew to appreciate the critical stages of flight. More training is also required to deal with medical emergencies and situations in the cabin. The Captain could have kept the controls and asked the first officer to find out what the problem was but, given the severity of the call '[alert code]', it was expected to be something very serious and the Captain wanted to hear first-hand what the event was.

CHIRP comments: Although it is important not to second-guess the crew because we do not have all of the information and context that may have pertained, go-arounds have their own additional risks and factors that should be carefully considered in such circumstances compared to continuing the approach - there's an important decision to make about which is the more hazardous, continuing the approach with a potentially sick passenger in an 'unsecured' cabin or increasing the workload of both flight crew and cabin crew by going around in marginal conditions? Nevertheless, with regard to the repeated use of the emergency call facility, whilst one would hope that this is covered in training, it may not be apparent to cabin crew what level of distraction this might be causing at critical stages of flight – although they were dealing with two events at once, a medical and a go-around, in the heat of the moment it is important to be disciplined in who is giving alert calls and when.

Report No.3 – ENG 712 – Safe working

Report Text: We are using Mobile Elevating Work Platforms (MEWP) for access against engines at great heights, leaning over the engines with only our feet on the lower floor of the MEWP whilst sprawled onto the engine. Very easy to fall Left or Right. Numerous times on a 4-day shift this can be observed. Safety boots are not being used by certain people for the entire shift and no use of high-vis jackets on the apron at any time despite being mandatory. Critical Tasks such as lifting [aircraft] pylons by hand and fitting them are occurring at the end of a 12-hour shift, with a heavy push to have them up and fitted before end of shift with a lack of a tea break.

My local area management are simply not overly worried about the use of high lifters in dangerous positions as long as they do not have to witness it. I was stood witnessing work carried out to an aircraft D-duct and my manager deemed it safe and accessible for my LAE to lean from the MEWP with only heels on the basket and the rest of his torso exterior of the basket.

Working through break times is more than acceptable to me - I understand flexibility - however the culture is shifting in a way that too much is expected in too short a timeframe with rushing and using incorrect equipment. Our man hours are not adequate for the work being pushed for and I can see standards slipping and I do not want to be on the receiving end of it. We have less than 3 people working for sometimes 8 hours solid with no break, trying to fulfil 12 peoples' work in the shortest timeframe possible due to our lack of personnel. This in my eyes is recipe for disaster. Finally I'm just totally in disbelief that more and more people are not wearing PPE such as safety boots, and it's just shrugged off when pointed out. High-vis jackets are not being worn in pitch black on the apron; this is even more ludicrous when not 2 weeks ago a member of engineering was taken downstream from an [aircraft] engine exhaust blast. I'm overly done with health and safety becoming second to aircraft delivery, and my own wellbeing put behind the wrath of a [Management Position] phone call demanding aircraft be finished earlier.

Company Comment: Working at height is a focus for us and we are working on developing and improving our Safe Systems of Work, especially around engine changes, and training on the use of MEWPS. Regarding line managers' attitudes to H&S, since the start of the year we have been running 'H&S Management' courses. We plan to cycle all Line Managers through this course, currently [##] have completed this training. The scope of this training is to highlight H&S law and specific responsibilities of management personnel and is part of our Safety Plan to improve H&S competence in Engineering.

I don't recognise the issue of PPE not being worn, and I have spoken to my Quality Engineers who do not recognise this statement either; I have asked my Quality Engineer to monitor this and they have not identified any shortfalls. I don't concur with the reporter on PPE. I have had no internal reports, or from the airport authorities, and my Quality Engineers, who conduct weekly checks of all areas, have not found any issues of PPE not being worn.

Regarding working time, there's no doubt that [Operator], similar to the rest of our industry, is in the process of recruiting various levels of maintenance staff, which has left some shifts below the expected levels. We have been monitoring this and deferring work to maintenance lines away from the reporter's location. We continue to work hard to increase recruitment and are now seeing new Licenced Engineers and Mechanics being deployed into the maintenance areas.

However, I don't recognise the issue of engineers being forced to routinely work through their tea breaks. There is a potential that there is a quid pro quo between staff and local management allowing staff to leave early in exchange for working through breaks. I don't agree with this practice and will follow up, but this is an age-old issue.

The jet blast event mentioned in the report happened about three weeks prior to this report and was during a [different aircraft to reporter] engine run. We are still in the process of the investigation, which is highlighting some interesting behaviours. When complete, I have no objection to sharing with you the learning from this event. Having reviewed our internal reporting system, we already have actions for the Engine Change risk assessment and the Jet blast event, but I cannot find any reports for non-adherence to PPE requirements.

We can Categorically state that no staff member has died falling from height. To hear that a staff member has a concern of repercussions for raising an internal report is always disappointing but I know the perception is out there, based on rumours and myths, and it's something we continue to communicate. I receive a [very large number] of occurrence reports raised per week. Throughout [considerable years' service], I cannot recall anyone being disciplined for raising a report. To make the system even more robust, earlier this year we implemented a change so only select people are able to view the reporter's name. The reporter's name can only be released if it is specifically required to aid the investigation and we centrally record each time we release a name and the reason why. We have communicated this to all areas.

I understand his opinion, [in working through breaks] but looking through the time data will give us the facts. When I have checked recently, I find many people leave earlier than their shift finish time. I accept, less managers tend to be on nights, and will send a note out to managers to speak to their night shifts. I will ask my teams to focus on this when on nights, but I know they are doing this already. Being super-critical, I would agree that sometime engineers don't use task specific PPE (like eye protection, ear protection and gloves etc.) but this is the continual journey our people are on.

CHIRP Comment: The CHIRP-relevant aspects of this report are that work and inspections carried out whilst a risk of injury is evident, affects concentration and propagates hurried actions. Additionally, HF concerns associated with staff shortages, long periods without rest and a dilution of standards on night shift are obvious. Many of us have experienced nights, and any "slack" afforded by management is gratefully received, but we also know our performance is reduced on nights and any lowering of standards may be more of an exposure to error than we realise. The Quality Manager and the Health and Safety officer of the operator were contacted with the reporter's permission. The Operator disputes many of the statements made, and the jet blast incident was adequately investigated and resulted in seven recommendations.

Your employer's Safety Management System should be sophisticated enough to integrate both airworthiness and H&S hazards, or any issues that present a risk. Compliance auditing can cover both areas. However, although H&S permeates SMS, the differences between them need to be understood. Changing an engine comes under Part 145 (therefore requiring an SMS). Working at height to carry out the engine change comes under H&S. Hazards associated with either subject should be considered as a part of the overall activity. All staff and management should adopt safe working measures and strive for a safe working environment. There has been considerable dialog in CHIRP publications in respect of potential risks of inexperienced people new to the role, being recruited to fill recent gaps. These staff need to be brought up to speed on how they fit in with the organisation's safety culture as a matter of priority.

Despite the fact that the PPE issue was unconfirmed when surveyed by Quality, everyone should comply with the Health and Safety at Work Act 1974, enforced by the Health and Safety Executive (HSE). These responsibilities cannot be delegated or failure to comply "blamed" on others. You are responsible for your own safety and the safety of others. Managers need to be alert to deviations from the required standards and be prepared to enforce the correct practice. The HSE have their own reporting vehicle on their web site. https://www.hse.gov.uk/contact/. However, it is probably more straight forward to submit an internal report to your organisation first, provided of course you are confident with the system. Organisations need to work with their staff to ensure reporting systems are open, objective and viewed as non-punitive.

Report No.4 – FC5188 – Company communications

Report Text: My employer regularly sends texts to its pilots late in the evening as they seek to find crew for departures early the next morning. This means that anyone responding has disturbed their rest only a few hours before reporting for duty. An example of this is below:

> Text message receipt timed at 22:37.
>
> Good evening from [Crew Control] – Sorry for late text. We have the following flight available tomorrow, if you can help with this, please call Ops.
>
> [Flight No]; [Route]; Report-0500; Depart-0610
>
> Thanks [Crew Control]

I feel uneasy about the quality of rest that a pilot would have achieved if they respond to texts such as these sent so late in the evening. This seems to be an established process and has occurred numerous times.

CHIRP Comment: 'Out of hours' company communications is a theme that reappears now and again and it's one that we've debated within CHIRP many times before. The general view being that it's highly dependent on circumstances and wholly down to individuals whether or not they respond in light of their individual responsibility to adhere to FTL requirements. That being said, although FTL adherence is a personal responsibility, companies need to be alert to the risks of crews being induced to work duties that might impinge on rest requirements and so such communications need to be appropriately targeted and with sufficient warnings about the need for individuals to ensure they meet their personal FTL obligations.

When we have engaged with companies on this in the past, although they acknowledge that some might feel pressured to accept extra duties, they comment that it is entirely an individual's choice and that they have to retain the ability to seek volunteers to fill vacant duties due to unforeseen circumstances; especially in the current circumstances of reduced crew availability etc. For those who are not able to respond because they know that they must wait for FTL rest times to be satisfied, the option to turn off notifications on their phone is the best way of avoiding disturbance; this can be done selectively these days so that important emergency contacts can still call through but those that you wish to block can be excluded for specified times.

The bottom-line is that peoples' rest periods and FDP cycles are all different and so it is conceivable that the duty highlighted could be legally performed by someone who was in the right phase of their FTL cycle. Therefore, although we would prefer to have seen a more nuanced approach to targeting and warnings about FTL requirements, it was appropriate for the company to send out requests like this because ultimately it is for individuals to look at their rosters and take personal responsibility for ensuring that they are legal to operate before they accept such additional duties.

Report No.5 – FC5219 – CRM issues

Report Text: I was a First Officer for a duty that was for a planned FDP of 11hrs 5mins. The day already started delayed because our aircraft arrived late from the previous flight (at the time that we should have departed). Disembarking from that flight also took more than 30mins due to airport delays. So, before we took off for our first sector, it was obvious that we would go into discretion. As this was not unforeseen, the cabin crew Number 1 asked the Captain if they would give Ops a heads-up so that they could maybe organize another crew on standby for the last sector. This was completely ignored by the Captain, who denied that we would go into discretion.

On the second sector, more delays accumulated so that there was no doubt anymore of going into discretion. The cabin crew consulted me and asked what to do and why we were not informing Ops. I tried to talk to the Captain about that issue, but the Captain just blocked any conversations about it. A very high gradient of authority was unfortunately present so talking about such issues wasn't easy. Between the second and third sector the Number 2 approached us in the cockpit after asking the Number 1 for permission. They also wanted to know why the Captain didn't want to talk about the obvious fact that we would have to go into discretion on the last sector and why they were not asking any of the crew whether they had any flight safety concerns or were not feeling fine to do the last sector. The Captain's answer was only that it was their sole decision to go into discretion or not, and that they did not have to talk to any of the crew about it. A loud discussion between the Captain and the Number 2 started and, after showing the Captain the associated company memo regarding discretion, the Captain then just ignored them.

The next sector was uneventful although the atmosphere deteriorated after that discussion. After the passengers disembarked, the Captain then approached the cabin crew whilst the passengers for the next sector were already waiting at the L1 door in the airbridge. The Captain initially informed everyone that it was his decision to go into discretion or not. The crew than informed him that the proper way would have been to talk to everyone individually to evaluate if they were still fit to fly or if safety was in question because we, as a crew, were one team. The Captain responded that they couldn't just go to the back of the aircraft to talk to everyone, and that this would be ridiculous. Whilst that discussion also got louder, the Number 4 started to cry silently in their seat. The Captain then said that if anyone wanted to offload themselves they should feel

free but that they would have to consider the 173 passengers who want to go back home. This put an unfair pressure on the crew not to tell the Captain if they felt fatigued. So, in the end, everyone said that they would do the last sector but only because they didn't want to be the one responsible for the whole crew staying overnight. On the last sector, due to exhaustion, we made a number of mistakes. On line up we recognised that the flight directors were not engaged; after take-off while doing the 'after take-off checklist' I recognised that the autobrake had never been in RTO; and in-flight due to turbulence with cost index 100 and being at Mach 0.8, the speed increased to 1 knot below the overspeed warning. When I mentioned this I got rudely told by the Captain that they knew that and that I didn't have to mention it as long as the overspeed warning was not activating.

I feel I should have spoken up more forcefully to defend the cabin crews' wishes.

CHIRP Comment: Aside from the debate about the use of discretion, this report represents some of the worst aspects of poor CRM that we have come across in recent years. That someone could be so un-empathetic to their crew beggars belief and seems a real throwback to the dark ages before enlightened Just Culture and modern safety management. Although the reporter's comment that they should have been more forceful is pertinent, we should not underestimate the cockpit gradient that was evident and so speaking out in such circumstances can take real courage.

With regard to the use of discretion, AMC1 ORO.FTL.205(f) Flight Duty Period (FDP) for UK Regulation (EU) 965/2012 comments on the "...shared responsibility of management, flight and cabin crew..." and that consideration should be taken of "individual conditions of affected crew members...". Regulation does not state how the Captain should consult their crew or whether this should be conducted face-to-face, individually or as a whole crew. Ultimately, the decision to go into discretion is not made collectively as some sort of 'committee meeting'; the crew make their representations to the Captain but, in the end, it is the Captain who decides whether to use discretion or not, most usually in discussion with the Senior Cabin Crew Member, having consulted with all the other crew members to note their personal circumstances and ensure that the flight can be made safely. In this later respect, it is the responsibility of each crew member to know the maximum FDP that they can operate and they should ensure that the Captain is aware if they think they will exceed this. Also, if any members of the crew have been called from standby to operate the duty, this information should be relayed to the Captain because this also might affect whether they can continue the duty into discretion.

Report No.6 – CC5881 – Minimum Rest Requirements

Report text: Delayed arrival into [Airport], long journey to crew hotel meaning down route rest falling way below required 10 hour 'Key to Key'. Crewing phoned to advise of arrival time at hotel so pick up could be adjusted accordingly. Initially told we had achieved 12 hours 'chocks to chocks' so not an issue. Next person insisted the term "key to key' is defined as arrival at hotel until commencement of next FDP.

Operator's Comment: The cabin crew scheduling teams always plan rest meeting regulatory (EASA/CAA) and any local cabin crew agreements. In the event of an unplanned delay on the day, the operations team should be contacted by the cabin crew who will be able to check their rest requirements ensuring it complies with 10 hours key to key (or at least as long as the previous duty period, if greater) when away from base.

CAA Comment: Under ORO.FTL.235 rest periods (b) the minimum rest period provided before undertaking an FDP starting away from home base shall be at least as long as the preceding duty period or 10 hours whichever is greater. This period shall include an 8-hour sleep opportunity in addition to the time for travelling and physiological needs. Operators are also required to comply with CS FTL.1.205 (d) delayed reporting and have procedures established within their operations manual.

The Oversight Team will discuss with the Operator of the delayed reporting procedures and their understanding of the regulations.

CHIRP Comment: As you can imagine, this is not the only report that CHIRP have received of this nature. As minimum rest is often the new norm it is important that all crew are familiar with their minimum rest requirements, especially as it's not unusual for an individual to have a different FDP from the rest of the crew due to being called out from stand-by, please ask your colleagues if you are unsure. Rest should be counted from when the crew arrive at the hotel and this is how the regulation should be read as. However, if there was a delay at the check-in desk, the commander could advise the Ops team that their rest needs to be amended and the next day's report should be delayed accordingly.

A Startling Predicament

by Captain Helen Heenan and Captain David Moriarty

The 'startle effect' is widely understood to be a factor in many aviation incidents and accidents. But is it just a case of surprise or are the two very different? Captain HELEN HEENAN MRAeS, Human Factors Specialist at NATS, and Captain DAVID MORIARTY explain the nuances of startle and surprise on the flightdeck.

Research shows that, from 2009 to 2018, accidents resulting from loss-of-control in-flight (LOC-I) events were the leading cause of fatalities in commercial aviation. It is estimated that in more than 80% of these accidents, the aircraft remained flyable, ie pilots lost control of aircraft that were fully functional or that had experienced non-catastrophic technical issues. In response to these findings regulators have tried to address the risk of LOC-I by mandating upset prevention and recovery training (UPRT) during recurrent simulator training sessions that flight crew undergo.

Delving deeper into why pilots may lose control of a functioning aircraft, a European Union Aviation Safety Agency (EASA) report published in 2018 notes that 'the startle reaction played a key role in a significant number of loss-of-control in-flight events.' In the case of Air France 447 that crashed into the Atlantic in 2009, startle is likely to have played a role in the first officer's erroneous control input which led to the aircraft stalling. Therefore, it is not surprising that within the UPRT syllabus, alongside aircraft handling exercises, we find both theoretical and practical training tasks are designed to help the pilot 'manage human factors, stress response, startle and surprise, counter-intuitive actions.'

It is here that we should explain what the difference between startle and surprise actually is. A startle is an innate, physiological response to a perceived or actual threat, or a sudden intense stimulus. It is our evolutionary human survival instinct and there is nothing we can do to stop it happening. In aviation, the problem is that it can lead to a freezing of our normal cognitive processes. The startle response evolved in our prehistoric ancestors for good reason but, as with so much of our hard-wired programming, it can become problematic when we put prehistoric brains in metal tubes flying at

great speed seven miles above the ground. Surprise is the conscious recognition that something has happened which was not expected or does not make sense. In highly automated aircraft, human factors researchers recognise the phenomenon of automation surprise which is when an automated system does something that the pilot is not expecting, often informally characterised by pilots as, 'what's it doing now?' A surprise may be followed by a startle reaction, but it is also possible to experience surprise without being startled, or a startle without being surprised.

Surprise and startle training

Startle and surprise training is not new. It is required to be covered in depth during crew resource management (CRM) training when crew join a new airline. The topic is then covered again during the recurrent training that crew undergo on a regular basis. What is relatively new, however, is that the practical application of these topics is now included within a European regulatory framework, known as Part FCL (Flight Crew Licensing), a framework that specifies the training delivered by licensed instructors. Despite the changes in the relationship between the UK Civil Aviation Authority and the European regulators, the outcome is that all pilots must now receive startle training with regulatory oversight from the classroom into the simulator, and this training must continue out into line flying operations.

CRM and human factors training syllabi give operators enough scope to tailor their training according to their specific requirements while still being able to be compliant with regulations. The downside of this is that operators need to look beyond the syllabi to try and find training material that is both scientifically robust and applicable to their requirements. Finding such information can be a challenge.

In 2019, the Netherlands Organisation for Applied Scientific Research and Delft University of Technology held an international symposium, entitled 'Pilot Training for Startle and Surprise Management.' It was recognised that, while aviation authorities recommend pilot training on startle and surprise, there were discrepancies and a lack of clarity as to how this could be achieved. By bringing together a selection of experts from both within and outside of aviation, training interventions were presented and discussed. The published presentations from the symposium demonstrate that, even within a team of experts, there was no clear consensus regarding their recommendations.

Opinions were split between whether focus should be on recovering the aircraft first, enabling the pilot to recover from the startle, or whether the focus should be on recovery strategies for the pilot first, thus enabling them to respond appropriately and regain control of the aircraft. The area of concern here from a human factors perspective is that these techniques assume that a LOC-I has occurred and that, by focusing the practical application of startle recovery within the context of upset prevention and recovery training, there is a risk of startle and aircraft upset becoming synonymous. The 2018 EASA report into startle management also highlights that startle and surprise do not always lead to a serious event. If they are only taught in the context of serious events, there is a latent threat that crews may be unable to recognise a startle that is not associated with an aircraft upset. This is where our startling predicament lies: for startle to be taught as an independent subject, we first need to define what we are trying to train crew to do and, as yet, no organisation or regulator seems able to agree on this.

Contemporary approaches to training

A literature review of publications dated between 2006 and 2020 shows that the divided opinions that were apparent at the symposium have been ever-present among researchers. Some authors recommend training techniques for recovering the aircraft first, while others recommend training techniques that would allow the pilot to recognise and recover from any startle effect as a first step. If we analyse this a little further, we can draw some ideas from UPRT training recommendations where it refers to:

1. Upset of the aircraft
2. Loss of control in-flight
3. Undesired aircraft state

If we generalise these concepts from the perspective of startle, we can consider:

1. Upset of the pilot
2. Loss of control of rational thought
3. Undesired cognitive state

Even within these categories, we can consider each area to be subdivided further into (a) prevention, and (b) recovery.

Can we prevent a startle response? Our amygdala, an area of our brain that we have inherited from our primitive ancestors, does not like sudden intense stimuli. It automatically assumes that the startling stimulus poses a threat to us. It does two things simultaneously and it alerts us by making us physically jump; it then fires a shot of adrenaline through our system. This causes physiological responses, such as an increase in heart rate, breathing rate, and sweating of the palms. The amygdala also generates the subjective feeling of fear. As startle is a physiological response, it is very difficult to prevent. Research does tell us that people differ in the magnitude of the startle response that they experience. Some people startle very easily and have a prolonged response. Others are quite difficult to startle and, if it does occur, they recover quickly from it. While we cannot prevent the reaction itself, we can give crew in training an insight into the nature of their personal startle responses. In a non-assessed, training environment, such as a simulator, crew can be presented with a sudden failure or unexpected flight condition. The aim of this training is not necessarily to get the crew to solve the problem but rather to get the crew to reflect on their own initial response. In some cases, the scenario might be designed to look at other competencies but trainers should recognise the opportunity to get trainees to reflect on any startle or startle-like response that did occur. Did they freeze? If so, for how long? What was their first reaction when the effects of the startle began to dissipate?

One of the biggest barriers to effectively training startle in the simulator is that trainees will be aware that no matter what happens, they are in no physical jeopardy. In a similar way, it is impossible in a simulator to replicate the physiological stresses that crews would experience when faced with a rapid decompression (ears popping, sudden cold, etc). The reality is that no simulator scenario is likely to evoke a true startle reaction but there may be a valuable learning opportunity for trainees to reflect on any 'micro-startle' that occurred to give them some insight into what the situation would be like if they experienced that scenario in the real world. This sort of training requires careful planning and plenty of reassurance but, if carried out correctly, can prepare crew for the day when a real startle might occur.

We can also train crew to recover from startle. Researchers at the Netherlands Aerospace Centre, in conjunction with EASA, have written, trialled and published a training programme that seems to be yielding good results. Presented to the European Aviation Training Symposium (EATS) in 2017, the acronym that underpins their programme is 'ROC': Relax – Observe – Confirm. At the same conference, Captain Owen Sims FRAeS presented a piece entitled 'Mindfulness in Flight Training'. Mindfulness is a proven psychotherapy technique for stress and anxiety which encourages practitioners to "focus on the here and now." At first glance, these are the first steps in the ROC method: Relax – Observe.

For this sort of training to be effective, there needs to be continuity between the theoretical framework presented in the classroom during CRM training, and the further training that pilots receive in the simulator and during line operations. This integrated approach

requires commitment from across the training department and from the pilot community. Implementing this sort of change also requires careful planning and we would recommend a previous article published on the AEROSPACE Insight blog that looks at successful change management within the aviation industry (link at the end of the article).

Within the training community, many will argue that startle and surprise were already covered in simulator programmes, even prior to the introduction of the new regulations. However, when it was introduced, it was conveyed as a single topic: 'startle and surprise.' This has resulted in the two terms being used interchangeably among trainers and pilots. It is now time to start defining them separately, particularly as the training methodologies that can help pilots deal with each of these effects are quite different. While the focus of this article is startle training, it should be noted that it is possible to implement training to help pilots deal with surprise, particularly automation surprise, although this training tends to focus on competencies, such as system knowledge and application of procedures, particularly when evaluating flight conditions by observing and confirming relevant flight mode annunciators.

Conclusion

Failure management, particularly when it comes to complex failures, is understandably geared towards identifying what has failed and what capabilities the aircraft has lost. In the case of the engine failure followed by severe damage experienced by Qantas Flight 32 (QF32) shortly after departure, the list of lost or degraded systems was so extensive that the crew reversed their approach and, instead, began to consider the systems they did have. This approach echoed the phrase uttered by Gene Krantz, the flight director of the Apollo 13 mission that experienced a complex failure en route to the Moon: "what have we got on this spacecraft that's good?" ROC suggests we relax, subsequently allowing a measured observation of what is happening. Conversely, mindfulness suggests you observe, which subsequently leads you to relax. These approaches, perhaps combined with the perspective taken by the crew of Qantas Flight 32 and the team responsible for the Apollo 13 mission, might allow us to create a response to a startle event that can subsequently facilitate the management of a complex scenario. Instead of trying to diagnose a complex problem when still in the grip of a physiological startle response, use the relax-observe/ observe-relax relationship to diagnose what you are left with. Rather than directing our attentional resources to 'what's wrong', we direct them to 'what still works?' That may be sufficient to alleviate the effects of startle and get the pilot's cognitive systems re-engaged with the situation to solve the problem in a logical and efficient way.

Resources

EASA Report on Startle Effect Management – https://www.easa.europa.eu/document-library/research-reports/easarepresea20153

Change Management – https://www.aerosociety.com/news/changing-course/

LinkedIn group: Royal Aeronautical Society Human Factors Group – Flight Operations and Training

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