



Communication of Design Requirements for Safety and Health in Systems Design, Development and Acquisition

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Background: DoD is in the process of a major re-capitalization of defense systems. Approximately 60 Billion dollars spending are projected research development and systems acquisition in each of the next 10 years.

Issues: Our process review indicated that many safety and health issues were not effectively communicated to the acquisition community.

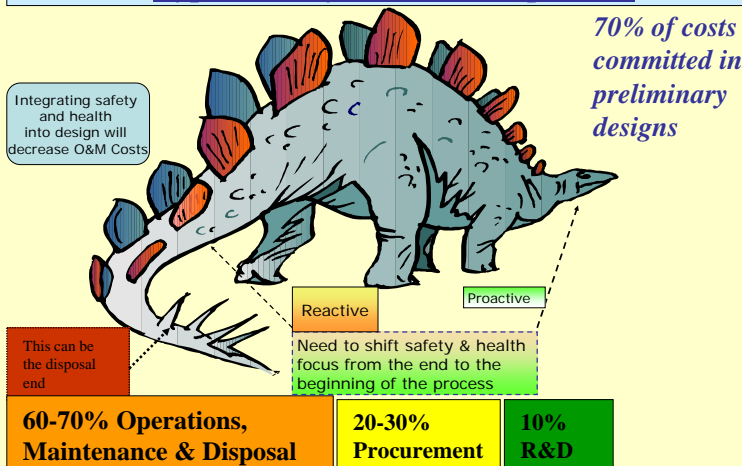
Many safety and health issues considered in the "OSH" domain such as noise, fall protection and control of hazardous energy sources were incompletely considered in the system safety risk assessment of military systems and equipment.

The result has been design of new systems and equipment that lacked effective controls for common safety and health hazards.

Concurrently, a high fraction of occupational safety and health (OSH) professionals lacked background in how the acquisition process operates and approaches to communicate risks within this system.

Action: The OPNAV Safety Liaison office has re-invigorated a program for management of safety risks during the design and development process. This supports the theme of Military Public Health: *From Knowledge to Action* by integrating **knowledge of safety and health** considerations into **actions** that influence design and development.

Typical life cycle costs in acquisition



RECAPITALIZING DoD WEAPONS SYSTEMS
 Estimated \$60 to 70 Billion/year for 10 years
ACAT I (> \$3.1 billion) MAJOR PLATFORM ACQUISITIONS

ARMY

COMANCHE Light Helicopter
 FMTV Medium Tactical Vehicles
 BLACKHAWK Utility Helicopter

AIR FORCE

EELV Expendable Launch Vehicle
 JPATS Joint Primary Aircraft Training System
 F-22 Advanced Tactical Fighter
 B-2A Spirit Stealth Bomber
 C-130J Hercules Cargo Plane
 C-17A Globemaster III Advanced Cargo Aircraft

DoD

JSF Joint Strike Fighter (F35)
 MRAP Mine Resistant Ambush Protected Vehicle

NAVY-MARINE CORPS

DDG1000 21st Century Destroyer Program*
 LCS Littoral Combat Ship*
 EFV Expeditionary Fighting Vehicle (previously AAV Advanced Amphibious Assault Vehicle)
 F/A-18 E/F HORNET Naval Strike Fighter
 SSN 774 Virginia Class Submarine*
 Ohio Class Conversion*
 V-22 OSPREY Joint Advanced Vertical Lift Aircraft
 CVN 68 NIMITZ Class Nuclear Powered Aircraft Carriers*
 CVN21 New Class of Nuclear Powered Aircraft Carriers*
 E-2C/D HAWKEYE Carrier-Based Early Warning Aircraft
 AV-8B Short Takeoff & Landing Close Air Spt. Aircraft
 DDG51 Guided Missile Destroyer*
 STRATEGIC SEALIFT Naval Transport Ship
 LPD 17 Transport Vessel*
 T-45TS Undergraduate Jet Pilot Training System
 LHD 1 Amphibious Assault Ship*
 * Ship programs

Issue: Limited process understanding and involvement

Occupational Health and Safety professionals are often not educated about, or involved in, the systems acquisition process and lack the background necessary to influence new systems designs.

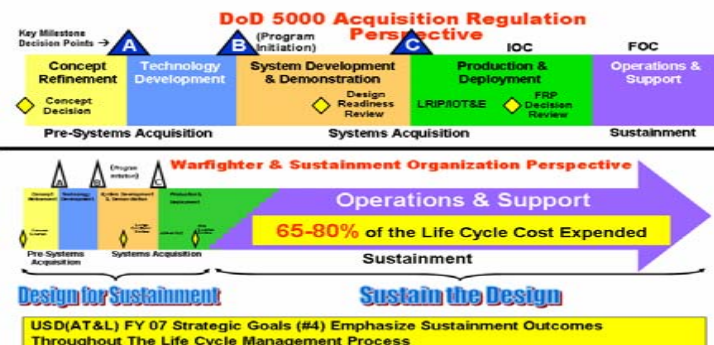
Key educational points

- Basic process that produces all our major (& minor) weapon systems. This includes Aircraft, ships, tanks, trucks, bio/chem filtration systems, etc.
- Process is divided into discrete phases that require major design reviews
- Process starts with a validated need requiring a material solution
- Ends with disposal/recycle/demilitarization
- Major upgrades or modifications also follow this process
- A Program Manager is assigned to plan, organize, and control each system under development

Methodology:

- (1) Participation in DOD/Navy acquisition committees
- (2) Website summarizing safety and occupational health issues in acquisition (www.safetycenter.navy.mil/acquisition)
- (3) Technical outreach and education
- (4) Update of Navy system safety policy (OPNAVINST 5100.24) and creation of a forum for communication of health and safety management issues among Navy organizations.
- (5) Collaboration with acquisition program offices and systems command technical authorities.

Defense Acquisition Management Framework



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Actions and Results

- Hired full time safety professional for OPNAV Safety Liaison Office and then for SECNAV I&E (Deputy Assistant SECNAV for Safety)
- Improved input into DOD and Navy acquisition policies
 - Influenced system safety content of DODI 5000.2 and SECNAVINST 5000.2 -> D acquisition policies
 - Working with committee updating Mil Std 882 System Safety Practice, including updated guidance on health hazard evaluation.

High level policy guidance

- SECNAV 5100.10H
- SECNAV 5000.2

Require system safety in acquisition (Mil Std 882)

- Service Safety Chiefs Commitment to System Safety Revitalization

Donald Rumsfeld's Challenge

75% reduction in preventable mishaps

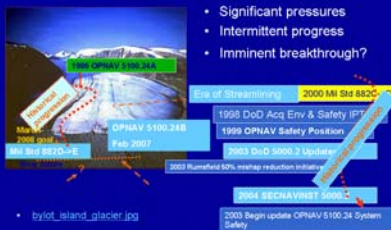
Design-related mishaps should be considered preventable!

DoD 5000.2 Enclosure 7 Human Systems Integration Requires human-system interface (includes safety and ergonomic elements) and system safety program



Requirements for Programmatic Environmental Health and Safety Evaluation (PEHSE)

Progress on OPNAVINST 5100.24 System Safety Instruction



- Significant pressures
- Intermittent progress
- Imminent breakthrough?

Limitations

- Additional staffing is needed at Safety Center Headquarters in Norfolk and elsewhere. (A second CNO position has been created). Collateral duty involvement from SOH professionals is needed.
- Policy update is manpower intensive and often has delayed impact. SOH Involvement will enhance policy implementation. Update of Mil Std 882 has been very slow.
- Enhanced cross-communication and cooperation is needed between technical specialties
 - Depot and operational with Acquisition community,
 - System safety practitioners with OSH Professionals
 - Human systems integration with ergonomics
- Technical outreach to other professional groups needs to increase
- Participation in ship, aircraft and other program system safety
- Many acquisition documents are not reviewed by safety and health professionals. Follow-on contract specifications remain inconsistent. Greater involvement is needed.

- The acquisition website has enhanced outreach and cross-communication between disciplines.
- Technical outreach and education has included papers and occupational health tutorial tracks at the International System Safety Society's annual conferences.
- Updated the 1986 OPNAVINST 5100.24 System Safety Policy and re-issued in 2007. The policy created the System Safety Advisory Board (SSAB), a Navy-wide forum to influence safety and health in acquisition systems.
- Guidelines have been developed for acquisition capabilities (requirements) documents in OPNAVINST 5100.24, but only about 40% of such documents are reviewed on a prioritized basis.

Use of the standard risk assessment matrix is required by Defense acquisition regulations (DODI 5000.2).

Raises risk acceptance to appropriate management level.

Aircraft carrier flight deck noise brought to VCNO and Assistant SECNAV for Research Development and Acquisition on this basis.

AT&L memo of 7 Mar 07 requires fleet concurrence prior to fielding high & serious risks.

Mil Std 882 RISK ASSESSMENT MATRIX

Use required by DODI 5000.2 Acquisition Regulations
HIGH :Requires Service Acquisition Executive (CAE (ASN-RDA) USSOCOM) Approval:1A,B,C,2A,B,3A)

- Need to describe risks per Mil Std 882 and communicate to program managers

Frequency Of Occurrence	Hazard Categories			
	I Catastrophic	II Critical	III Marginal	IV Negligible
(A) Frequent	1A	2A	3A	4A
(B) Probable	1B	2B	3B	4B
(C) Occasional	1C	2C	3C	4C
(D) Remote	1D	2D	3D	4D
(E) Improbable	1E	2E	3E	4E

HAZARD RISK INDEX: 1A, 2A, 3A, 4A, 1B, 2B, 3B, 4B, 1C, 2C, 3C, 4C, 1D, 2D, 3D, 4D, 1E, 2E, 3E, 4E

SUGGESTED CRITERIA: UNACCEPTABLE (1A, 2A, 3A, 4A); ACCEPTABLE WITH REVIEW & MANAGEMENT; ACCEPTABLE WITHOUT REVIEW/COM

NOTE: THESE ARE ONLY THE SUGGESTED CRITERIA. They may be adjusted in W agreement with the Component Authority.

Acquisition Safety

Naval Safety Center Acquisition Website

The Naval Safety Center maintains a group of safety experts who are familiar with nearly every major platform. Program offices are encouraged to contact Safety Center analysts in order to identify risks documented through surveys and investigations in order to avoid these problems (and costs) in future systems. The Safety Center can also help develop preliminary hazard lists and identify potential alternative approaches to risk mitigation. Contact us using our [Feedback Form](#) or call (757) 444-3520.

The Navy and Marine Corps considers protecting our people to be critical to our mission of national defense. The Department of the Navy is dedicated to ensuring our men and women are ready at all times to carry out their mission by providing them with safe and healthful work environments. One place to start, to ensure safe equipment and workplaces, is in acquisition.

The Navy's Safety Program is dedicated to enhancing readiness but ensuring every Navy and Marine Corps workplace, both ashore and afloat, is as free from hazards as possible. Each day thousands of safety professionals team up with Navy and Marine Corps workers and leadership to establish and maintain safe work environments in what are often inherently hazardous settings - aboard military ships and aircraft at sea as well as at ground and shore facilities. Safety professionals pursue the Navy and Marine Corps's goals in many ways: they train personnel in safe practices and procedures; they oversee the procurement, installation, and maintenance of safety equipment and systems; and they continually provide recommendations for improving safety conditions.

Effective acquisition safety increase productivity through streamlined work processes and avoidance of fatalities, injuries, and illnesses. It saves large sums of money by avoiding expensive retrofits due to poor design, disability and retraining costs, and lost productivity. It improves military quality of life and military retention.

A National Safety Council Study of the Department of Defense Safety Program estimated safety losses to the Navy, Air Force, Army, Marine Corps and Defense agencies to be \$10 to \$20 billion per year. Adding focus to acquisition safety will significantly reduce these losses.

One of the most effective ways to ensure the safety of a system, whether as complex as a ship or an aircraft or as uncomplicated as an aerosol dispenser, is to incorporate health and safety requirements before buying or building the system, at the very beginning of the acquisition process. With the advent of rapid technological advancement and the very real threat to our national security, the traditionally long acquisition cycle of 10-15 years is no longer acceptable. In recent years, acquisition reform has accelerated the rate at which leading edge technology is harnessed for military use. Today, acquisition reform is achieved through targeting a three-pronged approach:



www.safetycenter.navy.mil/acquisition

<http://www.safetycenter.navy.mil/acquisition/default.htm> (2 of 2) 2/14/2008 18:03:53

Discussion: Work in acquisition safety has improved fleet feedback and influence in specific technical areas. However, increased education and involvement of safety and health professionals is needed.

Conclusion: Effective integration into the systems acquisition process will require education and involvement of Safety and Health senior management and working level professionals. It support the theme of Military Public Health: *From Knowledge to Action* by incorporating knowledge of safety and health considerations into actions that influence design and development.

Recommendations:

- Integrate acquisition process information into training for OSH professionals.
- Industrial Hygiene and Safety staffing guidelines should consider involvement in system safety working groups and other acquisition support such as facility design reviews and external program reviews.
- Safety and health professionals should participate in professional forums linked to acquisition.
- Ensure communication of OSH issues identified by the fleet and OSH professionals to the acquisition system.
- OSH professional participation in acquisition programs and external program reviews.