The Safety Sigma

Mission Readiness through Operational Safety

Winter 2012 **Volume III, Number 4**

From the Director: Command Culture, Leadership, and Warfighting

CAPT Jody "Caveman" Bridges, USN – Director; jody.g.bridges@navy.mil

What is command culture? One way it can be defined is by behavioral norms or "how we do business around here." There are numerous command/organizational cultures. There are different cultures within the different services, within the different T/M/S and within squadrons on the same flight line.

What is a "good" command culture? As you evaluate whether your command has a "good" culture, think about this. As the Navy and Marine Corps team continually focuses on warfighting ability in a period of reduced budgets and increased OPTEMPO, leaders must find every way to maintain maximum combat readiness. The implication for our command culture these days is to maximize warfighting effectiveness at reduced cost. One significant way to reduce cost and increase readiness is to eliminate damage to equipment, personal injuries and/or fatalities resulting from human error. What we are talking about is maximizing human performance while minimizing the Blue Threat.

In *Charting a Course to Command Excellence* we find that we can maximize the performance of the Sailors and Marines within our commands through the pursuit of professionalism and command excellence. Command excellence can be attained by ensuring we are "brilliant on the basics" when it comes to our people, command relationships and command activities. "Brilliant on the basics" regarding command activities comes down to understanding what our instructions, SOP's and policies are and why they are that way (what risk are the procedures mitigating and how do the procedures make us more combat-effective).

Once we review and establish what the "book" says, we can focus on "by-the-book" procedures. We focus on by-the-book procedures by thorough training. Thorough training ensures every member of the command understands what the procedures are. The book establishes what the standard is, how we do business in the command and what we want our behavioral norms to be. In turn, these define our ideal command culture. That's the ideal culture, but what about command climate and how does it affect culture?

Through the treatment of our people and the relationships that we establish, the command climate is defined. A good command climate ensures a high level of motivation, commitment, morale, pride, teamwork, and sense of mission. It shapes the Sailors' and Marines' attitudes and values about the command and the mission. These attitudes and values determine how well Sailors and Marines buy-in to the command culture that is broadcast in standards and procedures. If the Sailors and Marines possess an attitude that does not value following procedures and meeting standards, but instead values shortcuts and work-arounds, then the established behavioral norms set by the commander will not be followed. This is a poor command climate, because the climate will not provide the attitude and motivation to buy-in to the ideal command culture. Eventually command culture will suffer and a new culture will form. What emerges will be different than the ideal culture which was delineated in commander's policy and procedures. In turn, risk management and combat readiness will degrade because the command climate did not provide the impetus to rise to the level of excellence the ideal command culture calls for.

This is how the leadership of the commander has a direct and immediate tie to "how we do business around here." The commander's leadership influences attitudes and values. The commander "owns" the command climate. How does a commander ensure a positive command climate that can enable the ideal command culture? How does the commander change a poor command climate? The climate is changed, first through policy then by walking the talk, being brilliant on the basics, empowering people and fostering positive relationships. By ensuring a positive command climate the commander maintains a "good" command culture and achieves maximum warfighting ability while minimizing the Blue Threat, or, as we say in the SAS…."I gotta have more cowbell!"

INSIDE

Medium: Looking Forward

CDR Dave "Ivan" Ivezic, USN – Associate Director / Programs Instructor; david.ivezic@navy.mil

For this issue I decided that instead of picking an aviation safety program theme to discuss and pontificating about it, I was going to talk about the aviation safety road-ahead and how it will benefit you as ASOs and leaders. There are several initiatives in the works at varying stages of development and I believe each one will incrementally get us closer to reducing our Class A rates from around 1.0 to 0.1 or lower. More importantly, these initiatives will aim at reversing the general trend of increasing Class B and Class C mishaps.

AQD – About a year ago RADM Prindle suggested we pursue professional recognition for the graduates of our ASO course. CDR Hart (you remember Dutch, right?) ran with it. He researched and wrote a request for a Navy ASO Additional Qualification Designation (ADQ). It was approved this past summer so if you are a previous ASO grad, you can update your ODC to list DZQ in Block 72 of your Officer Data Card. This should happen automatically for future students through the CeTARS system and I emphasize "should." Please verify. The ADQ brings our safety culture more into the mainstream by placing our ASO qualification on par with WTI, mission commanders, and instructor pilots/NFOs.

ASAP and MFOQA – Some of you might be scratching your head wondering what the heck I am talking about. Imagine the SA and perspective an ASO (and CO for that fact) would have regarding their squadron if they were able to compare aircraft exceedences (MFOQA) and human reports (ASAP), not only in their respective squadron, but against the rest of the community.

In the AIAA Centennial of Naval Aviation Forum in September 2011, members of CNAF, CNAL, NSWC, and Quadelta Inc co-authored an outstanding paper titled "100 Years of Achievement and Progress." In it they demonstrated simple yet powerful analyses by crunching ASAP data against MFOQA data. We are probably years away from performing this type of analysis at the squadron level, but the capability is out there. Some of you may remember my three principles of ASO tools – frequency, simplicity, impact. Combining ASAP and MFOQA, the potential exists to frequently get a huge impact via simple analyses. At SAS we are starting to develop techniques to use the capabilities available today to push this type of information out to the end users (you). Eventually I envision every one of you having the tools to do this yourself with ease.

SMS – The Naval Safety Center is working on an updated Naval Aviation Safety Program instruction, OPNAVINST 3750.6S. One of the most significant changes will be the lack of the word "program." We will be going to an aviation Safety Management System (SMS) concept that is taking root across the world's airlines and most industries. The beautiful thing is that this is nothing new for Naval Aviation. We already do just about every aspect of SMS, but instead of the current a'la carte nature of the many Naval Aviation Safety Program tools and techniques, SMS will provide a structure to tie it all together. It will help put perspective on the things we already do.

Accreditation – Thanks to the close call provided by Hurricane Isaac, the American Council on Education (ACE) team postponed their trip to Pensacola. By the time you receive this issue of Sigma we should have the ACE team results and shortly thereafter announce some good news. I'll remain vague so nobody accuses me of setting my pants on fire. Suffice it to say we're shooting for the stars, but tempering that optimism with a realistic perspective regarding our academic accreditation potential.

Research – One of our former CRM directors, the infamous LCDR (ret) Todd "Rooster" Ring and I are in the final throes of earning our respective master's degrees at Embry-Riddle Aeronautical University. We are both under the thumb of our own intrepid Dr. Phil "Phat Phil" Fatolitis while we plug away at different aspects of a huge database containing all the nanocodes from Class A and Class B mishaps in Naval Aviation from 1999 to 2009. So far we are finding some very interesting correlations between categories across all four levels of DoD HFACS. Our findings should be able to help you identify not only the hazardous elements within your command, but also those high-risk combinations of hazardous elements occurring in your commands. We'll also try to provide some good numbers to help define that nebulous concept of "probability" when your deliberate ORM teams start RAC-ing out the hazards.

Facebook – Jumping into the current buzzword trend, we have appointed one of our own, LT Jim "Pugsly" Bates, USCG pilot extraordinaire (but he still hangs a picture of a Phrog from his USMC days in his office), as the SAS Strategic Communications Officer, akin to when Otter nominated Flounder as the Pledge Representative to the Social Committee. Anywhoo, one of his first accomplishments was the establishment of the SAS Facebook page. Its purpose is to provide you with easier access to information we publish such as the Safety Sigma and Naval Aviation-related research results. We'll also post great ideas and tools we find around the Fleet and across the different industries' safety cultures. It'll also help us keep the spam emails to a minimum. You can find our page at www.facebook.com/navysafetyschool

That's all I have for now. Please let us know of any initiatives we can be working on to help you out. We may be limited by resources to actually implement your great ideas, but we want to give 'em all a hard look and see if we can make it happen.

Until next time, please be that proactive ASO and enable your shipmates to have a safe winter season, wherever that may be.

Machine: The Cost of Operating Engines at High Power Settings

Mr. Rick "Zeus" Wartman – Structures Instructor;
rick.wartman@navy.mil

Most aircraft have three different engine temperature limits. They are often referred to as continuous, military and max with the latter two having specific time limits. They are intended to give the operator the ability to go to a higher power setting as needed for a short period of time. However, there is a cost associated with this. To better understand these limits and the cost associated, we need to have an understanding of a phenomenon known as creep. Typically when a load is applied to a part it will stretch, bend or twist based on the type of load. If we remain within the material's elastic range, the part will return to its original size and shape when the load is removed. This occurs even if this load is applied for a substantial time period. However, if the part has a substantial temperature increase while the load was applied we get the phenomenon known as creep. If, for example, we apply a tension load, the part will stretch an amount relative to the applied load. However, if the part is in an elevated temperature environment it will continue to incrementally stretch even though there hasn't been an increase in the tension load.

Where this condition occurs in our aircraft is predominantly in the turbine blades of the engine. They are subjected to a centrifugal force which applies a tensile load and an aerodynamic force which applies a bending load. These loads combined with the elevated temperatures cause the turbine blades to experience creep. When either the load or the temperature is increased, the creep rate will also increase.

Figure 1 iis a typical creep profile for a specific material. The vertical axis is the amount of strain or stretch that the material has experienced. The second stage of the graph is the portion where aircraft engines typically operate. The initial stage shown on the graph usually occurs on the test stand before the engine enters service. I put a horizontal dotted line to represent how much strain the material could withstand before it begins to have problems. Its location is based on the material and the factor of safety for a given application. Where the horizontal dotted line intersects the sloped black line represents how many hours we can expect the engine to operate prior to needing an overhaul, assuming the slope in the second stage is as shown. The time span of the second stage is typically 2000 to 3000 hours. The slope that is shown in the second stage of the graph is an average of what the engine experiences. The actual slope will increase and decrease as the engine is operated at different power settings. If the engine is operated in the military or max position more than normal, this will increase the overall slope of the graph and reduce the life of the engine due to the amount of creep occurring in the turbine blades. It needs to be understood that there is only a certain amount of life in turbine blades. Operating an engine in the higher temperature range will reduce this amount of life.

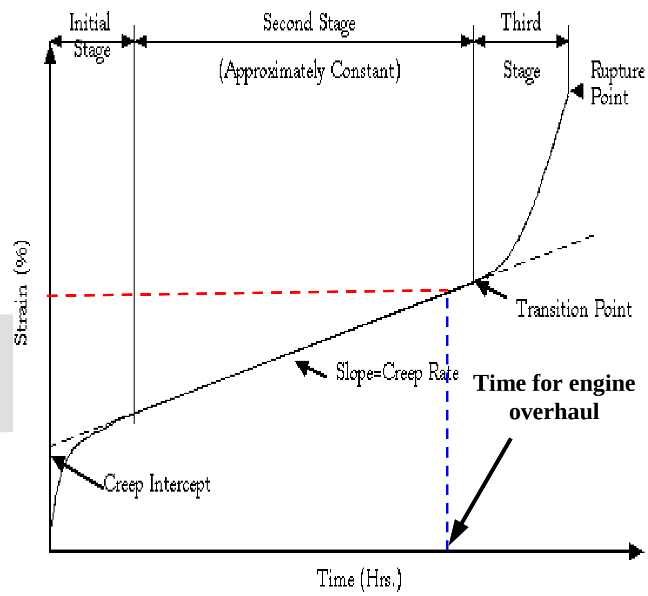


Figure 1. Generic creep profile. Adapted from "Fundamentals of Aircraft and Missile Structures," Naval Postgraduate School, Monterrey, CA.

Many of the modern aircraft engines have some form of digital control system that is used to control the engine and also to log its usage. This is helpful to measure the amount of creep that occurs to the engine turbine blades since the creep rate is a function of both load and temperature.

Some of these aircraft are designed such that the digital control system will only reduce the creep life of the components once a certain amount of time has expired at the higher power setting. It needs to be understood that an increase in creep rate will occur the moment the temperature or load (RPM) has been increased on the component. The operator should not make a routine of operating the engine at the higher power setting and then reducing the power setting just prior to the amount of elapsed time necessary for the digital control system to record it. If this is done, the life of the engine will be reduced yet the digital control system will be unaware of this reduction in life.

Mishaps: NFPA 921 for Aviation Fire Investigations

Maj Matt "Throb" Robinson, USMC –Investigations Instructor; matt.robinson@navy.mil

Fire: *"A rapid oxidation process, which is a chemical reaction resulting in the evolution of light and heat in varying intensities"* (NFPA 921, 2011).

Most aircraft crashes involve some degree of fire. On occasion, when evidence exhibits heat intensities above normal flame temperatures, an in-flight fire may be suspected. Considering artifact dissipation of energy and post-impact fire, the evidence of an in-flight fire is often masked, difficult to find, and sometimes obliterated. The task to determine area and point of fire origin can be daunting. This article serves as an ASO's and Senior Member's brief introduction to the systematic approach for determining origin. The School of Aviation Safety and The Naval Safety Center investigator stand at-the-ready to assist in further details and techniques if required.

The recommended systematic approach to point of origin determination is the scientific method as described in the National Fire Protection Association's *Guide for Fire and Explosion Investigations* (NFPA 921). The scientific method is "*a principle of inquiry that forms a basis for legitimate scientific and engineering processes...*" and utilizes the following steps:

1) Recognize the need (identify the problem)
2) Define the problem
3) Collect data
4) Analyze the data
5) Develop a hypothesis (inductive)
6) Test Hypothesis (deductive)
7) Select final hypothesis

Let's expound upon these one by one.

Recognize the need - Example: A fire occurred and the origin is unknown. The event requires investigation to ultimately prevent reoccurrence should the fire be deemed causal vice resultant of the crash. At first glance, this appears to be a relatively simple step in the scientific method. Beware! At this point in your investigation you haven't had the opportunity to collect data that supports either in-flight or post impact fire. You just know through initial observation that fire was present.

Define the problem - Determine the origin. Suppose the initial observation, witness statements and other evidence leads to suspicion of an in-flight fire.

Collect data - Basic site data collection and documentation. Beginning with, and throughout site observation, the investigator shall identify and eliminate known hazards within the crash site. Burned composite material, inflated tires, ordnance, HAZMAT, and a multitude of other hazards frequently reside within the wreckage. The site should be safe prior to entry. When safe to do so, the initial scene assessment or site observation serves to steer the investigation and identify future requirements to determine area and point of origin. Upon conclusion of the preliminary scene assessment, the investigator should determine areas of the wreckage requiring additional, detailed examination. Within and around these areas, data should be collected to identify all potential fuels, ignition sources, and oxidants. Do not rush this process. These assessments frequently take days.

If present, evidence to suspect an in-flight fire includes, but is not limited to: soot patterns, broom-straw, sooting within folded aircraft skin, sooted "things falling off aircraft (TFOA)" on the flight path prior to impact, electrical arc "beading" of wires, melting of certain materials, unique discoloration of certain materials, "Fire" or other significant annunciator light-bulb analysis and other evidence presented within the ASO syllabus.

Now is the time to determine pre-fire conditions and document post-fire conditions. This is accomplished through a thorough wreckage documentation and comparison to an exemplar.

Recovery, examination, and reconstruction of the aircraft and event is next. Reconstruction of pre-crash aircraft component positions allows the investigator to observe fire patterns in relation to the entire aircraft. This process ideally takes place in a hangar or warehouse but can be done in the field. Evidence may be positioned on the floor in general location of how the aircraft was constructed. Three-dimensional build-ups are accomplished through scaffolding, trusses, wire mesh, etc.

Witness statements are evidence and should be taken as quickly as possible after the event. Your ASO course provides detailed methodology into the interview process. Consider interviewing the flight crew, maintenance, and first responders in addition to other possible witnesses prior to, during and post event.

Analyze the data –

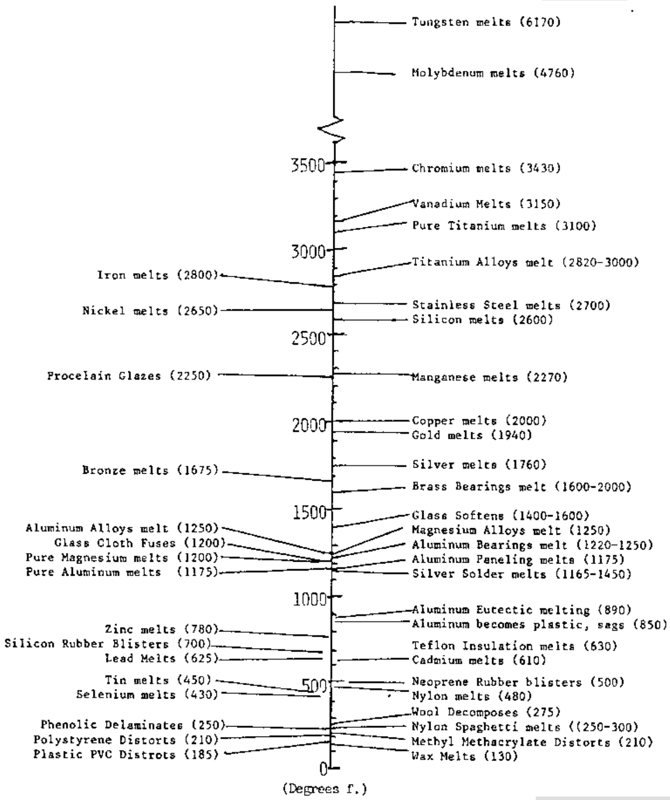
a) Pattern analysis: Determine the path of the flame via sooting and damage.
b) Heat and flame vector analysis: How does the damage correspond to slipstream and airflow?
c) Arc mapping: Was an electrical arc the ignition source? Where was the arc and what caused it?

Electrical wire exhibiting "beading", an indication of electrical arcing

d) Event sequencing: What was the sequence of events?
e) Consideration of fire dynamics: An understanding of the aircraft's construction and materials aboard are important. Burn patterns among horizontal stringer lay-out may initially be perceived as horizontal sooting, resultant of airflow when in-fact the "window pane" pattern was produced during the post-crash fire (see Figure 1).

A thorough knowledge of an aircraft's materials is another useful aspect to consider. Temperatures reported in laminar flames, under standard atmospheric conditions, can reach 1400^{0}C (2552^{0}F). If the materials within the aircraft wreckage do not exhibit melting above 2500^{0}F, inflight fire MAY not have occurred. The variable to consider is if the fire was subjected to the relative wind or slipstream. If a fire is subjected to the slipstream, the availability of oxygen is increased, thereby increasing the temperature of the flame beyond normal laminar temperatures. Think of blowing on the hot coals of a smoldering fire.

Beware of distractors and variables. An in-flight fire may have been internally confined within the fuselage or oxygen bottles may have ruptured and acted as an oxidizer in a post-crash fire. Both circumstances will produce evidence inverse to initial interpretation and documentation.



Develop a hypothesis – This involves establishing an initial origin hypothesis, working hypothesis, and alternate hypothesis.

Test the Hypothesis – Ask the following questions:

a) Was there a competent ignition source at the origin?
b) Does the origin explain the data?
c) Are contradictions resolved?
d) Does an alternate origin (if applicable) explain the data as well?

Select final hypothesis – Consider the area of origin and point of origin. The origin may be insufficient to determine the cause.

Given the wide possibilities of energy release magnitude in aircraft crashes, the amount of useful evidence to determine origin may simply not exist. Additionally, an uncontrolled, long-term combustion of the wreckage may consume all remaining evidence. The final determination of cause is based upon the quality of evidence and data gathered. *"This decision as to the level of certainty in data collected in the investigation or of any hypothesis drawn from an analysis of the data rests with the investigator."* A thorough and systematic approach to investigating these crashes, while adhering to the principles within the scientific method will ensure you are doing everything within your power to properly investigate.

Semper Paratus: Safety Stand-downs - Considering the Whole Audience

LT Jim "Pugsly" Bates, USCG – Coast Guard Instructor; james.a.bates3@navy.mil

Whether you call it a "stand-down" or a "stand-up," it's really just a matter of timing and material covered. Aviation units for decades have taken periodic opportunities to suspend flight operations and focus on training, education, mishap trend analysis, safety survey results and the like. Some of the best events include a balance between local unit speakers (most importantly the CO) and invitees who might share unique knowledge and experience on a certain topic. Top-shelf stand-downs may have participative elements and a good measure of humor to keep the audience engaged and interested. The target audience, obviously, is a Coast Guard air station or a Navy or Marine Corps squadron and the topics fall under the wide umbrella of aviation safety. More specifically, the target audience is the people who wear flight suits, but there are other folks in attendance.

Think for a minute about what it must be like to be an admin Petty Officer, embark Marine, or a cook at such an aviation-centric event as this. Navy and Marine Corps squadrons may not have as many different enlisted ratings under one command as a Coast Guard air station does, but they certainly have their share of support personnel. These great folks are integral to the success of our units on a day-to-day basis, but on this day they are trapped in an auditorium, likely listening to (or sleeping through) lectures that have little or no direct application to their job. Imagine if you were forced to sit through 8 hours of training on leave-processing, billing, or computer asset management. Not fun. With this new perspective, you as the FSO/ASO plan to do something about it.

Can you please everybody at the same time, providing lectures and training that will be riveting to all attendees, regardless of their rate or MOS? No, you can't and frankly you shouldn't. You are the FSO/ASO of a military aviation unit whose sole existence is to accomplish amazing and sometimes dangerous missions that have local, national, and international significance. Your mission and everyone that supports it is the focus of your stand-down. So how do you address the clerks and cooks?

At my first Coast Guard air station, the safety department kicked off the event by recognizing everyone who was there and their contributions to safety. Admin was recognized for handling our pay and benefits problems professionally so that we didn't have to carry any of these worries into the aircraft. The galley staff was recognized for such things as the box lunches they provided, which helped to keep us awake and alert on offshore searches at 0300. Supply was mentioned for providing us with adequate safety equipment, without which we might be tempted to cut corners or be completely non-compliant with PPE directives. Medical was lauded for their flexibility to see aircrew at the clinic at all hours in the interest of keeping us at maximum readiness, standing a consistent watch. This relatively short kickoff to the stand-down was well-received. One of our most experienced pilots told me afterward that he'd never seen the support personnel recognized at a safety stand-down in his 25 years of flying.

Two years later, in the same unit, a member of the admin department approached the operations officer with information about a junior pilot who was dealing with some significant off-duty issues that were previously unknown to the command. Human Factors Councils were foreign to the Coast Guard at that time, so there was no formal method for unearthing problems and providing interventions for crewmembers with issues that potentially affected flight safety. This responsible individual from admin understood the all-hands effort of safety, perhaps because she and other support personnel were recognized at the last stand-down. In the end, a heavily distracted and fatigued young copilot was able to receive the assistance that he neglected to ask for on his own and his fellow pilots and enlisted crew were better for it.

Consider and recognize the contributions of all-hands to your unit's safety posture. Your support personnel provide benefits to your safety program that you may have never noticed before.

The HMS Bount is shown submerged in the Atlantic Ocean during Hurricane Sandy 90 miles southeast of Hatteras, N.C., Monday, Oct. 29, 2012. Of the 16-person crew, the Coast Guard rescued 14. U.S. Coast Guard photo by Petty Officer 2nd Class Tim Kuklewski.

Crew Resource Management: Better CRM through ASAP (or is it better ASAP through CRM?)

LCDR Brendan "OB" O'Brien, USN – CRM programs; brendan.obrien@navy.mil

"Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity or neglect."
— Captain A. G. Lamplugh

"RATS!!!! I forgot to do my post-flight ASAP report again. Oh well… No big deal. I'll get it next time."

It's time for the good folks here at Crew Resource Management to give a little love to our naval aviation safety brothers and sisters. As with any requirement that insists that you sit down at a computer and write about things that you possibly did wrong or about things outside of your control that went wrong during a mission, CNAF's Aviation Safety Awareness Program asks that we take yet more time out of our already busy schedules to enter data that… "Nobody's gonna' look at anyway!" Right?? Really!! Who wants to spend more time fighting NMCI or TRANET right after you've been battling it for an hour already just to get your WINFLIR or your SHARP/TIMS Grade sheet entered?!

Let's get one thing straight right out of the box. Any/all information you enter into ASAP sees the light of day. When you hit 'Submit,' you're alerting your squadron or wing to the fact that something's amiss. It doesn't necessarily need to be worthy of a HAZREP or greater, but it does allow for folks up the chain of command to assess trends that might later become the cause of a mishap. Also, there have been positive, tangible results generated from your submissions. The other side of that coin is that, because of the mandatory nature of ASAP submissions, the frequency of reports that have actionable information is less than ideal. It's gotten so bad that some folks out there have even written desktop macros that'll let them sign in to ASAP and submit 'No Significant Event' with one click of the mouse- just to be able to say that they've met the requirement.

Fleet-wide ASAP submissions in a 12 month period beginning in Nov '11 numbered near 209,000. Of those, only around 17,800 contained reportable information.[1] The other 92% reported no significant event. What that tells me is that, over all of our hundreds of thousands of annual flight hours, 92% of the time, "It's all good." That number flies (no pun intended) directly in the face of the quote above from Captain Lamplugh. Kinda' doesn't feel right, does it? It doesn't feel right because we know that the odds are stacked against us.

[1] Fleet-wide ASAP submissions for 5 Nov '11- 5 Nov '12. Data generated by CNAF N45

Even when we execute our mission as we briefed, do all our procedures according to NATOPS, something can always go wrong…

Here's something for comparison. I flew two events last Friday and had three separate ASAP reportable items: 1) ATC problems, 2) Weather other than forecast, and 3) A mechanical issue on startup. That accounts for 100% of my flight events last week…

Reader: "Dear CRM Director, why are you spending time selling us someone else's program?

Here's why… We believe that we can be of assistance in the matter of making ASAP a more effective and commonly (read: properly) used program. With the application of a few simple CRM principles, meeting the ASAP requirement need not create so much heartache. We also believe that, through the proper, consistent feeding of actionable data into ASAP, we can raise the quality of CRM across the fleet.

Like most of the FRS' and Training Commands, we at CRM fully believe that the greatest learning occurs during post-flight debrief. We also believe that ASAP, as a mission analysis tool, can be most effective in the decision-making process. Instead of hurriedly fulfilling the requirement for ASAP submission, or worse, clicking on the "No Significant Event" macro on your desktop, we can do better. Conducting a solid mission debrief that ends up in a summarization of reportable items in ASAP can enhance the quality of the data generated. Because the data points are generated as the result of a thoughtful, integrated, crew-centric mission-analysis process, their benefit to the fleet can be more substantial. Standardizing debrief items in that way, giving all of your crew a voice, leads to better crew cohesion, coordination, and esprit-de-corps.

The ASAP newsletter, 'N-Plane-View' happily notes your achievements in solving aviation-related safety problems. Make no mistake about it, they are your achievements. Through your effective communication and leadership, significant changes have been made that fill in the holes in Reason's Swiss Cheese Model and prevent possible mishaps. As in most things, however, we can do better. CRM program managers and CRM instructors have the mandate to make this happen across all type/model/series. Adding ASAP to squadron debrief items is one way to fulfill that mandate.

There will, of course, be some missions that truly don't have any ASAP reportable items. When you find yourself at the last debrief item and the mission commander or aircraft commander is just about to close out for the day, if you have no external reportables, think of DAMCLAS. If you can find any breakdowns in CRM during the mission, I urge you to outline them in an ASAP report. The folks at Crew Resource Management are continually combing data, looking for feedback from the fleet that will help us better serve your needs.

The Official SAS Facebook Page can now be accessed at www.facebook.com/navysafetyschool

Be sure to "Like" us in order to immediately receive important information and articles relative to your job, your community, and the School of Aviation Safety

Your level of involvement can make this a truly worthwhile online community of aviation safety professionals

This is soon to become the primary way of announcing new issues of the Safety Sigma, so please join our Page.

Man: DoD HFACS Frequency Analysis Across Platforms FY 1999-2010

LCDR Phil "Dr. Phil" Fatolitis, PhD, USN; philip.fatolitis@navy.mil and CDR Bill "Pop" Little, USN (ret); william.l.little@navy.mil – Human Factors Instructors

In the Safety Sigma's last issue, the Human Factors team reported on a basic description of human factors (HF)-related causal factors in Naval Aviation Class A mishaps FY 1999-2010. In that issue, we presented the frequency of HF Class A mishap causes at the Acts level using the DoD Human Factors Analysis and Classification System (DoD HFACS). In the current issue, we expanded that basic analysis to include the frequency of causal factors at all levels of DoD HFACS. The figure below shows the relative frequency of HF-related Class A mishap causal factors for the defined period. Note that some mishaps can have multiple causes stemming from a single DoD HFACS category.

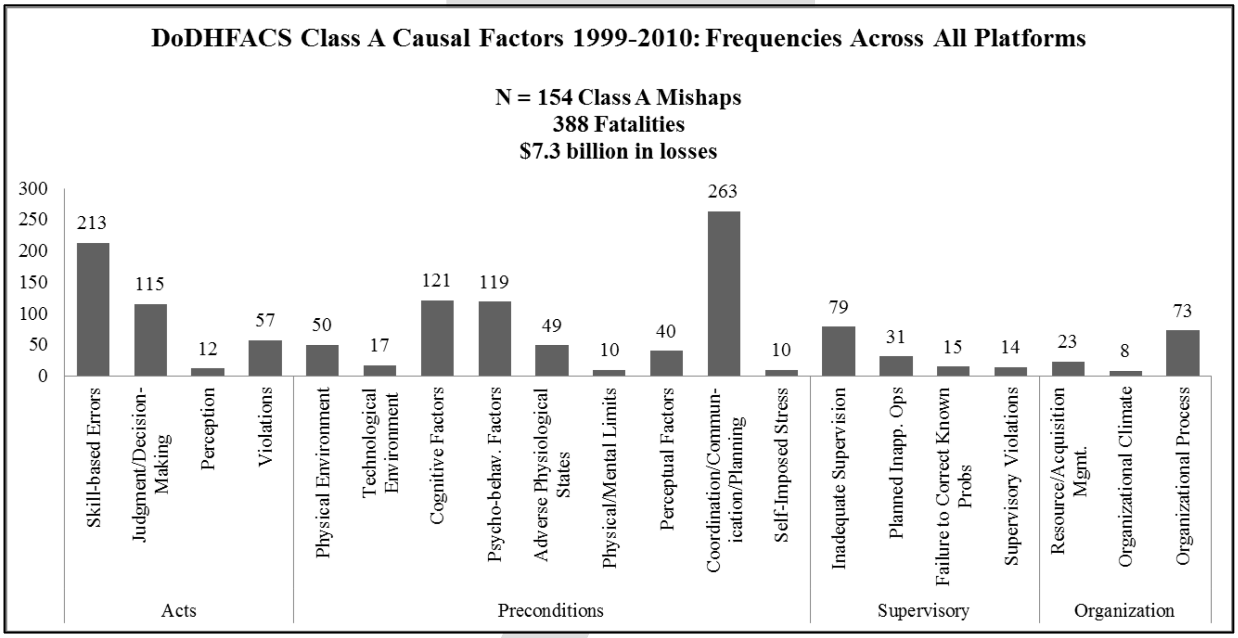


Figure 2. Frequency of Human Factors causal in USN/USMC Class A mishaps FY 1999-2010.

As you may be aware, the numbers associated with each bar on the graph represent DoD HFACS "nanocodes," or more specifically HF causal factors. The table below shows some of the most frequently observed nanocodes in the data for selected DoD HFACS domains. Note that some domains didn't have many nanocodes listed as causal factors, so those are not included in this report. Only fairly prominent nanocode frequencies are provided in the table.

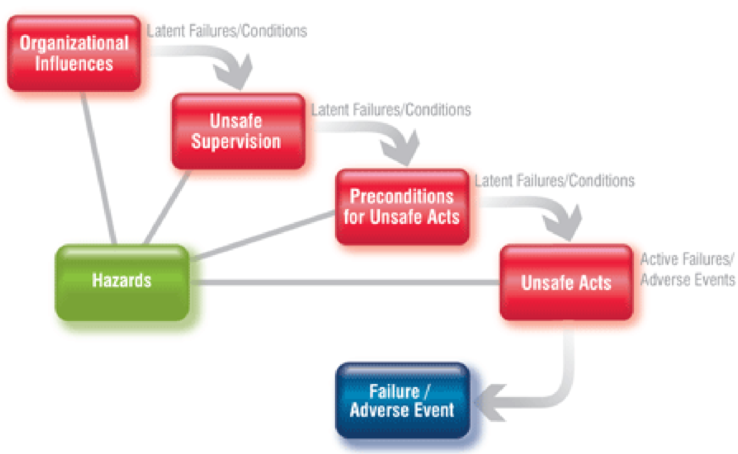


Figure 3. Adapted from "Human Factors Engineering: The Next Frontier in Reliability," by Drew Troyer, Machinery Lubrication Magazine, March 2010.

USN/USMC DoD HFACS High frequency nanocodes for Class A Mishaps FY 1999-2010

DoD HFACS Domain	Nanocode	Frequency
Skill-Based Errors	AE103 Procedure not followed correctly	71
	AE105 Breakdown in visual scan	53
Judgment/Decision Errors	AE201 Inadequate real-time risk assessment	56
	AE206 Wrong choice of action during an operation	35
Violations	AV003 Extreme violation	28
	AV002 Widespread violation	25
Cognitive Factors	PC102 Fixation (channelized attention)	41
	PC103 Task over-saturation	27
	PC106 Distraction	17
Psycho-Behavioral Factors	PC206 Overconfidence	25
	PC210 Misplaced motivation	18
	PC208 Complacency	15
Coord/Comms/Planning	PP102 Failure to cross-check/back-up	61
	PP101 Failure of crew/team leadership	41
	PP109 Mission planning inadequate	35
Inadequate Supervision	SI003 Failed to provide proper training	29
	SI001 Command oversight inadequate	27
	SI004 Failed to provide appropriate policy/guidance	21
Organizational Processes	OP003 Provided inadequate procedural guidance or pubs	32
	OP002 Org prgm/policy risks not adequately assessed	16

Hope that this helps to improve your SA in some general trends that show up across all platforms. In future issues, we'll be sure to generate some platform-specific analyses where possible. Fly safe and don't hesitate to call!

Doc Bank Memorial Distinction: ASO student recipients

The *Milt "Doc" Bank Memorial Distinction*, recognizes the student or students in each graduating ASO class that best exemplify the characteristics of the late, great Milt "Doc" Bank, PhD: motivation, intelligence, imagination and aptitude as a potential future ASO Instructor. The recipient of this award for ASO Class 12-7 was LCDR Loren Jacobi from HSC-12. The two recipients for ASO Class 13-1 were LCDR Kevin Christenson from Navy Region Southeast and LTJG Justin Pickworth from HSC-12. Congratulations to all!

SAS Hails and Bails:

This winter we bid farewell to Lieutenant Karl "HK" Orthner and thank him for his service to hundreds of ASO and ASC students as the SAS fixed-wing aerodynamics instructor. LT Orthner has accepted orders to ESG-2 in Little Creek, VA. We also welcome his replacement, LT Mark DeMann, who comes to us from VQ-3 (Tinker AFB), Oklahoma City, OK.

The Safety Sigma is published quarterly by the Naval School of Aviation Safety located at NAS Pensacola, Florida. If you have a question for the staff, or are interested in attending Aviation Safety Officer, Aviation Safety Command, or Crew Resource Management Instructor training, please visit our website at https://www.netc.navy.mil/nascweb/sas/index.htm or call (850) 452-3181. **If you would like to submit** a short article for publication, please contact LT Jim "Pugsly" Bates at (850) 452-5231 or james.a.bates3@navy.mil

Also, if you are receiving multiple emails from us due to attendance at more than one class (ASO and ASC) or would like to be removed from future emails, please email LT Bates (info above) with name and approximate dates of your class attendance. Thank you.