AVIATION SAFETY REPORTING
Getting *Snapshot* to maximum velocity

SITUATIONAL AWARENESS
The importance of a thorough lookout

AVIATION ACCIDENT
To go round or continue?

01 2021 EDITION

Spotlight

I DID NOT BRACE FOR IMPACT

AS IT DID NOT APPEAR TO BE SURVIVABLE

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FOREWORD

WELCOME TO THE first Spotlight for 2021. If you're anything like me, you will have seen the cover of this publication and felt compelled to read on. The story shared by LCDR Paul 'Mo' Morrison is a great read and contains numerous important lessons. Of all things to remember is that when things go wrong in aviation, they tend to go wrong very quickly. So if you were thinking you'd have time to tighten your straps or review your ditching procedure on the way down, then you're doing it wrong. You can expand this concept into all the ways that we manage emergency-response planning and the Defence Aviation Safety Manual provides good guidance in this respect (Edition 3 was released in March 2021). Thank you Mo for sharing your experiences with all of us.

Impressive too are the variety of articles in this edition – many of which are contributions from DFSB Aviation Safety Officer course participants who, as part of their training, are required to submit a short written piece on their own experiences within Defence Aviation. I have often made the comment that we are fortunate to have such a vast depth of experience out there in the Defence Aviation Community; and to see it captured here in Spotlight is gratifying.

Finally, I was really drawn to the story on page 24 regarding a short-lived flight in a RAAF Dakota in 1958. My thanks to AIRCDRE Mark Lax (Rtd) who continues to be a prolific contributor to our publications. These historical views of tragic events provide me with some validation that our system has improved over the years.

Thank you to all of the contributors to this edition of Spotlight. I trust that all of our readership will find something within these pages that enhances their approach to safety.

Regards,

GPCAPT Dennis Tan
Director DFSB

ROYAL AERONAUTICAL SOCIETY
AUSTRALIAN DIVISION

Dr Rob Lee Defence Flight Safety Award

This award recognises individual or collective efforts that have enhanced Defence flight safety. Nominations for the RAeS Flight Safety Award are open to all members of Defence aviation, including foreign exchange and loan personnel, Defence civilians and contractors.

The award covers a broad range of flight-safety initiatives, from a single act that prevented or could conceivably have prevented an aircraft accident or incident to implementation of long-term aviation safety initiatives and programs.

For details on the nomination process for the 2021 award please visit the DFSB Intranet site.

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Upside-down strapped into my seat

By LCDR Paul Morrison

I WAS INVOLVED IN an incident earlier in my career that in hindsight contains a number of factors relating to Aviation Non-Technical Skills (NTS). By writing this article, based on my personal experience, I hope readers with some previous exposure to NTS training, might identify some key areas to address in their own workplace.

Before transferring to the RAN I was a Royal Navy, Merlin helicopter Aviation Warfare Officer (AvWO). In late 2001, my unit 700M Squadron based in Cornwall UK, was preparing for a detachment to Scotland in order to conduct active dipping Sonar trials.

Everyone was busy conducting the usual pre-requisite preparations and mine included getting in date for the Helicopter Underwater Escape Trainer (HUET). This is an essential and demanding training evolution designed to prepare crews in the event of an uncontrolled ditching, which would likely require underwater and inverted egress.

We were the Trials Unit for the newly introduced Merlin Helicopter and after years of Seaking operations, by comparison, I felt comfortable with the amount of redundancy and safety features that had been incorporated into our new platform.

Our aircraft employed a relatively new automatic rotor brake system that released and applied at the appropriate stage of helicopter start up and shut down. In the days before our departure there had been an embodiment of a modification to the software that required the brake to be permanently isolated in the OFF position. This required a slight variation from the checklist procedure on aircraft start-up, which included the crew cancelling the illuminated 'Rotor Brake' caption prior to flight.

I was a warfare instructor and given that the nature of the forthcoming trial was an assessment of the dipping Sonar, factors effecting the airframe registered low down on my priority list. I have since learned the importance of paying close attention to such matters.

For the trial, my crew station was in the front left seat alongside the pilot. At the pre-brief we designated our individual roles and responsibilities which included actions in the unlikely event of an emergency.

The Navy Merlin simulator had not yet been delivered to the UK from Canada, therefore our pilots had been sent to conduct emergency-procedure training in the Air Force Merlin simulator at RAF Benson. I had not previously been exposed to any Merlin malfunctions or emergencies, simulated or otherwise; however, this was about to change.

As part of our training, the AvWOs and aircrewmen utilised PC-based emulators, supported by the aircraft itself (often on ground power). There was a degree of transfer of technical and tactical skills from previous aircraft types; however; our emergency handling was at a rudimentary level. It was reassuring that my pilot was one of the most experienced in the Fleet Air Arm and would no doubt be able to deal with any adverse situation.

We were operating from a fairly remote and unfamiliar location and as a result, routines varied slightly from normal. The processes employed on a daily basis including plan, brief, execute and de-brief (PBED) were modified due to our new environment. This meant that the normal repetition of routine was somewhat out of sync, as highlighted when we failed to sign the authorisation sheets before walking out to the aircraft.

On departure and prior to coasting out over the sea, the automatic Flotation Gear was armed and we transited to the first geographical position from where we would winch out the Sonar. After about five minutes in a 100 ft hover, a slight airframe vibration developed and then ceased. Nothing too unusual; however, it subsequently reoccurred and ceased on two more occasions, this time with a slight noise associated with it.

There were no other indications of anything amiss, although we did discuss the option of heading back to the airfield. I then detected a distinct smell of smoke and alerted the crew. This is the point where a decision based on the limited information we had determined the severity of the outcome. We had three options: stay in the hover to see what develops; cut the sonar winch and expedite the departure, or take an extra few minutes to winch the sonar back into the aircraft and then head for land. We took the last option, with an initial plan to head to the nearby range building where there was an adjacent landing pad.

The Merlin helicopter has three engines, and given enough forward air-speed speed, can fly quite comfortably on two. It was therefore intended to reach safe twin-engine speed in case we had an engine failure and then to continue low and slow to mitigate for the possibility of a gearbox issue.

During the transition from the hover and at about 150 ft and 90 kts, the Number 2 Engine (No. 2 Engine) Turbine Inlet Temperature Gauge flicked in and out of the red band and then back in, remaining solid. This meant we needed to shut down that engine and therefore carefully followed the process 'Locate – Mark – Select' to ensure we didn't inadvertently switch off a good engine. There was almost a sense of relief that there was now an identifiable malfunction to be dealt with and I was in the process of establishing the appropriate checklist section for follow-up actions when a split second later, No. 2 Engine also displayed on the warning panel and the associated very loud alarm was activated.

Standby instruments show 100 kts/65 degrees nose down and 30 degrees right wing low.

Almost immediately, the aircrewman, positioned behind us, reported that there was a massive fireball in the back and that white projectiles were visible through his window emanating from the aircraft. The fire extinguisher was then discharged into No. 2 Engine, to no effect. The 'Caution' and 'Central Warning' panels were lighting up progressively with about 70 per cent of them now illuminated, including a number of 'Hydraulics' warnings.

The associated loud aural alerts that could not be cancelled or turned down, made crew communication almost impossible. I recall staring at the emergency checklist hoping to determine what was happening, but to no avail. The minimal training I had for this developing scenario meant that I was now experiencing information overload.

What we didn't know, was that the maintenance procedure on the rotor brake, which should have isolated the automatic system to the off position, had been incorrectly executed before we departed for Scotland. Eventually, the rotor brake came on in flight during our first hover when we lowered the Sonar into the water. There was no resultant indication that the rotor brake had been applied nor any decay in rotor speed; however, friction then started to rapidly increase the temperature around the brake disc area.

The brake disc subsequently glowed white hot and then disintegrated, some of it dissipated as witnessed by the aircrewman and some of it pierced the hydraulic systems operating at 3000 psi. Perfect conditions were now established to produce a flamethrower, as corroborated by the crew of a fishing vessel we overflew. They reported a trail of flames behind us reminiscent of the Concorde disaster a year before. I had no recollection of seeing a fishing boat. It's likely I was experiencing a loss of situational awareness of external stimuli.

We had tried to put the fire out in No. 2 Engine, but as it transpired, the engine was purely drawing in the heat and flame from the hydraulic fire and wasn't in a bad state after all. Still, we had two more engines but it was obvious that we needed to ditch into the sea – anything overland would have been pretty catastrophic.

In preparation for the inevitable ditching, and being able to recall the recent lessons from my HUET training, I located my emergency escape exit jettison handle and decided to pull it in order to prepare for the first stage of release. HUET generally teaches the removal of exits once submerged and dry drills conducted in the hangar always required a firm push of the exit window to ensure its removal.

Due to our airspeed the handle was ripped out of my hand with the large escape window attached. It then flew rearwards on the same side as the tail rotor and was never seen again. It is still a little strange to recall that immediately I thought, "I hope we are ditching, I've just jettisoned a window in flight". I had made a decision and was already questioning it for fear of having made the wrong one.

As it stood, my perception of information, comprehension of events and prediction of outcome (we are going to crash) was correct. However the lack of emergency and malfunction training for the scenario up to this stage made it a challenging and demanding pre-cursor to the next phase.

In order to execute a safe, positive water landing in a controlled manner normally requires adequate control of the aircraft to turn into wind, a controlled rate of descent, a ditching brief to the crew, a Mayday call and if fitted, activation of the flotation gear. A benign sea state is a bonus.

In our favour, the sea was calm. However, the hydraulic-fuelled flamethrower had, by this stage, burned through the tail rotor drive shaft resulting in total loss of tail-rotor functionality. To exacerbate the problem, the part of the severed driveshaft still rotating managed to impact and destroy some of the burnt main rotor blade pitch control rods. Effectively we had no control whatsoever of the helicopter and we were still on fire.

As a consequence, we eventually departed controlled flight in a right-hand spiral, right wing low and nose down. The sea below was now filling up the view of my windscreen and I took one last look to my right to see the pilot furiously trying to get the cyclic and collective to provide some sort of response to the dive we were in. It sounds a bit strange but I did not brace for impact, as it did not appear to be survivable given the rate and aspect we were closing in on the water.

In 1982 during the Falklands conflict, my ship was struck by an Argentinean Exocet missile and it felt surreal when I got to shout "Abandon Ship – pass it on". This was the aviation equivalent to put a Mayday call out, which on the recorded tape sounded like a muffled MA ... The second part was cut off by the violent impact with the sea and within seconds the aircraft had flooded and inverted. The recovery of data later revealed we had impacted at 100 kts and 60 degrees nose down.

Due to the design and construction of the airframe and the effectiveness of the crash-resistant seats we all managed to remain conscious post impact – a fundamental prerequisite of surviving a ditching.

We were submerged and inverted. The automatic inflation of the flotation gear should now be taking place – theoretically. However, an issue with the wiring procedure during installation meant they remained inactive and of no use in keeping the airframe from sinking. All of the crewmembers experienced

Almost immediately, the aircrewman, positioned behind us reported that there was a massive fireball in the back and that white projectiles were visible through his window emanating from the aircraft. The fire extinguisher was then discharged into No. 2 Engine, to no effect.

ZH844 post aircraft recovery.

The crew as a whole at that stage had shared a degraded mental model of the situation although the extreme circumstances perhaps provided some mitigation.

varying degrees of difficulty in conducting their egress. The three rearward-facing occupants, having very little information displayed or relayed to them had no idea when impact was going to occur.

Should I have told them to get their emergency exits prepared/out and called "brace-brace"? With the noise of the alarms and warnings they may not have heard it, nonetheless I had no capacity to think beyond what was occurring in the cockpit. The crew as a whole at that stage had shared a degraded mental model of the situation although the extreme circumstances perhaps provided some mitigation.

Very few people enjoy HUET training, particularly as every 'run' gets progressively harder and the will to swim back into the unit after each 'ditching' soon diminishes. Though I was now in a situation I had encountered numerous times and had trained for recently.

Water had flooded the cockpit as the aircraft rolled over and I was now upside-down strapped into my seat. The alarms/alerts, lights and noise that seconds earlier had so overwhelmed my senses had now thankfully ceased. Although I was still in a pretty precarious situation, due to the repetitive drills and continuation training, it felt a much more familiar environment and I was confident of my next actions. I was able to apply the drills in the correct order as practiced, exit the aircraft and swim for the surface without too much difficulty.

On breaking the surface I was confronted by large amounts of debris and a distinct smell of aviation fuel which was spreading across the crash site. At no point can I recall the water being cold despite the location and time of year; in hindsight the stress-induced adrenaline must have played a part. I did a quick check for personal injury and my training kicked in once more – post-crash survival drills.

The back-seat crew had made it onto the upturned aircraft via various egress methods, one of them having to remove his helmet underwater in order to escape via a split in the airframe.

I proceeded to inflate and then board my life raft, which was a little difficult as my arm had sustained an impact injury (having failed to brace) and by now I was soaked in aviation fuel. I then tied my life raft to that of the pilot, who was experiencing a few difficulties of his own due to injuries, and we continued with the remainder of the post-ditching drills.

We had protection – next was location. My Locater Beacon was already activated so I pulled out my Smoke/Flame and Mini Flares. Wait! Surely it would be stupid after all of this to then introduce pyrotechnics to an environment laden with aviation fuel? I had a few words with myself and shoved them back into the life raft. I had never considered this factor of a crash scenario before, so perhaps it was a good lesson in situational awareness – taking the time to reflect before executing the next course of action.

We were rescued within an hour of being in the water. The fishing vessel we had overflown earlier came to our aid and transferred us to a range support vessel. The final part of the rescue was conducted by an RAF Seaking. After being winched into the back of the aircraft I made a mental note of where the exits were located, just in case!

After a short stay at the Isle of Skye hospital, I was soon back to work, initially in the HUET doing more drills to confirm lessons identified and then on to the RAF Benson simulator to conduct numerous re-runs of the crash profile to assist in the investigation and board of inquiry. In hindsight, this was slightly uncomfortable as each run concluded just prior to impact but was an important part of the fact-finding process.

It was also rather unnerving to be told that upon recovering the aircraft, molten metal had been found on the back of my seat and that all indications were that it had been seconds from destruction prior to ditching. I had been pretty focused on my personal experience, but what I really failed to appreciate was the effect the accident had on the maintenance team who had serviced and prepared the aircraft for flight – and this was probably my biggest regret.

As a crew we were confident we had done nothing wrong (although a civilian aviation magazine said it was probably crew error, as flying with a rotor brake applied was akin to driving with your handbrake on). However, the ground crew were left with considerable concern that they may have been in some way responsible.

I learned a lot about communication from that and it was a salutary lesson in recognising the importance of briefing and including the whole team through the highs and lows of flying operations.

Shortly after the event, a friend and colleague contacted me from Australia and congratulated me on the fact that I had just qualified to join him as a member the Goldfish Club. This club was formed in 1942 for aviators who had survived ditching into the sea. It is described as the club no one wants to join and with the most difficult joining routine.

Membership is dwindling, as many of those who were either brought down by enemy action or flew during the period when the culture was somewhat different to today, are no longer with us. The positive; however, is that it's becoming increasingly difficult to recruit new members, (ditched UAV's in Jervis Bay don't qualify) which is a testament to the enormous advances we have made in ensuring that flight safety remains at the forefront of our organisation.

It is reassuring that aircraft ditching is no longer as commonplace as it once was but there have been some close calls. Preventative and recovery risk controls have played a large part and we must strive continuously to ensure that our success in learning from lessons of the past does not lead to complacency in the years to come.

Review, reflect and reassess

By FLTLT Abhishek Onawale

AVIATION SAFETY ENCOMPASSES a broad range of activities that are either indirectly or directly related to supporting aircraft operations. It is the framework that ensures a foundation for the successful and sustained delivery of capability through protection of personnel, both on the ground and in the air.

Data from 1980 to 2020 demonstrates a significant reduction in both the number of aviation accidents resulting in lost airframes, and more importantly the number of lives lost[1]. In my opinion, This is largely attributed to the implementation and ongoing management of a safety culture that aims to eliminate the acceptance of military operations being inherently risky and instead present Aviation Safety as an organisational imperative where there is a practical means to do so.

Aviation Safety Reports are generated on incidents and provide an opportunity to review, reflect and reassess how we manage our operational and safety objectives.

One such incident saw a cable on an aircraft had been left disconnected following the completion of unscheduled maintenance activity and discovered after several flights.

On 26 February 2020, during Exercise Cope North, maintenance personnel carrying out a before-flight servicing on the aircraft discovered a disconnected cable to the Video Relay Panel assembly in the upper equipment bay. The last recorded maintenance activity in this work area was conducted on Friday, 14 February 2020, where wiring-integrity checks were performed as part of a subset of tasks to address Nil Heads Up Display (HUD) Recordings being produced.

As the Reviewer of the ASR raised, the following determinations were made when piecing together the scenario at hand:

- The member who had disconnected the plug during unscheduled maintenance had unintentionally deviated from the common practice of raising a unserviceability (U/S) for each disconnection performed. This would have reminded the member to re-terminate the plug before signing off completion of the test activity.

  Human factors play an evident role in this occurrence. The member was on B-Shift where personnel averaged 10-to-12 hours of work in the days leading up to the incident. A brief lapse in the member's awareness of the state of the task due to fatigue is identified as a likely cause.

- The U/S of Nil HUD Recordings had been in effect from 17 February, with component changes for the HUD and HUD Camera being the primary focus to resolve the issue. The disconnected plug is not located near other main areas of focus – limiting the opportunities to identify the missed cable once it had been tested and further troubleshooting was carried out on other sections.

  There is little that could be done here, apart from a functional test of the recording capability of the HUD after wiring termination checks had been carried out. However, noting the serviceability of the cable, there would not have been any changes made from a maintenance point of view and such a verification test would not be necessary.

- The U/S of Nil HUD Recordings had been deferred between 17 February and 13 March 2020 for mission/capability purposes over Exercise Cope North.

  The wiring checks were carried out on a Friday and the U/S was deferred to the following Monday. The aircraft was flown with the limitation that HUD recordings would not be provided and therefore no attention was brought to the disconnected cable, effectively masking it.

In summary, a combination of factors – Human Error/Fatigue and the Deferred Defect process – led to this occurrence. The workflow structure of the ASR system is useful to substantiate this determination. Clearly defined steps and instructional material, available on the Defence Flight Safety Bureau (DFSB) intranet[2], provides the basic prompts and guides for considerations required by the Reviewer and Investigator during the analysis of an ASR.

Continual refinement of processes to ensure a more robust safety culture is one of the intents of ASR investigations; however, not all cases will result in changes in the workplace or training of personnel.

With regards to this particular event, the outcome was an informal briefing to members involved in the practice of raising a U/S against disconnections to help prevent similar events in the future. Given the risk imposed to aviation safety and the factors at play, it was considered compliant with recommended actions in the Safety Behaviour Management Tool[3].

This ASR was the first for which I was the Aviation Reviewer and it was a valuable learning opportunity. It not only exposed me to the ASR process, but also the factors to be mindful of when attempting to piece together an analysis of the event. In hindsight I may have carried out the role of the Investigator; however, given that I had the time to gather the data, it justified my action of bypassing straight to the Approving Authority.

Aviation Safety is essential to the support and operation of Air Force capabilities; and the ASR system supports the concept of shared responsibility among personnel to continually improve safety culture within the organisation.

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2. http://drnet/raaf/AirForce/DDAAFS/Pages/Analysis-Help.aspx
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The importance of a thorough lookout

By FLTLT Mark Anderson

THERE I WAS, waiting at the holding point for RWY 12R at BFTS Tamworth ready to depart for my second ever solo flight. The sun was shining, the temperature was pleasant and the wind was light. The circuit only had two other aircraft at the time, with ATC available as an additional tool to assist with my situational awareness. Yes, it was a great day to be flying for a novice pilot.

Upon issue of line up clearance from ATC, I conducted a more-cautious-than-normal lookout on base and final and then taxied in to position. After advising the tower I was 'ready', I was issued my departure instructions of 'Charlie712, traffic, CT4 upwind, number three in the circuit, Runway 12 right, cleared for take-off'.

After tallying a CT4 upwind and in the process of commencing their crosswind turn I read back my clearance, released the brakes and applied power. As I was solo, the take-off roll in a CT4 is much shorter when you don't have an instructor sitting next to you, so I was airborne and climbing in no time.

Once I had raised the flaps and stabilised in the climb I confirmed the position of the preceding CT4 ready for my rapidly approaching crosswind turn point. Tally, great I thought, I could add that aircraft in to my subsequent ALAP. As it was my second solo, I thought I would increase the spacing between myself and the preceding aircraft so decided I would wait until the traffic was well past abeam on their downwind leg prior to commencing my own crosswind turn.

When I was happy with their position I 'cleared left, front, above and right' and then rolled in to my crosswind leg. Just as I was preparing to level off at circuit height ATC called up on the radio 'Charlie712, change of sequence, number two behind CT4 downwind'. Before I had any time to compute what had just happened I received another transmission from the Duty Instructor (DI) 'Charlie712, make this circuit a full stop'.

My first thoughts were what happened? Why did ATC advise of a sequence change followed by the DI direction of a full stop? I was following the CT4 I spotted upwind and commencing their crosswind turn during my take off clearance. The following request to ATC of a CT4 to conduct a low-level, early downwind orbit for spacing from the CT4 almost directly above them answered all of my questions.

It turns out that there were two CT4s upwind, with the 'middle' CT4 conducting a low-level circuit. They were extending their upwind leg to ensure they had their preferred spacing to the aircraft I was following. The slightly higher nose attitude and higher climb rate of a single pilot CT4 made it more difficult to be able to spot the low-level CT4 once the aircraft was cleaned up, the perceived preceding traffic spotted and my upwind work cycle had commenced.

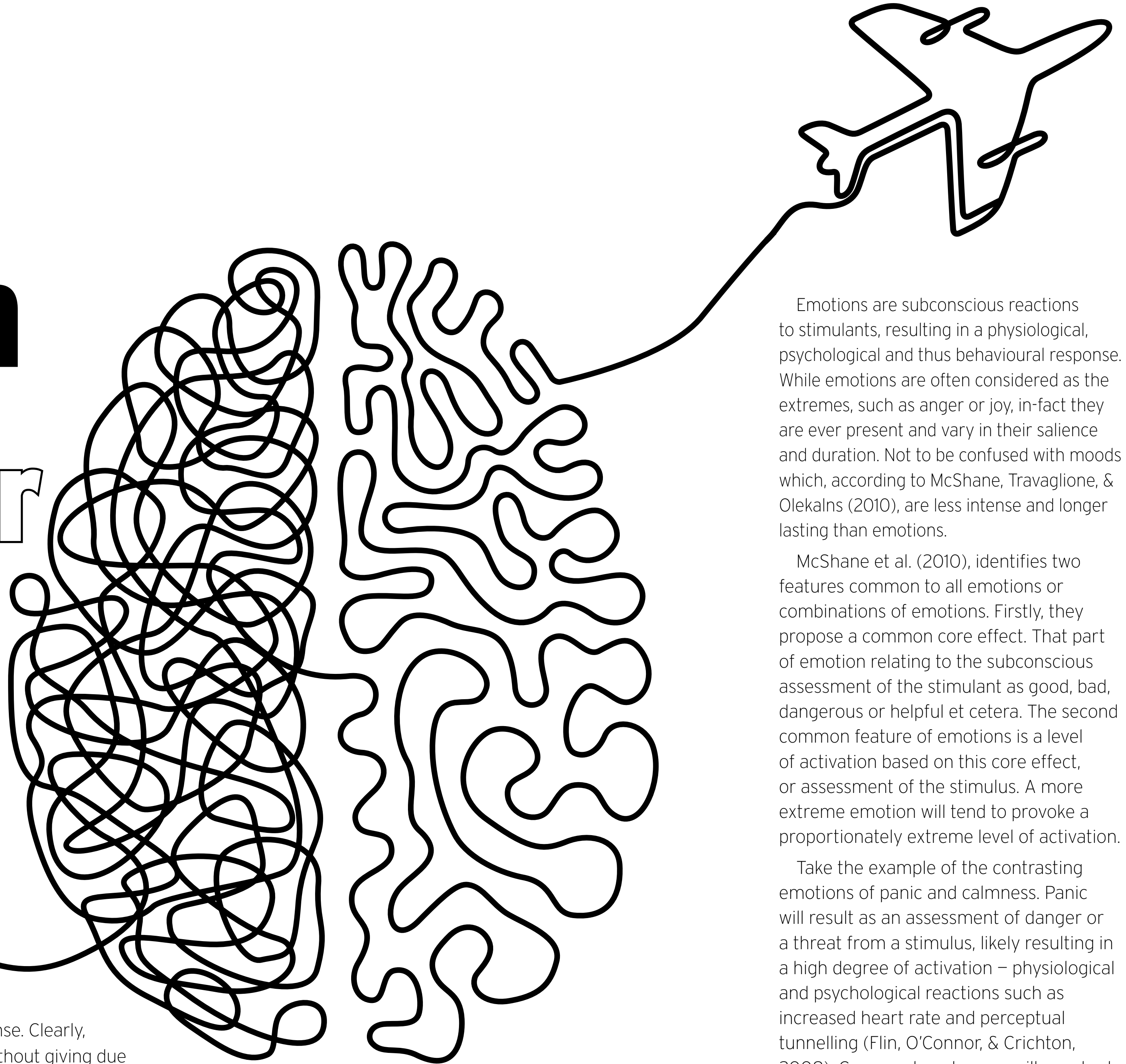
The completion of the circuit and taxi back to the lines was uneventful. Once I was on the ground I had a few minutes in the crew room to revisit the incident before my debrief with my Instructor and DI.

After replaying the events in my head several times I thought I had the answer. I failed to use the important information provided by ATC that there were two other aircraft in the circuit and just assumed that the CT4 I saw commence their crosswind turn was the immediately preceding traffic.

It would have only taken an extra few seconds to account for all aircraft in the circuit prior to brakes released. Pilots must remember that unless ATC stipulates 'immediate take off', you have a full 60 seconds from issue of take-off clearance to brake release. This gives you plenty of time to find each aircraft in the circuit and prevent a situation like this occurring.

Post script: It turned out the DI that day also conducted my re-fly of that sortie at Quirindi under CTAF. During the dual component when flying while de-briefing my engine failure after take-off drill happened to also cut off another CT4 when turning crosswind. This highlighted the importance of knowing who is in the circuit and where they are at all times regardless of experience.

Emotion AND behaviour



How emotional intelligence improves aviation safety

By FLTLT Sam Gladman

TO ACT IN 'the heat of the moment' is a concept familiar to most and one many of us are guilty of enacting. It represents making a decision to behave under the direct influence of an individuals' current emotional state.

It has the connotation of provocative emotion and proportionately incendiary behaviour. In contrast, the stereotypical cockpit is a place of considered logic and professionalism – of control in every sense. Clearly, acting without giving due consideration to emotion directly contrasts a calm and collected cockpit.

There have been numerous instances throughout aviation history where emotion has manifested itself unfavourably in the cockpit and disaster has ensued. By developing an awareness of how emotion influences behaviour and cognitive function, aircrew members will subsequently be able to recognise their individual emotional influences and limitations. This can lead to enhanced decision-making, improved crew resource management and ultimately, safer skies.

Introduction

" ... Attitudes and behaviour are important elements in many incidents and there can be little doubt that they play a significant role in the overall maintenance of flight safety." (Hawkins, 1993, p. 172)

Emotions are subconscious reactions to stimulants, resulting in a physiological, psychological and thus behavioural response. While emotions are often considered as the extremes, such as anger or joy, in-fact they are ever present and vary in their salience and duration. Not to be confused with moods which, according to McShane, Travaglione, & Olekalns (2010), are less intense and longer lasting than emotions.

McShane et al. (2010), identifies two features common to all emotions or combinations of emotions. Firstly, they propose a common core effect. That part of emotion relating to the subconscious assessment of the stimulant as good, bad, dangerous or helpful et cetera. The second common feature of emotions is a level of activation based on this core effect, or assessment of the stimulus. A more extreme emotion will tend to provoke a proportionately extreme level of activation.

Take the example of the contrasting emotions of panic and calmness. Panic will result as an assessment of danger or a threat from a stimulus, likely resulting in a high degree of activation – physiological and psychological reactions such as increased heart rate and perceptual tunnelling (Flin, O'Connor, & Crichton, 2008). Conversely, calmness will eventuate if a stimulant is deemed non-threatening or irrelevant and results in less salient physiological and psychological responses.

What is interesting to note – and key to the discussion – is how individualised these responses will be. What triggers one person to panic might leave another person perfectly calm in the same situation. Consider for example, an experienced and calm pilot flying a small aircraft through turbulence with a novice pilot panicking in the other seat. As emotional responses generally occur prior to cognitive processes, emotional state has a marked influence on human perception, decision-making and behaviour, by effectively biasing these cognitive processes before they occur (McShane et al., 2010).

In the complex, dynamic and unnatural environment in which flight crews operate, they are constantly exposed to physiological and psychological stressors, each of which will trigger an emotional core effect and level of activation. In such a workplace, interpersonal interactions, logical evaluation and unbiased reasoning can mean the difference between a routine day and tragedy. The fostering and development of emotional intelligence in all aviation-related workplaces is crucial to mitigating the detrimental effects of stressors and emotions on workplace performance.

How emotion influences behaviour

Emotion is present in, and part of, every human experience. Its significance is evidenced in the observation that one tends to remember and take note of events invoking relative extremes of emotion rather than ordinary occurrences (Dolan, 2002).

As mentioned, emotions are subconscious reactions to an event, object or person. In exploring their influence in the workplace, it is important to also consider attitudes, defined by McShane et al. as representing the "cluster of beliefs, assessed feelings and behavioural intentions toward a person, object or event (called an attitude object)" (2010, p. 123). The vital distinction between the two being the conscious reasoning associated with attitudes and the subconscious reaction of emotions.

The three-component model of attitude examined by McShane et al. (2010), considers that beliefs, feelings and behavioural intentions are influenced in parallel by emotions. Beliefs are the predisposed views about the attitude subject, influenced by previous experience, culture and so on. Hawkins (1993) describes beliefs as an assertion about the relationship between two things, one that is not necessarily positive or negative but can have a confident influence on behaviour.

Conversely, feelings are definitively favourable or unfavourable toward an attitude object, though, according to the traditional cognitive process of attitudes as cited by McShane et al. (2010), they are swayed by beliefs.

Finally, behavioural intentions, the motivation to act in a particular way regarding the attitude object, are the juncture between attitude and actual behaviour.

There is an important distinction between emotion and attitudes influencing behaviour, as opposed to determining behaviour. As Hawkins (1993) attests, there is much evidence to support the notion that behaviour is not determined by attitudes (which are influenced by emotions). A persons' behaviour will not always represent their attitude towards an object, despite being influenced by it. The relationship and interdependence of emotion, attitude and behaviour must be understood before analysing their impact on a workplace and attempting to mitigate the potential effects.

McShane et al. (2010) suggest there have been studies demonstrating that the 'best' decisions are generally made when one has had time to logically evaluate a situation, rather than decisions based on so-called gut feel, that is, an emotional, intuitive response.

Emotion in the cockpit

Invariably, all aviation-related workplaces involve interacting with, and relying on, other people. This article focuses primarily on the cockpit – a tangible example of a safety- and time-critical domain demanding high levels of emotional and cognitive labour. McShane et al. (2010) suggest there have been studies demonstrating that the 'best' decisions are generally made when one has had time to logically evaluate a situation, rather than decisions based on so-called gut feel, that is, an emotional, intuitive response. The airborne environment is one where individuals and crews rarely have the luxury of time to enact truly rational decision-making processes.

The 2013 study of the effects of emotion on pilot decision-making by Causse, Dehais, Peran, Sabatini, & Pastor provides a good example of the detrimental effects that emotions can have in the cockpit. Causse et al. examine what they call plan continuation error (PCE), defined as "failure to revise a flight plan despite emerging evidence that suggests it is no longer safe" (Orasanu et al., 2010; cited in Causse et al., 2013, p. 272).

In the RAAF this is known more commonly as 'press on-itis' or 'get home-itis'. Through behavioural experimentation and neuroimaging, they were able to conclude that the negative emotional consequences of a go-around (the decision to abort an attempted landing) can provoke an erroneous decision to land. Indeed, the French Accident Investigation Bureau revealed in the year 2000, that this press on-itis phenomenon had been accountable for over 41.5 per cent of general aviation casualties (BEA, 2000; cited in Causse et al. 2013).

While this is a very specific example, the broader implications are clear across all phases and domains of flight be they military, civilian or commercial. What is common to each phase and domain is that "emotional pressures can alter the rational reasoning ... " (Causse et al., 2013, p. 273) and as stated earlier, the rationality of airborne decision-making is inherently resource limited.

Undoubtedly, the majority of aircrew strive for safety and technical mastery. However, emotion influences attitudes and thus behaviour. Attitude and behaviours in turn influence the effectiveness of communication, leadership and teamwork – three attributes integral to safe and efficient aviation.

The cognitive and social skills which complement technical skills are summised by Flin et al. (2008) as what the experts do in addition to techinical skills that allows for consistently high performance. They list seven non-technical skills applicable to aviation including decision-making, communication, teamwork and leadership. Hawkins (1993) suggests that in incidents and accidents where human performance was cited as the root cause of failure, the operators did not perform technical skills appropriately despite having the capability to do so. This conclusion signposts the prominance of non-technical skills in aviation, demonstrating that factors beyond technical proficiency are clearly at play.

Communication, leadership and teamwork are components of the Liveware to Liveware interface in Hawkins' SHELL model (1984; cited in Hawkins, 1993). As Hawkins (1993) offers, an individual can affect the behaviour of the group. For example, quotes from a NASA program report demonstrate extreme liveware-interface breakdowns and their implications; " ... Don't talk; do your job and I'll fly." and " ... it was the hostile cockpit interruptions that I found accumulating in weight upon my mind ... I found it very difficult to keep my cockpit performance from degrading" (ASRS Callback No 78.; cited in Hawkins, 1993, p. 174).

One would assume that such serious breakdowns are rare, though more subtle failures can have equally dire consequences. For example, breakdowns may be attributable to a cockpit experience and authority gradient, where a junior pilot may not highlight an error or omission made by a veteran pilot, on the assumption that the error or omission was deliberate and based on experience (Hawkins, 1993). In 1979 a newly recruited airline co-pilot failed to take over control of the aircraft when the ill-tempered company vice president, who was captaining the flight, became incapacitated (NTSB-AAR-80-1; cited in Hawkins, 1993).

Emotional intelligence; the way forward

As these examples demonstrate, the influence of emotion on behaviour in the cockpit can manifest itself in innumerable ways. To mitigate the detrimental effects of these influences, one must look beyond the indicators discussed, and aim to educate and develop the operators' emotional intelligence (EI), defined as the ability to perceive and express emotion, integrate it in thinking and reasoning and regulate one's own emotions as well as those of others (McShane et al., 2010). There is an increasing awareness of a definitive link between emotional intelligence and job performance (Sy, Tram, & O'Hara, 2006; McShane et al., 2010). So then how does emotional intelligence apply to the cockpit? Sy et al. (2006) conclude that employees with higher levels of emotional intelligence are more proficient at regulating their emotions and demonstrate a greater awareness of the influence of emotions on their behaviours. Based on their research, Sy et al. (2006) propose that an employee with the capacity to regulate their emotions could "experience more confidence and control over the task requirements of their job" (p. 470). It is evident then that emotional intelligence on the flight deck could mitigate if not avoid the hazards present when emotion reveals itself in the cockpit.

Fortunately, EI can be learned and developed, and its importance is not lost

on employers, including the airlines. Pilot applicants at Air Canada for example, receive EI testing as part of their initial screening. And Wong & Law (2002; cited in Sy et al., 2006) purport that emotional intelligence is a 'core component' in determining the success of an employee.

Conclusion

The cockpit of an aircraft is a proverbial microcosm of factors known to induce and exacerbate an enormous range of human emotions, in an environment that humans were neither physiologically nor psychologically designed to occupy.

To operate effectively in such a setting, crews must balance personal motivations, economic implications, self-preservation and a duty of care to their passengers and crew, into time-and-information limited decision-making. As such, it comes as no surprise that the emotions provoked by such an environment would influence subsequent behaviour. By virtue of its place in the cognitive progression of information processing, emotion colours an individual's attitude and behaviour.

While they cannot be stopped, emotions and their effects can be recognised, considered and thus controlled. Education will develop an awareness of personal manifestations of emotion. An understanding of the emotional response, the way it guides one's own behaviour and cognitive processing, as well as that of others will mitigate the presence of emotion in the cockpit in two ways.

It will enhance decision-making through the recognition of emotional motivations. This recognition will also minimise the time that emotion may fog logic, leading to arguably more sound and 'level-headed' decision-making. It will also promote a more harmonious interpersonal interaction both within and external to the cockpit. Improved emotional intelligence will thus create a cockpit more open to the safety-generating process of cross-monitoring from both sides of the trans-cockpit authority gradient.

While they cannot be stopped, emotions and their effects can be recognised, considered and thus controlled. Education will develop an awareness of personal manifestations of emotion.

It must be highlighted that advancing EI is just one of many ways to address some of the issues highlighted. It has been focused on in the belief that it will most competently address the root cause of the problem, and in doing so will have the greatest overall improvement to aviation safety.

Emotion has both positive and negative influences on workplace behaviour. For this and so many other hopefully obvious reasons, any attempt to mitigate the unfavourable effects of emotions through eradication of emotion on the flight deck would be both detrimental and impossible. Though increasing the emotional intelligence of aircrew is an intangible and unquantifiable objective, its benefits have been demonstrated and it can ultimately serve to place yet another slice of James Reason's proverbial cheese between a hazardous situation and disaster (Reason, 1997; cited in Flin et al., 2008).

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Leadership in Army aviation safety

By CAPT Vlad Kaliyev

Editor's note: Since this article was written, the DASM has been updated into the ICAO model. Changes are reflected in the latest release of the DASM.

RECENT CHANGES TO aviation regulations, the accelerating pace of technological progress and the modern state of the aviation industry prompts me to pose the question of whether existing safety doctrine is adequate should we desire to stay contemporary and 'ahead of the curve' in terms of accident prevention.

What would it take to remain safe even in this dynamic environment? Does the *Defence Aviation Safety Manual* (DASM) address current and future challenges?

The cornerstone publication for Defence Aviation Safety Management, the manual identifies goals, sets out the safety framework and spells out responsibilities within Aviation Safety Management System (ASMS) in Defence. It attempts to clearly articulate holistic requirements for an aviation safety system through its 12 well-known elements with a clearly defined structure and the system composition expected to be mirrored across all levels of command. It also mentions the importance of the attitudes, beliefs and values of the personnel within an aviation organisation. However, the strong emphasis is on providing clear guidelines and mandatory requirements.

It is no surprise that the number one ASMS tenet is *Genuine Command Commitment* (Ed. now known as *Management Commitment.)* as the prequisite for success. The number two is *A Generative Safety Culture* which is the

Everything is ultimately linked to the leader's ability to be human and to possess a certain degree of emotional intelligence.

ultimate model for attitudes, beliefs, perceptions and values within an aviation organisation. The remaining elements define the mechanics of the safety system within the organisation.

As defined in the DASM, ASMS can be broadly aligned with command and management elements of the old CLM (Command, Leadership & Management) Army leadership model. However, the leadership part is not explicitly defined. Even the old CLM model recognises the primacy of leadership and its presence as an absolute necessity in any operating environment.

It can be successfully argued that the DASM is a publication about ASMS and it is not a leadership publication. However, the counter-argument is that without proper leadership an aviation organisation cannot be truly safe. Setting out the policies and procedures does not ensure a safe environment. Without ethical and inspirational leadership there cannot be a genuine command commitment. Command and management alone, without adaptive and emotionally intelligent leadership, will not produce a Generative Safety Culture. Therefore, it appears to be only logical to complete the ASMS elements by including one (or more) elements on expected leadership behaviour and its role in the overall success.

It is interesting that the Army Leadership Seminar 2019 emphasised an urgent need for change in the current Army Leadership Model. The current model is grossly inadequate now, and undoubtedly so going into the future. The current model is not adaptive and it does not allow for a continuous (and constantly accelerating) changes in the Army operating environment.

What can be said about the current Army Aviation environment? Army Aviation has been taking giant leaps forward in operation methodologies, preparedness and technology to meet the future conflict requirements of 'accelerated warfare'.

High operational tempo requirements have triggered increased maintenance support and commitments. Compounded by rapid technological advances, the usual lack of resources (both human and otherwise) and recent changes in Regulations (TAREG to DASR) consistently generate new aviation safety risks. The effective management of these risks cannot be achieved within a static ASMS. Only truly adaptive leadership will be able to implement the current ASMS while meeting and addressing the challenges of keeping aircraft safe.

There are many new (and not so new) leadership behaviours that can be included in the DASM in order to point the way to generating safety culture. Some of them are well-known and most are interlinked. A few examples are:

- Emotional intelligence and human touch (know each other, be human)
- Mission command and commander's intent (freedom to complete set tasks and shared understanding)
- Critical thinking, contributary dissent leading to innovation
- Role clarity
- Hot wash and 360 degree leadership
- Allow for failures/mistakes and learning from them.

Although some of the points are self-explanatory, most of them are comprehensive topics themselves and can be easily discussed in lengthy detail. Let's briefly examine three of them and their applicability to ASMS.

Allowance for failure is a fascinating one as learning from one's own mistakes is arguably the greatest teaching mechanism. However, an unplanned failure is always a dangerous one anywhere and principally so in aviation.

Creating a failure-tolerant environment in aviation is difficult but not impossible. Only a failure-tolerant environment will produce a Generative Safety Culture where safety issues are raised without fear. And this requires extra work – additional control measures, supervision, training opportunities, time to complete tasks. Ultimately more resources are consumed and more efforts are expended. With usual workplace constraints ('doing it for real', meeting flying program, et cetera.) and limitations, these tasks cannot be achieved without adaptive leadership at all levels.

Application of 'mission command and commander's intent' are extremely important if ASMS objectives are to be met. Shared understanding of the problem and interdependence in action are critical if documented safety policies are to be followed, if *Hazard Reporting* is to reach its goal of accident/incident prevention, if *Training and Education* is to contribute to continuous improvement, and if *Risk Management Plans* (RMP) are to serve their purpose of eliminating risk to safety SFARP. Inspirational leadership through building true mission command and working to the 'intent' at all levels can make it possible.

Everything is ultimately linked to the leader's ability to be human and to possess a certain degree of emotional intelligence. Knowing and understanding subordinates and superiors allows us to understand the 'intent', employ subordinates to the best of their abilities, tailor safety policies and training to resonate with workforce, and to improve communication.

In conclusion, the DASM sets out understandable guidelines on the expected structure of ASMS and the mandatory policies and procedures. Although the final product is clear there is no direct path to the true *Generative Safety Culture*. Static ASMS makes it difficult to ensure that new aviation risks, generated within constantly changing operational environments, are effectively managed.

Ethical, adaptive and inspirational leadership will allow for ASMS to meet the challenges and to 'stay ahead of the curve' and the requirements for leadership should be included as one of its elements.

Precautionary engine shutdown

By FLGOFF Gemma Dorn

THERE I WAS, at 32,000 feet as a relatively new D Cat captain flying on only one engine in my KA350. This had the potential to be a difficult situation, yet turned out to be a reassuring experience in terms of the simulated airborne-safety training we do so much of in case situations such as these arise.

In mid-2018 I departed RAAF Pearce Western Australia destined for Alice Springs to refuel my KA350, before continuing on to RAAF Townsville in North Queensland. Also onboard was my co-pilot and two aircraft maintainers along with a large amount of luggage and fuel, making the aircraft quite heavy for the leg to Alice Springs.

The weather in RAAF Pearce was a beautiful clear winter's day and the departure out of there was straight forward. As the leg to Alice Springs was a long one for a KA350 we elected to cruise at FL320 for fuel efficiency and so up we flew to level off and cruise at FL320.

Shortly after we had settled into the cruise, the right-hand engine's oil temperature started to rise. We monitored the oil temperature and as a crew discussed the situation; however, it continued to rise and we were left with no choice but to carry out a precautionary engine shutdown and return to RAAF Pearce on one engine.

The decision to shut down what looked to be a perfectly good engine out of the window was daunting yet necessary. It was an unnerving prospect as I had done this in the simulator numerous times but never in the actual aircraft. Once we started the precautionary engine shutdown checklist; however, my muscle memory and intinct to carry out a precautionary engine shutdown and single-engine landing pleasantly surprised me. It felt like my arms and legs knew what to do more than I consciously thought about or briefed before and during the approach. I have no doubt this was due to the amount of compulsory emergency training I had previously conducted in the simulator as per the squadron's training schedule.

At times simulated airborne-emergency training for situations such as engine failures or emergency engine shutdowns can seem monotonous and repetitive as it is practiced so much. It allows pilots to have more mind space to think about other considerations at the time knowing that their hands and feet are already trained and will know what to do.

Simulated emergency training also allows pilots to gain familiarity with procedures and aircraft systems associated with a particular failure so that it does not come as a shock when they are degraded or a checklist involves turning particular systems on or off as a result of the failure.

Again, this allows pilots to concentrate on other considerations at the time, such as weather, traffic, diversions, et cetera that are all individual to a particular situation and are hard to practice for as they are constantly changing factors that have no checklist to rely on or rehearse for.

On investigation after landing, maintenance found the vernatherm valve in the right engine to be faulty. A vernatherm valve opens and closes a certain amount to allow oil to pass through it to the oil cooler depending on how much the oil needs to be cooled. In this case the valve was not allowing enough oil through to the oil cooler.

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Off to Richmond in a Dak?

By AIRCDRE Mark Lax (Ret'd)

THE SHORT NIGHT flight from RAAF East Sale to RAAF Richmond had been hastily planned late on Friday evening, 28 November 1958. It was a dark, overcast and generally dull night as East Sale is often to experience. The flight involved a very early start on Saturday, with engines on at around 0230 hours.

It was a rare yet not unusual time for a flight and it awoke many who were living on the base including the duty air traffic controller who was not in the tower. Dakota A65-89's two Pratt & Whitney R-1830 twin wasp radial engines would have made a very loud noise in the still morning air, but the base population was used to such irregular air movements, so many went back to sleep.

A65-89's engines were run up as was normal practice to check magnetos and ensure they were in proper working order, then after a short taxi, the aircraft lined up on the old south-east runway heading 130 degrees and commenced its take-off run[1]. A moment later the aircraft was airborne, but seconds after, and under power, it ploughed into the ground about 250 m south-east of the base perimeter not far from the 25 m firing range. There was an explosion and a vigorous fire took hold of the entire forward fuselage and wings.

The accident site was just outside the base perimeter fence on a local farmer's grazing property. Fortunately, there was no-one from the family in the vicinity of the crash and there was little farm property damaged. After the fire had been extinguished, only the tail section was recognisable. The sole member on board was killed instantly.

Despite the early hour, many on the base were well awake as there had been a Friday night barbeque for airmen held in the base gym. The barbecue and drinks went on into the small hours before the orderly officer closed the gym around 0230 and sent the stayers home. As could be expected with so many hearing the crash, within minutes the base alarm sounded, and airmen and officers alike rushed to the scene.

So why did a Dakota take off with only one POB? The usual crew was pilot, co-pilot,

signaller or navigator and loadmaster. The reason is somewhat bizarre.

A Court of Inquiry (COI) was convened later that day to determine cause and if necessary, recommend corrective action. WGCDR Jim Gooch, a pilot from Air Force Office, and SQNLDR John Murphy an Aero Engineer from HQ Training Command were president and technical member of the court respectively. They were given a tight schedule and had to report by 3 December. Thirty-five witnesses were called to give evidence and it very soon became clear that not everyone had witnessed the same event.

The first witness called was LAC Ray Jones, an engine mechanic from Maintenance Squadron. Jones had gone to the barbecue and met up with his mate, LAC Harry Pocock, a fellow engine mechanic, where they proceeded to have a few beers. Jones testified that Pocock got progressively drunk and at some stage during the evening, Pocock told him, "Ray, I'm going to Richmond". When asked how, Pocock replied "by Dak".

Six other airmen witnesses at the barbecue generally with agreed the story, although some said they heard nothing about flying a 'Dak', while others said they didn't think Pocock was drunk. However, those that heard the 'Dak' story thought Pocock was simply joking.

When the witnesses heard the aircraft engine start, a few drove down to the flight line, to 'see if it really was Harry'. They knew there were no scheduled flights that morning, so no controllers were on duty, but a duty crew was rostered on in case of a call out for a SAR. At 0230 they were asleep in the crew hut. By the time the airmen had reached the flight line, several other cars were already there having heard the commotion and the duty crew was by now well awake. The group watched the aircraft take off, make a slight starboard banking turn and then plummet straight into the ground just beyond the base fence.

The race was now on to get to the crash site, but when the airmen arrived there was little they could do but await the crash tender and assist in extinguishing the ensuing fire. One body was recovered. First on scene were the base PTI, SGT Les Young and his wife Catherine who lived in a married quarter very close to the accident site. They were up attending to their sick child. Shortly thereafter, SQNLDR Dick Saunders from Maintenance Squadron arrived on scene and took charge.

The 17th witness, SGT Alex McCracken an airframe fitter from Maintenance Squadron and in charge of the duty crew, gave evidence regarding what he heard. The Dakota appeared to make a normal take off "by the noise". McCracken went to state "After take-off, the aircraft noise faded slightly which led me to believe the aircraft was about to clear the area. Then I heard the engines overspeed for a very short period and the noise of the engines cut suddenly and I saw a flash in the east of the aerodrome". It was McCracken who called for the crash tender.

As might be imagined, then the phones across the base began to ring. From the CO of the Maintenance Squadron, WGCDR Charles Butcher, to the Base Commander GCAPT Ted Fyfe, and between the orderly officer, the guard house, the duty crew, the fire section, the medical section and the base operations room. Each phone had a two-digit extension which had to be connected to the extension being called by a telephone operator, colloquially known as a 'switchie'. SGT Charles Doyle was the phone operator on duty and recalled for the court that he spent from 0245 to 0322 continuously connecting calls. The last was to advise the operations room at Training Command in Melbourne.

Pocock had made good his word. At around 0220, he left the barbecue and went to his room, then proceeded down to the flight line where he broke into the tarmac servicing hut and stole a set of aircraft headsets. He removed the wheel chocks and anchor ropes, but not the static earthing line (which later broke loose), entered A65-89, closed the door and started the engines. Ten minutes later he was dead.

SQNLDR Murphy, the technical member of the Court inspected the wreckage later the following day and made a startling discovery. The control locks were still in place. That meant that even an expert pilot could not have recovered the aircraft once airborne as they would not have had any aileron, rudder or elevator controls. The control locks were wooden wedges that prevent the aircraft control surfaces from banging in the wind. The locks are removed during a pilot's prefight and have long orange ribbons to indicate their presence. Pocock simply missed removing them.

Although an engine mechanic, Pocock was not authorised to start, run up or shut down Pratt & Whitney engines because of his inexperience. However, the OIC Tarmac, PLTOFF Ken Wilkins, testified that it was usual practice for Maintenance Squadron NCOs to allow junior personnel to sit in the co-pilot's seat and observe the engine-run process. Pocock had done this previously and this no doubt fuelled confidence in his abilities.

The follow up

Pocock's body was recovered to the Sale mortuary and an identification made from dental records, the body being too badly burned for physical identification. By way of confirmation, the next day, all units were requested to do a muster of all personnel on strength finding all accounted for except for Harry Pocock.

A check of the aircraft records showed it was fully serviceable, weight and balance correct and fully fuelled as the custom was to complete a refuel after the previous flight. While door padlocks were available, they were only used when an aircraft was away from base. In a sense, the aircraft was there for the taking.

It quickly became apparent to the Court that LAC Pocock had made the unauthorised flight after attending the unit barbecue, but that "although he had been drinking, had reasonable command of his faculties". A rumour that bets had been laid at the barbecue regarding Pocock's alleged ability were not substantiated. The finding was as might be expected: the accident was caused by "an unqualified, inexperienced and partially intoxicated person assuming control and causing an aircraft to become airborne". LAC Pocock is "entirely to blame for the destruction of the equipment [Dakota A65-89] ... and for his own death".

The Court made three recommendations. The first was that doors of parked aircraft be locked each night after stand-down. The other two recommended disciplinary charges be raised against two airmen for failure to carry out orders and dereliction of duty on the night of the accident. They were dealt with separately.

But the report of the Court of Inquiry was not the final say on the matter. As is the case of a RAAF member who dies on duty, a Committee of Adjustment is convened to clear up the members affairs. The Committee's role is to pay any debts (such as Mess bills, fines, amounts owing et cetera), return RAAF property on the members charge (such as public clothing), and return the member's property to next of kin or beneficiary. As LAC Pocock died intestate, and back then, as he was under 21 and therefore was considered a minor, his father was appointed as next of kin. While the Court of Inquiry only took three days, it took a full six months until Pocock's affairs were finalised.

As a postscript to this unfortunate story, it transpired that Pocock had recently applied for a pilot's course. Pity he didn't wait to get the call.

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1. This runway no longer exists but can still just be seen in satellite view on Google Earth.

Wheels-up landing

By SQNLDR Luke Warner

I WAS UNLUCKY – or lucky – to have been involved in a F-111 wheels-up landing back in 2006. At the time I was a senior navigator at No. 1 Squadron (1SQN) and was flying with a junior pilot, in accordance with our crew pairing philosophy of crewing opposite experience levels within the jet.

There are a number of interesting facets to this emergency, including the 'three ambers don't go' philosophy, the surprisingly violent landing iteration, and the fact that the left wheel somehow crossed underneath the aircraft and threaded its way between buildings to impact a parked vehicle belonging to a retired F-111 pilot. What are the chances?

But I want to touch on the amazing ad-hoc crew resource management that occurred on the ground between multiple agencies while the pilot and I sat at 20,000' burning fuel and twiddling our thumbs ...

After the initial call from ATC to advise that we had lost our wheel, followed by numerous radio calls from us to clarify they meant the tyre (the black rubber part), which they unfortunately further clarified that they did in fact mean the entire wheel; we made the forlorn radio call to 1SQN operations to advise the duty supervisor of our dilemma. At this stage an amazing array of people started doing whatever they could to provide the most thorough information to allow us to plan how we could best land.

An ex-F-111 pilot, currently posted to ARDU as a test pilot, happened to be at 1SQN at the time. He departed to the simulator straight away to start investigating landing options and profiles and how manageable those plans were to fly for a 'junior' pilot vice the senior test pilot practicing them.

Coincident with this simulation investigation, the SRSPO engineers were reaching out to our US Air Force brethren to get whatever information was available from any similar incidents and how they were handled. Another group of engineers (these ones with thick glasses and pocket protectors I suspect) were furiously using Pythagoras' theorum to calculate that if the jet was 70 ft long, angle-of-attack was 6 degrees, the hook subtended 13 degrees, was 7 ft long, started 12 ft from the rear of the jet, and the radar altimeter was 9 feet from the nose of the aircraft ... what reading in feet did we need to see on the Radar Altimeter to indicate when the hook was just touching the ground?

Simultaneously 1SQN sent an aircrew member to my serving partner's place of work on base to advise her of the situation (she had heard the crash alarm and after failing to get in contact with me was suspecting bad news), while also reaching out to my next-of-kin.

This process was executed so smoothly that by the time we landed, my parents (from the Gold Coast; Dad teeing off on the third hole of his weekly hit of golf) were on base to witness our successful cable arrestment ... lucky it went well.

At the end of the day the successful outcome was a direct result of a young pilot doing an amazing job to land the aircraft in such an unfamiliar method, holding his nerve during a period of intense ground rush.

What is rarely talked about is the incredible job that a range of people did in the background that armed the pilot and I with the best information available at the time, which resulting in that successful cable engagement.

The C in CRM doesn't just refer to the people in the aircraft – a take-away that is becoming even more poignant as the Air Force transitions to more platforms utilising blended support workforce solutions or 'enterprise' arrangements rather than the traditional uniform-only setup.

Who's the boss?

By WGCDR Tim Shaw

SO YOU HAVE heard of the trans-cockpit authority gradient right? The potentially problematic steep cockpit gradient with a very senior experienced captain and a new boggie co-pilot being the most common example. As a flying officer I recall being in an uncomfortable reverse cockpit gradient as a very junior captain flying with a group captain as my co-pilot so I know the issues in that situation. But no-one seems to talk about a level cockpit gradient – I guess because that would rarely happen. Rarely perhaps, but not never.

This is this story of one such level gradient where, for a short period of time, no-one on the flight deck made a decision, instead waited for the other to do so … and we went IMC below the highest safety height in Australia.

The three of us were mates, good mates, having joined the Air Force on the same day and lived, studied and worked together for the previous four years. We were of the old RAAF Academy at Point Cook where there were only around 40 guys per Academy course and even less once we started pilots' course. We all knew each other very well, all respected each other's flying abilities and it was very relaxed between us.

Following pilots' course we were posted to Caribous, with Greg and I on one conversion course and Steve the following one. Steve and I were posted to the "operational" and "tropical" squadron of No. 35 Squadron (35SQN) in Townsville while Greg was posted to No. 38 Squadron (38SQN) the "training squadron", at Richmond. A friendly rivalry existed between the two Caribou squadrons and we protected our turfs of PNG and the tropics for 35SQN, and New Zealand and the cold south for 38SQN.

We were all C Cat captains and had flown together many times on various tasks and exercises as co-captains where one of us was nominated as the captain for the task or the day and would swap the next task/day, but never the three of us together on the same aircraft on the same day … until that day.

Due to the nature of 35SQN operations, both Steve and I gained experience in tropical weather patterns, dodging thunderstorms and cyclones but had never really experienced the claggy, overcast, days-on-end weather of the southern states. Packing our rarely used flying jacket and never-used thermals, off we went, leaving the beautiful winter weather of the north behind, on a static line para task (another thing the North Queensland Air Force did not do much of) from Richmond to Puckapunyal and combining that with a cold-weather trainer.

Being Richmond based, and using a 38SQN airframe, Greg was appropriately appointed Detachment Commander, given his southern states and cold weather experience, and Aircraft Captain of the first day's transit and cold weather trainer.

As the Australian ski season had just started it seemed more than appropriate that we plan our transit via the NSW ski fields. The 35SQN boggie captains were excited about this as we had not seen the ski fields from the air before. At that time it seemed every few days during the ski season an Air Force aircraft of some type would be flying a "scenic" over the Australian ski fields – it was the "done thing" and now it was our turn. The weather report was typical of the season – it wasn't too poor to prevent our plan but also warned of overcast and sleet/snow conditions at times.

The flight initially proceeded uneventfully and, once in cruise, Greg jumped out of the left-hand seat remaining on headset down the back and I jumped in as pilot flying (no auto-pilot) with Steve remaining in the right-hand seat as pilot monitoring and directing the visual navigation (pre-GPS). As Greg had "seen it all before" he briefed that Steve and I could fly up the valley past Thredbo then turn onto our next track towards Mangalore and Puckapunyal. He also let the flight engineer stand between the seats, not just to monitor the engine parameters but also to enjoy the "scenic". So the captain of the aircraft was headset down the back looking out the right-hand side window with little forward vision. This was not an unusual operation in benign conditions during transit as at any time he could look over the flight engineer's shoulder, squeeze in beside him, or jump up instead of him.

Eventually we navigated ourselves over Jindabyne and entered the valley leading to the Thredbo bowl, flying up the left-hand side to allow a view of Thredbo village on our right with Mount Kosciuszko rising into the cloud behind the village. This also allowed a reversal turn to the right to escape back down the valley (we were well rehearsed in that procedure with our previous PNG Trainer experiences).

We also organised the aircraft into the bad-weather configuration, which basically meant props at "Climb" RPM and flap at 15 degrees to fly at a reduced speed and allow a better turn radius if required. Flying visually, we were climbing in the bowl just below the cloud base as it rose up with the valley rise. Thredbo village was clear below but Mount Kosciuszko behind the village was in cloud and the rim of the bowl ahead, which was where our planned flight path took us, was starting to cloud with some gaps.

We crept up closer and closer to the cloud base, Steve having the better view for a turn back if required as the cloud on the rim ahead started to close in. Perhaps it was some anxiety in our voices or some uncertainty in our conversation but approaching the rim Grant jumped up in between the seats for better forward vision and assessment and initially it seemed more of a casual chat … we were all good mates after all.

To this day I don't know why we just didn't turn around earlier, as pilot flying I should have just done that … but I wasn't the captain. As I was the one flying, Steve was waiting for me, and, as Greg was the Aircraft Captain and now positioned in between the seats, I was waiting for him, yet no-one said anything directive. As the seconds ticked away and the cloud fell more onto the rim I began to take action, starting a minimum-radius turn though it looked very tight – after all it was drilled into my brain not to go into cloud below a safety height.

This prompted action from Greg to overrule my decision and told us to roll out and go for a max rate climb, ultimately a better decision given the now limited turn availability to the right caused by the delay in any decision.

I rolled wings level, asked Stu for METO power (Maximum Except for Take Off) and pulled back on the control column to achieve best rate of climb and entered the overcast. Greg immediately prompted to go to max power (another good call). Once settled at max rate climb there was silence for a very long minute or two until we had gone through the safety height. From memory I estimate we were about 2000 ft below the published MSA when we entered cloud.

As a footnote there was one other pilot on board at the time who played no active role in this incident. Although he did not go through the Academy with us, he was on the Pilots' Course ahead of us and the same Caribou conversion as Greg and I. So, on that day there were three flying officers and one pilot officer – all C Cat captains and all mates – what could possibly go wrong?

[Names of those involved have been changed]

To this day I do not know why we just didn't turn around earlier, as pilot flying I should have just done that … but I wasn't the captain.

Establishing trust and connecting within teams

By SGT Gareth McGraw

WHY IS ESTABLISHING trust important? Building trust and a genuine rapport between team members is an essential part of facilitating open and effective communication. Genuine rapport means that there is a feeling of mutual respect and a belief that the other party will actively listen in any conversation, value any input and have a real interest and desire to understand what the speaker is trying to say.

As a leader or supervisor, you need your team to feel comfortable in discussing problematic topics or conveying difficult news in order for you to be able to effectively manage a challenging situation.

The chances of team members feeling able to do this will greatly increase if you have already established a genuine rapport away from any immediate, pressing workplace circumstances. Especially if they trust that you value them, you will actively listen, and will try to understand what they are saying.

However, like any specialised skills a leader or supervisor needs to employ, we often fall short in our knowledge or experience in certain aspects of utilising them.

In light of this, here are some practical strategies to help you build trust and rapport with your team:

1. Choose a good time to build rapport

Building rapport cannot reliably occur during a crisis or stressful situation. Especially where there can be any perception of an ulterior motive for a conversation.

Leaders must attempt to build this relationship in a safer, less stressful environment.

In essence, leaders must establish the belief that they are genuinely interested in the wellbeing and support of the other person or people away from the immediate needs of the workplace.

2. Learn to listen

As a leader or supervisor, the skill of listening is one of the greatest skills that can be used in building this rapport, showing empathy, and understanding the needs of your team. This is often a skill that is taken for granted, with an assumption that it is inherent in anyone who has achieved a leadership position. However, like any skill it must be trained and applied gradually in order to develop it.

"Humans listen before they speak, speak before they read, and read before they write. Thus, failure to refine our listening skills impairs the entire process of human communication." (Wolff, Marsnik, Tacey, & Nichols, 1983, p. 24)[1]

Some suggestions for improving listening skills are (Lyle, 1984)[2]:

- Realise that listening takes real effort. Be prepared to expend time and energy.
- Look at the person who is speaking to you. Do not fake attention or seem uninterested, do not ask a question you are not prepared to hear the answer to.
- Listen with an open mind. Receive information as fresh; suppress your bias or preconceptions.
- When listening to the reply to any question, let the person speak freely, try not to interrupt.
- Listen between the lines to hear what is not being said. Are you getting all the information?
- Pay attention to the feedback you provide, is it supportive and does it show you have understood the information, appreciate and value the input given?

3. Get curious

You can start applying listening skills by asking simple, open questions to allow team members to talk about themselves, their life, aspirations, and motivations in a safe and low-stress environment. Remember, in guiding individuals to achieve any team goal or outcome, a leader or supervisor needs to know what motivates their team members in order to drive positive engagement and active participation.

Initial questions should be generic and 'non-threatening' in nature, with no jeopardy or possibility of an ulterior motive attached to them.

The list below provides some guidance on the type and style of questions that may be beneficial to building rapport.

Note: The assumption for this list is that individuals are relatively new to each other and do not already have a degree of background knowledge.

Initial questions should be simple or open ones, such as:

- How long have you been in the ADF, (or within a specific unit or work area)?
- (If a short time), where did you work before here?
- What are your plans or personal/professional-development goals for the future?
- Topics away from work such as:
  - Do you have any interests or hobbies?
  - Recent holidays?
  - Follow a sport or sporting teams, et cetera?

This is where the importance of active listening must be stressed. Engaging with the speaker will establish a feeling of involvement in the conversation and of valuing what the speaker is saying. Once these very generic subjects have established that you are listening and are interested in the *person* you could move into areas of mutual (work-related) interest such as:

- How has work been this week? or,
- Have you had any difficulties or wins at work this week?

Note: If you can discuss positive work experiences as well as areas of difficulty it will assist in establishing the feeling of a positive workplace and relationship. Like delivering feedback, it is essential that conversations do not always centre on negative events or circumstances.

4. Summary

Building trust and rapport with team members is not only a good management strategy from a welfare standpoint but also from a performance point of view. It can improve a leader's ability to effectively communicate in high-stress situations and to motivate staff to engage with the task requirements as well as particular policy, process, and procedures.

But remember rapport requires communication skills that first must be developed and then exercised; and to do this correctly requires proper timing and forethought. Don't wait until a difficult situation to begin that development.

Start it early, exercise it often and above all, be genuine in your efforts; and like any good investment the returns will be well worth it.

More information on topics that may assist in building trust and rapport within teams such as effective communication, leadership and teamwork can be found in the *Aviation Non-Technical Skills* Guidebook or the DFSB website.

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1. Wolff, Marsnik, Tacey, & Nichols, (1983) – Perspective Listening
2 Lyle (1984) – Teaching Adults

Building trust and rapport with team members is not only a good management strategy from a welfare standpoint, but also from a performance point of view.

You are not always the best person to judge your own fatigue

Name withheld

WHILE IN THE latter days, Air Force deployments to the MEAO had become quite routine, the first rotations were highly dynamic and variable, changing from Maritime Intelligence Surveillance and Reconnaissance (M-ISR) to Overland Intelligence Surveillance and Reconnaissance (O-ISR) with little notice.

This was especially the situation during my first rotation to the MEAO in 2004, with frequent Troops in Contact (TIC) missions. Sometimes these were pre-planned offensive coalition operations, but often they were rapid re-tasks from various areas in order to get to the incident location as coalition forces encountered insurgents. This real combat environment provided an enhanced level of focus and willingness to help our fellow coalition forces at almost any cost. Tasking for the aircraft filtered down to the detachment – then just a tiny, dusty collection of demountable buildings and little else. The commanders in the detachment were always pro-active in seeking the juiciest tasking for the crews, usually O-ISR.

Forward planning was supposed to allow the crews to prepare for either day or night sorties as required, but we quickly found out planning in a combat area is rarely reliable.

As was the normal protocol for crews, we had regular access to sleeping medication such as Stilnox to assist with getting into the required sleep cycle. This medication was dispensed in a controlled manner among crewmembers, but getting more wasn't hard.

As we reached the second month of our three-month deployment, the medication was becoming less effective, resulting in me regularly getting less than three hours' sleep most nights instead of my usual eight hours.

Fatigue was building, but the need to help the troops in the middle of what seemed like hell on the ground kept me focused and pushing on.

Now almost into the third month of deployment, taskings became even more reactionary as insurgents became more offensive in taking on the coalition. Pre-planned day sorties were, at the last minute, becoming night or vice-versa.

On this particular occasion we woke from a day sleep, in preparation for a night sortie to be told "you are now flying tomorrow morning, go back to bed". But how? With Stilnox of course. Yet that was no longer working for me. I tried to get myself into another sleep cycle, but no matter what I tried I just couldn't sleep. Mindful of disturbing the other crew guy in the room I shared, who had managed to sleep, I just lay there staring at the ceiling.

As the morning rapidly approached I began, inconveniently, to become sleepy when in fact I was supposed to be fully rested. But as the only NAVCOM on the crew – and still only new – I was mission essential. If I didn't go the sortie didn't go ahead, the crew missed out and more importantly the troops on the ground lost essential O-ISR support putting them at greater risk.

As the crew woke and started the trip to the shower block next door, I too got up hoping that being out of the room would perk me up. As I exited the accommodation I was struck by the first rays of morning light, which seemed to have the desired effect. I felt that second wind coming on, "I'm fine" I told myself.

After an hour, the TACCO woke me for landing, having just covered my duties. Only then did I confess to the sleeping issues the night before.

Mission brief and pre-flight complete, I sat at my station waiting to get airborne feeling okay, but my eyes were burning from tiredness and my mind started to become a little distant. "I'll be fine once I'm busy" I thought to myself, having told no-one at this stage of my sleepless night.

The transit to the target area for the day was about two hours, but full of radio checks-in and systems checks as we transitioned various reporting agencies. The stimulation of being busy to this point had done its job of keeping focused on the task and not the burning eyes and constant yawning.

On station, the crew bounced between many TICs for the next four hours, but my ability to process the information and communicate on the radio was increasingly degrading. At this point I was barely able to keep my eyes open, often catching myself micro sleeping. By the time we started heading home it was too much and I literally just fell asleep at my station, completely involuntarily.

After an hour, the TACCO woke me for landing, having just covered my duties. Only then did I confess to the sleeping issues the night before.

During the debrief, while covering flight-safety issues, I confessed to the crew what had happened, and accepted that I shouldn't have flown and certainly should have made the captain aware before Flight Authorisation.

A combination of perceived pressure to complete the task, a sense of not wanting to let the crew down and not experienced at understanding the cumulative effects of fatigue lead me to decide that I was capable to fly when clearly I was not.

While we all have an individual responsibility to manage our own fatigue, I now know that we are not always the best judge, because when fatigued our judgement is already impaired.

DAYMODE NIGHTMODE

CIRCADIAN RHYTHMS

Circadian rhythms are the body's natural rhythms (internal body clock) which are repeated about every 24 hours. Due to circadian rhythms, the human body is more awake during the day and experiences a reduction in activity in the midnight-to-dawn period. This is a fundamental human characteristic and cannot be changed.

Work schedules that require people to be awake and active at night, or to work extended periods of time, disrupt circadian rhythms. These disruptions:

- affect the quality and quantity of sleep
- affect task performance, and
- may also contribute to a sense of personal dislocation and imbalance.

Accidents are more likely to occur at night, particularly during the period when the circadian cycle is at its lowest point (midnight-to-dawn) when a person would normally be sleeping.

Circadian disruptions affect eating and sleeping habits and have been linked to cardiovascular diseases such as coronary heart disease (blocked arteries in the heart), ischaemic heart disease (blocked arteries leading to a lack of oxygen in the heart muscle), high blood pressure; and myocardial infarction (heart attack).

Source: Workplace Health and Safety Queensland

Assessing the impact of working from home during the COVID-19 Pandemic

By Nicholas Lewins and Chris Brzozek

SINCE LATE MARCH 2020, Coronavirus (COVID-19) has triggered significant disruptions to the Australian workforce, including the Australian Defence Force (ADF). Authorities imposed self-isolation restrictions as part of efforts to stop the spread of the virus.

Self-isolation and workplace restrictions resulted in many people spending an increased amount of time working from home (WFH)[1]. This transition to WFH was not anticipated by the workforce, and therefore individuals were often inadequately prepared, presenting numerous challenges to individuals' health and wellbeing[2, 3]. These changes also increased psychosocial, behavioural and ergonomic-related risks[4, 5].

The lockdown for ADF personnel began one month before the launch of the 2020 DFSB *Snapshot* Survey. *Snapshot* participants include all Defence Aviation and Air Force units, aviation support elements (such as Air Domain within CASG), selected Defence contractors (such as Airbus Group), and 1st Division (Army). Given the timing of the lockdown, a late inclusion to the 2020 *Snapshot* Survey was a group of questions designed to assess challenges experienced by Defence aviation personnel and contractors adjusting to working from home. As such, responses to the survey were completed one-to-two months into the lockdown period.

This article touches on the perceptions of Defence aviation personnel towards being self-isolated, the difficulties they experienced, and the impact of working from home on the organisational climate. Additionally, this article also presents findings from the broader scientific community on how to best transition to WFH while also optimising worker wellbeing and productivity.

Working from home

Snapshot, which was completed by more than 15,500 staff, revealed about 58 per cent of the respondents were working from home at least three times a week or more during the pandemic as seen in Figure 1. This finding is quite similar to that of the Australian general public.

A recent survey of Australian households found only 16 per cent of respondents were working from home three days a week or more prior to COVID-19, which then increased to 53 per cent during the first wave[1, 6, 7]. Only 17.71 per cent of respondents reported not working from home at all and it is likely this represents the proportion of respondents unable to do so due to job specific roles.

Snapshot also found that most respondents felt as though they were satisfactorily effective at home with over 80 per cent giving positive ratings as seen in Figure 2. However, caution

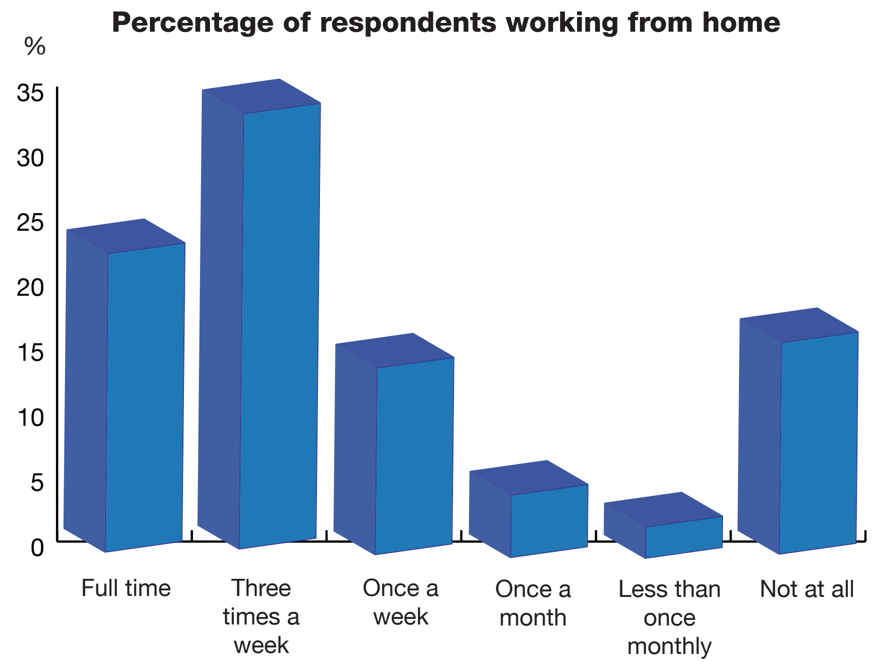

Figure 1. Percentage of *Snapshot* respondents working from home

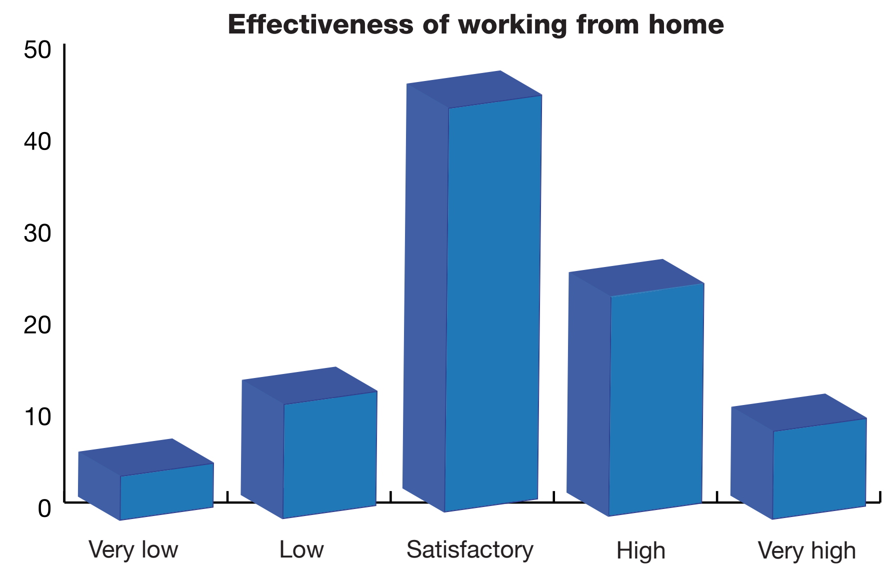

Figure 2. Effectiveness of working from home

Despite the challenges of WFH during the pandemic, *Snapshot* data has generally shown a positive shift in respondents' perceptions of their job demands and resources.

is recommended when interpreting effectiveness data due to self-report bias.

Difficulties working from home

It should be noted that working from home did not come without its challenges.

In addition to asking how often people worked from home, 2020 *Snapshot* also aimed to identify the difficulties they commonly faced. As illustrated in Figure 3, the greatest difficulty faced by *Snapshot* respondents WFH was DREAMS connectivity, closely followed by a general lack of social interaction and distractions from home.

DREAMS – Some of the more common comments related to DREAMS included ICT issues and accessing classified documents/work resources. These difficulties may have been compounded by the large influx of staff moving to WFH, exacerbating issues. However, IT challenges are not exclusive to the ADF alone. The growing shift to WFH across Australia coincided with a growing demand on the Australian internet with researchers reporting a significant increase in internet congestion, particularly within Canberra and Melbourne[8]. This growing demand saw a 70-80 per cent increase of Australian NBN access during daytime hours[8].

Social interaction – Close to half of *Snapshot* respondents reported difficulties with a lack of social interaction. A COVID-19 survey of 1000 adults conducted by the Australian Bureau of Statistics found that 28 per cent of women and 16 per cent of men reported feeling lonely as result of the pandemic, and that this was the most common personal stressor identified[9].

Loneliness is also considered to be a primary indicator of social wellbeing[12]. As such, loneliness has been found to have direct outcome of lower social interaction and has been considered a risk factor for many mental disorders like depression, anxiety and insomnia[11]. Furthermore, research related to COVID-19 lifestyle changes found individuals with pre-existing psychological disorders to have heightened psychological distress[10]. Despite this, shared activity programs and various uses of information and communication technology are potential strategies to reduce the impact of social isolation[13].

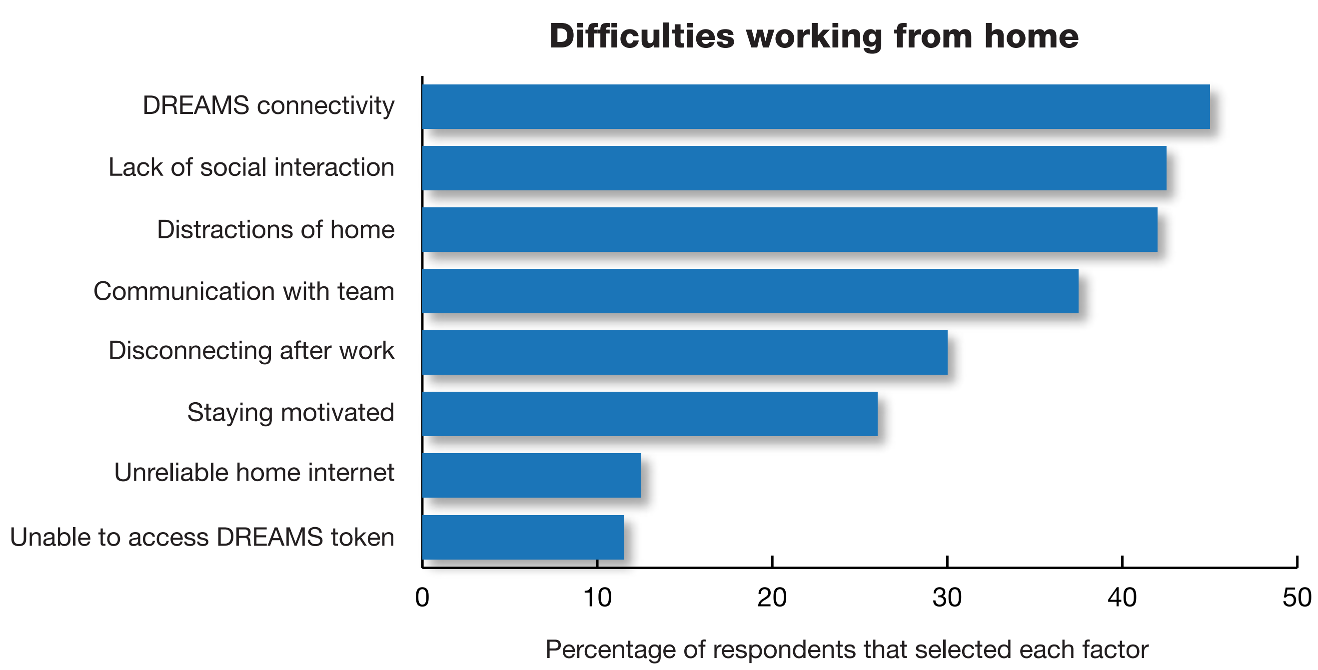

Figure 3. Difficulties working from home

Distractions from home

One of the more common distractions at home cited by personnel was having to care for and homeschool children. Caring/schooling children in particular was not an issue evenly distributed across the ADF workforce, as those with young families or personnel living in Victoria were more likely to be affected.

Caring/schooling children is a problem experienced by the wider Australian workforce during the pandemic, and causes disparate effects to those with young families as it can magnify stress and anxiety[4,14,15]. Increased supervisor support and flexible working arrangements can help reduce this burden[2].

Some additional WFH difficulties raised were:

- a general inability to be able to perform work at home (for example, aircraft maintenance)
- unsuitable or inadequate home-office equipment (for example, non-ergonomic seating, lack of dual screens, expense of operating equipment)
- difficulties related to communicating with team
- challenges with staying motivated.

Accounting for these previously unseen difficulties and challenges, one queries what effects this pandemic has had on the ADF's organisational outcomes and climate.

Organisational outcomes and climate

Despite the challenges of WFH during the pandemic, *Snapshot* data has generally shown a positive shift in respondents' perceptions of their job demands and resources. For example, respondents generally reported better work-life balance and autonomy compared to the previous year. As expected by the *Snapshot* model (Job-Demands Resources), these positive changes also generally led to a positive shift with organisational outcomes.

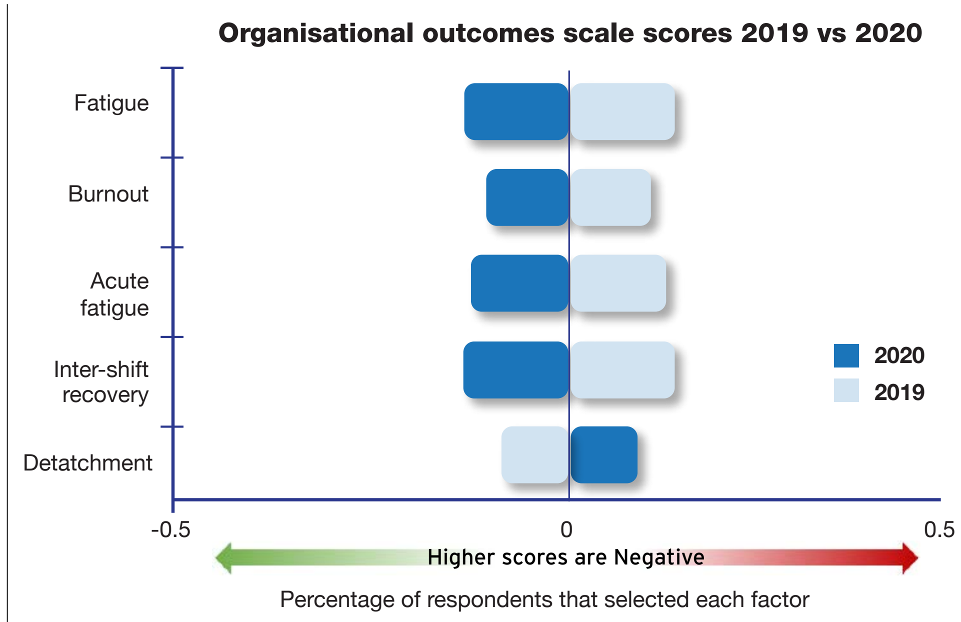

Figure 4. A comparison of scale scores for organisational outcomes 2019 vs 2020

One of the more prominent changes in these outcomes was a general decrease in fatigue. This reduction is not unexpected as recent research has shown WFH to have a beneficial effect on preventing worker burnout[16]. Additionally, it has been suggested that maintaining WFH post-COVID may also decrease worker burnout long-term[16]. In contrast to fatigue, detachment was the only outcome that was found to be worse in 2020 compared to the 2019 scores.

While this change is not unexpected due to the sudden increase of WFH, it provides interesting insight into how this shift can be detrimental in some areas. Research prior to the pandemic has shown WFH can affect detachment negatively for those who prefer work-family segmentation and for those who have high family demands[17-19]. During the pandemic these potential issues are likely to become more prevalent among those with young families due to the increased demands of caring for children/home schooling. This shift is particularly interesting when considering the decrease in fatigue, particularly burnout, despite this shrinking gap between work and home.

Another interesting shift found in *Snapshot* data was a decrease in psychological strain in 2020 compared to the previous year despite the COVID-19 pandemic. Research assessing the effects of pandemics on general mental health has found levels of anxiety, depression and stress to often increase[20]. Expanding upon this further, recent research reviewing the psychological impacts of quarantine reported negative psychological effects such as post-traumatic stress symptoms, confusion and anger[21].

These psychological impacts often stemmed from stressors such as long quarantine durations, infection fears, frustration, boredom, inadequate information, financial loss and stigma[21]. Whilst this may contradict our own *Snapshot* findings, research has found public servants to be more resilient to the mental-health toll from the pandemic[3]. A potential explanation for this is that increased job security – a common benefit of public service work – is related to greater wellbeing[22].

Ergonomics

A factor that can easily be overlooked among the significant changes experienced in the transition to WFH during the pandemic is ergonomics. Due to the sudden change, home offices may have been inadequately prepared for this significant increase in days spent WFH. As mentioned previously, unsuitable and inadequate home-office equipment was one of the most common WFH difficulties identified in *Snapshot*.

One of the more interesting results in this year's *Snapshot* data was a decrease in fatigue and psychological distress despite respondents feeling less detached from work.

Poor ergonomic set ups in home offices can lead to musculoskeletal issues such as lower back and neck pain[4,5]. This in turn can have significant impacts on workers' health and wellbeing. A simple immediate action which can minimise the risk associated with poor home-office set ups is the distribution of practical advice on good ergonomic set ups.

For example, keeping monitors an arm's length away, using a chair that keeps the knees at roughly the same height as the hips e tcetera. An additional measure that can help in avoiding these musculoskeletal issues is the promotion of physical activity. Further information and advice on workplace ergonomics can be found at http://drnet/raaf/AirForce/HQAC/WHS/Pages/Workplace-Ergonomics.aspx.

What can ease the burden on mental health?

Increasing supervisor support is a modifiable factor in reducing the stress associated with the increased burden of WFH during the COVID-19 pandemic[2]. Therefore, it is important that supervisors are mindful of those who may be under increased pressure and organise flexible WFH arrangements.

For further information on what supervisors can do to manage their team flexibly throughout the pandemic and beyond see *Managers Guide – Coronavirus* (http://drnet.defence.gov.au/People/Support/Pages/Coronavirus-Managers-Guide.aspx).

Mental health professionals recommend promoting health behaviours, avoiding exposure to negative news and using alternative communication methods such as social networks and digital communication platforms to prevent social isolation[23].

Misinformation and fabricated reports about COVID-19 have been found to exacerbate depressive symptoms in the general population[24]. Information related to the number of people who have improved and the progress of medications and vaccines have been found to reduce anxiety levels[25]. Further information on mental health can be found at https://www.defence.gov.au/Health/DMH/Factsheets.asp

Conclusions

When interpreting the data presented in this article it is important to keep in mind that the survey was administered at least one month after workplace lockdowns had begun. Therefore, we can assume that these data accurately represent the workforce at that stage of the lockdown.

By this stage a large proportion of the Defence aviation workforce were already working three days or more at home. The majority of those WFH were satisfied with their level of effectiveness with positive results for job demand, resources and organisational outcome metrics. While these changes indicate an unexpected positive shift in numerous areas, it is important to note that the small size of these changes need to be taken into consideration as to not over-amplify their significance. The most common difficulties experienced by those WFH were DREAMS connectivity, lack of social interaction and distractions. Respondents also reported difficulties in relation to ICT difficulties, social isolation, home-schooling/caring for children and inadequate office equipment.

One of the more interesting results in the 2020 *Snapshot* data was a decrease in fatigue and psychological distress despite respondents feeling less detached from work. However, this lower detachment is not unexpected with the surge in WFH.

An important thing to note with this data is that it has been several months since its collection and even mild difficulties can become major sources of strain if they persist over a long period. New difficulties not captured in the 2020 *Snapshot* may have emerged, especially for those still isolated or working in quarantine conditions.

Therefore, it is important to regularly monitor the situation and provide workers with ongoing support to adapt to the challenges presented by the COVID-19 pandemic. Some practical measures that can be implemented immediately include supervisor mindfulness of individual's stress, using social media networks and digital communication methods to maintain social interaction and a heightened focus on the positive aspects of COVID-19-related news.

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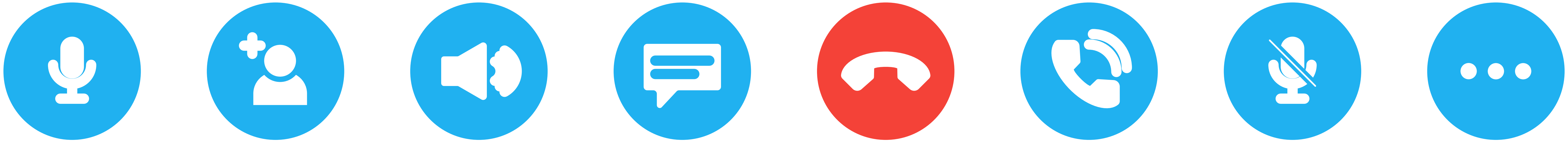


To go round or continue?

By AIRCDRE Mark Lax (Ret'd)

ONE OF THE most basic lessons a pilot learns under training is when to go round or overshoot a runway if all is not right.

Practice instrument approaches often involve a go round to avoid wear and tear on the tyres, brakes and airframe as well as to save time in the circuit. The reasons for going around are many and varied, including incorrect line up, runway blocked or birds on finals. And the decision should be made as early as possible.

Such a dilemma faced PLTOFF Kev Kluska and his navigator instructor FLTLT Bruce Kercher on 16 February 1965, when they had an engine problem during an instrument training sortie.

Kluska was undertaking a Canberra conversion course with No. 1 (Bomber) Operational Conversion Unit at Amberley. He had graduated from No. 51 Pilot's Course the year before, where he had been assessed as 'sound average and likely to develop well'. He had done a short posting at No. 10 Squadron flying Neptunes before being posted to Canberras in January 1965.

His fellow crew member, Bruce Kercher, was an experienced navigator and instructor and was sitting in the right-hand pilot's seat during this conversion flight – the usual practice during pilot conversion training.

The crew was scheduled for instrument training with three ILS approaches at Brisbane Airport followed by several low-level GCA approaches and a final visual circuit at Amberley. The 'B' Flight commander had briefed Kluska and Kercher for the day's flight which included the instrument approaches and circuits. The 'A' Flight Commander was satisfied and duly authorised the flight in the A.71. It was a Tuesday morning and the weather was a classic summer's day in South-East Queensland. Twenty-nine degrees, visibility of over 30 nm and 3/8th cloud at 3500 ft. Wind was calm, making for perfect flying conditions.

The Canberra had completed the Brisbane ILS approaches and had returned to the Amberley circuit. On attempting a third overshoot on Runway 15 at Amberley, the aircraft inexplicably rolled and crashed 3700 ft (1127 m) north of the field heading towards the northern threshold of runway 15. Both crew members were killed instantly, and the aircraft was destroyed by the subsequent explosion and fire.

The then Directorate of Flying Safety (DFS) immediately began an investigation, taking into consideration three main contributing factors: the crew, the aircraft serviceability and the working environment.

The investigation team's attention first turned to the pilot. Kluska at 22 was relatively inexperienced. He had logged a total of 317.25 hours, but only 17.2 in the Canberra, 5.25 hours of which were as aircraft captain. He had recently undergone his aircrew medical and appeared medically fit for flying so the investigators concluded there was likely no medical condition to cause the crash.

They interviewed the OCU staff next. Kluska's instructor regarded him as a steady student of average ability, but "a little under confident at times". He had no outstanding faults and "rarely made the same mistake twice". His handling of the aircraft was "generally satisfactory". Likewise, navigator Kercher's medical condition was examined. Although an instructor, he was not authorised to fly the aircraft and was discounted as causing the crash.

Next, the DFS team examined the aircraft: its maintenance history and current serviceability. The Canberra, A84-206, was an early model B.20 having first flown in July 1954. It had subsequently been modified as a B.21 trainer and passed to the OCU. Since the dual conversion it had amassed 1100 hours and was due for its next major servicing in 101 hours' time. At the time of the crash, both engines were signed off as fully serviceable. In fact, the DFS investigators found the aircraft remarkably serviceable. It had flown 18 times since arriving at the unit, recording only four minor unserviceabilities which had been rectified.

The flight prior was signed off by the instructor pilot as fully serviceable except for bellows on the rudder control rod which had been written up two weeks earlier and carried over. The aircraft was within weight and balance limits (C of G) and was under all-up weight. The DFS team concluded it was airworthy and safe to fly.

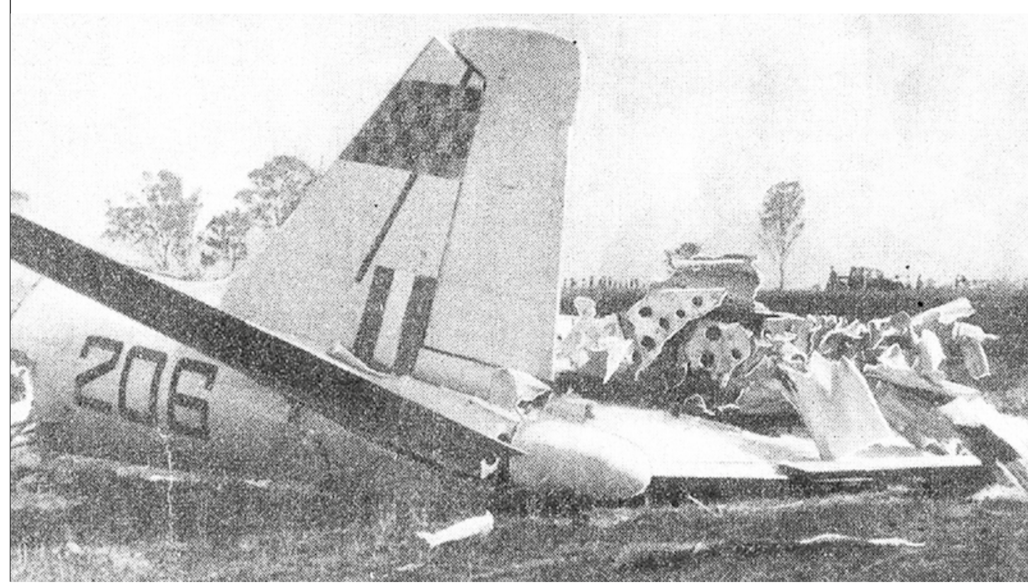
An examination of the crash site revealed many clues as to what had happened because the aircraft had impacted in a flat paddock giving easy access to the wreckage. It was clear the aircraft had hit the ground at very low speed, probably 60 to 80 knots. Initial contact was made by the starboard wing tip with the aircraft in an 80 degrees or 90 degrees right bank and nose 60 degrees to 70 degrees below the horizon on a heading of 070°M. The aircraft had cartwheeled, which was stopped almost immediately by the nose and starboard engine striking the ground, after which the aircraft instantaneously broke up and caught fire.

The investigators concluded that the port engine was under full power at the time of impact, but the starboard engine was only at about 60 per cent power. This was confirmed by the position of the throttle levers on both quadrants in the cockpit.

There was no sign of engine fire before impact and No. 1 Aircraft Depot investigators found no evidence of engine malfunction prior to the crash. There had been no compressor or turbine failure and the fuel cocks were open. The aircraft was also assessed as being in approach configuration with undercarriage down, speed brakes in and flaps up. What it did not explain was why the aircraft crashed.

The final area of investigation was the environment as recalled by witnesses and of the circumstances surrounding the flight itself. Evidence was taken from 10 Service members and two civilians who witnessed the accident. As is often the case, this evidence was contradictory, confused, inconsistent and 'spiced with much imaginary detail' yet each witness was adamant they had "seen what they said they had seen", 'even though this was later proved impossible'. Unfortunately, the audio transmission recorder in the tower had failed an hour before the crash, so no cockpit-to-tower audio was available. Despite the unreliability of the witness statements, some facts emerged.

The pilot was slightly high on approach and had received an ATC clearance to overshoot. At about 200 ft, the aircraft yawed and rolled into a 50 degrees to 70 degrees bank to the left. After turning left through 90 degrees of heading, the wings levelled, and a wallowing motion developed. With very slow forward speed, next came a burst of engine noise but the aircraft rolled right and crashed shortly after. The whole sequence took less than 10 seconds.



So, what happened? Astute readers might assume an incorrect overshoot procedure was initiated under a low power setting leading to an aircraft stall and subsequent crash or that the aircraft entered an asymmetric condition from which the pilot was unable to recover. Both are partially correct. When putting on power in a Canberra, the Avon engines take some seconds to spool up – the power is not instantaneous, and this was seen as a likely contributing factor.

An all-encompassing Air Force Order directed that practice asymmetric overshoots were not to be initiated below 600 ft which all pilots knew, so in this case as he was at 200 ft, it was assumed that Kluska intended to make a full-power overshoot. As all witnesses agreed the aircraft flight appeared normal to about 200 ft, the DFS team calculated the airspeed at that point to be around 120 kts – about 20 kts below minimum safe control speed as per the flight manual. When full power was applied, for unknown reasons, the port engine failed to accelerate as fast as the starboard engine causing the aircraft to first yaw to the left, then roll left. The pilot then tried to correct with rudder then aileron, pulled the nose up (an instinctive reaction so close to the ground), where the airspeed further reduced, resulting in an irrecoverable stall.

In all probability, the low altitude, low airspeed and some sort of engine problem leading to inadvertent and unrecoverable asymmetric flight was the root cause of the accident.

While plausible, it was not that simple. The technical investigation concluded that the starboard engine was working normally but only at about 60 per cent power at impact, so it seems likely the DFS team concluded, "that the pilot, in an endeavour to recover from the initial loss of control, had reduced power on that engine". But why would he reduce power on that engine further? Did he pull back the wrong engine?

Given several witnesses stated there was a sudden burst of engine noise, it seems plausible that the port engine suddenly slam accelerated to full power thus creating an inadvertent asymmetric condition at low speed and low altitude. The pilot was maintaining full right rudder as evidenced by examination of the tail rudder trim in the wreckage. This rudder position, combined with the sudden increase in power of the left engine caused the aircraft to rapidly roll right and into the ground before the pilot had time to recover.

By slamming the throttles forward at low airspeed, had the pilot inadvertently caused the port engine to stall, then closed the throttles and opened them rapidly again causing the port engine to slam accelerate while the starboard engine was still spooling up? It seems unlikely as Kluska was known to handle the throttles 'gingerly', but in the adrenaline rush such a situation induces, who knows. In all probability, the low altitude, low airspeed and some sort of engine problem leading to inadvertent and unrecoverable asymmetric flight was the root cause of the accident.

Yet there were still many unknowns in this case. The DFS investigators concluded that there was no evidence to show the pilot mishandled the throttles but "this must remain a possible cause of the engine malfunction". Because of a lack of conclusive evidence, the cause of this accident is recorded as No Known.

To close the report, the Director of Flying Safety at the time, WGCDR 'Congo' Kinninmont, wrote: "Asymmetric operation of aircraft at any time requires knowledge, skill and much practice, but further, in an emergency such as this, these attributes must also be so ingrained that reaction is instinctive and immediate … But you the old and bold, the chap who knows it all – how would you have made out? Answer that honestly, then do something about the answer you didn't like."

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Fatigue
and remotely piloted aircraft

By LT Freya Courtney

IT IS WIDELY understood and appreciated that workplace fatigue plays a large role in safety incidents. In the aviation industry fatigue management is imperative and is realised through strict regulations and requirements for work-rest ratios for both aircrew and maintainers. However, when it comes to remotely piloted aircraft these regulations do not always translate across.

The Australian Army Shadow Tactical Unmanned Aerial System (TUAS) is not regulated under DASRs and the requirements for operators are vastly different to that of manned aircraft. This is due to the lower risk level of operating a small unmanned aerial vehicle.

Operators of the Shadow TUAS are artillery gunners. They hold the responsibility of controlling an aircraft that is not only expensive but can do significant damage to personnel and other equipment if an incident occurs. When these soldiers are out field, they are not exempt from other duties such as the need to piquet throughout the night. These soldiers are not afforded the work-rest ratio or exemption from other duties that aircrew are. When out field they will have interrupted sleep in less-than-comfortable conditions. However they are still called on at all hours to operate the Shadow TUAS, often taking over a shift from another operator. This change-over process is susceptible to a high number of errors.

In a historic exercise a Shadow TUAS was damaged due to a hard landing when an operator used the long runway landing procedure when landing on a short runway. When the incident was investigated it was found that the landing had been performed in the early hours of the morning by an operator who took over the shift during the night. The operator said the short runway procedure landing was not promulgated to him in his handover.

The investigation brought about questions regarding the fatigue levels of the soldiers involved and the timing of handovers and landing procedures in the field battle rhythm. The priorities for Artillery Officers lie with operational and training requirements and they do not have exposure to an Aviation Safety Management System.

The separation of the Shadow TUAS from Army Aviation segregates the management of operating personnel from leadership that are well versed in aviation safety management. Does there need to be more involvement of Army Aviation personnel in this space? If the training and conditions of remotely piloted aircraft was more in line with that of aircrew this could reduce the level of risk in operating these aircraft.

As remotely piloted aircraft become more prevalent, does there need to be a change in who has control of these assets within Defence, and more importantly the personnel involved in their operation?

Aviation safety management is constantly evolving alongside changes in the aviation industry. Aviation safety incidents involving remotely piloted aircraft should be managed with the same level of significance as other aviation safety incidents. The structure of Army Aviation and the assignment and management of all aerial vehicles should be continually monitored.

Getting *Snapshot* to maximum velocity

By Nicholas Lewins

THE ANNUAL DFSB *Snapshot* Survey program has now been running for eight years, originally introduced in an effort to strengthen organisational monitoring of safety culture.

Since its inception in 2013, *Snapshot* has seen exponential growth in its reach and corresponding impact on those within those in the Defence aviation community.

In 2020, the survey had more than 15,500 respondents leading to the release of 300-plus reports to commanding officers (COs) throughout the Defence aviation workforce and 1st Division (Army).

Individualised reports provide COs with a picture of their unit's organisational climate and assist with strategic planning aimed at improving unit capability.

Snapshot also allows COs to:

- benchmark their unit against other units
- track changes in safety climate from one year to the next
- identify risks and "hot spots" in their unit and
- assess the effectiveness of recent changes.

One of the greatest benefits of utilising a survey such as *Snapshot* is that it's a quick and economical way of capturing information for COs on a diverse range of topics related to their unit's organisational climate. It also provides a great opportunity for Defence members to speak freely and know that their opinions will carry as much weight as any other member's opinions.

Ultimately, this can be a catalyst for change within units that members feel a true sense of ownership over. Another key strength of *Snapshot* is its foundation on the Job-Demands Resource Model which aims to capture factors that drive individual and organisational performance.

Snapshot survey foundation

As mentioned, *Snapshot* is founded on the Job-Demands Resource (JD-R) Model taken from organisational psychology. The JD-R Model (see Figure 1) proposes that there are two basic sets of factors that can affect people when they are in their work setting: job demands and job resources.

Job demands typically refers to the aspects of the job that require sustained physical and/or psychological effort and skills and are therefore associated with certain physiological and/or psychological costs. Some examples of job demands includes high work pressure, poor environmental conditions and organisational constraints[1].

In contrast, job resources refers to the aspects of the job that help in achieving work goals, reduce job demands and the associated physiological and psychological costs and stimulate personal growth and development. An example of some job resources would include autonomy and organisational support[1].

The basic principle behind these two factors and their interaction is that job demands put an individual under pressure while job resources help the individual deal with pressure. As such, when an individual feels as though his/her job demands are high, job resources can act as a strong counterbalance and often make them feel more supported about this heightened workload.

However, if high job demands exhaust employees' mental and physical resources, burnout, a lack of commitment and even turnover may result. In JD-R theory when this begins to occur it is referred to as the health impairment pathway. The health impairment pathway is the instance in which job demands outweigh job resources, resulting in negative outcomes. If, on the other hand, resources outweigh demands then individuals are likely to become more engaged and therefore a happier and more satisfied employee. This occurrence is referred to as the motivational pathway.

Reaching maximum *Snapshot* power

One of the strongest assets of *Snapshot* as a management device is its ability to be utilised as a predictive tool for change. As the JD-R Model has a strong theoretical and mathematical basis, the *Snapshot* model can be used to predict how much change should be expected in organisational outcomes when job demands and resources are managed. Because of this, it can also be utilised as a measurement tool for change. COs and senior managers are able to compare their *Snapshot* results from year to year, measure whether changes have been

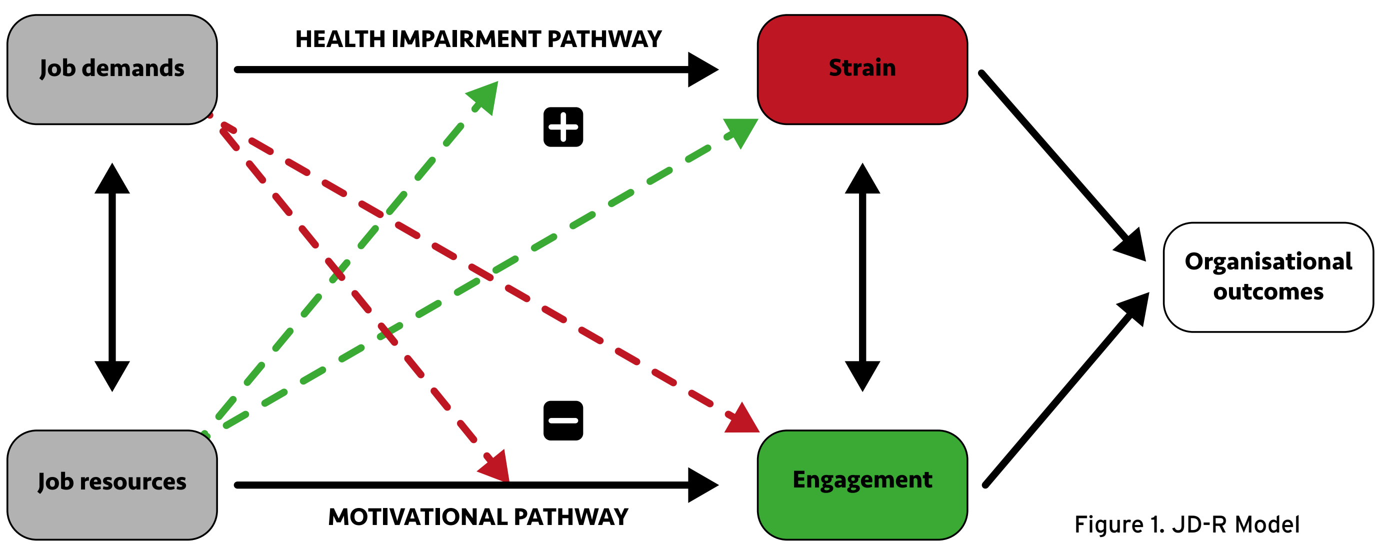

Figure 1. JD-R Model

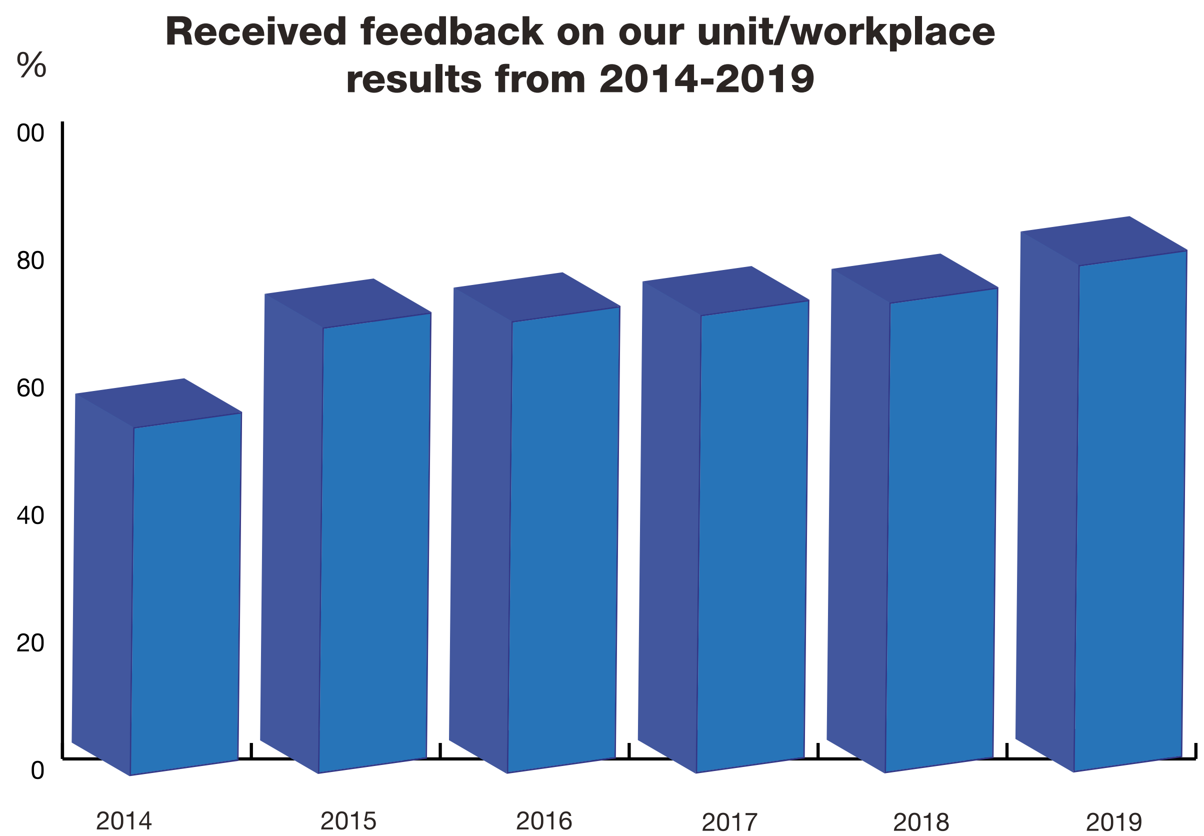

Figure 2. Percentage of respondents reported to have received last year's *Snapshot* feedback

successfully implemented, and what degree of impact these changes have had, both positive and negative. Another way COs can elevate *Snapshot*'s power is by providing feedback and facilitating discussions their unit about their results.

In 2014, 57 per cent of respondents reported receiving feedback in relation to their *Snapshot* results. Comparatively, Figure 2 shows how this has increased to 83 per cent of respondents in 2020 reporting feedback on the previous year's survey. This growing trend in feedback has also coincided with 68 per cent of respondents reporting improvements to safety systems and workplace performance and health as a result of *Snapshot* (see Figure 3). Our own analysis of *Snapshot* results has also revealed a positive association between receiving feedback and seeing value in contributing to future surveys. Additionally, ratings of unit moral and performance tend to be higher when feedback was given the previous year. This paints an incredibly positive picture for the benefits of COs embedding feedback delivery into the use of their *Snapshot* results.

At a basic level, this could be accomplished with a simple brief to the unit. However, focus groups are a more powerful method of providing feedback while also gaining a deeper insight into the potential connections between results and allowing investigation into areas of concern.

Magnifying what's influencing your results

A focus group is, in simple terms, a group interview with a smaller number of people designed to gather information on participants' knowledge, experiences and views on a specific topic. The purpose varies, but may include gaining a more in-depth understanding of an issue, identifying group norms and culture values or generating ideas and identifying priorities.

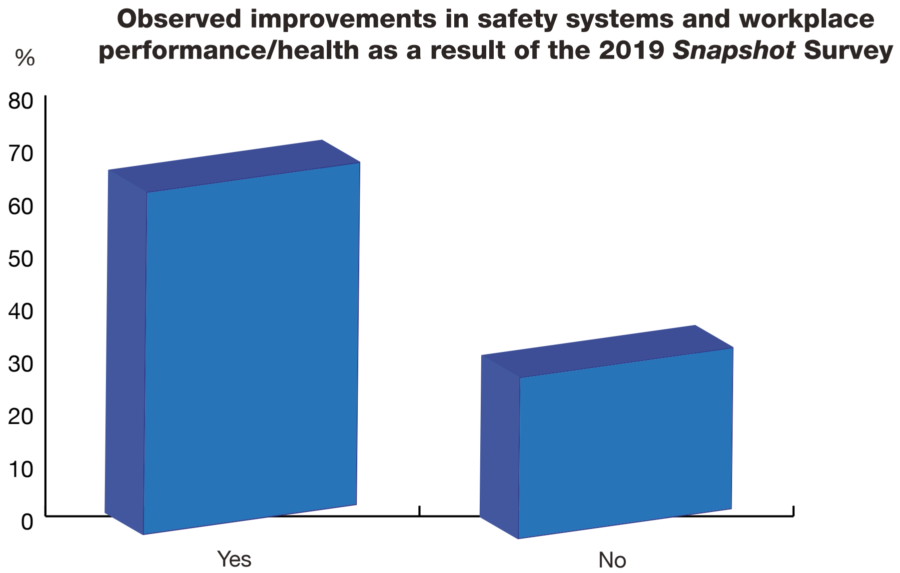

Figure 3. Percentages of respondents that reported observing an improvement to their safety systems and workplace performance/health as a result of the 2019 *Snapshot* Survey

One of the key advantages of using such an approach to explore these topics is that they can help in gathering more detailed information as it provides people with a platform to not only express their feelings but explain where they might be derived from.

This is particularly relevant when it comes to gaining a deeper understanding of potential issues. While surveys such as *Snapshot* can be a great tool for identifying these factors at a broader level, focus groups truly help magnify the underlying sentiments that might be driving these issues.

As such, utilising these tools together is a great way for COs to set themselves up for success by identifying potential issues, exploring why they may exist and then developing and executing an action plan to overcome them. Furthermore, a CO can then use their unit's *Snapshot* results from the proceeding year to see whether this plan was successful and if it had any potential side effects, both positive and negative.

Figure 4 shows a basic flow chart to guide a unit in utilising its *Snapshot* results to create targeted focus groups. It begins with the CO preparing the unit for the annual survey and encouraging participation to capture the greatest amount of information from the unit. Once *Snapshot* has concluded and the CO has received the results, the next step is to analyse them, taking into consideration the various factors (that is, job demands, job resources, fatigue, et cetera.) and the mechanisms underlying the model as previously discussed. This will enable a unit to identify its strengths and potential areas of concern.

After identifying these aspects, a unit is in a good place to begin planning for a focus group – where the session should be held, the formation of the room, electing a scribe and a question guide comprised of open-ended and non-leading questions to ask the group. It is also important to remember during this planning that a focus group is not just for digging through the issues but also an opportunity to celebrate unit wins and strengths.

Once the plan has been developed, it is time to deliver the focus group. On a practical level, it is always good to lead a focus group by advising participants of how a focus group works, the purpose of the session and how long the session is expected to run. It is also important to outline any group rules at the beginning of the session, for example there are no right or wrong answers, everybody has the right to contribute and every comment is valuable. Encouraging differences in opinions and perceptions and clarifying that the focus group is a safe space for people to share their opinions without punishment is also vital.

After the focus group has concluded, unit personnel can begin to develop and implement an action plan using the data from their *Snapshot* results, information captured during the focus group and their own research. Once this plan has been developed, sharing an outline with the unit can be beneficial in showing that their thoughts and opinions have been considered and are being actioned.

Additionally, this should also foster a sense of ownership from the unit regarding the plan, which has proven an essential component of successful and positive change. After the plan has been implemented, a unit can review the outcomes to establish its success. Furthermore, a unit can also continue this review of change by comparing their year-to-year *Snapshot* results. Further information on how a unit can develop and run a focus group can be found at www.health.qld.gov.au/__data/assets/pdf_file/0021/425730/33343.pdf

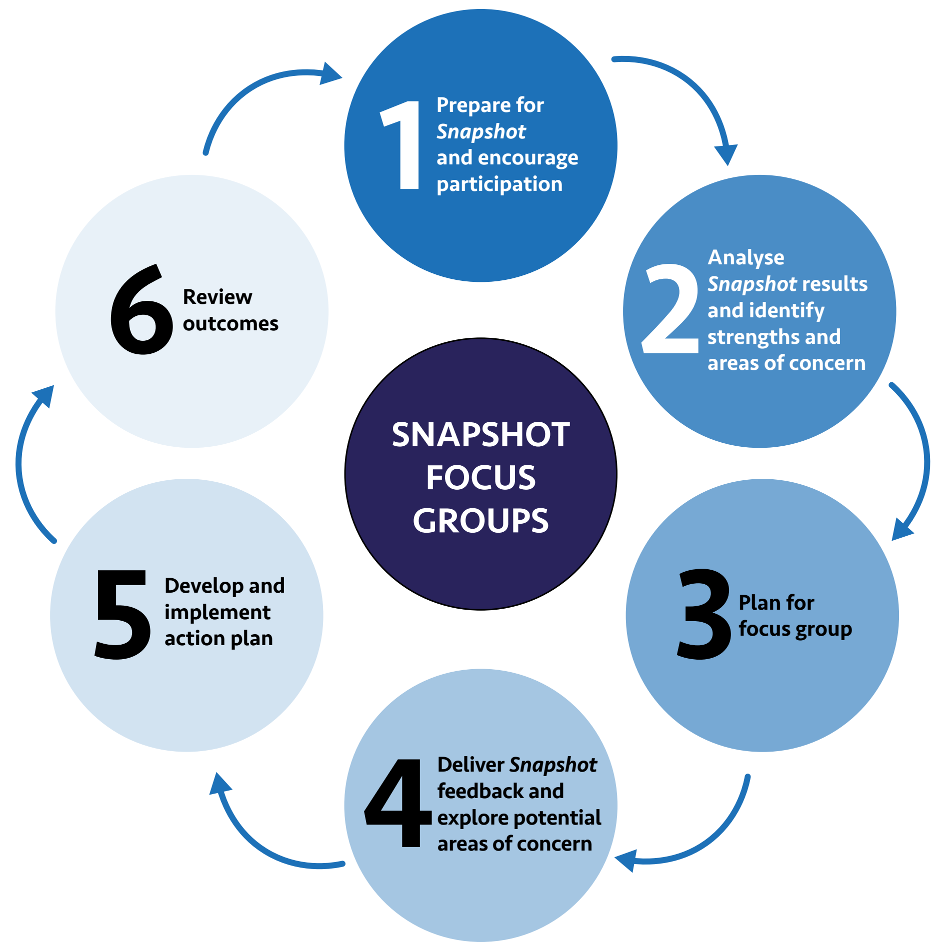

Figure 4. *Snapshot* focus groups

Conclusion

As mentioned previously, *Snapshot* can be an excellent catalyst for change within units that members can feel a sense of ownership over. By creating opportunities to provide feedback to unit members and exploring potential areas of concern, COs can develop action plans for change that can prioritise the most important issues whilst also providing members a sense of ownership over this change. This is particularly important when taking into consideration the multitude of research that advocates member ownership as an essential factor in successful and positive change. One of the effective ways in which COs can accomplish this goal is through targeted focus groups utilising their analysed *Snapshot* survey results.

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