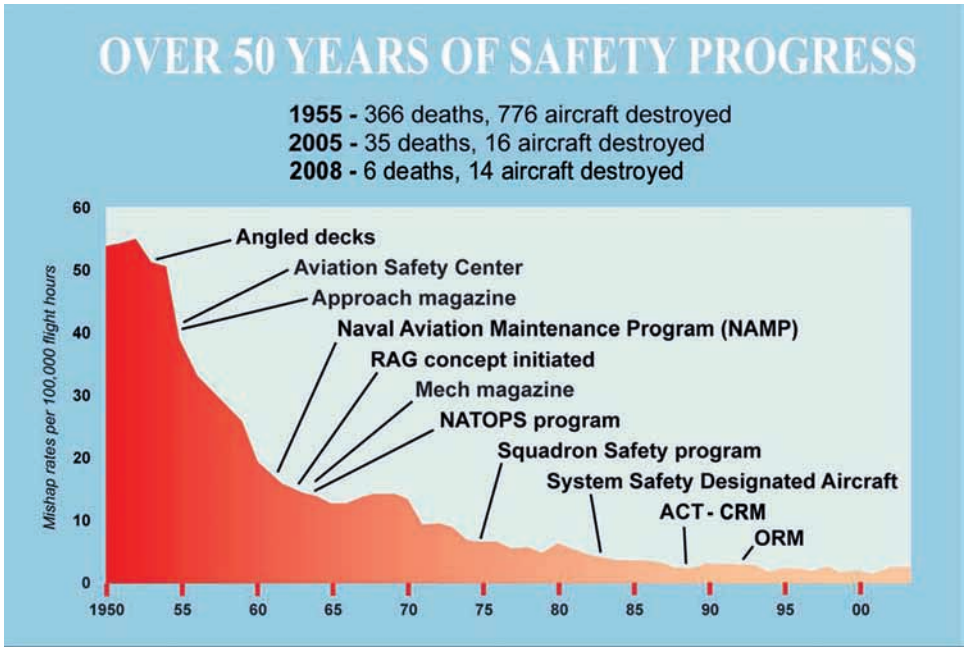
Naval Safety Center

A "One-Stop Safety Shop" for Sailors and Marines



Commander, Naval Safety Center (NSC) advises the Chief of Naval Operations (CNO) as a special assistant for managing the aviation, afloat, shore, and occupational safety programs for the Navy and Marine Corps. Commanded by RADM Arthur J. "Blackjack" Johnson, the NSC focuses on providing safety assistance and advice to the CNO, Commandant of the Marine Corps, the Deputy Assistant Secretary of the Navy for Safety, and ultimately to the fleet and Fleet Marine Forces. The NSC oversees a network of safety training, education and mishap-prevention programs for Sailors and Marines.

Beginning its operation in 1951, NSC maintains a computerized repository for reports on injuries, occupational illnesses and property damage. The NSC gathers information from the fleet, then analyzes and interprets data to help military and civilians develop programs on safety awareness and mishap prevention.

An essential part of naval readiness, NSC is designated as the operational risk management (ORM) model manager which includes the facilitation of ORM training during the career of every Sailor and Marine. The safety center also conducts worldwide mishap investigations, oversight reviews, safety surveys, seminars and culture workshops. The staff collects, stores and disseminates mishap information to the fleet and provides liaison support with international military, governmental and industrial safety boards, committees and councils. A key advocate of command excellence and safety culture promotion, the NSC develops hazard-awareness safety posters, videos, magazines, presentations and a Web site.

As the Navy and Marine Corps' "one-stop safety shop," the NSC manages the Department of the Navy's (DoN) Safety Management System of aviation, afloat, shore, and occupational and health safety programs. Supporting these efforts, the NSC maintains reports on hazards, mishaps, injuries, occupational illnesses and property damage.

Headquartered at Naval Station Norfolk, Va., the NSC has 220 military, civilian, and Reserve staff members who provide support to more than 4,200 commands and detachments worldwide. You can find the NSC on the Web at: www.safetycenter.navy.mil.

An overview follows of our aviation directorate and the various programs and resources available to keep our aviators, maintainers and support personnel combat ready. We also profile our communications and marketing directorate, which carries our safety message to the fleet.

The Aviation Directorate — Supporting Navy and Marine Corps Aviation

As a customer-focused organization, the NSC aviation directorate exists to enhance the warfighting capability of the Navy and Marine Corps, to preserve resources and to improve combat readiness by preventing mishaps and saving lives. To accomplish this mission, the NSC relies on naval leadership, teamwork, continuous improvement, customer focus and personal integrity. The Naval Aviation Safety Program is outlined in OpNavInst 3750.6 series.

The DoN's aviation safety program, much like programs currently in place throughout the military, the federal government and the commercial and general aviation industries, relies on analyses of past mishaps and identified hazards to prevent future mishaps. This proactive approach to safety has enjoyed considerable success over the years. In 1951 Naval Aviation had 2,066 Class A mishaps, *[Ed. note: See definitions of mishaps and hazards below.]* with a mishap rate of 54.03 per 100,000 flight hours. By 2008 the various elements of the Naval Aviation Safety Program reduced the number of mishaps to 22 and the mishap rate to 1.72. However, the rate has leveled off during recent years. The challenge is not to maintain the current rates but to reduce them even further. How can we break through the apparent safety floor and achieve the next big advancement in Naval Aviation safety?

NSC, in close cooperation with the Federal Aviation Administration, the other military services, other federal agencies that operate aircraft and industry, is developing the next generation of safety programs. The goal is a preventive approach that integrates historical and prognostic evaluation and management of hazards and their safety risk to avoid future mishaps and incidents.

CAPT Ed "Clyde" Langford's aviation directorate includes more than 25 percent of the Navy and Marine Corps military

MISHAP CATEGORIES AS DEFINED BY OPNAVINST 3750.6R

Class A Severity. *A Class A mishap is one in which the total cost of damage to property or aircraft or unmanned aerial vehicles (UAVs) exceeds $1,000,000, or a naval aircraft is destroyed or missing, or any fatality or permanent total disability results from the direct involvement of naval aircraft or UAV. Loss of a UAV is not a Class A unless the cost is $1,000,000 or greater.*

Class B Severity. *A Class B mishap is one in which the total cost of damage to property or aircraft or UAVs is more than $200,000 but less than $1,000,000, or a permanent partial disability or the hospitalization of three or more personnel results.*

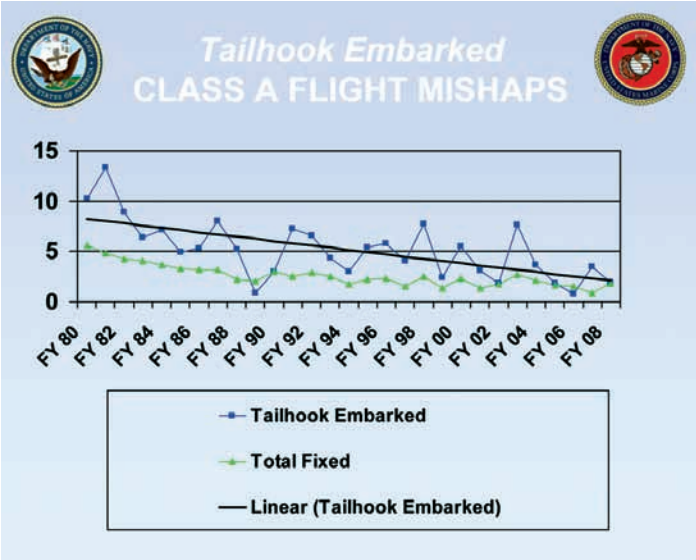
Class C Severity. *A Class C mishap is one in which the total cost of damage to property or aircraft or UAVs is $20,000 or more, but less than $200,000, or an injury requiring five or more lost workdays results.*

Hazards. *Any occurrence in which the total cost of property or aircraft or UAV damage is less than $20,000 and there are no reportable injuries is not an aviation mishap. Report these events as hazards.*

and civilian personnel assigned to the NSC and provides direct support to Naval Aviation. Many other people in the command provide support to aviation safety and readiness with skills in administration, legal, financial, afloat, traffic and recreation safety, parachuting, industrial and occupational health, information systems, data management and analysis, and communications and marketing.

The various divisions within the aviation directorate include aircraft operations, aircraft maintenance and material, aircraft mishap investigations, aeromedical, culture workshop and ORM. They analyze policies, procedures and practices affecting the safe operation of all Navy and Marine aircraft and associated systems. They also analyze mishap reports and statistics to detect aircraft-mishap trends and to formulate corrective recommendations.

The divisions work closely with aviation operational staffs and units to make sure they maintain an intimate knowledge of current fleet aviation policies, procedures and practices. They conduct studies for initiation of mishap-prevention programs, and review and close out all Class A Mishap Safety Investigation Reports (MSIRs) and reports of severe hazards. The directorate participates in program reviews, Naval Air Training Operating Procedures Standardization, contractor and other governmental agency conferences. The directorate also makes recommendations for safety techniques or products and evaluates acquisition and change proposals.



The chart above indicates an aggressive safety program spearheaded by the Naval Safety Center has resulted in a steady 25-year downward trend in embarked aircraft accidents from 1980 through 2005.

AVIATION PROGRAMS AND RESOURCES

Aviation Safety Surveys

The safety-survey program gives the requesting unit's commanding officer (CO) a "snapshot" of the command's safety posture. The survey team relates to the unit like a consultant to a client. Surveys are not inspections, but rather a "white hat" assist visit. No punitive actions come from a survey. COs should use the survey as a tool for process improvement. Commands should not prepare for a survey, but should go through their normal daily routine on the day of the survey. The one-day survey is conducted on a not-to-interfere basis with normal flight schedule, meetings and daily plan. The survey team usually consists of 13 personnel (four officers and nine senior enlisted). The team looks for, finds and reports problem areas, but the command takes action to fix any discrepancies. This helps the command identify hazards and thus mitigate the likelihood of future mishaps. The team's process of following a specific checklist, seeing what the command has, and then moving into "the training mode" helps to ensure the survey never feels like a reprimand. As a matter of policy, results of a safety survey are not released outside the command; in other words, the problem areas are not reported to the group, wing or type commander. However, the NSC shares trend information and common areas of concern with all squadrons and leadership.

USN

Naval Safety Center survey team meets with a squadron during survey visit.

Airfield Facilities Surveys

The airfield facilities branch conducts safety surveys of all Navy and Marine Corps air stations, airfields and outlying landing fields. The team visits each field once every three years for a weeklong survey. The survey team consists of three Navy personnel including a lieutenant limited-duty officer, a master chief or senior chief aviation bos'n mate and a senior chief or chief air-traffic controller. The facilities safety surveys are designed to provide a snapshot of the command's airfield operations, support services safety posture and to provide air traffic control (ATC) safety team training. Additionally, the team surveys the command's traffic-safety program. Airfield operations, ATC, Bird and Animal Strike Hazard (BASH), aircraft rescue and firefighting, visiting aircraft line procedures, aviation fuel programs and traffic safety are reviewed during the survey. At the end of the week the team leader debriefs with the CO.

USN

Aircraft mishap board and support crew work to remove the remains of a Marine Corps AV-8B Harrier *from a muddy hole.*

Aviation Investigation Division

The phone rings at 0330. An NSC duty officer answers. The caller says, "Good morning, sir," and identifies himself as the duty officer from a squadron. "I'm calling to report that we've had a Class A mishap. Here's what we know so far. …" With those words, another mishap investigator from the NSC will be on his way to help an aircraft mishap board (AMB) determine the cause of the event.

The mishap investigation division consists of two civilian and four military investigators with over 25 years of combined experience investigating more than 200 mishaps. In addition to the investigators' personal flying experience, each one has taken numerous courses and attended a host of schools to gain a comprehensive knowledge of the latest investigative techniques for rotary-, fixed-wing and tilt-rotor aircraft mishaps.

The division's primary mission is to support the investigation of Navy and Marine Corps aircraft mishaps in order to determine causal factors and provide recommendations in an effort to prevent recurrence. This effort involves such tasks as direct support to the AMB, liaison with engineering activities and manufacturers and assistance to the controlling

USN

NSC investigators in Iraq examine the wreckage of an H-60 that hit another Seahawk *that had already landed.*

custodian with deep-sea-salvage of lost aircraft. A secondary mission includes supporting the training and education of fleet squadrons in executing their responsibilities in preparing for and conducting mishap investigations.

Although not always required, investigators are ready to depart within four hours to anywhere in the world. An expeditious arrival on-scene facilitates preservation of the evidence and provides timely expertise on site, supporting the mishap squadron and AMB. The investigators have been through the mishap process many times and know what actions and resources are required for success. Additionally, they have access to many valuable resources that can contribute to an investigation including fleet technical-support personnel, aircraft-manufacturer representatives, salvage assets and aircrew survivability equipment experts. After the field work, the investigators assist the AMB in drafting the MSIR.

Aeromedical Division

The aeromedical division has a small but highly experienced staff to address aeromedical safety issues. In surveys of mishap causes, 80 to 85 percent involve human factors, and over half have aeromedical causes, so identifying and controlling these factors goes a long way to ensure safe operations.

USN

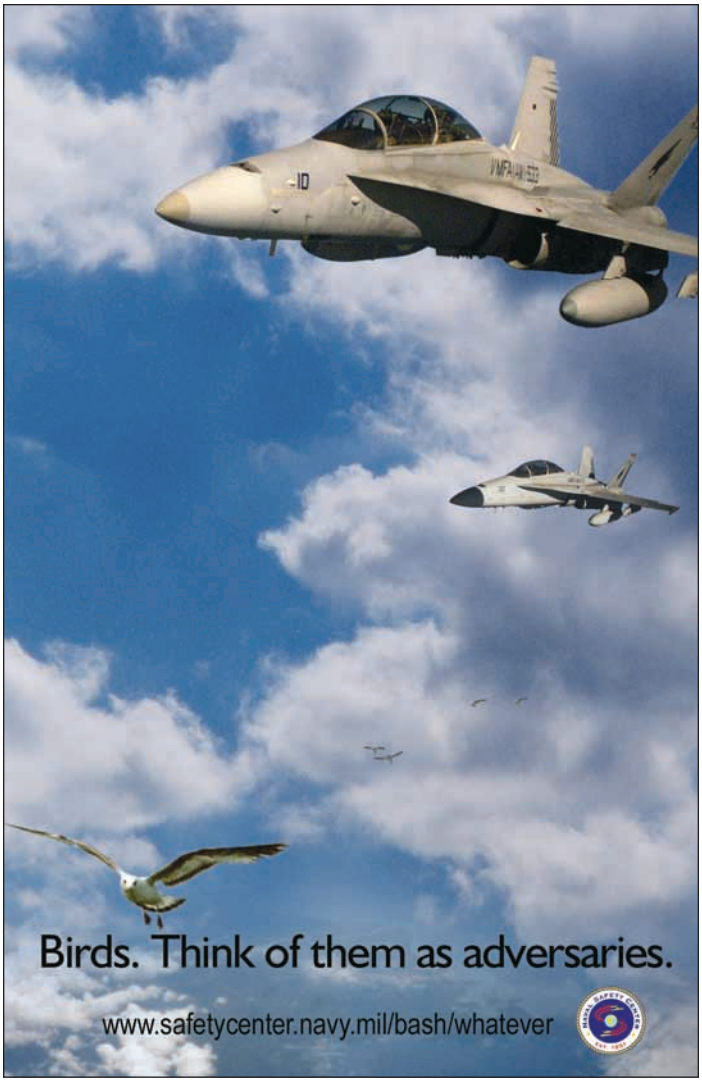
Human factors contribute to most aviation mishaps. The flight surgeon is a key member of the safety team.

It's worth recalling the many ways that aeromedical safety officers (AMSOs), aviation physiologists, aeromedical experimental psychologists (AEPs), aviation corpsmen and flight surgeons (FSs) serve the aviator. Many pilots tend to envision the typical flight surgeon in terms of the doctor depicted, but this isn't the only support aviators receive at the hands of their flight surgeons and other aeromedical experts. The division has two FSs, one AMSO and one AEP on staff.

The aeromedical staff participates in all safety surveys and assesses the level of aeromedical services being provided to squadrons. Adequate flight surgeons, AMSOs and corpsmen staffing, up-to-date physical exams, waiver processing, aircrew education, training on the physiological hazards of flight, management of health and wellness programs, the thoroughness of pre-mishap planning and mishap response are all areas for review. On these surveys, the aeromedical team member conducts one-on-one training of squadron flight surgeons, aviation safety officers and corpsmen, debriefs the CO on the extent and quality of the aeromedical services he or she is receiving and suggests areas for improvement.

Studies show that all mishaps have detailed causal chains extending from the aircrew through staffing, training, resourcing, leadership policies, aircraft design, organizational climate and the like. One of the most recent tools for identifying these layers of influence is the Department of Defense human-factors analysis and classification system (HFACS). The division is using HFACS to analyze all Class A mishaps over the past nine years and has developed "threads" of evidence identifying actionable information over categories of mishaps, which give operators more detail to identify hazards and mitigate risk.

The division also analyzes the aeromedical issues present in all aviation mishaps reported to the NSC and works closely with AMB flight surgeons and other aeromedical experts in the field to fully identify the medical and human causal factors which led to the mishap. Fatigue increasingly is being recognized as a root cause of mishaps, and the division is promoting the use of fatigue and performance software modeling programs. Programs such as the Fatigue Avoidance Scheduling Tool and the Air National Guard's FlyAwake program analyze sleep and duty schedules of aircrew involved in mishaps, and they proactively improve scheduling practices to control fatigue.



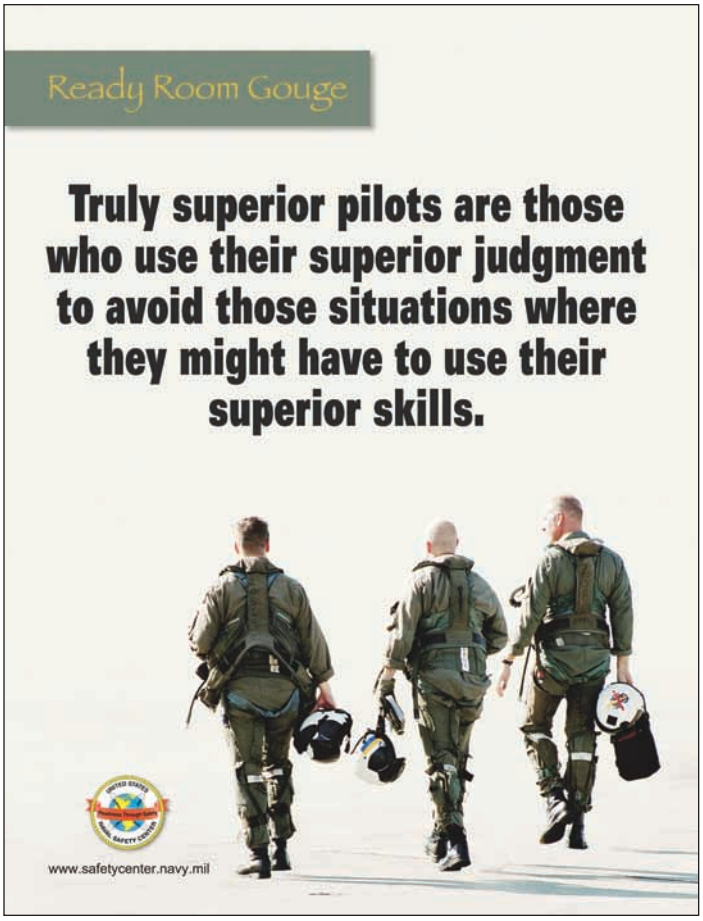
Bird and Animal Strike Hazard (BASH)

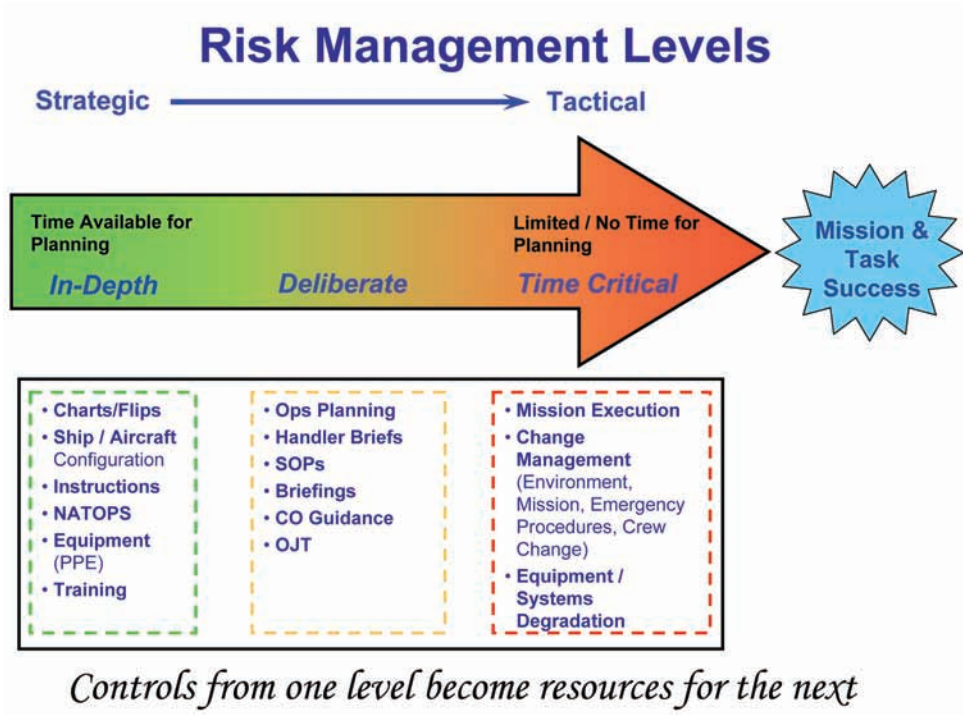
Bird and animal strikes to aircraft continue to be a hazard to all aviation activities. The most important aspect of any BASH program is reporting. Information in these reports of bird and animal activity and actual strikes around the airfield environment provide the most accurate and real-time information for pilot awareness. The pilot on final approach, the person driving the duty sweeper, the contractor refueling parked aircraft — everyone should contact the tower and relay information regarding wildlife activities that may pose a threat to aircrews and aircraft.

Reports of near misses, actual aircraft strikes, and dead or wounded animals found in the area are important to maintain an accurate database. This data increases our ability to address and solve wildlife issues. Information about species, location and time of day can be valuable regarding problem areas in the airfield environment and low-level routes. We then can identify what attracts the species to a particular area, and in many cases, remove the attractant and modify low-level routes as necessary.

To assist reporting and hazard-mitigation efforts, the Navy has partnered with the Smithsonian Bird Identification Lab. To identify remains, samples of blood, feathers and skin are sent to the lab. This information is used to update mishap and hazard

A Sampling of Naval Safety Center Posters





reports (HazReps). Required forms and instructions for submitting remains can be found on the Naval Safety Center's Web site at:

www.safetycenter.navy.mil/aviation/operations/bash/index.asp.

Bird strikes cost military and commercial aviation more than $1.5 billion each year in aircraft loss, damage and out-of-service delays. More specifically, Navy and Marine Corps costs from 1980 to present are:

- 20 Alpha mishaps — $319,870,291
- 40 Bravo mishaps — $9,957,004
- 358 Charlie mishaps — $18,424,077
- More than 16,000 HazReps submitted (many with no cost entered), totaling $2,342,466
- Total cost to the Navy: $350,593,838

Operational Risk Management (ORM)

The NSC was designated as the ORM model manager to revitalize and improve operational risk-management concepts across the fleet as part of decisions made and actions taken by every Sailor, Marine and civilian employee — on and off duty. As model manager, NSC provides subject matter expertise to the fleet including collaboration with naval training and assessment commands to improve ORM training and evaluate its effectiveness. NSC developed a four-pillar approach to revitalize ORM in the fleet:

- Policy and leadership initiatives
- A focused and relevant education and training continuum
- ORM program assessment and feedback
- Tools and resources

Development of a focused ORM training continuum is under way, which will direct training to applicable levels based on time in-service and level of responsibility. This effort will ensure all DoN personnel receive targeted ORM training. The safety center's ORM division comprises two military and two civilian personnel who develop, plan, evaluate, analyze and report ORM initiatives.

The levels — in-depth, deliberate, time critical — are depicted in a shaded gradient because there are no definitive breaks among the three levels of ORM. There is a flow from one level to the next depending on the time available. Each level plays a role in improving our chance of successfully completing the mission. The controls developed at each level are resources we can tap into to accomplish our job or mission during its execution.

Culture Workshops (CW)

Dysfunctional organizational cultures lead to practices or habits that can result in mishaps and degraded combat readiness. The CW program assists COs by identifying organizational strengths and potential hazards, which often arise from unit culture.

Operational excellence exists on a foundation of trust, integrity and leadership that is created and sustained through effective communication. During the workshop, a trained facilitator directs individual and group discussions to discover underlying culture elements within the command. The CO receives feedback during a frank debrief. Specific results do not leave the squadron. However, the NSC uses CO critiques as a process-improvement tool, and to provide senior leadership with an aggregate list of risks faced by COs.

After the workshop, COs may make hazard assessments and risk decisions, implement controls and exercise leadership to fine-tune their unit's culture.

To maximize objectivity and confidentiality of the results, the NSC carefully selects and trains Navy and Marine Corps active-duty and Reserve officers (typically O-5 or O-6) from outside the unit's chain of command as facilitators. Units requesting a culture workshop need to arrange for two additional personnel (typically a lieutenant or company-grade officer and a chief petty officer or staff noncommissioned officer) from a sister or like unit to assist the facilitator.

Maintenance Risk Management Presentation

The NSC provides a variety of services in an effort to raise fleet awareness and improve focus regarding safety culture and readiness. Among our most successful and well-received services is the maintenance risk management (MRM) presentation. NSC personnel present it in a multimedia format, upon request from the individual command. It runs approximately 1.5 hours in length. The MRM uses a mix of slides, pictures, videos and real-world experiences to emphasize concepts, practices, procedures and pitfalls associated with the aviation maintenance environment. This presentation targets the "deckplate" maintainer, all maintenance managers and serves as an outstanding tool to aid in the recalibration of individual and organizational mind-sets. This presentation is best suited for large audiences, i.e., aviation squadrons, organizational and intermediate level activities, air stations, aviation facilities and detachments.

Included in this presentation are:

- A refresher on the concepts of ORM
- Ground Crew Coordination (GCC)
- HFAC overviews
- Motor Vehicle safety overview

Military Flight Operations Quality Assurance (MFOQA)

MFOQA involves analyzing and visualizing flight data to give users objective information they can act on to reduce risks and improve operational efficiencies. The military derived MFOQA from commercial aviation's flight operational quality assurance program. The program includes animated flight replays and single-flight analysis/reporting that aircrew and maintenance personnel can use for flight performance feedback during post-flight debriefs. The program enables aircrews to self-monitor their performance and correct detected deficiencies. The program also gives squadron leaders automated reporting and query capabilities to provide greater insight into aircraft maintenance and operations, flight safety, and aircrew training and proficiency at the individual and squadron levels. Type-wing

and carrier air wing commanders and commodores can objectively monitor and assess fleetwide operations, determine if and what changes in policies and directives may be needed, and effectively assess the results of any changes implemented. While MFOQA is now being introduced to the helo and *Hornet* communities, other aircraft types will follow.

MFOQA animated replays have enhanced the quality of aircrew debriefs, especially multiship engagements, and have been used to conduct post-flight reviews of aircrew performance during evaluation flights and actual in-flight emergencies.

Timely and user-friendly MFOQA data-visualization capabilities have aided maintenance personnel with system troubleshooting. One user reported a time savings of eight hours to diagnose an engine malfunction, and MFOQA was credited for the successful resolution of a recurring flight-control-system problem that had previously been characterized as "cannot duplicate on deck." Quality assurance personnel have used MFOQA to validate functional-check-flight data and to determine if functional systems checks were performed correctly.

Aviation Safety Awareness Program (ASAP)

ASAP, like MFOQA, is a derivative of an established commercial aviation program. It is a web-based mechanism for aircrew and maintenance personnel to anonymously report information relevant to aircraft operations and maintenance. ASAP data are collected, analyzed and trended to provide squadron leadership with a timely means to identify unsafe practices or conditions (i.e., mishap leading indicators) and take appropriate action without the need to identify individuals involved. It also provides insight into the command's safety climate that augments information gained from other sources such as the NSC safety surveys and culture workshops. No flight data is required.

As with prototype MFOQA capabilities, fleet users have benefited from use of the first generation ASAP. Report submissions have alerted squadrons to unsafe practices that have been mitigated with leadership's increased emphasis on standard operating procedures adherence and relevant training. Aircrew reports have helped quantify the extent of specific aircraft-systems-related problems. ASAP also has provided a more objective means to quantify the extent of unsafe conditions including human and material factors.

ASAP analytical results include summaries and trends of reported actions by aircrew and maintenance personnel (both good and other), recurring aircraft systems problems, and individuals' perceptions of their overall command safety climates.

THE MEDIA AND MARKETING DIRECTORATE

There are several ways to become aware of the NSC including safety surveys and one of the many programs just described. The command's Web site is a popular way that most fleet personnel know the command. Or read the safety center magazines, *Approach, Mech* and *Sea & Shore.*

Web site

Attracting more than 1.8 million page requests per month, www.safetycenter.navy.mil consistently ranks near the top Navy Web sites in terms of Internet traffic. The site offers the traditional safety tools: presentations, articles, news stories, checklists, statistics and other forms of technical information. A recent growth area for the Web site has been videos, as we create, acquire and post a steady stream of new, high-quality public service announcements and safety advertisements. Also available on the site's main page, playable with a single click, are humorous vodcasts and podcasts showcasing the popular "Friday Funnies," based on the command's well-known weekly Summary of Mishaps AlSafe message. Another popular feature is the "Order by Mail" poster assortment, which sends hundreds of posters a week to fleet units on request.

Approach Magazine

"There I was. …" Since 1955 *Approach* magazine has guided Navy and Marine Corps aviation professionals with information, statistics and a bit of humor. Most of all, *Approach* has given aviators a place to share stories, misdeeds and adventures, to make us better, safer and more effective. These first-person, or "There I was" stories have been the basis for *Approach* since its inception. This sharing of stories also has bonded Naval Aviators — past and present — to one another and to the profession itself. Picture yourself with a damaged aircraft, operating in blue water with a pitching deck and enough gas for one, maybe two, approaches, and you have everything needed for a "There I was" story. More than 14,000 copies are published bimonthly, and as with all our media products, are available online.

Mech Magazine

Since 1961 *Mech* magazine has helped improve Naval Aviation safety by providing a format to share stories and provide tips for military aviation maintenance professionals. For over 47 years *Mech* has been the Navy and Marine Corps' leading aviation maintenance safety magazine. It deals with maintenance cause factors and servicing errors, and includes accidents, incidents, flight hazards and ground accidents. It's published quarterly, has a fleetwide distribution of more than 17,000 copies and is read by more than 100,000 Sailors and Marines.

Sea & Shore Magazine

This publication combines the award-winning magazines, *Fathom* and *Ashore.* It provides a forum for sharing safety related stories from Sailors and Marines from around the world. Stories usually represent a mix of on- and off-duty events, with emphasis on the latter. Perhaps the most popular attraction is *Sea & Shore's* annual traffic-safety issue, which appears each spring. Published quarterly, *Sea & Shore* has a distribution of more than 25,000 copies destined for Sailors, Marines and their families.

CNO Aviation Related Safety Awards

On behalf of the CNO, the Commander NSC administers and reviews nominations and awards the CNO Aviation Safety Award, the Admiral Flatley Memorial Award (sponsored by The Boeing Co.), the Naval Aviation Readiness Through Safety Award, the Admiral James S. Russell Naval Aviation Flight Safety Award (sponsored by the Daedalian Foundation) and the Grampaw Pettibone Award.

Safety awards recognize operational excellence, exemplary safety contributions and further the Naval Aviation Safety Program. The awards recognize economy of operations through safety. In addition to an outstanding safety record, commands and ships selected must have aggressive aviation safety programs that contribute new ideas in mishap prevention for the general benefit of Naval Aviation. Professional reporting is essential to the success of the Naval Aviation Safety Program, consequently, safety awards are presented partly as a result of comprehensive and reputable reporting. Consideration for CNO safety awards requires meeting the highest standards of aviation safety.

The CNO Aviation Safety Award is awarded to Navy and Marine Corps squadrons. The Admiral Flatley Memorial Award is awarded to one CV/CVN and associated CVW and to one LHA/LHD and associated MEU. The Naval Aviation Readiness Through Safety Award and Admiral James S. Russell Naval Aviation Flight Safety Award are awarded to an aircraft controlling custodian.

The Grampaw Pettibone Award is awarded to one individual and to any Navy or Marine Corps aviation unit that contributed the most toward aviation safety awareness through publications. In 2008, the NSC added an award for excellence in electronic media. The award commemorates the work of the late CAPT Seth Warner, USN, originator of Grampaw Pettibone, and the late Mr. Robert Osborn, illustrator of Grampaw Pettibone.