US Air Force Perspective:

Rapid or Urgent Acquisition ESOH Management – Mine Resistant Ambush Protected (MRAP) Vehicle Program Lessons Learned

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Agenda

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▸ MIL-STD-882 Process

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1) Limited Ability to Affect Design
2) Field Experience Exploitation
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4) ESOH Practitioner Integration in the SE Process
5) National Environmental Protection Act (NEPA) Compliance
6) Keeping Management Informed
7) ESOH Reports/Analyses
8) Hazard Tracking System

Introduction

▸ Rapid or Urgent Acquisition programs pose unique challenges for the Systems Engineering Environment, Safety, and Occupational Health (ESOH) Subject Matter Experts (SMEs) in their efforts to conduct a MIL-STD-882-compliant ESOH risk management program

▸ The Air Force was one of the participants in the Joint Program for the rapid fielding of the Mine Resistant Ambush Protected (MRAP) family of vehicles

  – Marine Corps Joint Program Office (JPO)

  – Overseas Contingency Operations (OCO) funding

▸ ESOH Management directed by team of Principals for Safety (PFS)

  – Led by the Marine Corps JPO PFS

  – Each Service had its own PFS
    − Army
    − Navy
    − SOCOM
    − Air Force (Forbes)

▸ This presentation will review eight key Air Force Lessons Learned

Introduction

▶ MRAP Program Details

– V-hulled to deflect blast from Improvised Explosive Devices (IEDs); Heavily armored to withstand small-arms fire

– $48B program managed by a Joint Program Office (JPO) augmented by Service SMEs

– 27,740 vehicles produced 2007-2012

– Seven manufacturers produced 21 different variants

MAXXPRO Cat 1

CAIMAN CAT II

RG-33

M-ATV

Buffalo Cat III

Cougar Cat I
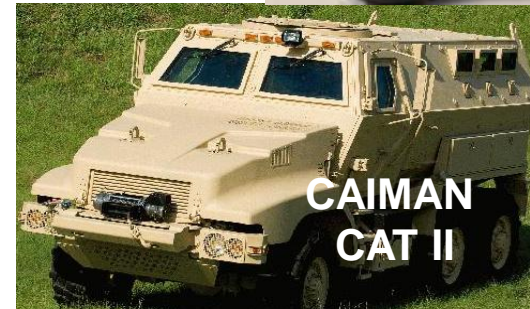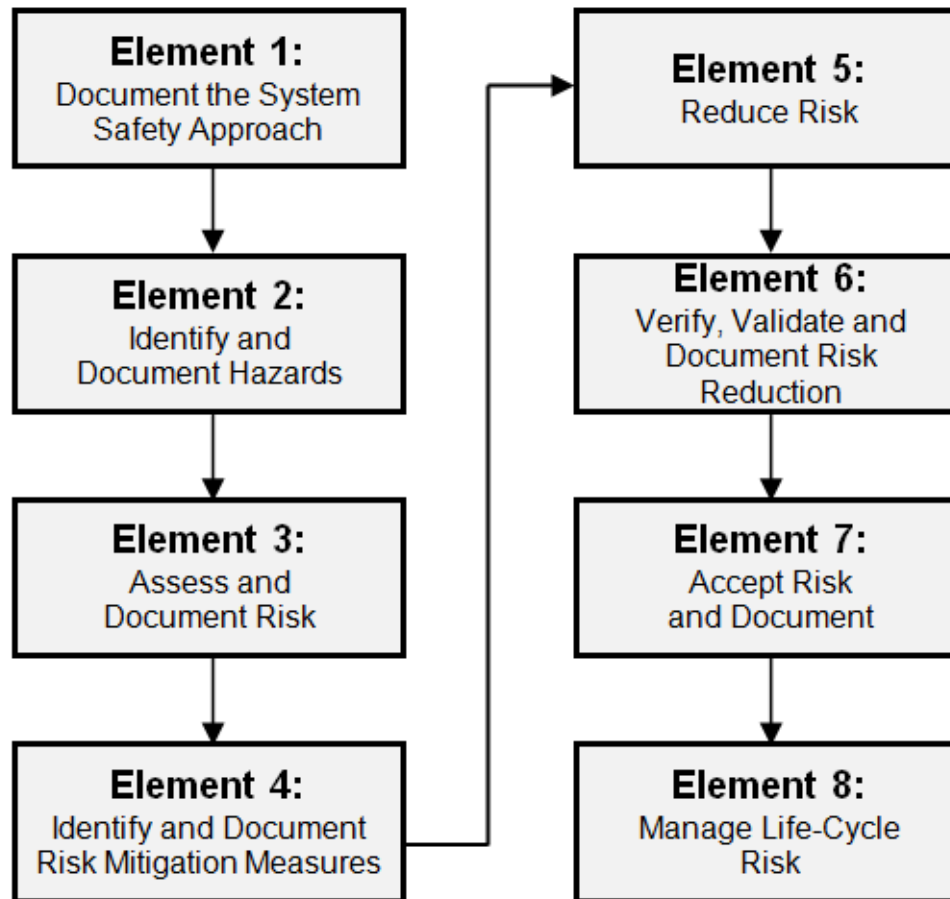
Introduction

MIL-STD-882 Process

FIGURE 1. Eight elements of the system safety process

Lessons Learned

▸ **Lesson 1: Limited Ability to Affect Design**

  – The MRAP program responded to warfighter's critical need for rapid survivability improvements in Iraq (Operation Iraqi Freedom) and Afghanistan (Operation Enduring Freedom) combat theaters to counter proliferation of IEDs

  – Government purchased, tested (for survivability), produced, and fielded existing designs as quickly as possible with the minimum modifications necessary to install mission equipment, e.g., radios and weapons

  – Systems Engineering ESOH SMEs initially limited to

    – Identifying the most obvious and significant hazards

    – Developing and fielding training materials with the available hazard information

    – Obtaining the required risk acceptances for identified hazards to support the rapid fielding

      – Provided Senior Leader awareness of unmitigated risks

      – Contributed to Leadership support for funding of the development and fielding of risk mitigation retrofits

Lessons Learned

▸ **Lesson 2: Field Experience Exploitation**

– In-use experience will drive hazard identification and risk reassessment

– Safety mishaps and survivability incidents highlight design deficiencies and problems

– Programs must establish method for monitoring reports of in-theater mishaps and incidents

– Limited number of safety personnel in theater restricted mishap investigations

▸ **Lesson 3: Mishap Investigations by Program Office Staff**

– Timely and relevant data needed to understand and to address mishap causes

– Insufficient Safety personnel in theater to investigate mishaps

– Operators, maintainers, and safety staff do not have time to provide detailed reporting

– Programs must have ESOH SMEs that can respond quickly to the scene of mishaps

– Collect and report to the Program Office targeted data relevant to root cause analysis

– Support any formal safety investigations while avoiding privileged information restrictions

– DoDI 5000.02 and DoDI 6055.07 (Mishap Notification, Investigation, Reporting, and Record Keeping) provide requirements that support this approach

– Targeted, streamlined questionnaires for safety personnel to use is an optional but sub-optimal alternative

Lessons Learned

▸ **Lesson 4: ESOH Practitioner Integration in the SE Process**

– ESOH practitioners for rapid fielding programs should be experienced SMEs

– ESOH SMEs must be fully integrated into the program's Systems Engineering processes, staff, and IPT structure to take advantage, on a real time basis, of opportunities to identify and field mitigations to known hazards

▸ **Lesson 5: National Environmental Protection Act (NEPA) Compliance**

– Only applicable to non-combat locations

– Services have different NEPA compliance requirements – only significant to joint programs

– Most effective and efficient approach for a Rapid or Urgent program is to prepare a Technical Document with detailed system specific data, and data on system sources and magnitude of environmental contaminants, e.g., community noise levels, air and water pollutant emissions, and hazardous materials

– Services can use this Technical Document as the basis for their unique NEPA analyses

▸ **Lesson 6: Keeping Management Informed**

– Frequency and severity of mishaps

– Status of High and Serious risks

– Funding and fielding of mitigations

Lessons Learned

▸ **Lesson 7: ESOH Reports/Analyses**

– Standard ESOH reports produced by non-Rapid or non-Urgent programs have little or no value to actual hazard management in Rapid or Urgent programs

  – Divert resources from addressing actual ESOH hazards

  – Especially true for retroactive efforts to prepare standard documentation, e.g. Preliminary Hazard Analyses done years after fielding the system

– The only essential ESOH documentation is the HTS, which must include the formal risk acceptance documentation and hazardous material data

▸ **Lesson 8: Hazard Tracking System**

– Commit resources to starting with a robust and flexible hazard tracking system (HTS) to

  – Define data requirements from the beginning

  – Avoid significant workload and potential for data loss associated with converting to a more capable HTS later in the program

– Never develop a unique database -- use either an existing HTS from a similar type of program or a commercially available product

Summary

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- ▶ MIL-STD-882 Process
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    1) Limited Ability to Affect Design
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Questions

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