
Crew resource management's contribution to flight safety and operational effectiveness at the UK National Police Air Service, as understood by flight-crew

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Abstract: National Police Air Service (NPAS) pilots and tactical flight officers (TFOs) were asked a series of questions about the teamwork standard known as crew resource management (CRM). It was agreed that CRM supported safe flight and mission effectiveness. Interviewees claimed CRM was useful in helping crewmembers navigate traumatic, high-stress incidents such as murders and riots. Interviewees claimed the CRM skillset supported objective analysis of personnel issues, such as overbearing pilots or under-performing TFOs. Some suggested the constituency for CRM training should be expanded to include dispatchers, managers and others connected with the NPAS. As the interviews and flight-deck observations progressed, it emerged that the relationship between the bases and headquarters had become strained, possibly affecting morale. The NPAS must create a trusting, open and inclusive culture in which critique is welcomed and good ideas implemented. The tenets of CRM could inform transformation.

Keywords: police helicopter support; pilots; tactical flight officers; TFOs; crew resource management; CRM; implementation; perceptions.

Reference to this paper should be made as follows: Bennett, S.A. (2019) 'Crew resource management's contribution to flight safety and operational effectiveness at the UK National Police Air Service, as understood by flight-crew', *Int. J. Human Factors and Ergonomics*, Vol. 6, No. 2, pp.160–178.

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1 Introduction

This paper explores the relevance to pilots and TFOs employed by the NPAS of the flight-deck teamwork standard crew resource management (CRM). CRM instils in pilots and cabin crew the skills and confidence required to assemble, organise and direct

resources (hardware, software and liveware) for safe and efficient flight (Bennett, 2018b, 2019; Kanki et al., 2019).

The NPAS provides helicopter support to the 43 police forces of England and Wales and to the British Transport Police from a network of fourteen bases (National Police Air Service, 2019). Created in 2012 with the aim of delivering a more efficient and effective service, the NPAS has been criticised on grounds of cost and service delivery (Her Majesty's Inspectorate of Constabulary and Fire and Rescue Services, 2017; Collins, 2017; Bennett, 2018a). At the time of writing, the NPAS was in a state of flux. Changes under consideration included reducing the number of bases, and introduction of fixed-wing aircraft in lieu of helicopters.

Viewed through Cook's (2000) systems-thinking lens, the NPAS qualifies as an 'intrinsically hazardous system' that invests in 'multiple layers of defence' for the purpose of delivering a safe and reliable service. Technical layers of defence include component redundancy (use of twin-engine helicopters) and a variety of electronic protections [for example, the traffic alert and collision avoidance system (TCAS) and global positioning (GPS)]. Organisational layers of defence include recruitment of military pilots and CRM training.

Interviews with pilots and TFOs were conducted in 2017. In 2017, the NPAS operated a fleet of Eurocopter (EC) 135 and 145 twin-engine, four-seat helicopters. Equipped with advanced sensors (for example, an infra-red camera) and mapping systems, these small, agile machines were operated at altitudes of between 1,000 and 1,500 feet to visual flight rules (VFR). Standard operating procedure was not to fly in, or above cloud. Minima were:

- cloud-base 300 feet (around 50 feet above the tops of electricity pylons)
- daylight visibility one kilometre
- night visibility three kilometres (night-vision goggles were available).

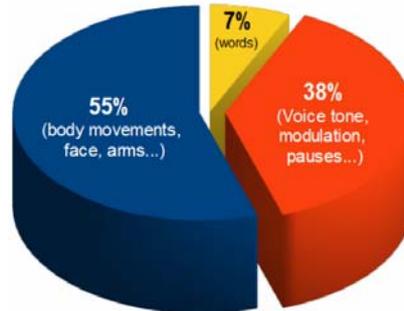
Work is organised around twelve-hour shifts, with handovers at 07:00 and 19:00. Usually the outgoing shift is able to brief the incoming shift (if not all, then some of the incoming shift are briefed). The NPAS synthesises two distinct work cultures – aviation and policing. Pilots work to European Aviation Safety Agency (EASA) flight-time limitations (FTLs), TFOs to police shift-work rules. Working with the NPAS transforms officers' outlook. As one TFO put it: "[one's] police officer ... identity is taken away massively. You become aircrew." Pilots and TFOs work a four-days-on, four-days-off cycle. One TFO remarked that the first rest-day is often spent catching up on sleep.

The EC135/45 usually carries a crew of three: a pilot and two TFOs. The TFO in the front left-hand seat operates the camera and manages some of the radio communication. Tactical control of the sortie is vested in the TFO in the rear right-hand seat. This TFO operates the mapping system using a keyboard, accepts or declines tasks (in consultation with the other TFO and pilot) and manages the bulk of the communication with ground units and flight dispatch (located in a purpose-built suite in a West Yorkshire Constabulary facility in Wakefield).

During single-TFO sorties, the TFO will occupy the rear right-hand seat. A pilot commented that in this configuration, non-verbal communication, which represents *circa* 55% of communication (Figure 1), is impossible. Tandem seating inhibits communication. As a pilot observed during his interview: "when you single-crew, you no

longer have the cross-cockpit non-verbal communication with the TFO. You can't poke him [sic] in the shoulder to get his attention." Green et al. (1996, p.100) note: "the main non-verbal methods of communicating ... are eye contact, facial expression, touch, body orientation and posture, hand and head movements and physical separation (personal space)."

Figure 1 Elements of the communication process (see online version for colours)



Source: Monarch Airlines (2017)

In police helicopter operations, each mission or job is unique. Each sortie is different. The nature of the policing mission means that the majority of intra-crew communication is contingent on circumstance. Given the non-standard and spontaneous character of the majority of intra-crew communication, the inhibition of non-verbal communication potentially reduces crew effectiveness.

Roles are not determined by rank. It is possible that a PC will occupy the rear right-hand seat (from which s/he will exercise tactical control of the sortie) and a sergeant the front left-hand seat. As a TFO put it: "[I]f you are in the back ... you have the shout." Another TFO said: "the pilot does not decide on the tasking. The pilot is a taxi-driver, effectively. They go where we ask them, if it is within limits."

To better understand the missions performed by the NPAS, the author occupied the rear left-hand seat (and, on the occasion of a ferry-flight, the front left-hand seat) on 18 sorties. These observation flights, undertaken *post* the interviews, revealed the lived reality of police helicopter operations in England and Wales. Noteworthy aspects included:

- The operational imperative to launch as quickly as possible once a task had been accepted.
- Operating at low altitude in uncontrolled airspace in proximity to other aircraft and flocks of birds. Helicopters are vulnerable to bird-strikes.
- Transiting controlled and uncontrolled airspace at close to maximum speed (known to the crews as straight-lining) to arrive on-scene as quickly as possible.
- The need to create a mental model of the incident and task from multiple reports of varying quality submitted across busy communications channels in a noisy, vibrating cabin. To this end, TFOs and pilots perform *bricolage* (see Sanchez-Burks et al., 2015 for a definition).

- An ability to quickly develop robust work-arounds for technical faults (such as communications breakdowns).
- The mental capacity and stamina to accommodate no-notice, *en-route* re-tasking. Occasionally, a crew would be re-tasked multiple times.
- The mental capacity and stamina to multi-task for the duration. For example, crewmembers are required to monitor six police, and two air-traffic channels.
- The need to maintain a high state of situation awareness throughout the sortie, especially regarding weather, fuel-state, potential traffic conflicts, terrain issues and threats from miscreants (helicopters are shot at and are subjected to laser attack).
- The need to continue to perform effectively when faced with traumatic or threatening situations (such as following a railway track to locate a person hit by a train, being shot at or being targeted with a laser).
- The need for the pilot and TFOs to maintain the highest standard of teamwork regardless of the number, severity and duration of threats and their own physical and psychological state (Bennett, 2018a).

The way in which CRM is taught differs between operators. For example, while some airlines run joint training for pilots and cabin crew, others train pilots and cabin crew separately (Bennett, 2018b). To understand how the NPAS trains CRM, the author attended a recurrent CRM course at a police base in the south of England.

2 Methodology

The data reported in this paper emerged from a two-year programme of mixed-methods research.

2.1 Interviews

Semi-structured interviews (see questions at Appendix A) were conducted individually with four pilots and eight TFOs at a variety of NPAS bases (the NPAS pilot responsible for the service's CRM programme sat in on the first interview). The interviews were conducted in private. Interviewees were informed that transcripts would be anonymised. Responses were tape-recorded and transcribed verbatim by the author. The transcribed interviews ran to over 30,000 words. The narrative was subjected to textual analysis (TA) and content analysis (CA) (Dixon et al., 1987; Taylor et al., 1995; Neuman, 1997; Maxfield and Babbie, 2001; Braun and Clarke, 2006), enabling identification and substantiation of themes and trends.

2.2 Non-participant observation

Ethnographic research (Geertz, 1973; Burgess, 1984; Van Maanen, 1988) provided insights into two aspects of the service's work:

- operational sorties

- the style and content of the CRM training provided to pilots and TFOs.

Ethnography is an epistemological process that generates high-fidelity accounts – Geertz’s (1973) ‘thick description’ – of social worlds (Bogdan and Taylor, 1975; Ellen, 1984). The author took detailed notes during sorties, creating a thick description of team function under stress. He also conducted opportunistic, unscripted interviews with pilots and TFOs.

In February, 2018, the author attended a CRM training course. The NPAS jointly trains its pilots and TFOs in CRM. The course, which took half a day, admixed:

- chalk-and-talk presentations
- case studies (of the loss in 2011 of an Aerospatiale Gazelle single-engine helicopter near Honister Slate Mine, Keswick, Cumbria, and the loss in 1995 of a Boeing 757 passenger aircraft near Cali in Columbia)
- a self-administered psychometric test (that rated assertiveness)
- question-and-answer sessions.

Regarding the case studies, the pilot of the Gazelle, described by some as opinionated and driven, was not qualified to fly at night. The Boeing’s flight-crew had mis-programmed the aircraft’s flight management computer, inducing controlled flight into terrain. To foreground aspects of the Gazelle accident, attendees were organised into three groups. The first group was tasked to look at the accident through a threat-and-error prism. The second to look at it through a personality-and-attitude prism. The third to look at it through an information acquisition-and-processing prism. Each group reported back. The first group highlighted suspect maintenance and poor weather. The second highlighted the pilot’s alleged over-confidence and risk-tolerance. The third highlighted the pilot’s failure to perform an adequate walk-around, his lack of night-flying experience and his failure to obtain a weather report. The presentations sparked discussion. Trainees appeared engaged throughout.

The NPAS must train its pilots and TFOs for unique and severe challenges. As one pilot put it: “we have to go further at night in worse conditions and approach the lowest fuel states with a mix of personalities in the aircraft.” A TFO claimed that the NPAS’s small helicopters were being pushed to their operational limits because of base closures.

3 Confidence limits

No academic research is entirely objective or accurate. The analysis presented here may have been skewed by the following factors:

- 1 *the data may have been skewed by the Hawthorne effect (Landsberger, 1958; Taylor et al., 1995):* observation may cause observees to modify their behaviour
- 2 *the data may have been skewed by experimenter-bias:* observees’ identification with the observer may cause them to modify their behaviour
- 3 *the data may have been skewed by observer-bias:* preconceptions or prejudices may influence an observer’s choice of scenario and subsequent interpretation of discussions, decisions and actions

- 4 *cognitive-overload may cause the observer to misinterpret or lose data:* information-overload and poor prioritisation may leave the observer overburdened, reducing situation awareness and note-taking accuracy (Gordon et al., 2013)
- 5 *ignorance and lack of familiarity may reduce the accuracy of observations:* in mitigation, it should be noted that the author has spent almost 20 years interpreting flight-crew interactions (see 4).

4 Author's experience of aviation

Knowing the subject environment is important for the ethnographic device known as *verstehen* (Bogdan and Taylor, 1975). The author has spent two decades studying flight-crew interactions, accumulating over 1,500 hours on the jump-seat and *circa* 200 hours on the ramp. He has: performed a landing in a 737–300 simulator; received safety and emergency procedures (SEP) type-training; delivered human factors training to flight-crew; attended human factors courses, including CRM courses; supported a 757 line operations safety audit (LOSA).

5 Data

5.1 Interviews with TFOs and pilots

The narratives generated by the eight TFO and four pilot interviews were subjected to TA and CA. Thirteen themes emerged.

5.1.1 The CRM skillset provides a coping mechanism for challenging situations

It was universally agreed that CRM training helped develop the skills and attitudes required for teamwork. Some interviewees claimed that CRM had helped them function during stressful incidents. One TFO who, as camera operator, had witnessed a beheading, observed: "you tend to lean on it sometimes. I had quite a horrific incident a couple of years ago. We were dealing with a call to a chap with a knife in North London It quickly developed into something very significant where a chap who turned out to have mental issues actually beheaded somebody on camera while we were watching. He held her head up to us. Threw it down the garden. You don't expect to see that. He continued down a row of gardens towards children playing. He had a bloodied knife in one hand. You are thinking 'here we go.' As it was going on, and we were all using colourful language ... myself especially ... we were all almost leaning on CRM as a kind of a support: 'OK boys, you've got to remember what you are doing.' 'Pilot, are you happy? Are you safe? Are you level? Are you with it? Are you OK?' 'Guy in the back. Andy. How are you doing?' Because Andy's brother was actually down there dealing with this guy as well. The radios were dropping out. The mapping was inaccurate. So there was a lot of pressure. And we kind of almost took ourselves out of it by using that interaction, not as a crutch, but as a guide to get us through the situation, so you almost made a point of verbalising your thoughts more than you would normally: 'OK. We've got to think about the SOPs for landing.' It was really useful to lean on the awareness of CRM and

things like the SOPs. We were making sure we were talking [verbalising], which is what CRM is all about: ‘is the aircraft good?’ ‘Are you good?’ ‘Are we ready to do the pre-landers? [Prior to landing, the TFO in the front left-hand seat runs through a check-list with the pilot].’ ‘Is everyone happy that we have done the pre-landers correctly?’ ‘Do we need to do them again, because we have all had one hell of a shock?’ There was a lot more chatter and interaction than there would have been without awareness of it [CRM].”

The stress inherent in this incident was exacerbated by circumstance. Specifically:

- The helicopter was tasked to this incident late in a sortie. Instead of landing back at base the crew found itself catapulted into a major incident. As the TFO explained: “[it was] one of those jobs where you are on your way home, you can see your landing site, and it just came over the radio, it was one of those very low-key things. It quickly developed into something very significant ...”
- The TFO in the rear right-hand seat was related to one of the Metropolitan Police officers who attended the incident. Because there were no Taser or armed response (‘Trojan’) units in attendance, first-responders were in jeopardy. The perpetrator, Nicholas Salvador, was a paranoid schizophrenic who smoked skunk cannabis, claimed by some medical practitioners to induce psychosis (British Broadcasting Corporation, 2015).

During another incident, CRM helped a crewmember identify and resolve a breakdown in teamwork and functionality. As the base commander-TFO of a southern base explained: “[o]ne of my crews attended where a horse was butchered during a riot at a town near here. On that occasion, the crew was unable to intervene and prevent that from happening. At the time, the performance of one of the crewmembers in the cab deteriorated very badly and the other person involved was able to recognise that and take on the communications aspect of their role as well. There we had two people. One with good CRM skills who used them. One with poorer CRM skills who was struggling. I don’t think in their case it was a lack of CRM training or input that caused the problem. It was down to a more general difficulty of dealing with stress and maintaining situational awareness in stressful situations.”

In another incident, CRM helped the TFOs and pilot maintain focus and deliver a result during a pressured search for a missing person undertaken in challenging conditions. As the TFO who occupied the rear right-hand seat explained: “about three years ago [2013] two teenage girls went swimming in the river Wear. They went under. The police retrieved one body. The other body could not be found. I was in the back. We did a sweep of the river. We used the searchlight. I was lying on the floor of the cabin looking out the door. Murky water. The pilot said we’re getting low on fuel and we are losing the light. I went on the radio and said: ‘this is probably going to be our last sweep.’ You could feel the tension from the control room. Basically, the police wanted to say: ‘Here’s your daughter.’ There was a lot of pressure on us. People on the ground were not having any luck. We eventually found the body and talked officers on to the location. We performed well as a team. It was like a very sombre victory. We did it methodically. There was pressure and upset. CRM helped us through it.” Asked to reflect on *how* CRM helps in charged situations, the TFO said: “it makes you look out at yourself. It’s as if you can look in and see yourself: ‘I know what is happening here.’ It is like me looking down, and seeing how we

operate. Seeing how this can go really bad if we are not careful: Look at it; reassess; talk about it.”

The data suggests the CRM skillset acts as a coping-mechanism, delivering support in several ways:

- CRM promotes mindfulness (see Langer's, 1989 definition) and high-reliability operating (see Mason's, 2004 definition). It creates in crewmembers a potential for calm, unhurried reflection. In an operational context, this potential, when realised, can deliver important benefits, including an ability to accommodate distractions and stressors, identify weaknesses, canvass opinion and formulate action-plans. Accommodation of stressors helps subjects maintain focus. Identification of weaknesses (for example, a colleague who is underperforming) supports effective working. Formulating action plans keeps minds focused by structuring and directing activity.
- CRM encourages the sharing of information and ideas, creating synergies. Interviewees linked the volume and quality of communication with mission success. The TFO who witnessed the beheading observed: “CRM is about everyone constantly bouncing off everyone else. It worked. It really worked.” Effective CRM supports high-reliability operating: “[*highly reliable*] organisations are constantly aware of the possibility of failure, appreciate the complexity of the world they face, concentrate on day-to-day operations and the little things, respond quickly to incipient problems and *accord deep respect to the expertise of their members. They value knowledge and expertise highly [and] communicate openly and transparently [my emphasis]*” [Mason, (2004), p.140].

5.1.2 *The more visceral the task, the more difficult the post-sortie adjustment potentially*

Several TFOs and pilots talked about the emotional strain of high-consequence, time-critical jobs such as searching for a person swept out to sea or a person struggling to stay afloat in a fast-flowing river. Some jobs were so out of the ordinary they took on a surreal quality. The TFO who witnessed the beheading recalled sitting with his colleagues post-sortie in a canteen in a state of bewilderment: “we were all just in the canteen saying: ‘can you believe that?’ ‘What the frigging hell just happened?’ ‘Did that really happen?’” Asked to describe his feelings on witnessing the beheading, the TFO said: “I felt sick. Kind of cold. Very, very stunned.”

Interviewees' testimony resonated with Wickler's (1990, p.103) observations on American soldiers' responses to being transported in a matter of hours from a battlefield in Vietnam to main street, USA: “not uncommonly, a soldier ... [will] travel fifteen hours ... arrive on a base and six to eight hours later be on the street as a civilian. Such procedure disallowed the possibility of veterans collectively ‘working through’ their war experiences and possibly resolving or coming to terms with the injuries of self.” Many of the young men who fought in Vietnam experienced post-traumatic stress disorder (Card, 1987; Barrett et al., 1996). During the Second World War, troops returning to the USA from Europe and the Far East were carried on troop ships, allowing time for reflection and adjustment. While the crew that witnessed the beheading was immediately stood down, others found themselves preparing for the next job with no time set aside for reflection.

5.1.3 CRM provides a counter to stressors

Stressors are inherent to police helicopter operations. For example: the pressure to launch quickly; operating at low altitude in marginal weather; vibration and noise; pressure to turn the aircraft around quickly; the frustrations of inactivity; irregular meals; lost or poor-quality sleep. Sleep-loss affects performance, which naturally deteriorates during the circadian lows (Bennett, 2010). One TFO reflected on sleep deprivation: “after 02 [2 a.m.] I am quite grumpy. You are heading for the 04 trough It is dark, your body is in a different state. On a night shift, I go from sleeping seven hours to sleeping two. You are robbed of sleep. Doing four hours flying on a shift is quite a long time. You get back, you get gassed up. Do your admin. You end up throwing your food down your neck Three hours [flying] makes an impact on you. My ears are ringing sometimes. The aircraft vibrates. It just tires you out. You might be bouncing around. Your eyes get quite strained.”

Another TFO reflected on the frustrations of down-time and working four consecutive, twelve-hour shifts: “people can get agitated and irritated while on the ground We get along by ribbing and taking the Mickey out of one another. But sometimes it can be taken too far.” Several interviewees claimed the CRM skillset helped them manage stressors. A pilot put it like this: “CRM does flag up where things are about to go wrong If things are getting kind of hectic, you feel a bit more confident in saying ‘stop’. That is ... a big thing.” CRM, informed by HRO theory (see Mason’s, 2004 definition), encourages mindful behaviour.

5.1.4 CRM encourages mindful behaviour

Several interviewees claimed that CRM promoted mindfulness. One TFO explained: “[CRM] makes you more aware of yourself and how you are received by people. Your body language. Your tone It makes you realise that people will be reading you. And that you can affect how they read you by staying calm and just controlling yourself It makes you much more accommodating with people. It makes you take a deep breath.” A pilot claimed that CRM had helped him decide that he should tell colleagues about his cancer. He explained: “I was encouraged to do it by some CRM training Getting stuff out into the open so it does not become a secret.”

5.1.5 Crewmember ad hoc practices support teamworking

Several claimed that spontaneous innovations and work-arounds helped team function. A pilot explained: “after you have done all your training, there are certain things that you don’t know. For example, there are six police and two air traffic channels to be monitored. In an ideal world, all crew would monitor all channels all of the time. You can’t do that. You’d max-out. I listen to the air traffic channel and turn down all the other channels. I ask the TFOs to tell me if they are given new operational orders or requests, because I have turned those channels down. Then I can concentrate. Conversely, the TFOs want the tactical information. They turn the air traffic channels down and turn the other channels up. At some point, once we are safely in flight, we can start putting the volumes up on the radios. Nobody ever teaches you that. It’s not a SOP. That’s pure experience that tells me that’s the best way to do it. Little things like that should be filtered into the CRM training.” Snook (2000) describes how under-resourced and

over-extended employees modify or circumvent procedure on their own initiative to meet production targets.

5.1.6 Frustrations are generally met with circumspection and resolve

There was universal agreement that safety came first and that the frustrations of the job should be viewed through a safety-first prism. As a TFO put it: “you have got to be a bit stoic and say: ‘we’ll get them next time.’ ‘It will happen again. We’ll make a difference, more often than not.’ You kind of pacify yourself that way. You think of all the times you have made a difference. You always get them in the end. Because they will always do it again. And you get them eventually. They [the perpetrators] don’t know what else to do.”

5.1.7 Occasionally, CRM breaks down

When CRM fails, the consequences can be serious (Federal Aviation Administration, 2017; Bennett, 2019). Some interviewees claimed to have witnessed breakdowns in CRM. A TFO recalled a sortie occasioned by a marine emergency: “we went to look for two divers who were lost off St. Mary’s Light House [on the north-east coast]. The pilot decided that when the SAR [search-and-rescue] helicopter arrived on scene, we were going. Normally we would split. SAR would go low, and we’d go high, to put a safety margin in. The pilot insisted on leaving the scene. I questioned his decision. He said: ‘I’m the captain of the aircraft. We’re going.’ We got back and had a big row. I politely said that there were things we could have done on-scene. He said: ‘I’m not going to discuss this with you.’ I said: ‘fair enough ... but I’m going to tell you.’ Like the NHS, my job is vocational. I’m here to help people. The day you stop wanting to help, leave. He was a civilian pilot who wasn’t bothered what was going on in the water. Me and my colleague in the aircraft were wanting to help. They were found a few hours later, dead. Both drowned.”

Another TFO recalled an occasion when crewmembers disagreed over the feasibility of a task: “we were flying to a job on a night when the weather wasn’t very good. Bravado kicked in a little bit. We were tasked to a job close to the coast. There was a bank of cloud. We said that we should turn the job down. The pilot said ‘stop being soft. Man-up. We can’t turn down all jobs because of weather.’ That gets your hackles up. This is CRM breaking down. Totally wrong attitude. We are not allowed to fly in cloud. We went to the job. It wasn’t a particularly good job. We didn’t need to risk ourselves for it. We turned around to look at the airport, and it was covered in cloud. We had to fly above the cloud, which you are not supposed to do. We can’t get into the airfield. A small hole opened up. We didn’t know what was through that hole. We flew through that hole. We could have hit power lines. Very, very dangerous. Managed to get in. The pilot admitted he’d screwed up. I was angry because we’d risked our lives because of bravado.”

A third TFO recalled working with a pilot whose behaviour was far from mindful: “when I came to the unit ... you had a chief pilot ... who was old-school, ex-military. There is no such thing as a stupid question. But if you asked something that you think is a sensible question, you could get rebuffed. ‘What you asking that for?’”

A base commander-TFO recalled a breakdown in CRM at a critical moment during a sortie: “[one of our TFOs] has a tendency to move into a state of auditory exclusion [T]hey were deeply involved in a task. They had got to that stage of auditory exclusion,

and they are shushing the pilot as the pilot calls up a ‘close-by’ TCAS [traffic alert and collision avoidance system – a device that scans for aerial threats] hit.” A TCAS hit requires the pilot and two TFOs to visually scan for conflicting traffic. Crewmembers reviewed the event at the end of the sortie: “everyone in the cockpit was able to recognise what was going on [A]t the time [CRM] did not get us out of trouble, but it gave us a framework to address a problem.”

A pilot recalled an occasion when his crew voiced concerns about a mission, but he decided to press on: “we were going to a job. The crew were aware of the minima, but they had not experienced them. There was some bad weather coming through. We had 2,000 metres visibility. The cloud-base was about 500 ft. We were following a railway line. I told them that I knew the area. I knew there were no power lines or high obstacles. I said: ‘I’m quite happy to push on’. But they were still unsure. They were saying ‘we’re not happy with this’. But they listened to me. It was just a thin band of weather. We got through. Now they have experienced it.”

5.1.8 Debriefs are not always performed when needed

Some interviewees claimed debriefs were routinely performed, others that they were not. A TFO explained: “what you tend to do is, if any one member of the crew feels there is an issue, then they’ll say: ‘do you want to have a little chat over a coffee, chaps, about that last one?’ Normally, someone will have a point to make. If you have new crew you will debrief every flight as a matter of course. If you are on an assessment, you will be debriefed as part of your assessment. Maybe debriefing should be compulsory. Maybe you should add it to the routine. It would only take five minutes.” Interviewees’ different understandings of the status of the post-sortie debrief supports a base commander-TFO’s observation that each NPAS base possesses a unique *modus operandi*: “[t]he NPAS is a national organisation – has been for four years – and we still have not got set SOPs that are national. Every base does things in different ways. Which is wrong. There should be interoperability.” This assessment resonates with Eyre’s (1984) observations about sub-cultures.

5.1.9 Expanding the constituency for CRM training would help ensure resources are used effectively and efficiently

There was a strong consensus that expanding the CRM training pool to include dispatchers, managers and others would help deliver a more effective service. A pilot summarised the problem succinctly: “[control room staff] are not hugely aviation-aware.” Asked who should be trained in CRM, a TFO observed: “the Wakefield dispatchers ... regional managers, whether they come from a flying background or not Senior people need to spend time with us. They need to understand the basics and the demands One time in a twelve-hour shift I did five hours and fifteen minutes flying. You might say ‘that’s not even half.’ You are absolutely knackered after four hours. It is not like sitting on the flight deck at 35,000 feet on autopilot, monitoring.”

A base commander-TFO observed: “I think [dispatchers] should be attached to a unit for a week or two to gain a better understanding of the working environment and the demands They need to see what happens in the aircraft and what happens on the ground between jobs. They need a better understanding of the paperwork side of down-time. They can sometimes be too quick to send you to another job. They need to

understand that when you land ... after that second job, you have twice as much paperwork to do [t]hey should see CRM practiced at a unit level.”

Another pilot observed: “when a unit is running CRM training, ops staff and managers should attend CRM is much better when it is done with a crowd. The ops staff and managers might see something different. They might throw something in. Sometimes totally left-field From a CRM and training point of view, the NPAS needs to involve everybody The RAF ... used to have a very good film that highlighted to backroom staff why they are part of flight safety. A Harrier pilot had a crash, and the immediate reaction was ‘pilot error’. The film went through the pilot’s day prior to the crash. The chef had turned up late, so the pilot did not get his breakfast. Just as he got into work, he got a phone call from the pay office saying they had screwed up his pay, and there was nothing on his pay slip. He had to see his commander, who told him that a party he was organising had been brought forward. All piling on the stress. Then he goes flying Everyone in the organisation needs to be aware of the impact they can have through something they have done or something they have not done.” The accident described in the RAF training film was an *organisational* accident (see Reason’s, 2013 definition).

5.1.10 CRM training has maximum impact when tailored to the needs of police helicopter operations

A majority of interviewees said they found the NPAS’s tailored CRM training useful. A base commander-TFO explained: “I did some of the early CRM courses It was tailored to major airlines. Over the years the training has become more tailored to our operations. The last few courses were run by police aviation pilots. They have tailored it towards our working environment. We look at incidents that are more relevant. Over the last ten years we have had a few incidents with police helicopters and air ambulance helicopters. There are cases to look at. Tailoring it is quite important.”

5.1.11 The working relationship with ground units could be improved through education

Some interviewees claimed that education of force officers in the capabilities of the helicopter would improve the effectiveness and efficiency of the NPAS. A TFO explained: “there is a lack of understanding as to what is involved in our role We have asked whether we can talk to the new recruits. We’ve been told there’s no time within the timetable It’s ridiculous, because the helicopter is a fantastic resource ... which is a really expensive resource if it is tasked incorrectly.”

5.1.12 The NPAS harbours sub-cultures – some functional, some dysfunctional – that influence perceptions and behaviour

Organisations, comprised of people, goals, processes/procedures, culture, technology and buildings/infrastructure, operate within a context shaped by regulation, economic circumstance and stakeholder requirements (Davis et al., 2014). Sub-cultures are a feature of organisational life (Eyre, 1984). Sub-cultures, associated with interests, beliefs, skills, gender, salary, career-stage or physical location (Turner, 1988; Kilmann, 1989; Trice, 1993; Brown, 1995; Hatch, 1997), may induce members to support or undermine the host

(Armstrong, 1996). Employees may express frustration or disaffection through 'organisational misbehaviour' [Watson, (2003), p.229]. Organisational misbehaviour is as likely to manifest at the top of an organisation as at any other level (Watson, 2003). Employees may associate themselves with/reproduce more than one sub-culture (Waring, 1996).

During his fieldwork the author noted that teams formed quickly, performed effectively (even under duress, as when equipment failed) and unformed quickly and un sentimentally. There was minimal disagreement. No conflicts were witnessed. Some interviewees claimed the relationship between the bases and the national organisation was strained. According to the base commander-TFO of a southern base, the act of absorbing numerous force or regional helicopter support units with their aviation cultures into a national organisation whose senior managers were regular police officers had stressed the NPAS.

The culture of aviation is different to that of operational policing. Aviators, embedded in close-knit teams and indoctrinated with CRM, are trained to monitor decision-making and to challenge decisions that, from a safety or efficiency perspective, they feel uncomfortable with (Kanki et al., 2019). Police officers, who receive no formal training in teamwork, are less inclined to challenge decisions or admit to errors. A TFO explained: "as a police officer you don't get any teamwork training. I started my CRM training pre-NPAS. It was completely eye-opening that we should challenge regardless of rank or seniority. The police had taught me the opposite: that you should just obey and take orders. CRM taught me that I should not be intimidated by rank or qualifications: that the point is to get home safely. That you should not blindly accept what is going on." Another TFO said: "as a police officer, CRM is completely new to me. We don't have anything like that in the police. The culture within the police is very much ... depending on where you work ... if you make a cockup, don't tell anyone. CRM is very much the opposite. There is a big change for police officers new to this aviation environment. It was a big change ... understanding the culture of CRM and what it means." The base commander-TFO of a northern base said: "you can see the difference ... between standard policing and police aviation. In the former ... there isn't the openness and honesty [sic] around those teams, and people tend to be told to do things, and they do them, and there is a fear of challenging." The base commander-TFO described the relationship between the bases and headquarters in these terms: "we are an aviation business involved in policing. However, at the top we are policing with aviation involved There is still too much of an attachment to West Yorkshire police." A TFO observed: "the whole idea of being able to challenge your manager in the right circumstances should go across the police If you have a better idea, they [senior officers] should be receptive If something needs saying, it needs saying. I think I can do that in this organisation [the NPAS]. If I couldn't ... I wouldn't be happy working here."

Some interviewees claimed that locating the NPAS within the institutional setting of the West Yorkshire constabulary caused friction. The base commander-TFO of a southern base said: "the top brass does not have an aviation or an air support background. They have an operational policing background. Probably, to start off with, they were not used to being challenged in the way that I would expect to be challenged in the aviation world." Challenges caused ruptures in the cultural fabric of the NPAS. The base commander-TFO alleged that suspect behaviour manifested at every level: "there have been quite a few occasions over the last year or eighteen months where the hierarchy of the organisation has really put the fear of God into the middle management. Which left

people either fighting the organisation, or shutting up and hunkering down Sometimes when people are jaded, rather than find a positive way to develop a new process, they just wait for it to fall over. There is some oppositional behaviour between some people in our organisation and the top brass." A TFO observed of senior officers' behaviour: "they are resistant to change. Their way is the right way. 'I am a senior officer, I am right.'" Of course, senior ranks may hold the same opinion of junior ranks.

5.1.13 Resourcing has implications for effectiveness, teamwork and flight-safety

Police budgets have been cut. Some claim the cuts have had a detrimental effect on front-line policing. In late 2018, the chief constable of the West Midlands force observed: "the public's experience is policing that is less visible, less responsive and less proactive Core aspects of policing – such as answering calls, attending emergencies, investigating crime, bringing offenders to justice and neighbourhood policing – are being pushed beyond sustainability, and are in danger of becoming ineffective, to the detriment of confidence in the police" (Thompson cited in Dodd, 2018).

Some interviewees claimed that budget cuts have obliged the NPAS to modify its *modus operandi*: for example, dispatching aircraft with one TFO only. A base commander-TFO claimed that single-TFO sorties increased operational risk: "the systems in the aircraft are configured for three-person operation. The systems are not compatible with two-person operation. You don't get the full benefit of the systems. If you are on a slow-time job – for example, missing from home in a rural area – you can do it with two people. Albeit you would not get the result you would get with three people. Fifty percent of our searching is done with the camera. The other fifty by the rest of the crew with eyes-out. With a two-crew aircraft, you have the pilot who is flying the aircraft and glancing out, and the person on the camera, who is eyes-in, working the camera. They are also having to work out where they are and be situationally-aware. So they are not giving full commitment to looking at the screen and searching, because they are having to look where they are, switch it to the mapping system to work out the location of possible sightings, use the radio to talk to people on the ground whilst monitoring the dispatch channel and air traffic channel. You can get into max-overload very quickly, even on a slow-time job. On a high-demand job, such as a firearms incident, you cannot give a proper service. I'd say you are putting yourself and that aircraft at higher risk because you are maxing-out so quickly with your workloads. Now, I understand why they want two crew ... because we only have so many aircraft and we have to provide a service. Most bases will offer two crew, but they'll say we can't do that job because I'm not competent to deal with that job. The big danger is that you are tasked to a slow-time missing-from-home, and while you are on that job, you get something else. If you turn it down it damages the organisation's reputation. Also it puts pressure on the individuals to say 'yes' and to try and provide a service."

A pilot noted that the NPAS trains for three-crew operation. He commented that the seating arrangements dictated by single-TFO operations inhibited non-verbal communication, and that pilots' natural desire to support colleagues could see them drawn into the policing side to the detriment of flight-safety:

"normally you train as a crew of three. When you single-crew, you no longer have the cross-cockpit non-verbal communication with the TFO. You can't poke him [sic] in the shoulder to get his attention, because he is now sat in the back. Because the guy in the back is now working like a one-armed paper-

hanger, it is only natural that me as the pilot wants to help him out. The problem then is that you get sucked into the job [policing] side of it, and pay less attention to ... not flying into anything. I think it is quite a big CRM issue. We are not trained for single-crewing. No one says: 'when you are single crewed, this is what you have to do.'"

It could be argued that the sanctioning of single-TFO operations equates to a latent error or resident pathogen (see Reason's, 2013 definition).

A base commander-TFO described how staff shortages affected capacity: "I have enough staff to crew the aircraft every day, so long as everybody is here. If people take leave it gets trickier. The shift-pattern is designed for twelve people, and I have eleven. It's a balancing act." According to this commander, complaints had fallen on deaf ears: "decisions are made in Wakefield without much consultation. For the last two or three years the understaffing issue has been flagged up by the base managers. It has been flagged to the senior leadership team and to HR, but nothing has been done about it."

6 Conclusions

Interview data confirms that CRM helps pilots and TFOs work effectively and efficiently. It was agreed by a majority of TFOs and pilots that CRM:

- facilitates teamwork and communication, both in the cabin, between the aircraft and dispatch, and between the aircraft and ground units
- helps pilots and TFOs cope with challenging situations by, for example, creating expectations and specifying behaviours
- supports the development and implementation of creative solutions to operational problems such as communications breakdowns
- mitigates the risks inherent in single-TFO operations.

All 12 interviewees agreed that CRM positively contributes to the safe and efficient operation of the NPAS fleet. It was unanimously held that CRM is a good thing. This is an interesting finding, given aviators' initial hostility to CRM: "a great many pilots ... dismissed CRM as 'charm school' or even a 'communist plot' to erode their authority [O]ne of the primary fears that pilots had was that CRM would devalue their expertise and cripple their ability to command Flight attendants were also initially sceptical" [Gordon et al., (2013), pp.157–159]. The Civil Aviation Authority (2016, p.11) observes that "early [CRM] courses had mixed reviews from pilots."

There are qualitative differences between police helicopter and scheduled passenger operations. While airline crew may witness violence and be called on to resolve disputes [for example, between drunken or drugged passengers (Bennett, 2016)], police pilots and TFOs regularly witness acts of violence, destruction and lawlessness and are frequently involved in emotionally-charged incidents, such as searching for a missing child or locating the remains of a person hit by a train. Further, while performing their duties, crewmembers may be targeted by miscreants. Police helicopters are shot at (the EC135s/145s operated by the NPAS carry no armour) and targeted with lasers (British Broadcasting Corporation, 2014). Aircraft that land away from base may be vandalised.

Aircraft are also vulnerable on-base: in 2009, a NPAS EC135 was destroyed in an arson attack (*Birmingham Post*, 2009).

To the extent that it provides a problem-solving framework, CRM helps crew overcome the often severe challenges thrown up by police helicopter operations. It is clear that CRM helped the crew who witnessed the beheading. Faced with something unfamiliar and shocking, CRM helped crewmembers focus on keeping their aircraft safe, providing ground units with situation-reports and ensuring that colleagues were performing. Three CRM routines – monitor-and-cross-check, inquiry and verbalisation – helped the crew navigate the incident. As the TFO put it: “there was a lot more chatter and interaction than there would have been without awareness of it [CRM].”

At the NPAS, pilots and TFOs are trained jointly in CRM. There was a consensus that including dispatchers and managers in the training would help the NPAS use its scarce resources more efficiently and effectively. There was also a view that more should be done to educate force officers in the capabilities of police helicopters, again with a view to using resources more efficiently and effectively. Widening the catchment for CRM training has been trialled in commercial aviation: “American Airlines is including dispatchers in CRM training in recognition of common concerns and responsibilities, and the need for effective, open communication” [Helmreich and Foushee, (2010), p.33]. The Civil Aviation Authority (2016, p.8) says: “case study material reinforces the need to widen the CRM training net.”

Interviewees confirmed that force officers do not receive teamwork training. Given the centrality of teamwork to policing, this is an oversight with potentially serious consequences (for example, injury or loss of life). It is suggested that force officers be given teamwork training. Given the effectiveness and popularity of the NPAS CRM programme, consideration should be given to rolling it out – suitably adapted – to recruits, probationers and serving officers.

As stated, it was clear from interviewees' testimony that CRM helps mitigate the risks inherent in single-TFO operations. Those who claim that single-TFO operations are less effective and less safe could, with justification, argue that the CRM skillset is complicit in the paring-down of resources. A politicisation of CRM?

Since its creation, the NPAS has been an organisation under stress, whether from budget cuts or from the drive to rationalise and harmonise the service. On occasion, the resulting stresses have manifested in intra-organisational strife. To a degree, the NPAS's structure, with service delivery (production) organised around fourteen geographically dispersed bases manned by tight-knit and highly-motivated teams, provides fertile ground for the emergence of sub-cultures whose mores, world-view and actions may conflict with those of Wakefield headquarters staff. Whatever the field, sub-cultures have the potential to frustrate management agendas (Armstrong, 1996).

Functionalists believe culture to be malleable (Deal and Kennedy, 1986; Dyer and Dyer, 1986; Kono, 1990). Interpretavists believe it to be fixed (Watson, 1982; Davies, 1988). Taking a functionalist view of the problem, and with CRM providing behavioural cues, parties should reflect on their actions to date and, through collegial and empathetic behaviours, seek to improve communication and co-ordination with the aim of creating a coherent, inclusive organisational culture that is supported by every employee. The CRM skillset can be used to effect at every level of an organisation – micro, meso and macro.

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Appendix A

Interview questions: NPAS

- 1 In what ways has your CRM training helped in your routine, day-to-day work?
- 2 In what ways has your CRM training helped in non-normal situations?
- 3 What changes would you make to CRM training to make it more relevant to your role in the cockpit/in the cabin?
- 4 Do you think CRM could be used in other professions/industries?
- 5 If 'yes', which professions/industries, and what benefits might CRM bring?
- 6 Is there anything else you would like to say?