



# **US Air Force Perspective:**

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

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# Agenda

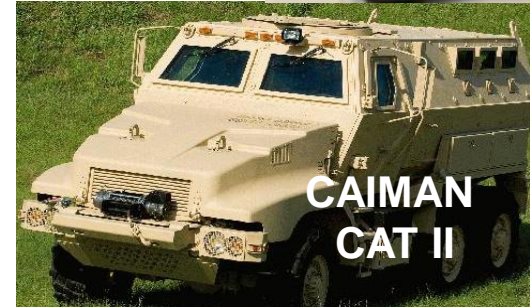
- ▶ Introduction
  
- ▶ MIL-STD-882 Process
  
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  - 1) Limited Ability to Affect Design
  - 2) Field Experience Exploitation
  - 3) Mishap Investigations by Program Office Staff
  - 4) ESOH Practitioner Integration in the SE Process
  - 5) National 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



# Introduction



# MIL-STD-882 Process

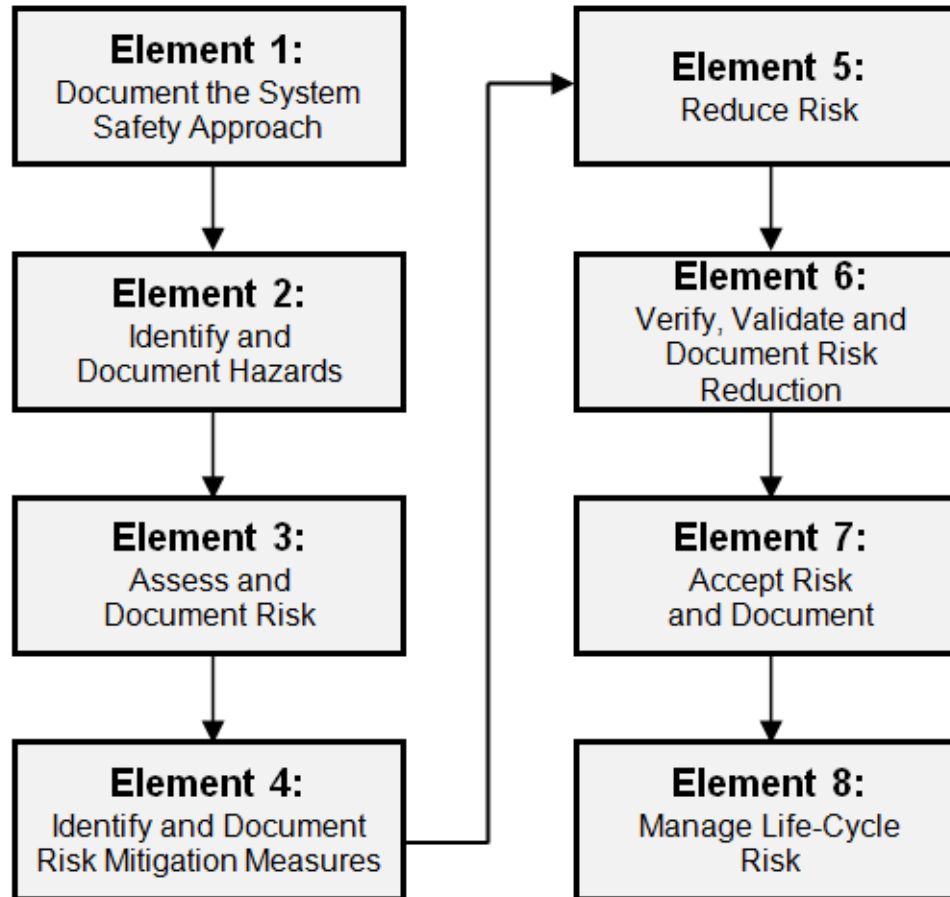


FIGURE 1. Eight elements of the system safety process

# 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

- ▶ Rapid or Urgent Acquisition programs pose unique challenges for the Systems Engineering ESOH SMEs in their efforts to conduct a MIL-STD-882-compliant ESOH risk management program
- ▶ MIL-STD-882 Process
- ▶ Lessons Learned
  - 1) Limited Ability to Affect Design
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# Questions

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