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FOCUS is a triannual 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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Editorial 1

Chairman's Column 3

Spin Axis 6
by David Learmount

Why is it just so difficult? 8
Barriers to 'Just Culture' in the real World
by Steven Shorrock

Flight and Cabin Crew 12
Early starts, late finishes & everything in between:
where does the duty of care start and finish?
by Peter Coles

Psychological Safety on the Flight Deck 13
by Kimberly Perkins

CHIRP 16

Seven Deadly Shortcuts Cognitive Biases and Aviation 21
by Robert Wilson

Forecast: A Bumpier Ride 24
by Linda Werfelman

Members List 25

Front Cover Picture: A Joint Helicopter Command Chinook Mark 6a from 27 Squadron RAF installing a new radar to the Rock Gun Battery in Gibraltar in March 2022. Photographer: Wing Commander John Plenty RAF.

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Why Standards and Supervision Matter

by Dai Whittingham, Chief Executive UKFSC

This year started with 2 accidents, closely separated by time but on opposite sides of the world when viewed from the UK. The media interest was intense and sensationalist, and it would be understandable if the average consumer believed commercial aviation was inherently unsafe. You can perhaps forgive editors concentrating on the very dramatic footage of a blazing A350, the flames enhanced by the night sky, but not for some of the accompanying hype.

Then came the Alaska B737 MAX door loss and rapid decompression. Again, it's not a surprise the event was newsworthy - there can be few of us who have not seen some Hollywood spectacular where the bad guy leaves via a small window, courtesy of a gunshot or an explosion that leads to a decompression that goes on for a full minute. The event was made more newsworthy by the earlier MAX accidents and the idea that Boeing might in some way be at fault again; sadly, it seems from the recently issued NTSB interim report that this may indeed be the case.

So, is the industry unsafe? Approximately 35 million commercial flights operated during 2023 and there was only a single fatal accident, an ATR-72 crash at a new airport in Nepal that killed 72 people after the training captain feathered both engines during a circling approach. You can do the maths for yourself – you are at more risk crossing the road at the airport. In the same time frame, there were also a couple of ramp fatalities from engine ingestion and several from collisions with vehicles; the ramp can be a dangerous place.

Standards and supervision run through all the events mentioned so far. The Haneda runway collision investigation has already determined that the presence of the Coastguard Dash-8 on the runway was not detected by the ATCO or the A350 crew, but it also highlighted the fact that the radio phraseology, albeit the norm at Haneda, was non-standard and open to confusion. Changes have already been made.

Also on the phraseology theme, the Alaska decompression crew responded to that event with "we are declaring an emergency", which is the norm in the USA. The tragic Challenger accident in Florida in February involved a double-engine failure and forced landing, but even that did not prompt a distress call. The ICAO Recommended Standard and Practice is to call MAYDAY or PAN. The USA does not do that, though making such a call will get you the relevant system response. All ICAO signatory nations can file a 'Difference' from the ICAO standards (the UK does so, for example our Rules of the Air differ) but the problem comes when home-based procedures conflict with national procedures when you are away from home.

If we throw startle and surprise into the mix, you can see that a US-trained pilot whose aircraft has just had a rapid decompression over London, Paris or Frankfurt might well 'declare an emergency' because they are reverting to their training. That 'emergency' call will prompt additional traffic while the controller works out what level of priority and protection should be afforded to the aircraft in question. In the Alaska event, several questions were required before the ground environment understood what was required and how help could be provided.

As a further example, the transcript of a close-call event in New York (JFK) showed non-standard phraseology was rife. The transcript is not as illuminating as the recording available online because you can read text at your own speed. Those have operated there will know radio traffic at JFK is delivered at enormous pace and is riddled with slang and informal abbreviations. It causes problems for native English speakers, but it is part of the JFK culture because the supervision has never considered enforcement of ICAO standards. "It's how we do it here...".

It's not only the USA: colleagues in an operational safety meeting in London last year were shocked to learn from a Spanish pilot that his airline required crews to conduct a threat and error management brief covering the difficulties caused by language in the London TMA. Yes, British controllers and aircrew using non-standard phraseology and slang, delivered at a pace that make it hard for non-native English speakers to cope with. Who would have thought it?

Work is in hand via ICAO to address RTF delivery, but it will be a long road to any meaningful change. For now, we can but try to ensure the ATC and flying communities appreciate that the difference in this area between 'work as imagined' and 'work as done' can cause real difficulties, but it is adherence to standards that is at the root of the problem.

FDM has provided a means by which pilot performance and, especially, adherence to SOPs can be viewed directly. It has provided operators with the ability to supervise and to detect procedural drift. But, crucially, there is no FDM in the hangar, on the ramp, or in manufacturing facilities. Instead, consistent adherence to standards and processes relies on compliance monitoring and physical checks.

Checking and supervising is not a skill you simply absorb by watching, so why is training in supervision or management notable for its almost complete absence from our industry? An informal straw poll at a ground handling safety meeting last year was very revealing: of the 60+ people in the room, all had been promoted to a managerial

or supervisory role. When asked to raise their hands if they had received any training for the role, there was just one hand to be seen, which belonged to a military representative. For most managers and supervisors, the early stages of their first position will be sink or swim.

This is not to say the people in supervisory roles are not up to the job, just that we should not be surprised if the system occasionally fails, as seems to have happened in the complex 737 MAX manufacturing process. Even if you have properly trained supervisors, backed up with a solid QA process, there will always be leakage.

A very long time ago I was programmed to conduct a post-minor air-test on a Phantom. The ejection seat had been fully bay-serviced before being re-installed, and the work had included a new 5-point combined seat and parachute harness assembly. When I tried to strap in, it proved physically impossible to do so because the quick release fitting that held the harness together had been fitted upside down on the crutch strap. End of air-test. That faulty harness assembly had made its way through the manufacturing QA system, through the supply system, had been fitted to the seat by a highly trained armourer and been subject to two further independent supervisor checks before the aircraft was released for flight. It should not have been possible, but it happened. It was a good reminder that 'oversight' can have two meanings.

Rules, instructions, technical orders, and standards can be a pain, but they have normally been written in blood and we ignore them at our peril. Holding people to account for compliance can also be a painful process but, if you allow professional standards to slip, the risk will start to creep up and you eventually begin to operate by luck rather than judgment. Compliance and quality assurance comes at a cost, and there is often a temptation for one of Haddon-Cave's 'risk ignorant' or 'risk cavalier' managers to see this cost as needless. Far from it: compliance and quality failures can end up costing the company many times more than the assurance costs. Look no further than Boeing's MAX-related additional costs, which have exceeded $21 billion before the Alaska events are taken into consideration.

focus
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The Space Shuttle That Fell To Earth

by Rob Holliday, Chairman UKFSC

'The Space Shuttle That Fell to Earth' is a television documentary series that explores the events leading up to the Columbia Space Shuttle disaster and its aftermath. The three-part series provides a detailed examination of the technical, organisational, and human factors that contributed to the accident. It is available on BBC iPlayer.

Notwithstanding that we have 20:20 hindsight, it is fascinating, when watching this documentary, to observe from a safety management perspective the behaviours, attitudes and management systems that would be red flags in any commercial aviation operation today.

The series delves into the foam strike incident that occurred during Columbia's launch, where a piece of foam insulation broke off from the external fuel tank and struck the shuttle's left wing. This event is widely recognised as the primary cause of the disaster, as it damaged the thermal protection system, leading to the shuttle's disintegration upon re-entry.

Safety Governance Structure

Fundamental to a successful safety management is an organisational structure. To be effective, essential components are: personnel; resources; lines of communication; safety groups at the operational level with escalation paths to the board level safety committee; training and clearly defined safety management roles; accountabilities and responsibilities of management and personnel involved in safety related tasks.

The hierarchical structure within National Aeronautics and Space Administration (NASA) created communication barriers that inhibited the free flow of information and feedback between lower-level employees and senior management. This made it difficult for concerns or warnings about safety issues, such as foam shedding during launch, to reach decision-makers at the highest levels of the organisation in a timely manner.

In this hierarchical environment dissenting opinions were not welcomed, leading to groupthink and conformity, where individuals were reluctant to voice alternative viewpoints or challenge the prevailing consensus. In such a culture, critical safety concerns are overlooked or dismissed in favour of maintaining harmony within the organisation.

Single Point of Accountability

The concept of the accountable manager is of an individual that has responsibility for the overall safety of the operation that cannot be delegated. The accountable manager will have the authority to ensure that activities are sufficiently resourced and have well qualified people in each area of the operation, known as post holders or nominated persons to deliver regulatory compliance and risk management. The accountability focal point is highly effective.

It is clear from the interviews and one of the findings of the Columbia Accident Investigation Board (CAIB) was the lack of clear lines of authority and accountability for safety within NASA's management hierarchy. Responsibility for safety was dispersed across multiple offices and individuals within the organisation, leading to ambiguity and confusion regarding who ultimately held accountability for ensuring the safety of the shuttle program.

This lack of a single point of safety accountability contributed to a culture where safety concerns were not always given the appropriate level of attention and priority. Decisions related to safety were often made in a decentralised manner, without sufficient coordination or oversight. Safety oversight was dispersed across multiple offices and individuals, leading to ambiguity regarding who ultimately held accountability for ensuring the safety of the shuttle program. This lack of a centralised safety governance structure made it challenging to coordinate safety efforts and ensure consistent implementation of safety protocols.

Reporting Culture

A coactive approach to safety management systems emphasises collaboration, communication, and proactive measures to enhance safety within an organisation. This fosters a culture where safety is everyone's responsibility. It encourages active participation from all levels of the organisation, leading to increased awareness and commitment to safety. By involving everyone in safety-related decision-making processes, a coactive approach promotes open communication channels. This enables the sharing of insights, concerns, and best practices, facilitating the identification and resolution of safety issues before they escalate.

There was a prevailing fear among NASA employees, particularly engineers and technical staff, that reporting safety concerns could result in negative consequences such as career repercussions or retaliation. This fear of reprisal discouraged individuals from speaking up about potential safety issues, contributing to a culture of silence and reluctance to raise concerns. In one interview an engineer reveals that he did not send an email with his concerns for fear of retribution. The flow of safety-related information across different levels of the organisation was impeded, preventing it from being appropriately addressed and escalated to senior leadership for action. This organisational hierarchy deterred individuals from taking personal responsibility for safety or speaking up about concerns.

Normalisation of Deviance

Normalisation of deviance refers to the gradual acceptance of abnormal behaviours or deviations from established standards as normal over time.

The concept of "normalisation of deviance" played a significant role in the Columbia Space Shuttle disaster. In the case of the Columbia accident, there were several instances where deviations from safety protocols and engineering standards became normalised within NASA's organisational culture, ultimately contributing to the tragedy.

Foam shedding from the external fuel tank during Space Shuttle launches was not an uncommon occurrence. Despite being recognised as a safety concern, the occurrence of foam strikes had become normalised within NASA. Engineers and managers grew accustomed to these incidents and gradually accepted them as an inherent risk of spaceflight, rather than addressing the underlying issue.

Prior to the Columbia mission, engineers had expressed concerns about the potential for foam strikes to cause damage to the shuttle's thermal protection system. However, these concerns were downplayed or dismissed by management, contributing to the normalisation of deviance. Instead of addressing the root cause of the problem, there was a tendency to rationalise and minimise the significance of the risks involved.

Complacency

Good outcomes are not the best metric of a safe operation.

Looking back at 2023, the Flight Safety Foundation have cautioned: *'Despite last year being among the safest in aviation history in terms of accidents and fatalities, it's crucial to acknowledge and address the warning signs that were present in events that narrowly avoided disastrous outcomes,"* said Foundation President and CEO Dr. Hassan Shahidi. *"Complacency is a stealthy threat that can erode safety and quality unless it is actively countered with a robust safety culture. Complacency can lead to shortcuts, degradation of quality and neglect of procedures, poor communication, and a delayed response to escalating risks. Failing to rigorously reinforce a strong safety culture can become the weakest link in the safety chain.'"*

Over time, NASA had become accustomed to certain anomalies or deviations from established safety protocols, such as foam shedding from the external fuel tank during Space Shuttle launches. Despite recognising these issues as potential safety hazards, there was a tendency to accept them as normal occurrences rather than addressing the underlying risks.

Foam strikes during Space Shuttle launches had become relatively common and were often perceived as a routine part of spaceflight operations. As a result, there was a degree of complacency regarding the potential consequences of foam strikes, and safety concerns raised by engineers about the risks posed by foam debris were sometimes downplayed or dismissed by management.

NASA's organisational culture also played a role in fostering complacency. There were cultural norms and expectations within the organisation that discouraged employees from raising safety concerns or questioning established practices.

Mission First

Integrating the operations control centre into the safety management system is essential to ensure that the risks and mitigations identified in the safety system are understood so that risk sensible decisions are made at the point of delivery of the operation on a day to day basis.

Completing the mission was given priority over safety in the Columbia Space Shuttle accident. There were instances where management decisions prioritized schedule and mission objectives over safety concerns, contributing to a culture where safety was sometimes compromised in favour of meeting operational goals.

The CAIB report also noted that NASA's safety oversight mechanisms lacked sufficient independence from programmatic pressures. There were concerns that safety considerations were sometimes compromised in favour of meeting schedule and budgetary constraints. The lack of independence in safety governance contributed to a culture where safety concerns were not always given the appropriate level of attention and priority.

One of the key factors contributing to this prioritisation of mission completion over safety was the pressure to adhere to launch schedules and meet mission objectives. There were numerous delays and technical issues leading up to the Columbia launch, with associated pressure to avoid further delays or cancellations. This pressure to stay on schedule influenced decision-making and led to a reluctance to address potential safety risks that might delay or jeopardise the mission.

Post-Accident Public Communication

There is a right way and a wrong way to communicate publicly after an accident. Training for staff who will face the press is an essential part of any Emergency Response Plan.

In a startling statement, pre-empting the accident investigation, NASA initially excluded foam strikes as a cause of the Columbia Space Shuttle disaster during a press conference. By downplaying the significance of foam strikes and dismissing them as a potential cause of the accident, NASA failed to acknowledge a critical safety issue

that had been raised by engineers prior to the disaster. This omission hindered the investigation process and delayed the identification of the true underlying causes of the accident.

Causes

This foam strike occurred just 82 seconds after lift-off, and though it was initially deemed as a relatively minor incident, it had profound consequences. The impact of the foam caused significant damage to the thermal protection system on the leading edge of the left wing, compromising its ability to withstand the intense heat generated during re-entry.

Despite concerns raised by engineers about the potential damage, NASA management did not fully appreciate the severity of the situation. The lack of in-orbit inspection capabilities and a refusal to interrupt the mission to re-orientate the shuttle for inspection by ground based telescopes or military satellites, meant that the extent of the damage to the thermal protection system couldn't be adequately assessed. As a result, when Columbia re-entered the Earth's atmosphere, hot gases penetrated the damaged area of the wing, leading to the disintegration of the shuttle.

The foam strike itself was the primary catalyst for the accident, but it was in every sense an accident from the culmination of systemic issues within NASA's organisational culture and decision-making processes. There were instances of miscommunication and flawed risk assessment, as well as a failure to heed warnings from engineers regarding the potential consequences of the foam strike.

Some of the key recommendations from the report

The CAIB emphasized the need for a cultural shift within NASA to strengthen safety culture and prioritise safety above all else. This included fostering an environment where dissenting opinions could be openly discussed and addressed, and where all employees felt empowered to raise safety concerns without fear of reprisal.

The report called for enhancements to NASA's risk management processes to better identify and mitigate potential hazards associated with spaceflight. This involved implementing more rigorous risk analysis techniques and ensuring that risk assessments were integrated into all aspects of mission planning and execution.

The CAIB recommended improvements to NASA's technical oversight processes to ensure that critical safety issues were adequately addressed. This included enhancing the independence and authority of technical review boards and ensuring that engineering concerns were given proper consideration in decision-making processes.
Given that the failure of the thermal protection system was a primary factor in the Columbia accident, the CAIB recommended enhancements to the design and maintenance of thermal protection systems to improve their durability and reliability.

The report highlighted the need for the development and deployment of in-orbit inspection capabilities to enable astronauts to assess and repair damage to the shuttle while in space. This would allow for a more thorough assessment of potential damage to critical systems, such as the thermal protection system, before re-entry.

The CAIB recommended changes to NASA's management structure to improve accountability and decision-making processes within the Space Shuttle program. This included clarifying roles and responsibilities among key stakeholders and implementing stronger oversight mechanisms.

Conclusion

Inspired to revisit the lessons from the Columbia accident by this short mini-series was a refreshing exercise and a reminder to ensure that we have not drifted away from these values over time or through the changes experienced during the disruption of the last few years.

Of critical importance is the maintenance of rigorous safety protocols throughout every stage of the operation from maintenance to in-flight and post-flight. Careful evaluation of potential hazards, anticipation of failure modes, and implementation of robust contingency plans to ensure safety. Moreover, fostering a culture where concerns can be openly raised, taken seriously and addressed without fear of reprisal is essential for effective risk management.

The accident highlighted the importance of fostering interdisciplinary collaboration across different fields to comprehensively address complex challenges in the dynamic unforgiving environment of the air or space.

In the aftermath of the Columbia disaster, NASA underwent significant organisational changes to enhance safety and mission assurance. The cornerstone to the success of NASA's and also of our operational safety is a 100% commitment to continuous improvement.

Spin Axis

by David Learmount

It may seem unlikely that any aviation professionals still do not know that the global industry is preparing to change its navigational heading reference from Magnetic North to True North (Mag2True). In reality, however, there may be many such people, employed by airlines, airports, air navigation service providers, and even some at national civil aviation authorities.

Using data gathered by a working party of the International Association of Institutes of Navigation - known as the Attitude and Heading Reference Transition Action Group (AHRTAG) - this article provides an update on the progress of research into options for managing the transition process. AHRTAG's work is being overseen by the International Civil Aviation Organization (ICAO).

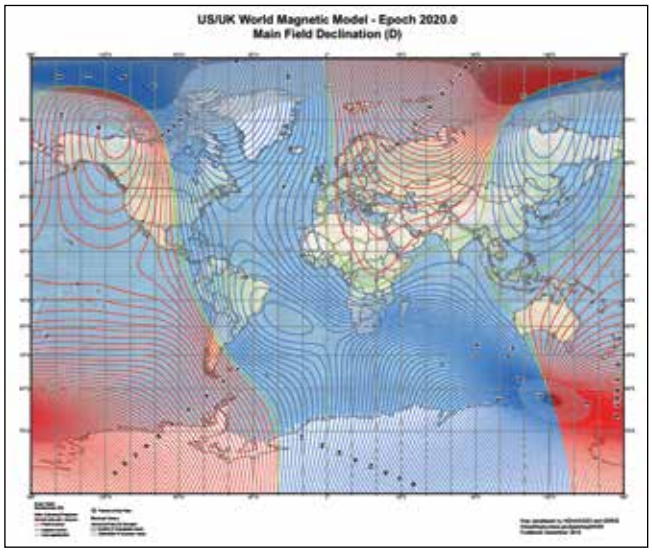
Magnetic North, aviation's traditional heading reference, has always been shifting but, for reasons unknown, the shift has accelerated recently. Having to cope with this uncertainty has now become an expensive distraction, especially considering that modern navigation technologies already enable an alternative: using True North as the heading and azimuth reference. This eliminates the problems, the inaccuracies, and the associated ongoing costs of this constantly shifting reference.

Canada's air navigation service provider (ANSP), Nav Canada, is the world's expert in coping with massive local variations between Magnetic and True North, because the geographical location of Magnetic North has traditionally been in its far north domestic territory. This has recently changed, however, with the magnetic pole now lying in the eastern hemisphere.

If this sounds like a problem peculiar to Canada that others could ignore, a chart of global Mag/True variations shows burying one's head in the sand is not an approach that would work everywhere. And the crews of long-haul flights in particular cannot ignore the inevitable changes in variation during a journey if they are navigating by Magnetic.

Canadian crews of aircraft with the latest avionics – including the latest triplex inertial reference units (IRU) as well as GPS – will have no problems with True. Pilots flying classics, on the other hand, have to be familiar with the techniques of flying in an area where variation can change considerably on a single leg, especially flying across lines of longitude rather than along them. But this can be done, even with old equipment, and traditional navigation skills prevail.

The multinational AHRTAG, led by Nav Canada, has been engaged for more than three years in a detailed study of the Mag2True transition and all its implications, technical and operational, and the progress of its work is being monitored by ICAO and aviation authorities around the world. Indeed, ICAO has, since mid-November 2023, begun to set up an internal working party called the True North Advisory Group (TNAG), inviting representation from carriers, aerodromes, ANSPs, OEMs and all professional bodies or unions that could be considered stakeholders in the Mag2True endeavor.



Nav Canada has its own True North Sub-Working Group, which has produced a Concept of Operations (ConOps) for transitioning the whole of Canadian airspace onto True North as employed in its NDA.

The ConOps rationale for the change to True North reference is spelled out in this simple statement: "After the 1980s, as aircraft systems became more tightly integrated and digital systems developed, minor magnetic variation errors have become more than a mere distraction, driving a mismatch between the various navigation systems." Whatever risks might be involved in transitioning to True, the growing risks described in Nav Canada's ConOps will outweigh them. Meanwhile AHRTAG - which has met monthly via webinars for several years – recently conducted a face-to-face meeting at the Royal Institute of Navigation (RIN) in London, England (5 June 2023). The Group reported a growing international awareness of the desirability of change.

Indeed, Dai Whittingham, a member of AHRTAG and chair of the UK Flight Safety Committee, observed at the RIN that failure to transition would be to ignore the UK Civil Aviation Authority's

definition of its duty to ensure aviation operations are "as safe as reasonably practicable". Whittingham points out that, by staying with the Magnetic heading reference, "We are accepting errors that we can easily eliminate."

Factors that have to be considered in the event of the Mag2True transition include aircraft equipage, airport signage, ground navigation beacon orientation, ANSP/ATC procedures, meteorological reporting, and aviation information service (AIS) updating.

Changes, where necessary, may be adopted in advance, or switch-over prepared beforehand. Nav Canada, which has carried out airborne trials of options for transitioning to True, makes this observation: "In its simplest form, changing from Magnetic to True could be done in many aircraft avionic systems by setting the magnetic variation to '0'. Since all procedures and systems have been built by original equipment manufacturers (OEM) to a stable common reference (TRUE NORTH) and then converted to magnetic for end use, setting the correction to '0' will set the reference to TRUE."

Speaking at the RIN meeting, Susan Cheng, a flight deck crew operations engineer at Boeing, paints a picture of the potential for data mismatches that exists within all modern commercial air transport category aircraft when they use the Magnetic heading reference for navigation. Cheng points out that the main sources of potential mismatch are the magnetic variation (MagVar) tables that are part of both the inertial reference system (IRS) and the flight management computer system (FMCS). There is a need for the operator to update the MagVar tables regularly in both these complex interacting systems, so if they are updated late - or not at all - or if one table is updated and the other is not, the outputs can differ, confusing the autoflight systems. Also, other pilot tools like synthetic vision systems can be affected by mismatches.

No-one is suggesting that any operators should give up their standby magnetic compasses, but organisations like GAMA (General Aviation Manufacturers' Association) and AOPA (Aircraft Owners and Pilots' Association) warn against forcing GA pilots – while flying - to read their standby compass, apply the local magnetic variation, and set their gyro-driven directional indicators (DI) to True. The potential for error, they argue, is high. Both are also nervous about GA aircraft fitted with horizontal situation indicators (HSI) slaved to flux valves that provide Magnetic headings. Their concern is the expense of fitting converters to make the HSI read True. Meanwhile there are also those who accuse detractors of exaggerating the problems, and of ignoring the capabilities of Global Navigation Satellite Systems (GNSS), widely used by all sectors of GA.

ICAO has, meanwhile, conducted a survey to measure the support for a Mag2True change. The Organisation reported that it received a robust response from more than half the contracting states and found that less than 10% were resolutely opposed to it. Those most in favour included ANSPs and flight procedure designers. Air operators provided varied levels of support, but less than 15% actually opposed change.

ICAO also noted that many air operators say they already use True North procedures in remote and oceanic airspace, and in polar regions.

Right now, a set of four objectives in advance of transition have been mooted: development of a global ConOps; development of strategies for implementing True North; analysing the potential safety risks and mitigations; and finally identifying the ICAO Air Navigation Commission Panels that will be impacted and propose tasks accordingly.

Nav Canada's own ConOps argues that the move to True is essential for aviation's future: "The case for converting to True as the datum for aviation instructions, procedures, and surveillance is clear, and the only problems would be those of practically implementing it. Whilst it would be a large-scale undertaking, it would also be a one-off operation which, once completed, would be final."

AHRTAG chairman, Nav Canada's Anthony MacKay, sums up the Group's conclusion: "The risks of change are known and manageable. The transition will require careful planning and implementation, most likely through ICAO. To remain on magnetic continues to allow a latent threat to safety to reside within our aviation safety system." Finally, ICAO's survey found that there is a very high understanding of the many benefits of a True North reference, including more accurate navigation performance and "eliminating errors caused by MAGVAR".

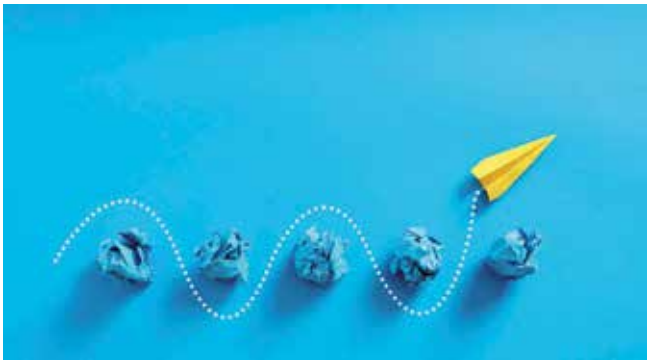
David Learmount was AirTransport Editor and Airsafety Editor of (and still contributes to) Flight International Magazine.

This article was first published in RAeS AEROSPACE

Why is it just so difficult?

Barriers to 'Just Culture' in the real World

by Steven Shorrock



Drawing on his research and practice, Steven Shorrock explores the various barriers that we face when trying to make sense of Just Culture, inviting readers to reflect on the intricate nature of justice and safety in our complex world.

At the heart of Just Culture lies a simple acknowledgment: we all make mistakes. Sometimes we forget things, we don't see or hear things, we misperceive and misinterpret things, we misjudge things, we make decisions that do not fit the evolving situation, we do or say things that we didn't mean to do or say. We all do this, in the living room, in the ops room, in the board room, even in the court room. None of us is immune. These unwanted moments are a great leveller.

So how can we judge people for making mistakes – for being human? No mistake should be sufficient to instigate a disaster. Systems that require perfect performance by human controllers are bad systems, because they deny nature. Complex, safety-critical systems should be highly defended from normal variability in the workings of the head and hands.

But sometimes, it is easy for things to go disastrously wrong. And so this quandary remains difficult to reconcile. My interest in this issue stems back to the late 1990s as a young psychology student. I eventually completed my doctorate on the topic twenty years ago. I consulted hundreds of academic papers, analysed hundreds of incident reports, and spent hundreds of hours in control rooms and simulators, observing and interviewing controllers. What do these brain blips have in common?

At that time, with my psychologist's perspective on 'cognitive errors', what they had in common was a deviation from one's own intentions and expectations. But for other stakeholders, what they had in common was deviation from *others' expectations and requirements,* including those of other professionals, organisations, the criminal justice system, the media, and citizens. I increasingly became uncomfortable. "Human error" was used by many to infer cause and culpability. This made everything more complicated. And especially when it comes to decision-making and habits, we then enter the realm of conduct and practice. But right and wrong are not black and white.

In the last decade or so, my colleagues and I have spent over 30 weeks with controllers, engineers, managers, safety specialists, and others in air navigation service providers in over 30 countries, talking about Just Culture and safety culture in workshops. Together with colleagues, I have also worked with prosecutors and judges along with pilots and controllers. In a patient safety context, I have collaborated on approaches to Just Culture within healthcare, given and heard evidence to a committee meeting in the UK Houses of Parliament, and given evidence at a hearing for a review on Gross Negligence Manslaughter.

The perspectives I gained during this time are so numerous, diverse, and intermingled that it is not possible to do justice to them. But what emerged are many barriers to Just Culture. These are what makes it so difficult. So, that is the focus of this article. For each kind of barrier, a whole book could be written, but I hope that the sketch below gives an impression of some of the barriers that we need to talk about if we are to make progress.

Conceptual Barriers

Just Culture is defined in Regulation (EU) No 376/2014 as *"A culture where staff are not punished for actions, omissions, suggestions, or decisions taken by them that are commensurate with their experience and training, but where gross negligence, wilful violations and destructive acts will not be tolerated."* But 'Just Culture' is not really a culture per se, or even a subculture. It is a trope – a figure of speech or recurring theme. It puts a focus on a particular value – justice – within a culture. Just Culture is a reason to have a conversation. An organisation may have supporting policies and processes, and there may be overarching regulation, but a conversation is needed to uncover how we think and act. Different groups (with different subcultures) have different ideas and ideals.

We may try to achieve a common culture across the organisation, but you can't 'design', 'engineer' or 'implement' a culture of any kind. Unfortunately (or fortunately, depending on your perspective) culture is largely read-only/write-protected. There is change, but adaptive change is mostly bottom up, and slow. True cultural change means changing shared values, beliefs, assumptions, and practice. That's hard enough for one person trying his or her best! For a thousand people...? Good luck. So, culture change is not usually centrally directed or top down. Culture change is evolutionary – more

glacial than galloping – as groups learn and pass on lessons for their survival. But safety and justice are important values, and the notion of 'Just Culture' helps to trigger conversations about them.

Personal and Social Barriers

Whatever our culture, we are all different. We have different values, beliefs, attitudes, and habits. When it comes to justice and fairness, we also see the world very differently. Some people accept the 'just world hypothesis', and assume that a person's actions inherently bring morally fair consequences to that person. And people have different attitudes to mistakes. Some are unforgiving, and see even rare mistakes as a sign of incompetence. Punishment is often seen as a useful corrective measure. Most of us have this attitude in some circumstances. If it is your relative who is harmed by a distracted driver or a overconfident surgeon, your perception of justice will tend to differ compared to when an unknown person is harmed. Our judgement of performance is affected by the severity of the outcome, hindsight, and who is affected.

Importantly, the Just Culture ideal is built on trust, and trust is fragile. In an organisation, it takes a long time to develop confidence that one will not be punished for mistakes that constitute normal human variability, and this trust is rapidly eroded. A change of manager to one who is unsympathetic to the reality of work-as-done can undo a lot of work on Just Culture. This fragility highlights once again that Just Culture isn't a 'culture', as such; it's an agreement.

Linguistic Barriers

Philosopher Ludwig Wittgenstein wrote that *"the limits of my language mean the limits of my world. All I know is what I have words for."* The form of something, even the very existence of it, depends to a large degree on the words we have to describe it. In this sense, *words shape worlds* (Shorrock, 2013). Our safety lexicon is not neutral, and certainly not positive. This shapes a deficit-based way of thinking, which further reinforces deficit-based language. If you think about the words associated with safety management, for instance as might be found in the glossary of a safety report, you'll find a negative tone: accident, cause, danger, error, failure, harm, hazard, incident, loss, mistake, near miss, negligence, risk, severity, violation. You'll find relatively few words to describe how safety is created, and those that one finds are rarely 'human' (e.g., barriers, redundancy). The same goes for taxonomies used for incident analysis. Again, the terms are routinely negative (e.g., poor teamwork, inadequate supervision), reinforcing a human-as-hazard perspective. (They could just as easily be neutral, e.g., teamwork, supervision.) To make matters worse, slogans such as 'zero accidents' and 'never events' send messages that undermine safety and justice (Shorrock, 2014). For doctors, 'First, do no harm' is a commonly cited principle. It is often misunderstood as 'zero harm', when it originally meant 'abstaining' from intentional wrongdoing, mischief and injustice. It did not refer to mistakes. We might see it as an early line in the sand.

Professional and Organisational Barriers

Different professions have different ideas about justice and associated issues such as mistakes, competency, and negligence. There can be striking differences between operational and engineering staff, for instance. For engineers, there tend to be fewer shades of grey in both procedure and practice. But professionals – with insider knowledge and high expectations – can be the harshest critics of their peers. We tend to fear the judgement of our peers the most, but we coalesce to repel the judgement of external parties, such as managers or prosecutors. This is valid in a sense, because external parties don't understand the work. (Whether we want them to understand the work or not, depends on how we imagine the outcome of their judgement.)

Each profession – operational, HR, legal, safety, regulation – also takes comfort from its own form of *déformation professionnelle,* and experiences 'trained incapacity' (see Shorrock, 2013). Our professional experience deforms the way we see the world, at least to other people outside of our occupational clique, and even incapacitates us. It creates differences in how the same decisions and conduct are viewed in retrospect. Our ideas about justice and the acceptability of occupational conduct are deeply ingrained in our own professional background. Some acts are deemed unacceptable a *priori*. Organisations sometimes give examples. These usually involve illegal use of alcohol and drugs, as well as forgery or falsification. But in the middle lies a grey area of conduct. Some organisations adopt engineeringstyle flowcharts to help navigate this, which may be a good starting point, but may also reflect our stage of maturity when it comes to conversations about practice.

Historical Barriers

Organisations have a history, which includes unwanted events and how people are treated following such events. People in organisations have a memory of these events, which influences their beliefs about the future. How will I be treated if I make a mistake and things turn out badly? It makes sense to consider how others

were treated in similar circumstances. If someone was previously treated unfairly, this influences how I think, feel, and act. Interestingly, memory of previous episodes is somewhat independent of whether a person was even in the organisation at the time. It is encoded in organisational folklore, passed on from member to member, and so influences behaviour even for those who were not part of the history. When someone is blamed for an 'honest mistake', it is like a social oil spill. The pollution sticks around for a long time. It remains even after the judging person has left the organisation. Ironically, mistakes in handling others' mistakes are among the least readily forgiven by groups of professionals who find themselves under the spotlight. The clean-up operation can take a generation unless apologies and amends come quickly, and they rarely do.

Regulatory Barriers

Regulations are infused with messages – explicit and implicit – about 'safety', 'justice', and 'acceptability', even if the words aren't used. The provisions and articles are not always consistent or compatible. This is partly because of the huge effort required to do so thoroughly. Constraints on regulatory resources mean that an efficient solution is chosen instead – leave people to interpret the regulation and resolve vagaries and inconsistencies. In the now-famous definition of Just Culture in EU 376/2014, we are let to define for ourselves what is meant by *"gross negligence"* and *"wilful violations"*. We need to interpret what is meant by *"actions, omissions or decisions taken by them [frontline operators or others] that are commensurate with their experience and training"*. And who are the *"frontline operators"* and *"others"*? The confusion at least reinforces the point that 'just culture' is an idea and a reason for a conversation, not a thing that exists out there in the world.

Technological Barriers

Technology can make it easy for things to go catastrophically wrong. We somehow accept this for some technologies (e.g., trucks, buses, cars), partly because they offer convenience that we value more than the risk of harm. We do not accept it for other technologies, but still it happens. Spain's worst train crash in over 40 years is testament to this. The derailment happened 10 years ago on 24 July 2013, when a high-speed train travelling from Madrid to Ferrol, in the north-west of Spain, derailed on a curve four kilometres from the railway station at Santiago de Compostela. Eighty people died. The train was travelling at over twice the posted speed limit of 80 kilometres per hour when it entered a curve on the track. The technological system allowed this to happen. Neither the passengers nor the driver was protected, but "human error" by the driver was blamed in the aftermath (see Shorrock, 2013). Ten years later and the trial remains ongoing. There are other examples of how 'simple mistakes' – of the kind that anyone can make – precede disaster. The real mistake is the failure to mitigate inevitabilities.

Legal and Judicial Barriers

Whatever the attitudes to safety and justice inside an organisation, organisations operate in a legal context. Naïve ideas about not punishing innocent mistakes may collide at speed into reality once a prosecution commences. In many civil law jurisdictions, prosecutors lack the discretion as to whether to file charges and how to present a case. So unintended 'honest mistakes' may well be criminally relevant acts of negligence that must be prosecuted according to the penal code. (In this context, incidentally, the famous question, "who draws the line?" is easily answered: a judge or jury.) In a common law context in England, Wales and Northern Ireland, 'Gross Negligence Manslaughter' applies to deaths in a workplace of any nature. What is interesting is that the degree of negligence needs to be *"very high", and conduct must "fall so far below the standard to be expected of a reasonably competent and careful [person in the defendant's position] that it was something truly, exceptionally bad."*

But we also have to grapple with our confused and inconsistent standards when it comes to legal action. An ordinary driver who displays essentially the same behaviour as a train driver, professional pilot, or air traffic controller, will be judged quite differently, also depending on the outcome. We commonly agree that faults in driving ought to be punished. We even have specific laws for driving conduct. Again, in England, Wales, and Northern Ireland, driving offences mainly fall under two categories: dangerous driving, and careless or inconsiderate driving. Dangerous driving includes obvious things such as racing and ignoring traffic lights, but also using a hand-held phone or other equipment, looking at a map, talking to and looking at a passenger, or selecting music. Careless driving, or driving without due care and attention, is committed when driving falls below the minimum standard expected of a competent and careful driver, such as unnecessarily slow driving or braking, dazzling other drivers with un-dipped headlights, or turning into the path of another vehicle. What is an 'honest mistake' depends on the context and the outcome.

Societal Barriers

'Just Culture' is entangled in a struggle with the pervasive fear that that we have created systems that can fail catastrophically, albeit very rarely, seemingly as a result of ordinary and inevitable human variability. Complex systems have a terrifying habit of operating efficiently close to a tipping point into failure. Professionals whose contributions are closest to that tipping point become the target for the dual fear response of anger and blame. In psychology, this is known as 'displacement'. Despite being set up to fail, there is simply no one else who is convenient to blame in the heat of the moment. Headlines of "human error causes accident" mirror our appetite for simple, low context, low complexity explanations that come with a scapegoat upon which to offload our anxiety about what we've created.

Evolutionary Barriers

Our sense of justice is not unique to modern humans. We have inherited it from our primitive ancestors. This can be seen in our closest relatives: chimpanzees discipline greedy peers who cheat or are otherwise uncooperative. Other mammals administer justice in groups for breaches of social norms. Some group norms are essential for group survival and so deviations will not be tolerated. But our evolution has hamstrung our thinking about justice. We make simple-to-complex reasoning errors; our thinking and internal reactions about simple situations are transferred to unwanted events in complex situations. But for complex, high-hazard socio-technical systems that need to be defended heavily from the effects of simple mistakes, this thinking and feeling is misplaced.

So, What Can We Do?

It seems that we are in a phase of confusion. We are trying to work things out. Acknowledging this is a good first step. Perhaps we can accept, though, that people make genuine mistakes, all the time. And sometimes – but quite rarely – conduct really is unacceptable. Using the words of retired English judge Sir Brian Henry Leveson, who served as the President of the Queen's Bench Division and Head of Criminal Justice, we must sometimes identify *"the line that separates even serious or very serious mistakes or lapses, from conduct which was truly exceptionally bad"*. This was directed at gross negligence manslaughter, but removing that fatal outcome, it seems reasonable to apply this more generally when it comes to corrective justice. And remember that the term 'serious mistakes' does not necessarily refer to outcome: systems should be designed – so far as is reasonably practicable – to prevent catastrophic outcomes. Complex, high-hazard systems such as transportation, healthcare, and power generation must be defended from the effects of such mistakes. If it is easy for things to go disastrously wrong, that is a more fundamental mistake of design and management.

And many are harmed in some way when things go wrong. So, we should seek to identify who is impacted, understand their needs, and help to meet those needs. This is the essence of restorative just culture, which has additional complications (for instance, those who are impacted may express a need for retributive justice).

By reflecting on our own reactions to failure, and how we contribute to creating, maintaining and overcoming each of the barriers to Just Culture, we can genuinely do our part for justice at work, at home, and in society more generally. This way, even though unwanted events will always be hard to handle, there may be fewer barriers to learning and healing from them.

Reference

Shorrock, S. (2013, December 12). Déformation professionnelle: How profession distorts perspective. *Humanistic Systems*. https://bit.ly/HSDefPro

Shorrock, S. (2013). Human error: The handicap of human factors, safety and justice. *HindSight*, 18, 32-37. https://www.skybrary.aero/articles/hindsight-18

Shorrock, S. (2016, February 27). Never/zero thinking. *Humanistic Systems*. https://bit.ly/HSNZT

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Flight and Cabin Crew

Early starts, late finishes & everything in between: where does the duty of care start and finish?

by Peter Coles, Partner HFW

In most jurisdictions employers have a responsibility to take all reasonably practical measures to ensure the health, safety, and wellbeing of staff in situations where the employee is at work. This is also true of airlines and their flight and cabin crew.

The foremost consideration for airline schedulers is to ensure that crews operate legally. Regulations exist for flight duty limitations in most countries to ensure adequate rest and enhance safety. The hours that crew can work in a single duty period are dictated by how many flights the crew are working and when the duty time commences. Working more flights and starting earlier reduces the number of hours that crew can work in a day.

Every airline schedules their crews differently. Scheduling, and many of the rules related to it, is highly dependent on the contract between the airline and its crews. However, the law governing the flight operation and the crews' contracts may prohibit deviations that undermine the regulations for flight duty limitations but permit conditions that help mitigate the risk of fatigue, including extended rest when transferring multiple time zones, the elimination of standby shifts and requiring a minimum number of days off.

A question that often arises is where an airline's duty of care to crews commences and ends. Logically, that should depend on three factors: location, when the period of work starts and ends and whether the crew member is acting within his/her scope of employment at the time.

An airline may well feel that the determining factor is when the crews' flight duty time commences. Ordinarily, this will be when they are required to report for duty on a given sector or series of sectors. The actual location for reporting will vary between airlines but should take into consideration the type of operation, the size and type of aircraft and conditions at the airport and elsewhere. It may include at a downtown airline office, at a passenger terminal or somewhere airside after security and immigration. For example, at the gate or on the ramp. The earlier it is, the longer the operating day and the impact on fatigue.

However, attendance at work for other purposes is also relevant. As examples, this could include courses at a training facility or airline headquarters or participating in marketing roadshows.

Regulations may acknowledge that there will be commuting time for crew to get from home to the report location and the associated start of a flight duty period, but the writer is not aware of any regulation that specifies a regulatory time for the commute and subsequent path to the report point. It will differ depending on location and company contracts.

As a matter of general law, commuting to and from work is generally not included in an airline's duty of care. This is particularly true where crew are travelling to work on public transport or in a private car. In those cases, the public transport provider and private driver owe a duty of care.

However, it is possible for an airline's duty of care to be extended to travel to and from work if briefings take place during this period or it arranges the transport or helps employees in other ways to avoid risks in a particular journey. Typically, this occurs when travelling from an airport located in another country from the airline's home base to an airline office or hotel. Or travelling the next day back to the airport for the next flight. It is also very likely that the transport operator will owe a duty of care as well.

The airline's duty of care may also extend to periods in hotels if crew are obliged to stay at a particular location selected by an airline and are asked to participate in work activities away from their homebase. These might include periods of being on call when say an aircraft has had to divert to a remote airfield due to a security or flight emergency or when briefings take place.

The fact that an airline's duty of care may extend well beyond an airport is important given that flight duty periods for crew are often said to end when an aircraft finally come to rest and the engines are shut down, at the end of the last sector on which the crew acts as an operating crew member. Therefore, a distinction needs to be drawn between duty time for rostering and hours measurement purposes and the total time period when a duty of care exists. For example, a pilot may injure himself/herself while exiting an aircraft due to faulty emergency slides long after the engines have stopped. Or a cabin attendant might fall on the steps of a crew bus if the driver moves off early.

In legal terms the scope of employment may be relevant. The scope of employment refers to the range of activities that an employee is authorised to perform or reasonably expected to participate in as part of their duties. Therefore, if a crew member is injured while performing activities that he/she was not asked to perform then a duty of care might not arise. This is also true if the crew member was at a location he/she was not authorised to be in.

As always, each decision on the liability of an airline to crew will be dependent on its facts and his/her contract and applicable law.

Psychological Safety on the Flight Deck

Enhanced interpersonal skills training may be the necessary upgrade to human factors training.

by Kimberly Perkins

Crew resource management (CRM) is aviation's global gold standard for training pilots on crew collaboration. Since its inception 50 years ago, it has evolved to incorporate new academic research and new safety models.

In the 1990s, an updated version of CRM emerged to include an integrated safety model called threat and error management (TEM). TEM is a conceptual model designed to identify, mitigate and trap errors on the flight deck. It assumes pilots always speak up, admit mistakes, ask for help and share safety concerns. However, my research has shown these baseline assumptions are not always correct. When pilots do not speak up about safety concerns, the CRM/TEM safety model degrades to little more than hopeful rhetoric.

Two of the assumptions built into the CRM/TEM model are that captains will successfully foster a collaborative dynamic on the flight deck, and that both the first officers and captains will (consistently/unfailingly) share safety concerns. We train pilots on the imperative necessity for these behaviors, but rarely measure the flight deck microculture to see whether they are actually occurring.

Recent academic research reveals that 93 percent of first officers feel compelled to adapt to the culture style established by the captain.[1] This is no surprise since leaders are expected to set the tone of a workplace.

The research also revealed that 75 percent of first officers report they shift from a safety voice (clearly communicating a safety concern) to a muted safety voice[2] (hesitating to report a safety concern or suggesting — rather than directly reporting — a safety concern), according to the tone established by the captain.[3] In an even more alarming statistic, 57 percent of first officers report having felt silenced by the captain after sharing a safety concern.[4]

As a pilot and academic aviation safety researcher, I hypothesized that an underlying cause of this reduction in safety voice is due, in part, to a lack of psychological safety on the flight deck[5] and set out to determine if psychological safety might be a missing element in CRM/TEM training. In a study of more than 800 industry pilots, I found that a reduction of flight deck psychological safety dramatically reduced safety voice. I used various aspects of psychological safety (for example, a pilot's ability to admit mistakes or ask for help) to measure its level and to determine how the perception of crew dynamics affects safety voice.[6]

Additionally, I reviewed the U.S. Federal Aviation Administration's (FAA's) recommended CRM training curriculum and discovered that we, as an industry, initially built safety models and systems on the assumption that psychological safety was omnipresent in flight deck microculture. I found that pilots in general have a major training gap involving *interpersonal skills* — the necessary tools to help build psychological safety.

Training Gaps

In 2004, the FAA introduced guidelines to train pilots in collaborative safety and interpersonal skills. Important concepts such as "ways to behave to foster crew effectiveness," "strategies to handle conflict" and "external influences on interpersonal communications" debuted in an advisory circular.[7] Nevertheless, my research shows many pilots do not feel they have been trained on these important interpersonal skills. A survey of more than 800 professional pilots revealed that only about 50 percent of airline pilots believe they received training on the FAA recommendations.[8]

The advisory circular encouraged CRM facilitators to assess a pilot's competency in CRM by having pilots demonstrate "the usefulness of showing sensitivity of other crewmembers' personalities and styles." Since U.S. airline pilots are required to receive CRM training, I asked them whether they ever had to demonstrate this facet of CRM. Fifty-one percent said they had not, and 85 percent said such training might enhance safety.[9]

A more disheartening finding was the emotional response to the word *sensitivity* in an aviation safety survey. One pilot, reflecting the opinion of many others, wrote "Sensitivity towards others? Is this an airplane or a therapy session? Cockpit demands respect of others not sensitivity."

Another pilot did not complete the survey because the word was too upsetting, evident from their comment, "I stopped at the word "sensitivity … that does not contribute to good CRM." Fear of interpersonal skills becoming too "touchy-feely" was a prevalent theme of many pilots' comments, as seen here: "Feelings, gender, race, religion etc. don't belong in the cockpit. That's why they have checklists. Do your job and we'll get along fine." The emotion exuding from these comments indicates that this isn't just a training gap – there's a culture issue that needs to be addressed.

The fear of *having to display sensitivity* is often used to discredit collaborative safety. This phenomenon is not new. Similar sentiment was well documented in groundbreaking research on airline pilots in 2005 by Karen Ashcraft, a communications professor at the University of Colorado.[10] She hypothesized that the resistance to collaborative safety in the early days of mandated CRM resulted from a perception that collaborative safety was emasculating and a threat to power structures. The persistence and prevalence of some professional pilots' inability (or unwillingness) to grasp the interdependency of crew collaboration and overall safety is a missed opportunity for CRM initiatives and an increased safety risk in crew operations.

S-Frame Solutions

We can initiate solutions that are either i-frame *(i for individual)* or s-frame *(s for system)*.[11] I-frame approaches assume that individuals may choose to alter their cognition, affect and/or behavior for moral, altruistic or personal gain. Such is the work of behavioral and cognitive scientists. Recent studies show much of the failure of diversity training programs stems from a reliance on i-frame approaches, hoping individuals, en masse, independently choose to become more inclusive.[12] They usually don't.

Instead, we must approach the training of pilots' interpersonal skills through s-frame interventions. Policymakers and social psychologists use s-frame interventions to change the rules of the game – requiring a behavior change, which eventually leads to a shift in how we think (cognitive) and how we feel (affective) about something.

Rather than waiting for individuals to change, we must implement a strategy to require change. Our s-frame solution will fill the training gap while increasing the efficacy of CRM/TEM by removing the erroneous assumptions on which the models were built. We cannot wait for a collective epiphany of pilots to individually seek enlightenment on collaborative safety.

My recommendation is that regulators require enhanced interpersonal skills training to include the following concepts: psychological safety, the triad of bias (cognitive, affective and behavioral), interpersonal communication and resiliency. This training should occur early on (as early as commercial pilot license) and must occur at all levels of professional pilot development (initial, recurrent and upgrade). Furthermore, we must operationalize these concepts by requiring competency-based training in which pilots are required to demonstrate their ability to create psychological safety. Without re-inventing the wheel, we can integrate these concepts into frameworks and systems that already exist.[13]

Further justification for an s-frame solution is recent academic research revealing that U.S. pilots, in general, score lower than the general public on emotional intelligence traits.[14] Here's why this is critical: Emotional intelligence is a strong predictor of safety performance.[15] The industry needs a mandatory s-frame intervention on collaborative safety.

Two necessary aspects of an s-frame intervention are to establish the terminology that is adequately representative; and to utilize a vernacular that radiates familiarity as a tool to elicit buy-in. In this light, I advocate that we position the flight deck as a sociotechnical system in all future human factors discussions. The flight deck consists of a *socio*, or social, aspect (emphasizing the human role) and a *technical* aspect (focusing on the airplane and its technology). The health of the socio impacts the health of the technical. The interdependency of a healthy *socio* on the functionality of the *technical* is evident from recent aviation news. In a display of pro-safety decision-making, Alaska Airlines Flight 1080 returned to the gate at Washington Dulles International Airport in July 2022 when the two pilots had a dispute and determined they could not fly together.[16] The *socio* conflict impacted the ability to operate the *technical*. The event illuminates a need for better interpersonal skills training integrated into pilot training.

When pilots display emotion-laden rejection of collaborative safety or deem CRM too touchy-feely, they are acting in an unsafe manner. The flight deck is a sociotechnical system, and it's time the industry does a better job of training the *socio* aspect of safety.

The FAA now requires airline captains to receive leadership training, but with no mandated syllabus, pedagogical approach or methodology, it is likely the plight of leadership training will end up similar to that of CRM. Important concepts like *growth mindset, emotional intelligence* and *psychological safety* are, at best, mentioned in ground school. More realistically, these concepts go unnamed and untrained, but their ethos may be plastered on a poster hanging somewhere in the halls of a pilot training facility. We can do better than this.

The fear of collaborative safety or the touchy-feely-ness of interpersonal skills reflects a culture of hyper individualism and a lack of understanding of sociotechnical systems. It is a culture laden with emotion that rejects change, thrives in the status quo and feels threatened by diverse thinking or by diversity itself. It would be irresponsible to assume a culture shift will occur naturally (despite the common temporal argument of *wait a generation*). We need an s-frame intervention to nudge this culture in a new direction. We can do this without reinventing the wheel.

Our industry loves quantification — we are numbers and stats people. We measure what we care about (number of long landings, go-arounds, hours flown and safety reports, for example). But we are not adequately quantifying culture. There are nuances of CRM, such as those suggested in the CRM advisory circular, that must be measured. The current metric of CRM success — often a checked box at the end of a simulator ride or a "good CRM" comment written on an assessment — is insufficient.

The upsurge of human factors (HF) specialists over the past decade indicates the industry is moving in the right direction. From integrating HF into aircraft certification to designing a taxonomy of cognitive processes, HF specialists are uniquely positioned to be the vanguard of the inner workings of the *socio* dyad of our sociotechnical system. We ought to be thinking about the structural facets of crew dynamics: How does power sanction exclusionary behavior? How does psychological safety influence the flight deck microculture? What is the role of individual resiliency in building crew psychological safety? The answers to these questions, I believe, will enhance safety.

Aerospace is such a thrilling industry because we are continuously pushing for the next technological advancement. Let us now push for the next sociotechnical advancement by spotlighting the need for enhanced interpersonal skills training. As a pilot, I, for one, am on board with enhancing safety. How about you?

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Notes

1. *Perkins, K.; Ghosh, S.; Vera, J.; Aragon, C.; Hyland, A. "The Persistence of Safety Silence: How Flight Deck Microcultures Influence the Efficacy of Crew Resource Management." International Journal of Aviation, Aeronautics, and Aerospace Volume 9 (Issue 3, 2022): 6.*
2. *Noort, M.C.; Reader, T.W.; Gillespie, A. (2021). "Safety voice and safety listening during aviation accidents: Cockpit voice recordings reveal that speaking-up to power is not enough." Safety Science Volume 139 (July 2021), 105260.*
3. *Perkins et al.*
4. *Ibid.*
5. *Psychological safety is a team condition in which members of the team feel that it is safe (in other words, they won't be viewed as incompetent or receive retaliation) for interpersonal risk taking, such as asking for help, admitting mistakes and sharing ideas. It is a team condition in which individuals share safety concerns and feel that they are valued members of the team.*
6. *There was over a 50 percent increase in the number of pilots who strongly agree that they can admit mistakes and ask for help on the flight deck when the pilot perceives team synergy (that is, getting along) with the other pilot.*
7. *FAA. Advisory Circular 120-51E, "Crew Resource Management Training." 2004.*
8. *Perkins, K.; Ghosh, S.; Hall, C. (Under Review). "Interpersonal Skills in a Sociotechnical System: A Training Gap in Flight Decks," 2022 academic research conducted at the University of Washington.*
9. *See U.S. Federal Aviation Regulation Part 121.405.*
10. *Ashcraft, K.L. (2005). "Resistance Through Consent? Occupational Identity, Organizational Form, and the Maintenance of Masculinity Among Commercial Airline Pilots." Management Communication Quarterly Volume 19 (Issue 1, 2005): 67–90.*
11. *For more on i-frame vs. s-frame see: Chater, N.; Loewenstein, G.F. "The i-Frame and the s-Frame: How Focusing on the Individual-Level Solutions Has Led Behavioral Public Policy Astray." SSRN Electronic Journal. 2022.*
12. *Study of 985 anti-bias interventions revealed training does little to reduce bias; a meta-analysis of 426 studies found unconscious bias training has little effect on altering behavior. See Dobbin, F; Kalev, A. Getting to diversity: what works and what doesn't. The Belknap Press of Harvard University Press. 2022.*
13. *For example, line operations safety assessment (LOSA), line oriented flight training (LOFT) and advanced qualification program (AQP)*
14. *Dugger, Zachary; Petrides, K.V.; Carnegie, Nicole; McCrory, Bernadette. "Trait Emotional Intelligence in American Pilots." Scientific Reports12, no. 1 (2022): 15033–15033.*
15. *Bates, S.G. Emotional intelligence and safety culture in business aviation (Order No. 30250161). Available from ProQuest Dissertations & Theses Global. (2777980712). 2023.*
16. *List, Madeleine. "Alaska Airlines Pilot Clashes with Copilot, Walks Off Plane 'Fuming,' Passengers Say." Miami Herald, July 22, 2022.*

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Report No 1 – ATC833 – Rest-period tasks

Report text: With the removal of SRATCOH [as a result of the introduction of CAP670 Part D], I feel that the issue of additional tasks taken on during breaks is not well regulated. Our unit has introduced their own rule stating that *"ATCOs may undertake additional tasks during their breaks, including meetings, if such tasks do not cause mental or physical fatigue"*. Due to chronic staff shortage (which is unlikely to improve in the near future) there is virtually no facility time available so this modification appears to have been introduced to allow administrative tasks to be completed despite the lack of staffing. Until a task or meeting has been completed how will an ATCO know whether it has caused mental fatigue? Also by this point you will be scheduled to recommence providing live operational duty. If you then declare yourself as fatigued, it is likely that an operational position will have to close. At a small airport such as ours this can lead to a full closure of the airport and this can cause you to feel obligated to continue working. I feel this modification has been introduced for the sole benefit of the management and to the detriment of the operational staff.

My major concern caused by the introduction of this rule is the ability of our management to try and cover the shortfall in our staffing by making those of us left carry out all the required administrative tasks while "on duty" but within our breaks from the operational position. Our management say there isn't a problem because the instruction only says *"MAY carry out additional tasks IF they don't cause mental or physical fatigue"* but you won't know if you feel fatigued until after the meeting/administrative task and that will be just as you are about to resume live operational duties.

ATCU Comment: We are absolutely focused on ATCO fatigue, breaks and rest, and we make sure that we comply with all rest and break requirements, especially the requirement for no more than 2hrs on console. Although not a busy airport, we don't underestimate the potential effects of fatigue although we feel it is manageable. In fact, one of our concerns is under-arousal and we have had incidents from that in the past. But we accept that people become acclimatised to their context and so if operations ramp up then people can easily become tired/fatigued. That being said, no controller has ever said they are too fatigued to control, although we have diverted aircraft due to controller availability in the past. Whether controllers haven't reported being fatigued because it hasn't been a problem or because they are reticent to do so is not something that we can comment on, but we openly encourage controllers to report their concerns without prejudice in a Just Culture approach.

The new rule also introduces napping for the first time as a further mitigation for fatigue. Along with NOTAM'd closures to cover breaks or lack of controller availability, this shows that we are flexible, taking pro-active measures regarding fatigue and rest, and we are not pressuring controllers to conduct administrative tasks during breaks if they feel they don't want to. The definition of 'may' is that the instruction is permissive, optional or advisable; every rule could be interpreted in black-and-white terms if people chose to do so, and so there are bound to be some who question every nuance. Over-complicating the document with endless amplifications or explanatory clauses would not be practical but, when the rule becomes incorporated into our MATS Part 2 later this year, there will be scope for looking again at the wording.

CHIRP Comment: UK CAP670 Section D is largely silent on what may or may not be done during breaks other than to give broad guidance on what should constitute a 'Break' in itself as in Para D27 below.

CAP670 Part D Para D27: *"Breaks shall include all measures necessary to ensure that controllers will not be suffering, to any extent as a consequence of their duties, mental or physical fatigue whilst exercising the privileges of their licence. Such measures are expected to include a certain detachment from the operation, e.g. rest areas, some of which shall afford the individual 'quiet space' and facilities for adequate refreshment."*

Part of the problem is that administrative staff who had previously dealt with many of these tasks are often now no longer employed at many units due to resource constraints and so increased burden and pressure is falling on controllers to manage and conduct additional administrative activities in addition to their core workflow. As a result, there are undoubtedly additional tasks that need to be done by controllers but they should not necessarily be expected to do so during breaks. Moreover, extraneous tasks that are not required for regulatory purposes should be shed, and ANSPs should review the remaining administrative/ancillary tasks that they are expecting controllers to do during breaks to evaluate the risk/benefits so that everyone is clear as to their likely demand. These risks/benefits and safety justifications should be transparently stated and continually reviewed as part of the unit's change management process so that controller activities and fatigue levels are appropriately monitored.

CHIRP has previously reported on similar concerns about additional tasks that might cause a conflict with SRATCOH in July 2020's AT FEEDBACK Ed 135, Report 13 where we stated:

"Whilst SRATCOH provides guidance on duty hours, the critical factor is whether controllers are actually feeling fatigued. Any mandated non-control duty counts towards the ten hours SRATCOH limit, but some meetings are considered voluntary and therefore do not technically affect SRATCOH. Irrespective, it is essential that an ATCO removes themselves from duty and report instances of fatigue whenever they occur. That being said, it is more prudent to prevent the situation in the first place, and use

the guidance provided under SRATCOH to help avoid known situations where fatigue can become an issue. If extra duties are to be carried out in addition to a full operational shift, then it would be better to do these extra duties after the operational part of the shift, rather than before - some units reduce the finish time for afternoon/evening shifts if meetings are conducted in the morning, and allow the option of attendance or not for afternoon meetings if morning shifts have been carried out. Ultimately, an ATCO is fully within their rights to refuse to attend any meeting prior to a full ATC shift."

The CAA commented in Ed 135 that completing additional tasks such as this was voluntary and so it was up to controllers to either accept them or decline. That is easy to say in theory no doubt, but somewhat harder to do in practice at small units where resources are constrained and some additional tasks simply have to be done to ensure the smooth operation of the unit.

Report No 2 – CC6337 – Flight Deck Rest

Report text: I [Cabin Crew] called the flight deck to make my routine check via interphone, there was no answer, this is concerning. One FO was in flight crew rest, leaving an FO and Captain in the flight deck. I proceeded to enter the usual code into the flight deck door keypad, initially there was no answer, after a good 10 seconds I was allowed entry and asked to be quiet as the FO was in-seat napping. The flight crew had not made the crew aware that both FO's we're napping at the same time.

Company Comment: For Flight Crew Controlled Rest, as detailed in the OM-B, the SCCM, or nominated deputy, should be briefed that Flight Crew controlled rest is planned. The brief should agree the timing of a routine 30min check on the Pilot Flying. The watch-keeping pilot should notify the cabin crew when controlled rest is complete. By the look of this report, the procedure was not correctly followed. [Airline] do not discourage controlled rest when the flight is operated by 3 pilots. Flight Crew controlled rest may be necessary for example if a pilot fails to achieve good rest in the bunk (i.e. turbulence).

CHIRP Comment:
Cabin Crew Advisory Board (CCAB): The pilot in command should have informed the senior cabin crew member of the intention of the flight crew member to take controlled rest, frequent contact should be established between the non-resting flight crew member and the cabin crew.

Air Transport Advisory Board (ATAB): CHIRP has received a number of reports in the past from cabin crew regarding the procedure and practice of flight crew Controlled Rest, and it's one of those areas where reminders about what the process should be are useful. Controlled Rest is sometimes referred to as 'in-seat-napping' and is used by most UK operators. It is the process where the flight crew can be 'off task', including taking short periods of sleep, whilst temporarily being relieved of operational duties in accordance with company prescribed 'controlled rest' procedures. UK regulations GM1 CAT. OP.MPA.210 'Crew members at stations' describes the overall rules for conducting Controlled Rest, which is limited to 45mins per individual at any one time, with a maximum of 30mins asleep so that they don't enter deep sleep/sleep inertia. Under Controlled Rest, one member of the flight crew should always be awake at all times and, although flight crew can sequentially take controlled rest, there should be 20mins between such periods to ensure that the crew member who has come out of rest is fully alert and briefed before the other one enters rest. Controlled Rest should only be used during periods of reduced cockpit workload i.e. during cruise, and has been proved to increase alertness levels during other critical stages of flight such as the approach and landing. Some of the longer-range aircraft have designated rest areas for the flight crew to use but these should only be used when there are more than two flight crew rostered to operate the flight.

The need for flight crew to inform cabin crew that they are undertaking Controlled Rest is a fundamental requirement both to ensure that such periods are not interrupted by the cabin crew but also for safety reasons so that the cabin crew can ensure that both operating flight crew have not inadvertently fallen asleep. The flight crew must tell the cabin crew how long they will be conducting Controlled Rest for, and the plan for regular contact intervals (e.g. every 30mins) to ensure that communications between the cabin crew and flight crew are maintained. In support of this, there should be procedures stated in the company's OM-B for how controlled rest will be managed. When conducting contact at the prescribed interval, cabin crew should understand that an immediate response may not be possible if the awake flight crew member is busy with other tasks such as communicating with ATC or carrying out critical flight activities that delay them responding.

Report No 3 – FC5246 – Simulator unfit for training

Report text: Today has finally made me submit a report due to the inoperative A/C in the simulator. It could not be controlled and went as low as 13°C which is against health and safety guidelines for working indoors. We resorted to wearing jackets, hats and scarves to complete the training, which is not acceptable. This has been flagged to training management who appear to be ignoring the problem with one even telling me he could lend me his hat if needed (not funny and shows the disdain held for the trainers). This is on top of numerous faults being carried in the simulators which have not been working for months and I can't believe it is considered as acceptable to use them for training let alone testing. We are all very good at adapting in order to complete the task but it just seems we are not being heard and nothing is getting done which will ultimately impact the quality of the training.

Airline Comment: The simulator is operated on behalf of [Airline] by [third-party operator]. They meet all the regulatory requirements for certification and ongoing maintenance of FSTD [Flight Simulation Training Devices] for both UK and EASA certification. It's the responsibility of an instructor to enter defects into the electronic defect reporting system provided for each FSTD. Those defects are investigated and cleared by [third-party operator] within agreed time frames and this process is not only governed by the appropriate regulator, but also the airline. There is also a clear process to ensure

that the device is declared 'AOG' for critical failures. Furthermore - through the equivalent of an MEL process, the airline empowers instructors to declare a device 'AOG', should they believe training cannot be delivered effectively.

Instructors are responsible for ensuring that the learning environment is effective for training or checking taking place on the day. Where a device isn't enabling that - for whatever reason - they are trained and supported to stop. A decision to stop training by an instructor will always be supported by the airline and they are empowered to make such decisions whether in an aircraft, classroom or FSTD. We'll highlight this again during our next recurrent instructor training to ensure everyone feels confident and competent to protect the learning environment for all of our people.

CAA Comment: Simulators are checked once a year and issued with a certificate of compliance; within this, environmental temperature is one of the things that is checked by CAA FOIs. Irrespective, simulators still have to be 'fit for purpose' if something goes wrong between annual inspections, albeit there are permitted limitations provided they are still suitable for the task.

CHIRP Comment: Environmental temperature is something that should not be compromised because it not only has wider health and safety implications but can also lead to cognitive decline as temperatures reduce. Noting the airline's comments about instructor responsibilities and empowerment, CHIRP is heartened that they will re-emphasise these during instructor recurrent training but the issue remains that in the incident described it appears that the third-party simulator operator had not responded to fault reports in the past. Whilst less than desirable, and subject to MEL requirements for specific training activities, we suggest that instructors faced with similar conditions should stop the training detail until MEL requirements are met; that will soon get the attention of both the airline and the third-party operator when the airline subsequently asks questions.

Report No 4 – ENG729 – Part M/145 organisation resources

Report Text: All areas of engineering at [Location] are at breaking point. There is simply not enough staff employed to conduct the work to a satisfactory standard. CAMO has recently reported that unsecured access panel reports are increasing exponentially. It is only a matter of time before another [Registration] incident (or worse) occurs.

So many staff are leaving or have already left! To [Alternative Operator] mainly but there are other places recruiting and paying more. Morale is really low and ADDs are through the roof because there's no spares. Our lineside vending machine has been broken for months. Not enough vans, etc, but we're told by senior management that everything is fine, that the rate of attrition is no more or less than anywhere else. It's worse than I've ever experienced in my time at [Operator]. We're managing to keep going because of overtime but I feel sorry for the [Engineering Section A] staff, they're really struggling, especially the [Aircraft Type] Engineers. The news that [Engineering Section B] are closing and they and the [Terminal A] staff are moving to [Terminal B] just means that more qualified people will be leaving. They're in [Engineering Section A] because that's what they prefer to do, apparently 4 of them immediately said they were leaving. And management won't talk about pay.

CAA Comment: The CAA audit [Operator] regularly in all operational and support areas. Following some feedback from both CHIRP and the MOR system, coupled with our own audits, the CAA is aware that some manpower shortages in certain areas are manifest and this has been raised to the [Operator] management at the highest level. The company is undergoing a recruitment drive with engineering staff entering the organisation at various grades from Mechanic to Licensed Aircraft Engineer. The CAA recently attended a presentation from the production and quality department management about how they are addressing the training and induction of new staff into the organisation. This process has also been presented to the Trade Unions and, as far as we can ascertain, has their support. It is noted that there is a national shortage of qualified and competent aircraft engineering staff, [Operator] is not unique in this issue.

Regarding the issues of tooling and vehicle availability, this has also been raised and discussed with the organisation. The organisation has invested a large amount of time and capital in introducing companywide tooling. This process has now been completed in the base maintenance areas and is scheduled to complete in the operation areas of [Airport] Terminal by second quarter 2023. Again the Management and quality team have engaged with the CAA throughout this process. The availability of vehicles again has been discussed with the new head of operational maintenance and an updated tracking system has been introduced to both track and see the location of vehicles.

On the issue of ADD levels and spares availability, this is discussed between the CAA and the CAMO management team on a weekly basis. The ADD levels are higher than the norm for some particular fleets, and this is indicative of a worldwide spares shortage. The organisation are using various methods to mitigate this problem.

CHIRP Comment: This report is one of several in relation to this operator, some of which are still in progress. A number of these have been passed straight to the CAA to add to their records of safety issues. It should also be appreciated that *CHIRP* has received a number of similar reports in relation to various other operators with exactly the same post-COVID safety concerns.

Although the remit of CHIRP means that we cannot enter into any discussions about remuneration or industrial relations, manning levels; the number of carried-forward defects; and insufficient ground vehicles are of course safety issues and so this report was passed to the CAA with the reporter's consent. We note the CAA's comments about increased oversight of this operator as a result of reporting, and it is vitally important to continue reporting such problems internally so that trends and paterns can not only be identified by the company but also so that the CAA, your employer's customers and their National Aviation Authorities can become aware of issues when and if they request a review of Internal Reports. Resolution of these issues will be a long-term prospect but at least the company and regulator are aware of the issues and hopefully applying suitable mitigations (the operator has reduced its flying as one mitigation). When submiting an Internal Report, it is important to differentiate

between industrial relations, safety and human factors issues. CHIRP is of course ready and able to investigate your Human Factors reports and forward safety concerns to the CAA so that they can either become whistle-blower reports or at least be recorded for trends and statistical purposes.

Report No 5 – FC5280/FC5281/FC5282 – 18hr awake 'rule'

FC5280 Report text: Recent communication from our Chief Pilot was aimed to 'clarify' the 18hr awake guidance we have in our manuals. This has been triggered by multiple pilots using this guidance to report as unable to perform a duty. The tone of this email is very clearly pressure being applied from above on pilots to operate the schedule they have very poorly designed from the outset. The biggest culprits are deep-night duties and our extended 2-sector duties which have the highest cancellation rates.

Standbys are being rostered to start at 1400L where call-outs are being made for pilots to operate deep-night duties. These are typically scheduled to land back to base at 0500L to 0700L. The inference from the company by rostering like this is that the crew member should be adjusting their sleep periods to move towards these late duties in their own time on their own days off. A typical 3 days off would allow the circadian rhythm to only move about 4 hrs, which would still put a deep-night duty at the extreme end of the company's own 18hr limit. A 1400L standby on day 1 after days off is fine but the expectation on the part of the company must be that a crew member can only operate a reasonable duty. A finish by 2am from this example would be reasonable as this could assume something like an 8am natural wake up as circadian rhythms predicate – a 7am finish is unreasonable.

We have hundreds of new pilots in the company who are going to be very easily influenced by someone like the Chief Pilot and will now feel pressure to operate beyond what they should safely do. [Airline] seem to have forgotten their own responsibility to create safe rosters and put far too much onus on individual crew members.

FC5281 Report text: [Airline] have recently picked up several night slots operating from 6-9pm and finishing 6-9am. Whilst if rostered this can be managed, a significant number of them are uncrewed on roster publication leading to Standby call outs. When on Home Standby, it is reasonable to be awake at 9am, regardless of the Standby start time. This subsequently leads to a period awake of roughly 24 hours and when quoting to crewing the 18hrs awake/ reduction in FDP they're extremely reluctant to change anything.

We have recently had an email from our Chief Pilot applying lots of commercial pressure to be asleep until our Standby starts in order to complete these duties. Quite frankly I think it's utterly ridiculous and stems from the company not adequately crewing the operation.

FC5282 Report text: Our Chief Pilot issued an email reminder on the use of the 18hr awake rule when called from Standby. This is mainly related I believe to the overnight flights that [Airline] have been operating since last summer. These have proved difficult for the company to crew as they are effectively trying to operate package holiday flights while the organisation is setup to operate a scheduled service. This has resulted in them often being crewed by staff who have been called out from Standby duties that are not really aligned with the night flights.

The latest email guidance from the company is that the 18hrs should only refer to the sum of the Standby period added to the FDP and that crew should be managing their rest appropriate to the Standby period. This seems to match the CAA guidance but surely it is madness to expect someone who has, for example, a 1415L Standby start embedded in a standard roster of lates (that might involve reporting early afternoon and off duty around midnight) to stay asleep until 1415L in case they get called to do a late duty?

There are already plenty of stories doing the rounds of crews really struggling to operate safely when bringing a plane back into [Airport] in the middle of the morning rush and now we have some added commercial pressure to continue to operate when it's not really sensible. Doesn't look like a good recipe to me!

Company Chief Pilot email: [CAP1265] guidance material recognizes that awake time is difficult to control for an operator and consequently creates an expectation on the design of our procedure. The UK CAA have also confirmed that 18hrs awake time is covered in the guidance material of the regulation and as such there is no 'rule' in the eyes of the regulator but [Airline] needs to have processes in place to ensure they consider this guidance covered within the FTL regulation.

Our OM-A has a number of protections built in to ensure our standby procedures in combination with FDP manages this limitation as described below:

In order to ensure that crew members are not awake for more than 18 hours, [Airline] limits the maximum duration of Home Standby to 8 hours and crew members may request hotel accommodation at home base at the Company's expense after having completed a duty of 14 hours or more.

Nevertheless, it is the responsibility of the crew member to manage their rest and sleep opportunities during pre-duty rest periods and while on standby to enable them to carry out an FDP. If a crew member is called from home standby to undertake an FDP and has reason to believe they may not be sufficiently rested as they will have been awake for 18 hours or more when the duty finishes, the individual needs to consider whether they are fit to operate either part of the duty or the full duty based on whether they are sufficiently rested and fit to fly. In the event that the crew member is insufficiently rested to complete the full advised FDP, the individual should explain this to the Crewing Officer who will consider whether there are other options available. If the crew member operates an FDP shorter than that originally advised, or no alternative FDP is available although the crew member is fit to fly, a paper Commander's Discretion Report should be completed in respect of "Discretion to Reduce a Flight Duty Period". In such circumstances the limitation on individual crew members (see Section 7.2) will not apply. In the event that the crew member states they are insufficiently rested to perform any FDP a Fatigue Report Form should be completed in the normal manner, within 72 hours of the conversation. The FRF will be managed through the current safety system.

[Airline] will monitor duty length resulting from combination of standby and FDP and will identify duties over 16 hours as part of the FRM compliance oversight.

The majority of the 18 hour awake calls from the crew don't come from their standby and FDP combination being 18 hours, it is crew stating they have been up since X and with the off duty of their flight they will have been awake for 18 hours. We are also seeing crews quoting the 18hrs rule when a scheduled duty is delayed but within FDP limits.

There is currently no intention to amend our procedures but we would ask you to ensure you manage your rest and nap opportunities in pre-duty rest periods and while on standby to enable them to carry out an FDP.

CAA Comment: The 18-hour awake guidance is guidance and was never intended as a tool to manage crews on the day of operation. The intent was to avoid operators planning 12+ hrs on standby and not relating the standby period to operational needs using the 18-hour awake as a metric for planning purposes. The fact that operators have shorter standby periods staggered over the day meets the requirements of the 18-hour awake guidance.

CHIRP Comment: The first key issue is whether being 'awake' is counted from the start of Standby or when actually awake. The guidance for 18hr maximum 'awake' calculation for time on standby plus FDP is somewhat vague in this respect and simply comments that the combination of standby and FDP should not lead to more than 18hrs awake time. The company email, says that they limit Home Standby to a maximum of 8hrs so their expectation is that there are at least 10hrs of FDP time available if someone were called at the end of the standby period and they were awake at the beginning of their Standby. It is this awake time that is in contention given that people may well have been awake before their Standby starts depending on their previous roster/life activity. The human body cannot simply be switched on and off and so it is the impact of that pre-standby 'awake' time that needs to be considered but is not factored into regulations.

This issue is akin to acclimatisation in circadian rhythm terms - the start of a standby period ought perhaps to be looked at in terms of effective time zone transitions from the previous duty so that an assessment of human performance can be made; that sounds complicated and involved but there may be ways of thinking of it in these terms to provide a firmer basis for rostering based on what might be expected of the human body. A table might be produced for those transitioning to standby from a previous rostered duty that reduces the 'standby and FDP' awake time allowed depending on the temporal relationship between the previous duty's end and the Standby duty's start.

CHIRP considers that it is not unreasonable for companies to expect crews to condition themselves in terms of rest on days off before duties so that they effectively 'acclimatise' to the duty ahead, but there are limits as to what can be expected in normal day-to-day operations. To be fair to the company, the email does state that: *"In the event that the crew member is insufficiently rested to complete the full advised FDP, the individual should explain this to the Crewing Officer who will consider whether there are other options available."* The bottom-line is that crews need to be sufficiently rested for the potential duty they might be asked to do and this might have to involve sleeping at odd hours during days off so that they are rested sufficiently to do the 18hr 'standby plus FDP' period (albeit the 18hr awake time is purely guidance). If crews are not sufficiently rested when called from Standby then they are correct to report as fatigued and the company email highlights that: *"In the event that the crew member states they are insufficiently rested to perform any FDP a Fatigue Report Form should be completed in the normal manner, within 72 hours of the conversation."*

The corollary question from all of this is, "Are days off really days free from duty if people are expected to condition themselves for subsequent 'work days' given that this might involve serious disruption to their 'day off'?" but that is part and parcel of being a professional pilot to some extent.

Associated regulations:

CS FTL.1.225 Standby

(b) Standby other than airport standby:

...

2) The operator's standby procedures are designed to ensure that the combination of standby and FDP do not lead to more than 18 hours awake time;

GM1 CS FTL.1.225 (b)(2) Standby

AWAKE TIME

Scientific research shows that continuous awake in excess of 18 hours can reduce the alertness and should be avoided.

CAP1265 EASA FTL Q&A

How do you apply CS FTL.1.225 (b)(2)? What is the definition of "awake time"?

CS FTL.1.225 (b)(2)

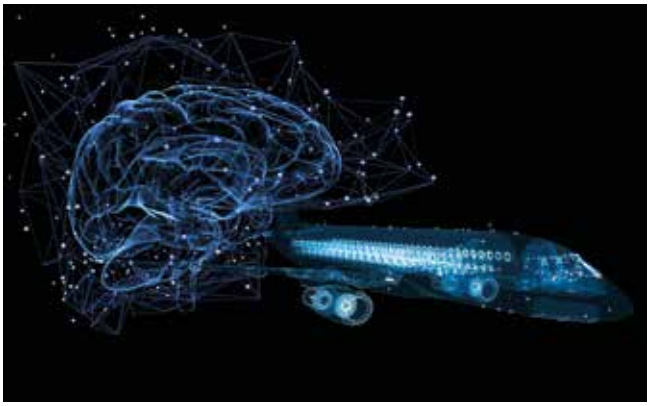
...

EASA have not provided a definition of "awake time". A straight forward mathematical answer is not possible. There is no expectation on the operator to verify how long a crew member has been awake.

However, the operator has to design its standby procedures in a way that the duty in combination with the FDP will manage this limitation. The operator can only manage what it has control of (the standby and FDP). The operator's procedures need to demonstrate how the awake time is managed. It is reasonable for the operator to expect a crew member to manage rest and nap opportunities in pre- duty rest periods and while on standby to enable them to carry out an FDP. The expectation is on the design of the procedure.

Seven Deadly Shortcuts
Cognitive Biases and Aviation

by Robert Wilson



The habits and tricks your brain uses to get you through everyday life become a problem when they run riot in the cockpit.

We do no end of feeling and we mistake it for thinking.
- Mark Twain

The Nobel Memorial Prize for economics had an unusual winner in 2002. Daniel Kahneman became the first psychologist to win the world-renowned award, with a version of an idea he had first developed 30 years earlier with Amos Tversky – cognitive bias.

If his life's work can be summed up in a proverb, it would be that we are not as smart as we like to think we are. As well as changing economic thought, Kahneman and Tversky's insights have unsettling ramifications for aviation safety.

In 2 minds

A widely quoted but unsourced statistic says the average person makes 35,000 decisions a day. Whether you agree or disagree with this extraordinary number – which works out to a decision about every 2 seconds – is not the point. Each of us makes a huge number of decisions every day, starting when we get out of bed.

Most of these decisions are automatic. The unconscious mind has been known of and accepted since the time of Sigmund Freud in nineteenth century Vienna. Kahneman and Tversky's contribution was to show, by experiment, how the unconscious mind could influence conscious decision-making in ways that were irrational – and potentially dangerous if they happen in a cockpit.

Kahneman proposes our brain has 2 operating systems, which he calls System 1 and System 2.

System 1 is the fast-thinking mind:

- unconscious, automatic, effortless
- no self-awareness or control
- assesses the situation, delivers updates
- does 98% of thought.

System 2 is the slow but thorough part of our thinking:

- is deliberate and conscious, effortful, controlled and rational
- has self-awareness/control, logical and scepticism
- seeks new/missing information, makes decisions
- does 2% of thought.

The automatic System 1 lightens the load on the deliberate System 2, in 2 ways:

- takes care of our more familiar tasks by turning them into automatic routines, also known as habits
- rapidly and unconsciously sifts through information and ideas by prioritising whatever seems relevant and filtering out the rest by taking shortcuts, called heuristics.

Your first few flights as a pilot use System 2 as you struggle with the effects of controls, radio procedures, engine management and your instructor's helpful suggestions. Remember how exhausted you used to be after an hour of circuits? But, as you learn, the task of flying becomes transferred to System 1 – and gets easier. The problem for safety is that System 1's network of decision- making shortcuts can 'leak' into our System 2 thinking. These leaks are biases.

The number and scope of all our cognitive biases is a matter of discovery and debate, but there are at least 7 that are potentially troublesome for aeronautical decision-making:

1. confirmation bias
2. continuation/sunk cost bias
3. outcome bias
4. anchoring bias
5. expectation bias
6. framing bias
7. ambiguity effect.

1. Confirmation bias

Just as I've always thought.

Confirmation bias is the tendency for a person to seek out information that is consistent with an individual's existing beliefs or expectations when confronted with unusual situational factors. In the setting

of VFR flight into IMC, confirmation bias might result in a pilot subconsciously searching for environmental cues that the weather conditions are slightly above the minimum required, steady or improving, when the opposite is true.

2. Continuation/sunk cost bias

Stepped in so far, that, should I wade no more / Returning were as tedious as go o'er
- Macbeth, William Shakespeare

Continuation/sunk cost bias is the tendency to continue a decision, endeavour or effort to preserve an investment of money, effort or time. As the goal – such as arrival at the destination – becomes closer, people may tend to change their decision-making. The mid-point of a flight can be a significant psychological turning point for pilots when faced with adverse weather decisions, regardless of the distance flown. An analysis of 77 general aviation cross-country accidents in New Zealand between 1988 and 2000 found weather-related accidents occurred further away from the departure aerodrome and closer to the destination than other types of accidents.

3. Outcome bias

No harm no foul.
- Chick Herne

Outcome bias is the tendency to judge a decision based on its outcome rather than on an assessment of the quality of the decision at the time it was made. Outcome bias can arise when a decision is based on the outcome of previous events, without taking into account how the past events developed. Outcome bias can contribute to the organisational phenomenon of normalisation of deviance, where obvious hazards are ignored or downplayed because they have not so far contributed to an accident.

4. Anchoring bias

I can see clearly now the rain is gone.
- Johnny Nash

Anchoring bias is the tendency for a person to rely substantially on the first piece of information (the anchor) that is received and make estimates or judgements based on the anchor. This first piece of information becomes an arbitrary benchmark for all other information. A pilot may perceive a ceiling of 500 feet as good after many days of 200-foot ceilings, or bad after many days of CAVOK. A more relevant reference point for decision-making would be fixed minimums, whether personal, operator or regulatory.

5. Expectation Bias

Believing is seeing.
- Karl Weick

For the second time that afternoon, the first officer ran the pre-take-off checklist. The first departure had been abandoned after an anomalous reading in an engine temperature probe. Now, with the problem fixed, they were going again, not a minute too soon. But 3 seconds after take-off, the MD-82 began rolling and yawing. Spanair flight 5022 crashed near the boundary of Madrid Airport on 20 August 2008, killing 154 people.

Expectation bias occurs when a pilot hears or sees something they expect to hear or see, rather than what actually may be occurring. This bias likely played a role when the MD-82 first officer called out a flap setting of 11 degrees while conducting both the take-off briefing and the final check before take-off.

'There is a natural tendency for the brain to "see" what it is used to seeing (look without seeing),' the final accident report said. 'In this case, the first officer, accustomed to doing the final checks almost automatically, was highly vulnerable to this type of error. … The captain, for his part, should have been monitoring to ensure that the answers being read aloud by the first officer corresponded to the actual state of the controls.'

6. Framing Bias

Good advice is one thing, but smart gambling is quite another.
- Hunter S. Thompson

Framing bias is the tendency for a person to respond differently to the same information and choices, depending on how the information is presented to, or received (framed) by, the decision-maker. A decision can be framed as a gain or loss. Kahneman and Tversky showed when a decision is framed positively, as a gain, a person is likely to be more risk adverse. When the same decision is framed as a loss, people tend to exhibit more risk-seeking behaviours. They called this prospect theory.

In the setting of VFR flight into IMC, the framing effect plays a role when pilots are considering whether to divert or continue, when faced with adverse weather. If a pilot perceives a diversion as a gain (safety is assured), they are more likely to adopt a risk-averse decision and divert.

7. Ambiguity effect

Better the devil you know.
- Kylie Minogue

The ambiguity effect is a cognitive bias that describes how we tend to avoid options that we consider to be ambiguous or to be missing information. We dislike uncertainty and are, therefore, more inclined to select an option for which the probability of achieving a certain favourable outcome is known.

An example of the ambiguity effect is when a pilot decides to fly an approach in questionable weather, rather than diverting to an alternate airport which may have better weather but may have other unknown issues.

Battling your biases

CASA Sport and Recreation Aviation Branch Manager Tony Stanton, who wrote a PhD on the hazards of biases in general aviation, says the first safety step is to understand biases are real. 'They are natural responses to the environment and the volume of information we receive,' he says.

Biases also apply on an organisational level and Stanton is inspired by the success of a select group of high-reliability organisations. Individually, we can steal some of these concepts and steel ourselves with them, he says.

Stanton nominates 3 of Kathleen Sutcliffe and Karl Weick's high-reliability principles as particularly apt:

- Preoccupation with failure rather than success. 'Think, "everything is going well, so what do I need to examine,"' he says.
- Reluctance to simplify. 'Realise not everything is a simple as it seems, and you bring your own perspective to what you are looking at or thinking about.'
- Deference to expertise. 'Ask someone else whose biases are different.'

A trekkie solution

As a doctor, CASA Deputy Principal Medical Officer Tony Hochberg sees cognitive biases as a result of the interplay between the brain's subsystems: the prefrontal cortex which is the seat of rational thought, and the limbic system of hippocampus and amygdala which are the centres of emotion and sensation/reward.

Like Stanton, Hochberg has no doubt biases are real, and deep seated. Controlling their influence over your thinking is analogous to the struggle of instrument flight, where pilots are taught to believe their instruments instead of their vestibular systems.

Adherence to checklists, written personal minimums and standard operating procedures are the best tools for keeping biases at bay, Hochberg says.

He agrees with the usefulness of seeking a second opinion and cross-checking. And he has a novel mental shortcut to help identify and counter biased thinking. As an easily recalled example, he invokes the extraterrestrial, emotionless and implacably logical intelligence of Star Trek's Mr. Spock, who was never afraid to contradict the mercurial Captain Kirk.

In aviation, it's sometimes good to be like Spock. Ask yourself, "What would Spock do?"

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Forecast: A Bumpier Ride

A new study predicts a continuing increase in CAT on some of the world's busiest routes

by Linda Werfelman

Clear air turbulence (CAT) has increased significantly in recent decades at key locations around the globe, and climate change is expected to intensify that trend, according to a study by U.K. meteorological researchers.

The researchers — from the University of Reading and the U.K. Meteorological Office — analyzed CAT trends from 1979 through 2020 and found "clear evidence of large increases around the midlatitudes at aircraft cruising altitudes," according to their report, published in the June 16 issue of *Geophysical Research Letters.*

Of the five categories of CAT, ranging from "light or greater" to "severe or greater," the greatest increase was recorded in the "severe or greater" category, in which turbulence was 55 percent more frequent in 2020 than it had been in 1979, the report said. The 55 percent increase meant severe turbulence per year increased from 17.7 hours in 1979 to 27.4 hours in 2020. In the same time frame, moderate turbulence increased 37 percent from 70.0 hours to 96.1 hours per year, and light turbulence increased 17 percent from 466.5 hours to 546.8 hours per year.

The report said that the aviation industry's understanding of past CAT trends has been limited because information was derived from outdated reanalysis data. (Reanalysis involves synthesizing data from a variety of sources, including past weather observations, past short-range forecasts and modern forecasting models.) The new information was the result of an analysis based on modern reanalysis procedures.

Largest Increases Over U.S., North Atlantic

The largest increases in CAT over the period studied were recorded over the United States and the North Atlantic, both characterized as busy flight regions. Absolute increases in "moderate or greater" CAT were 0.22 percent (amounting to 19 hours per year) over the continental United States and 0.3 percent (22 hours per year) over the North Atlantic — amounts that, in both cases, were considered significant, the report said.

"Absolute changes are important in regard to aircraft damage, as every additional minute spent traversing turbulence causes fatigue and increases wear-and-tear on the airframe and increases maintenance costs and the potential for injuries, irrespective of whether the increase is on top of a low or high base rate," the report said.

Relative increases in CAT in 2020 compared with 1979 were 29 percent over the United States and 37 percent over the North Atlantic, the report said.

"These relative changes are useful for diagnosing which regions are expected to become significantly more turbulent," the report said.

As another example, the report cited the area over the northern coast of Brazil, which recorded a 100 percent increase in moderate CAT. The size of the increase "informs us that even though the baseline occurrence is relatively low compared to other regions, the frequency has now doubled compared to the start of the period," the report said.

Although the greatest increases in moderate turbulence were found over the United States and North Atlantic, other significant increases were found overbusy flight routes in Europe, the Middle East and the South Atlantic, the report said.

'Hot Spots'

Areas over western ocean basins are considered "hot spots" for CAT, the report said, noting that because of the low surface roughness over ocean waters, the jet stream is faster there than over land. Another contributing factor is the difference in temperature between ocean waters and nearby land, especially during winter, when the contrast in temperatures contributes to vertical wind shear, which, in turn, contributes to CAT.

A statement issued by the University of Reading, which employs three of the report's authors, said the study provides evidence validating the long-suspected link between climate change and CAT.

"[W]e now have evidence suggesting that the increase has already begun," Paul Williams, an atmospheric scientist at the university and one of the report's authors, said. "We should be investing in improved turbulence forecasting and detection systems to prevent the rougher air from translating into bumpier flights in the coming decades."

Coauthor Mark Prosser, a researcher, added that airlines should consider how they will manage increased turbulence and its costs, which are estimated at between $150 million and $500 million annually in the United States alone.

The report noted that forecasts based on climate models over the past decade may have underestimated the likely increases in CAT; forecasts based on modern reanalysis data indicate CAT increases will be more significant.

Note

1. *Prosser, Mark C.; Williams, Paul D.; Marlton, Graeme J.; Harrison, R. Giles. "Evidence for Large Increases in Clear-Air Turbulence Over the Past Four Decades." Geophysical Research Letters, Volume 50 (June 16, 2023).*

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