



# **19697 – Environment, Safety, and Occupational Health (ESOH) Risk Management**

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**Mr. David Asiello  
Office of the Assistant Secretary of Defense  
(Energy, Installations & Environment)**



# Outline

## Acquisition Environment, Safety, and Occupational Health (ESOH)

- Role of OASD(EI&E)/ESOH
- Acquisition ESOH Policy
- Comparing and Contrasting Risk, Issues, and Opportunity (RIO) Management & ESOH Risk Management
  - Risk Assessment
  - Risk Tracking
  - Risk Acceptance
- Summary





# DoD Mission and Acquisition ESOH

## DoD Mission:

The mission of the Department of Defense (DoD) is to provide the military forces needed to deter war and to protect the security of our country

Acquisition ESOH supports the DoD's mission during non-combat activities by:

- Preventing loss of life or serious injury
- Avoiding damage to facilities or equipment
- Preventing harm to the environment and the surrounding community
- Avoiding system failures and impacts to mission capability or mission operability





# OASD(EI&E) – ESOH Role in Acquisition

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- **Defense Acquisition Board Advisor for ESOH considerations**
  - Oversight of ACAT 1D, IAM, and Special Interest programs
  - Provides ESOH subject matter experts to DASD(SE)-led Program Support Assessments
- **Member of Defense Acquisition Policy Working Group (DAPWG)**
  - Focus on DoDI 5000.02 -- ESOH in acquisition policy
  - Identify OSD ESOH “expectations” in the Defense Acquisition Guidebook (DAG)
  - Provide guidance for policy implementation on the Acquisition Community Connection (ACC)
- **Provide ESOH input to Chairman of the Joint Chiefs of Staff Instruction CJCS 3170.01, *Joint Capabilities Integration and Development System (JCIDS)***
- **Chair of DoD Acquisition ESOH Integrated Product Team (IPT)**
  - Component consensus on ESOH policy and guidance



# Acquisition ESOH Policy Requirements

- **DoD Instruction 5000.02, *Operation of the Defense Acquisition System, Enclosure 3 (Systems Engineering (SE))***
  - Integrate ESOH risk management into the overall SE process for all engineering activities throughout the system's life cycle
  - As part of risk reduction, eliminate ESOH hazards where possible and manage ESOH risks where hazards cannot be eliminated
  - Use methodology in MIL-STD-882E, *Standard Practice for System Safety*
    - Includes a process that requires assessment of software's contributions to system risk that considers the potential risk severity and the degree of control that software exercises over the hardware
    - Document hazards with a closed-loop Hazard Tracking System (HTS) and specifies required data for tracking





# Acquisition ESOH Policy Requirements, Cont.

- **DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, Enclosure 3 (Systems Engineering (SE))**
  - Prior to exposing people, equipment, or the environment to known system-related ESOH hazards, document that the associated risks have been accepted by the delineated acceptance authorities
  - The user representative, as defined in MIL-STD-882E, must be part of this process throughout the life cycle of the system and will provide formal concurrence prior to all High and Serious risk acceptance decisions
  - Address the status of ESOH risks and acceptance decisions at technical reviews
  - Address the status of all High and Serious ESOH risks at acquisition program reviews and fielding decisions



# Acquisition ESOH Guidance and Resources

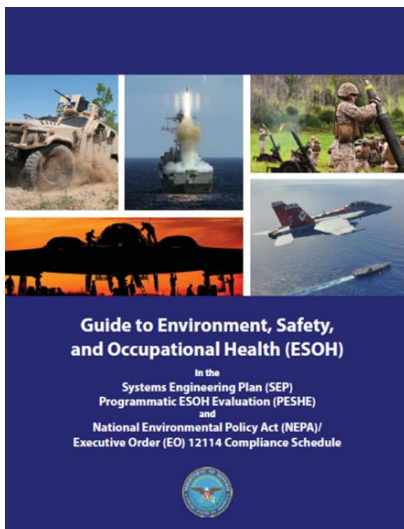


**Defense Acquisition Guidebook**  
*Your Acquisition Policy and Discretionary Best Practice Guide*

➤ **DAG SE Chapter**  
[\[https://dag.dau.mil\]](https://dag.dau.mil)

➤ **Acquisition Community Connection (ACC)  
ESOH Community of Practice**

**ACC Website:**  
[\[https://acc.dau.mil/esoh\]](https://acc.dau.mil/esoh)



➤ ***Guide to ESOH in the Systems Engineering Plan (SEP), Programmatic ESOH Evaluation (PESHE), and NEPA/EO 12114 Compliance Schedule***  
[\[https://acc.dau.mil/CommunityBrowser.aspx?id=683547&lang=en-US\]](https://acc.dau.mil/CommunityBrowser.aspx?id=683547&lang=en-US)



# Comparing Risk, Issue, and Opportunity (RIO) & ESOH Risk Management

## RIO Management

- Focus is on impacts to program cost, schedule, and performance
  - Can drive ESOH risks
- Aims to manage uncertainty and increase predictable outcomes in delivering capability to the warfighter
- Most important decisions to control risk are made early in a program's life cycle
- Less emphasis on RIO Management in Operations and Support Phase
- Issue is a realized risk

## ESOH Risk Management

- Focus is ESOH risks
  - Can drive cost, schedule and performance risks
- Aims to eliminate hazards or minimize ESOH risks to people, equipment, or the environment
- Most important decisions to eliminate hazards or mitigate risk made early in a program's life cycle when they impact system design
- ESOH risks identified and tracked throughout life cycle – key sustaining engineering activity
- Mishap is a realized ESOH risk

**Opportunities have potential future benefits to the program's cost, schedule, and/or performance baseline.**





# Assessing “ESOH” and “Program” Risks

## RIO Management

- DoD RIO Management Guide for Defense Acquisition Programs
- Identify the “future event” that could occur and the potential impact to the program's ability to meet cost, schedule, and performance
- Determine consequence of impact to program's ability to meet cost, schedule, or performance objectives
- Determine, qualitatively or quantitatively, likelihood the future event could occur and cause negative consequences

## ESOH Risk Management

- MIL-STD-882E methodology
- Identify the hazard and potential mishaps that could harm people, equipment, or the environment
- Determine severity of the consequences of the mishap occurring
- Determine, qualitatively or quantitatively, probability that the hazard could result in a mishap

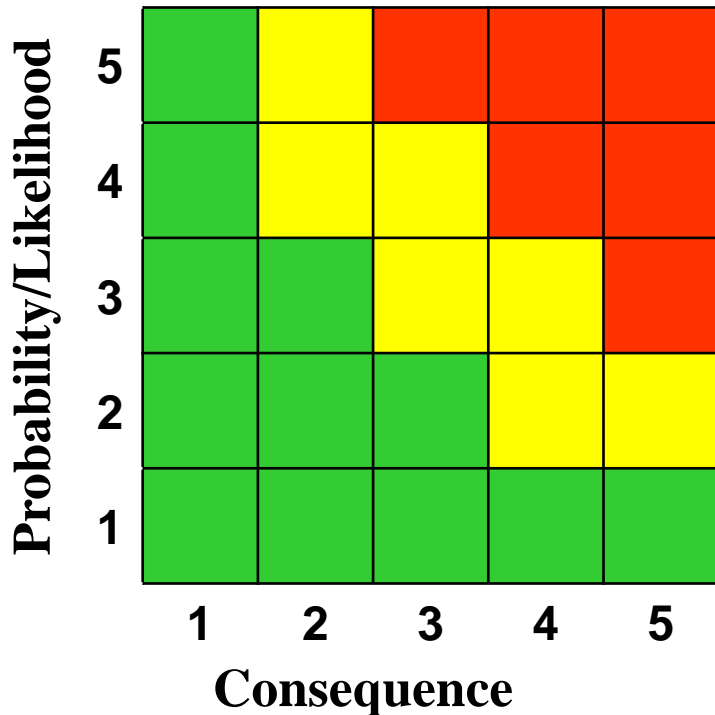
**Process is fundamentally the same for cost, schedule, and performance risks and ESOH risks.**



# Assessing “ESOH” and “Program” Risks

## RIO Management

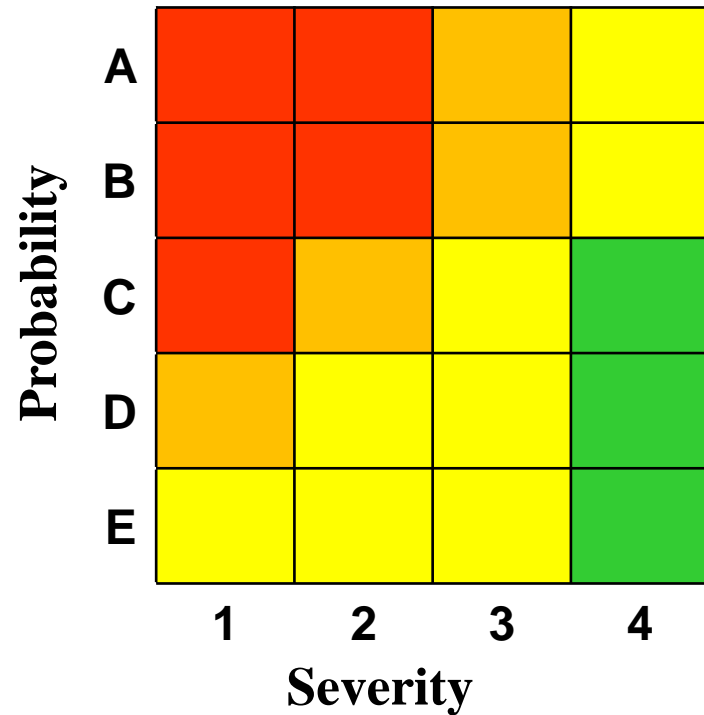
➤ 5 x 5 Matrix



Red = High Risks  
 Yellow = Medium Risks  
 Green = Low Risks

## ESOH Risk Management

➤ 5 x 4 Matrix



Red = High ESOH Risks  
 Orange = Serious ESOH Risks  
 Yellow = Medium ESOH Risks  
 Green = Low ESOH Risks



# RIO Consequence Criteria

SAMPLE CONSEQUENCE CRITERIA			
Level	Cost	Schedule	Performance
5 Critical Impact	10% or greater increase over APB objective values for RDT&E, PAUC, or APUC  Cost increase causes program to exceed affordability caps	Schedule slip will require a major schedule <u>rebaselining</u>  Precludes program from meeting its APB schedule threshold dates	Degradation precludes system from meeting a KPP or key technical/supportability threshold; will jeopardize program success 2  Unable to meet mission objectives (defined in mission threads, <u>ConOps</u> , OMS/MP)
4 Significant Impact	5% - <10% increase over APB objective values for RDT&E, PAUC, or APUC  Costs exceed life cycle ownership cost KSA	Schedule deviations will slip program to within 2 months of approved APB threshold schedule date  Schedule slip puts funding at risk  Fielding of capability to operational units delayed by more than 6 months	Degradation impairs ability to meet a KSA. <u>2</u> <u>Technical</u> design or supportability margin exhausted in key areas  Significant performance impact affecting System-of System interdependencies. Work-arounds required to meet mission objectives
3 Moderate Impact	1% - <5% increase over APB objective values for RDT&E, PAUC, or APUC  Manageable with PEO or Service assistance	Can meet APB objective schedule dates, but other non- APB key events (e.g., SETRs or other Tier 1 Schedule events) may slip  Schedule slip impacts synchronization with interdependent programs by greater than 2 months	Unable to meet lower tier attributes, TPMs, or CTPs  Design or supportability margins reduced  Minor performance impact affecting System-of System interdependencies. Work-arounds required to achieve mission tasks
2 Minor Impact	Costs that drive unit production cost (e.g., APUC) increase of <1% over budget  Cost increase, but can be managed internally	Some schedule slip, but can meet APB objective dates and non-APB key event dates	Reduced technical performance or supportability; can be tolerated with <u>little impact</u> on program objectives  Design margins reduced, within trade space
1 Minimal Impact	Minimal impact. Costs expected to meet approved funding levels	Minimal schedule impact	Minimal consequences to meeting technical performance or supportability requirements. Design margins will be met; margin to planned tripwires



# MIL-STD-882E Severity Categories

SEVERITY CATEGORIES		
Description	Severity Category	Mishap Result Criteria
<b>Catastrophic</b>	1	Could result in one or more of the following: death, permanent total disability, irreversible significant environmental impact, or monetary loss equal to or exceeding \$10M.
<b>Critical</b>	2	Could result in one or more of the following: permanent partial disability, injuries, or occupational illness that may result in hospitalization of at least three personnel, reversible significant environmental impact, or monetary loss equal to or exceeding \$1M but less than \$10M.
<b>Marginal</b>	3	Could result in one or more of the following: injury or occupational illness resulting in one or more lost work day(s), reversible moderate environmental impact, or monetary loss equal to or exceeding \$100K but less than \$1M.
<b>Negligible</b>	4	Could result in one or more of the following: injury or occupational illness not resulting in a lost work day, minimal environmental impact, or monetary loss less than \$100K.



# RIO Likelihood / Probability Levels

Typical Likelihood Criteria		
Level	Likelihood	Probability of Occurrence
5	Near Certainty	> 80% to $\leq$ 99%
4	Highly Likely	> 60% to $\leq$ 80%
3	Likely	> 40% to $\leq$ 60%
2	Low Likelihood	> 20% to $\leq$ 40%
1	Not Likely	> 1% to $\leq$ 20%



# MIL-STD-882E Probability Levels

PROBABILITY LEVELS			
Description	Level	Specific Individual Item	Fleet or Inventory
Frequent	A	Likely to occur often in the life of an item.	Continuously experienced.
Probable	B	Will occur several times in the life of an item.	Will occur frequently.
Occasional	C	Likely to occur sometime in the life of an item.	Will occur several times.
Remote	D	Unlikely, but possible to occur in the life of an item.	Unlikely, but can reasonably be expected to occur.
Improbable	E	<u>So</u> unlikely, it can be assumed occurrence may not be experienced in the life of an item.	Unlikely to occur, but possible.
Eliminated	F	Incapable of occurrence. This level is used when potential hazards are identified and later eliminated.	Incapable of occurrence. This level is used when potential hazards are identified and later eliminated.



# Tracking and Communicating ESOH Risks & Program Risks, Issues, and Opportunities

## RIO Management

- Risks tracked in a risk register
- Risk register may include the following information for each risk:
  - Risk category
  - Risk statement
  - Likelihood
  - Consequence
  - Planned mitigation measures
  - Risk owner
  - WBS/IMS linkage
  - Expected closure dates and documentation of changes, where applicable
- Risks communicated at Risk Management Boards
- Risks communicated at Program Reviews

## ESOH Risk Management

- ESOH risks must be tracked in a hazard tracking system (HTS)
- HTS has required fields for each ESOH risk
  - Identified hazards
  - Associated mishaps
  - Risk assessments (initial, target, event(s))
  - Identified risk mitigation measures
  - Selected mitigation measures
  - Hazard status
  - Verification of risk reductions
  - Risk acceptances
- ESOH risks must be communicated at Technical Reviews
- High & Serious ESOH risks must be communicated at Program Reviews



# Example for Communicating ESOH Risks Using RIO Management Guide Matrix

## RIO Management Guide

Probability/Likelihood	5		4A		2A	1A
	4		4B	3A 3B 3C	2B	1B
	3		4C	3D 3E	2C	1C
	2		4D		2D 2E	1D
	1		4E			1E
		1	2	3	4	5
		Consequence				

## MIL-STD-882

Probability	A	1A	2A	3A	4A
	B	1B	2B	3B	4B
	C	1C	2C	3C	4C
	D	1D	2D	3D	4D
	E	1E	2E	3E	4E
		1	2	3	4
		Severity			





# ESOH Risks and Program Risks are Linked

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## ➤ ESOH risks can drive Program Risks

- ESOH Risk: Far Field Noise emissions from the system exceed the requirements detailed in the Air Installation Compatible Use Zone for planned basing/training locations
- Resultant Schedule risk: Program had to stop using aircraft as intended and could not field systems as planned

## ➤ Program risks can drive ESOH Risks

- Schedule Risk: Testing site will no longer be available six months from now as originally planned; to avoid schedule slip, program testing will be done earlier
- Resultant ESOH risk: Because now there was not enough time to conduct National Environmental Policy Act analysis/documentation requirements for testing



# Comparing ESOH & Program Risk Acceptance

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## RIO Management

- There is no formal “acceptance” of risks
- It is implicit that risks are “accepted” when briefed at Program Reviews

## ESOH Risk Management

- Appropriate authority must formally accept ESOH risks
- User representative must concur before risks accepted
- Risk acceptance must occur before exposing people, equipment, or the environment to known hazards
- Risk acceptance is linked to specific event and system configuration (e.g., Developmental Test)
  - Thus, ESOH risks may need to be accepted at multiple times during the program



# ESOH Risk Acceptance Authorities

RISK ASSESSMENT MATRIX				
SEVERITY PROBABILITY	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	1A	2A	3A	4A
Probable (B)	1B	2B	3B	4B
Occasional (C)	1C	2C	3C	4C
Remote (D)	1D	2D	3D	4D
Improbable (E)	1E	2E	3E	4E
Eliminated (F)	Eliminated			

Risk Assessment Code	Risk Level	Risk Acceptance Authority
IA, IB, IC, IIA, IIB	High	Component Acquisition Executive
ID, IIC, IIIA, IIIB	Serious	Program Executive Officer-level
IE, IID, IIE, IIIC, IIID, IIIE, IVA, IVB	Medium	Program Manager
IVC, IVD, IVE	Low	Program Manager



# Summary

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## ➤ **Two approaches for managing risk in Acquisition**

- RIO management
- ESOH risk management

## ➤ **Approaches for RIO and ESOH management essentially the same**

- Risks are assessed using severity of consequence and probability criteria
- Risks are depicted in risk matrices
- Risks need to be tracked and communicated

## ➤ **ESOH risk management has some unique features**

- MIL-STD-882E methodology must be followed
- DoDI 5000.02 lists specific requirements for briefing ESOH risks
- ESOH risks must be formally accepted by the appropriate risk acceptance authority
- ESOH risks must be managed throughout the system's life cycle

## ➤ **ESOH and cost, schedule, and performance risks are linked**



# OASD(EI&E)/ESOH



**Mr. David Asiello**  
Acquisition ESOH Lead  
david.j.asiello.civ@mail.mil