Facing The Change:

From Organisational Responsibility To Personal Accountability

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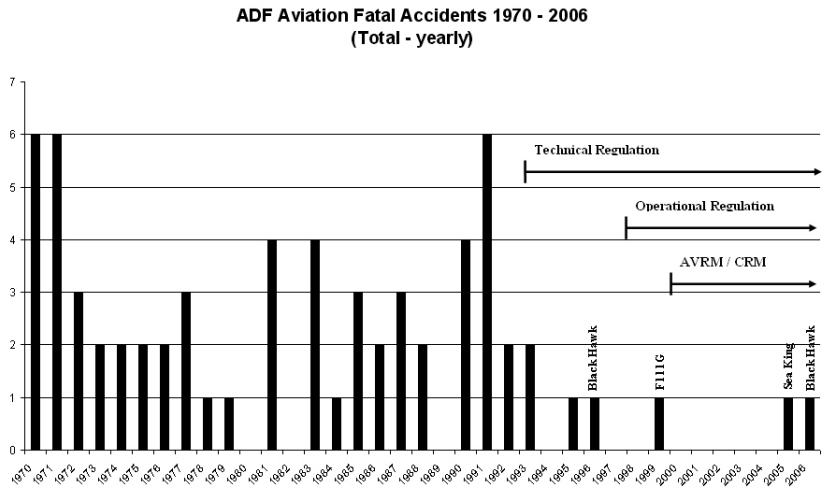
The Need for Change.

The Royal Australian Navy (RAN) Fleet Air Arm (FAA) has had a long and varied history. Aircraft types have changed along with the role we do. Long have the days passed of fixed wing operations with all the assets now rotary and operations as small independent units, embarked on a variety of ships is commonplace. The FAA currently consists of three Squadrons that operate four different aircraft types, but it is still relatively small in comparison to other Naval air wings. The diversity of the roles and responsibilities of the FAA is extensive. The operations range from ab-initio aircrew and maintenance training to flights at sea conducting operations in the Arabian Gulf and humanitarian assistance post flood, fire and earthquakes.

As time has passed the activities and actions that were once considered part of the business and the method of how the FAA achieves the mission are now assessed against a new standard. The standard has been changed due to advances in technical and operational regulation and the introduction of Crew Resource Management (CRM) and Aviation Risk Management (AVRM). Additionally, the acceptability of the loss of an asset and more importantly the loss of life is no longer considered part of the job particularly in the eyes of the Australian public, which is emphasised when the accident is avoidable. Following the development of the new regulatory standards the number of fatal accidents dropped significantly from approximately 4.04 per year prior to 1993 to 0.38 per year post 1993, see graph 1 (Navy Media Release n.d.). This was despite a significant increase in operational commitments from 2000 onwards with greater demands being made on the members of the FAA but no corresponding increase in resources. The FAA was committed to operations in the Solomon Islands, boarder protection and the commencement of operations in the Arabian Gulf and a number of humanitarian assistance missions. The thought of saying no to tasking was relatively unheard of. From senior leadership down to the man and woman on the shop floor tasking appeared to be accepted unquestioned. The period of increased operational tempo did not result in an increase in reported major incidences nor did it alter the accident rate figures, as could have been expected, instead operations appeared to be safer than ever before. As a result complacency and a belief that aircrew and maintenance actions being conducted not only guaranteed mission successfulness but also were inherently safe, led to the acceptance of workarounds and shortcuts to achieve the mission.



GRAPH 1 - ADF Aviation Fatal Accidents 1970-2006 (Navy Media Release n.d.).

In April 2005 the Australian Defence Force (ADF) and specifically the FAA was shocked into reality with a catalyst event. Sea King Shark 02 crashed in Nias, Indonesia and Australia lost the lives of nine defence personnel. This was the first fatal aircraft crash the FAA had experienced in 20 years and the most significant loss of life in decades. When it was revealed that a maintenance error was the reason for the uncontrolled flight into terrain the RAN and Australia began to ask the all-important question; why it did happen? Getting the job done at all costs had taken its toll. This event forced the FAA to look inwards once again, and take stock of the way it was doing business.

Prior to this accident the culture of the FAA truly was one of getting the job done with minimum fuss and maximum efficiency. Members of the FAA at the time when embedded in the culture, find it difficult and almost impossible to detect that there was anything wrong with the way the organisation was doing business. What was needed was an external look at the Squadron system to help identify what the problem was. The initial internal FAA review of the system identified the lower level faults of workarounds and missed steps. Patches were put in place to treat the identified causes. However it came apparent that the problem was much deeper than basic workarounds. The culture of the FAA was scrutinised and it was found that the organisation had an embedded culture that accepted risks without understanding the possible consequences and failed to identify the real causes of incidents, particularly those of the maintenance fraternity.

The FAA is and always has been an inherently flexible organisation. The high level of training that is conducted and the expectation of the workforce to think outside the box is one

of the reasons it has been so effective in operations. It could be argued that this ability to be infinitely flexible in operations contributed to the catalyst event. It comes back to the understanding of how that flexibility could and will affect the airworthiness, both technical and operational, of the platform and organisation. This flexibility may have acted to thwart any error capturing defences that may have existed at the time. Although the FAA remains flexible, consideration is now given to the consequences of stretching the work force and saying no is now an option. Significant defences have now been established in the effort to catch the events before they become accidents.

It was well established that aviators needed to always learn from the lessons, not only from within the organisation but also from external agencies. But our organisation was not effective at assessing and passing on the lessons identified in the Aviation Safety Occurrence Reports (ASORs) particularly those in the maintenance reports. Heinrich introduced the accident pyramid in 1931. Essentially the pyramid depicts that for every fatal accident there would be at least 3000 near misses, and over 300,000 at risk behaviours (Roughton 2008). In other words, Heinrich was lamenting the fact that there are rarely un-avoidable accidents as there are normally many warning signs and incidents, which should alert us to an impending fatal or major accident. For every organisation, the ultimate safety goal is to capture and identify at risk behaviours and near misses before they result in a fatal accident - to become predictive.

In hindsight, the 2005 Nias accident, like almost all accidents was avoidable, and for the FAA, one major contributing factor to the accident was the safety culture at the time. The FAA had failed to recognise the underlying cultural issues that ultimately resulted in a significant loss of life.

The catalyst event required the FAA to do an overhaul of its business. Significant work has been done across the platforms and professional disciplines. The FAA has used many tools and teachings from both civilian and military leaders in the fields of error management, human factors and cultural change. The remainder of this paper will explore those avenues used to guide the FAA to take the difficult steps to change its culture. Transforming the organisation from one that would “get the job done at all costs” and considered itself to be “better than the rest” to an effective, efficient organisation that is not afraid to question and one that recognises that culture, human factors and the individual play a significant role in its success.

The Evolution

Before 2005, the FAA operated under a well-established safety management system, which on paper was not very different to the safety management system it operates within now. However, what is different is the attitude towards safety. The significant reduction in accident rates led to a degree of complacency in the way we operated and maintained. The degree of complacency was exacerbated by two attitudes which dominated our maintenance workforce. These attitudes were: 'I don't want to let the team down' and 'this is how it's always been done'. This combination resulted in a workforce that was susceptible to cutting corners and doing workarounds to complete tasks and had adopted a can-do attitude towards tasks.

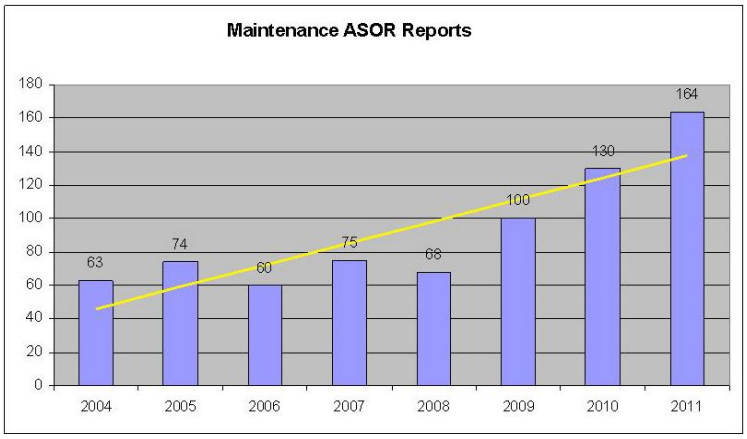
Additionally as a close-knit aviation community there was an over-arching element of trust amongst maintenance personnel. Why was this a problem? For any organisation to be sustainable there should be a healthy element of trust. However, pre-2005, our organisation did not have the right balance of trust. A reluctance of members to cross check or conduct close inspections of others' work was seen as a violation of trust on the tradesperson. This imbalance was unhealthy in such a safety critical organisation.

Up until 2007, the FAA had been operating under the Aviation Maintenance Quality Assurance System (AMQAS), whereby the tradesperson, normally of junior rank such as Able Seaman or Seaman, would conduct the assigned maintenance task. This tradesperson had the ability to self-certify a large amount of tasks. As a way of checking the accuracy of the maintenance carried out, a mandatory quality assurance checklist step was dictated within maintenance publications. Discretionary quality assurance could also be utilized for any complicated or error-prone tasks. These discretionary and mandatory checks were carried out by a more experienced maintainer, normally of the rank of Leading Seaman, who was known as the Maintenance Quality Inspector (MQI). It is important to note here, that the MQI worked very closely with the tradesperson, and since the tradesperson was able to self-certify a majority of the maintenance tasks, there was a very strong element of trust between the two. This resulted in the MQI rarely utilizing the discretionary quality assurance checks to confirm tasks were carried out correctly. The only form of independent quality assurance came from the senior sailor, who would conduct a final quality assurance on safety critical systems only. From a holistic point of view, the AMQAS exposed the maintenance workforce to a degraded ability to capture any errors. Since there was no independence between the tradesperson

conducting the task and the MQI inspecting the task, the only layer of defence was at the final quality assurance level, and even then, it was only on safety critical items.

In 2008, to assist the transition to joint rotary wing operations and to strengthen our error capturing defences within the maintenance workforce, ADF aviation community embraced the introduction of the ADF Aviation Maintenance Management System (AMMS). This was a change from an inspection to a supervision-based regime (Roach n.d.). Essentially under the AMMS, whilst the tradesperson and the leading seaman (MQI) still work closely the leading seaman adopts the role of a trade supervisor and is directly responsible for ensuring adequate supervision is applied on each maintenance task. The amount of supervision is reflective of the tradesperson's experience and the complexity and the criticality of the task. The amount of self-certifying maintenance tasks has been significantly reduced and the majority of maintenance tasks now require two or three level signatures. Replacing the final quality assurance inspection, an independent inspector, of senior sailor rank, is responsible for performing a higher level of inspection, in addition to the supervision provided by the trade supervisor. The AMMS has effectively introduced three levels of defence for error capturing within the maintenance workforce - the first is the tradesperson, the second is the trade supervisor and the third is the independent inspector.

There has been a steady increase since in maintenance ASOR numbers since 2008 as depicted in graph 2. While many factors could have contributed to the rise in ASOR numbers, the introduction of the AMMS has been significant. This coupled with an increase in training aimed at; ASOR investigations, the importance of a healthy reporting culture, and the integration of a just culture concept into our daily operations, still remain the main factors influencing the increase in ASOR reporting. The three levels of defence are identifying errors which were previously missed or not reported. The awareness of a healthy reporting culture and the integration of just culture have cultivated a workforce where personnel are willing to come forward and admit to an error, in an organisation that is now fair and just in their way of dealing with errors and violations.



GRAPH 2 - Number of Maintenance ASORS 2004-2012

Changing organisational culture takes time. Change only occurs if the majority of the organisation is willing to implement it and constantly monitor and review its progress. For the FAA, the shift in culture started with the introduction of Human Factors and Maintenance Error Management (HFMEM) training to our maintenance workforce. In its infancy the HFMEM training introduced maintainers to the concept of the dirty dozen. The dirty dozen is a term for the most common human factors that can be attributed to causing errors. These are communication, complacency, knowledge, distraction, teamwork, fatigue, resources, pressure, assertiveness, stress, awareness and norms. HFMEM training is tailored to combat the adverse effect of fatigue and emphasise the importance of effective communication. The training was very well received, and maintainers were responsive to the concept. In reality, the training has brought awareness and put definitions to the feelings and circumstances in which maintainers have found themselves. It is important to note that, while the dirty dozen was being introduced to the maintenance world around 2004, it had already been integrated into the aircrew training continuum via Crew Resource Management (CRM) training.

HFMEM awareness training was indeed improving the learning and informing aspect of our safety culture (Reason 1997). As a result, the organisation experienced an improvement in incident reporting. However, what was still missing was the full understanding of where the FAA was with respect to its safety culture. Incidents were reported, but as previously mentioned we did not do much to ensure the lessons were learnt. There was minimal to no proactive analysis and monitoring of the reported data. In the aftermath of the Nias accident, most of the citied contributing factors were found in various incident reports raised prior to the accident, highlighting that the accident may have been avoided if the organisation had successfully learnt the lessons from its own reports. Although reporting was occurring the

effectiveness could be questioned. The understanding of Human Factors in maintenance and how they translate to work outcomes was missing. Once an individual was identified as making the mistake, error or violation that created the event, the investigation was completed.

In the years following the accident, due to lessons learnt and the maturing safety management system, four milestones marked the progression towards a better safety culture; the initiation of the aviation safety climate survey late 2005, the aviation maintenance reinvigoration program initiated in 2006, a change in supervisory responsibilities within the maintenance workforce 2008, and the commencement of trend analysis of the Aviation Safety Occurrence Reports. It is important to note that these milestones, coupled with continued HFMEM and other aviation safety related training is slowly fostering a culture where members within the FAA are constantly looking for the cause of the next accident and aiming to be predictive. The culture is one where aircrew and maintainers are trained, at their initial entry courses, in the importance of effective communication, and the need to question and identify cultural norms and complacency.

The cultural change - Trend Analysis

ADF utilizes the Defence Aviation Hazard Report Tracking System (DAHRTS) as a database for all of our aviation safety occurrence reports. DAHRTS has been in existence since 2004, however, it was only in 2007 when trending of the data officially started. The ultimate purpose is to answer the key question – what will be the cause of the next accident, and how can we prevent it? Although this key question has remained the same, the trend analysis itself has undergone an evolutionary progression. Trending was limited, and initially the hierarchy only requested the number of maintenance and aircrew ASORs and the classification of these as a guide to their seriousness. Whilst this generated discussion and interest within the organisation, the attention soon shifted from the how many to the why are these incidents occurring? This question marked the evolution in trend analysis in the FAA being now focused on the whys rather than the how many.

Further analysis was conducted which focused on the main contributing factors reported in ASORs. However this soon exposed an inherent flaw in that the data is only as accurate as the quality of the ASORs being submitted. This flaw spearheaded a training initiative, starting in 2009 that focused on the quality of investigations the importance of uncovering all factual information and identification of the root cause and contributing factors. As part of the ASOR review process, the Fleet Air Arm Safety Cell (FAASC) adds any contributing

factors that are in the investigation but have not been entered into DAHRTS as a contributing factor by the investigation team. Additionally, feedback is provided to the units as to which contributing factors were added to ensure they remain informed and to help improve future quality.

The current trend analysis exemplifies a move from reactive analysis to a more proactive approach. In the last year, trending has been more focused on frequently occurring incidents, the associated contributing factors and the actions and recommendations made to prevent reoccurrence. In an attempt to answer the key question, the FAA is now more focused on quality of investigation and associated contributing factors to incidents. As mentioned previously, trend analysis is wholly dependent on the quality of the investigation; therefore, the organisation seeks to continually improve the reporting culture through targeted investigation training and frequent review of ASORs.

The cultural change - Culture Climate Survey

The FAA culture climate survey was first initiated in 2005 in response to the Sea King Board of Inquiry recommendation 13-3 (Sea King Board of Inquiry 2007). It originally focused the culture of the maintenance workforce. The aim of the survey was to gauge the perception of errors by maintenance personnel, the type of errors being committed and reported, and ultimately what maintenance personnel believed would be the cause of the next major accident. Seven years on, the aim of the survey remains the same, however its content and its integration within our workforce has evolved.

The first generation of the culture survey was conducted by an external agency utilizing questions that were intended for the Australian Regular Army (ARA). Whilst the initial survey provided senior command with an insight into the safety attitude of the maintenance workforce, the questions were not specific enough to target our unique workforce. Much like the progression of the FAA's trend analysis, its survey was initially focused on outputs, i.e. the percentage of errors made, the number of errors reported or the number of violations conducted by maintenance personnel. However, the survey did not address the fundamental question, namely: why are these errors and violations occurring within our workforce?

Noting this deficiency, the FAA created the Aviation Psychology position within the FAASC in 2006. The Aviation Psychologist is responsible for conducting and analysing the annual cultural climate survey. With the subject matter expert knowledge and experience, the survey

was soon modified and morphed to cater for the needs of the organisation. The questions within the survey were refined through a series of maintenance focus groups, conducted within all FAA squadrons between 2006 and 2010. The climate survey is conducted annually, the results are analysed and summarised by the Aviation Psychologist, and are presented to the FAA Headquarters and each of the FAA squadrons. The results give individual squadron commanders an insight into their squadron's strengths and weaknesses. With the assistance of the Aviation Psychologist and the FAASC, squadron commanders are able to formulate strategies to address any deficiencies, and generate squadron safety goals for the coming year.

The early cultural surveys were reflective of an organisation that was task and output focused which in turn had led to work arounds and short cuts in maintenance procedures. They also reflected an ill-defined safety management system, as there were no squadron safety goals, nor were there any unified or defined command safety messages and expectations. This resulted in scenarios where safety considerations and decisions were left to the discretion of individuals within a squadron without any formal guidance. The survey highlighted the need for the FAA to shift its focus from achieving results to concentrating more on the process of conducting work safely in achieving the operational output.

The cultural surveys triggered the creation of training packages targeting effective communication within a team environment, fatigue management, workload management and risk management. The surveys introduced the maintenance workforce to the concept of non-technical skills, including Human Factors, leadership, communication and teamwork. These skills are now recognized as of paramount importance. This is particularly applicable in the present time where, due to the explicit nature of maintenance procedures and the outsourcing of deeper level maintenance, there has been degradation in the technical skills of maintainers. In the current maintenance environment, the majority of reported incidents are caused by non-technical errors such as, distraction, inattention, lack of communication and assumptions. It is important to note that the annual culture survey is still ongoing, senior commanders and squadrons are constantly utilizing the results to identify cultural strengths and weaknesses.

Recently, the FAA has been focused on professionalism and personal accountability. In 2005, maintenance personnel were considered as tradespeople with a set of skills to complete assigned tasks. The culture has transitioned to a point where maintainers are now considered professionals in their field. It is not just their technical skills that are valued, but also their

non-technical skills such as leadership, self-awareness, awareness of others within a team, and their ability to uphold professionalism in their workforce. The sustainability of the cultural survey and other safety programs are a testament to the genuine command commitment to an ongoing effort in shaping the safety culture.

Conclusion

The FAA is in another process of change, as platforms and roles once again shift. The new challenge is to maintain the drive and ensure the lessons from the past are not lost as those people affected move on and the new era of the FAA move in. Current initiatives to combat the transition of personnel include introduction of maintenance risk management, training emphasis on proactive hazard identification and maintenance resource management to align with the aircrew CRM. The aim of this is to ensure that the education of the next generation is maintained and the initiatives that have transformed the FAA are not lost. The responsibility of everyone in the FAA is now to make the organisation effective and safe in what ever mission it is called upon to conduct. Whilst the safety culture is not perfect and has not yet achieved the status of being purely proactive and predictive, it has however, matured to a stage where the organisation understands the dangers of complacency and is always searching for potential hazards to aviation safety.

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