



18887 – Environment, Safety, and Occupational Health (ESOH) – A Design Consideration with Benefits

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(Energy, Installations & Environment)**



Outline

Acquisition Environment, Safety, and Occupational Health (ESOH)

➤ Mission and Benefits

- Support the War Fighter
- Objectives of ESOH Integration
- Benefits (Mission, Program, and Systems Engineer)

➤ Policy: The Foundation for Achieving Benefits

- Overview of Major Policy

➤ Initiatives: Building on the Foundation

- Sustainability & Climate Change
- SLCA Tool
- Hazardous Materials Management
- Environmental Liabilities
- REACH

➤ Validation: Ensuring Programs Achieve Benefits

- Program Oversight





DoD Mission and Acquisition ESOH

DoD Mission:

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

Acquisition Environment, Safety, and Occupational Health (ESOH): Support the warfighter & DoD's mission

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





Acquisition ESOH Design Consideration

Have DoD Acquisition Programs Address:

➤ Environment

- Manage ESOH risks and minimize hazards to environment
- Compliance with all ESOH regulations (e.g., Clean Air Act)
 - Compliance with National Environmental Policy Act (NEPA) / Executive Order (EO) 12114, Environmental Effects Abroad of Major Federal Actions

➤ Safety and Occupational Health

- Use MIL-STD-882E, Standard Practice System Safety for all developmental and sustaining engineering activities
 - Apply methodology as early as possible during system design
- Manage ESOH risks and minimize hazards to people and equipment
 - Includes managing software system safety risks
 - Software controls hardware
 - Includes the information software relays and its influence on a person's decision making



Acquisition ESOH Design Consideration

➤ Hazardous Material (HAZMAT) Minimization

- Minimize potential exposure risks to hazardous materials (Cadmium, CR+6, etc.)
 - Reduce the costs associated with HAZMAT (PPE, IH monitoring, treating waste streams)
- Purchase Sustainable/Green products where possible
- Use approved alternatives when possible

➤ Know what hazardous materials are in the system

- Needed if chemical is banned due to changing regulatory landscape
- Needed in global market to support Foreign Military Sales (FMS)
- Needed to understand potential environmental liabilities (costs)

HAZMAT has Environmental Considerations
HAZMAT has Safety & Occupational Health Considerations
HAZMAT has Mission & Cost Considerations
DOD working to address these Considerations Comprehensively.



Integrating ESOH in SE is Important

➤ Benefits the Mission:

- Protects Warfighter
- Helps ensure our System Sustainment Ability (Operations & Maintenance)
- Promotes System Sustainability

➤ Benefits the Program:

- Helps Decrease Schedule Risk
- Can Lead to System Performance Improvements
- Supports Implementing Better Buying Power (BBP) 3.0 Principles
 - Helps Lower Life Cycle Cost

➤ Benefits the Systems Engineer:

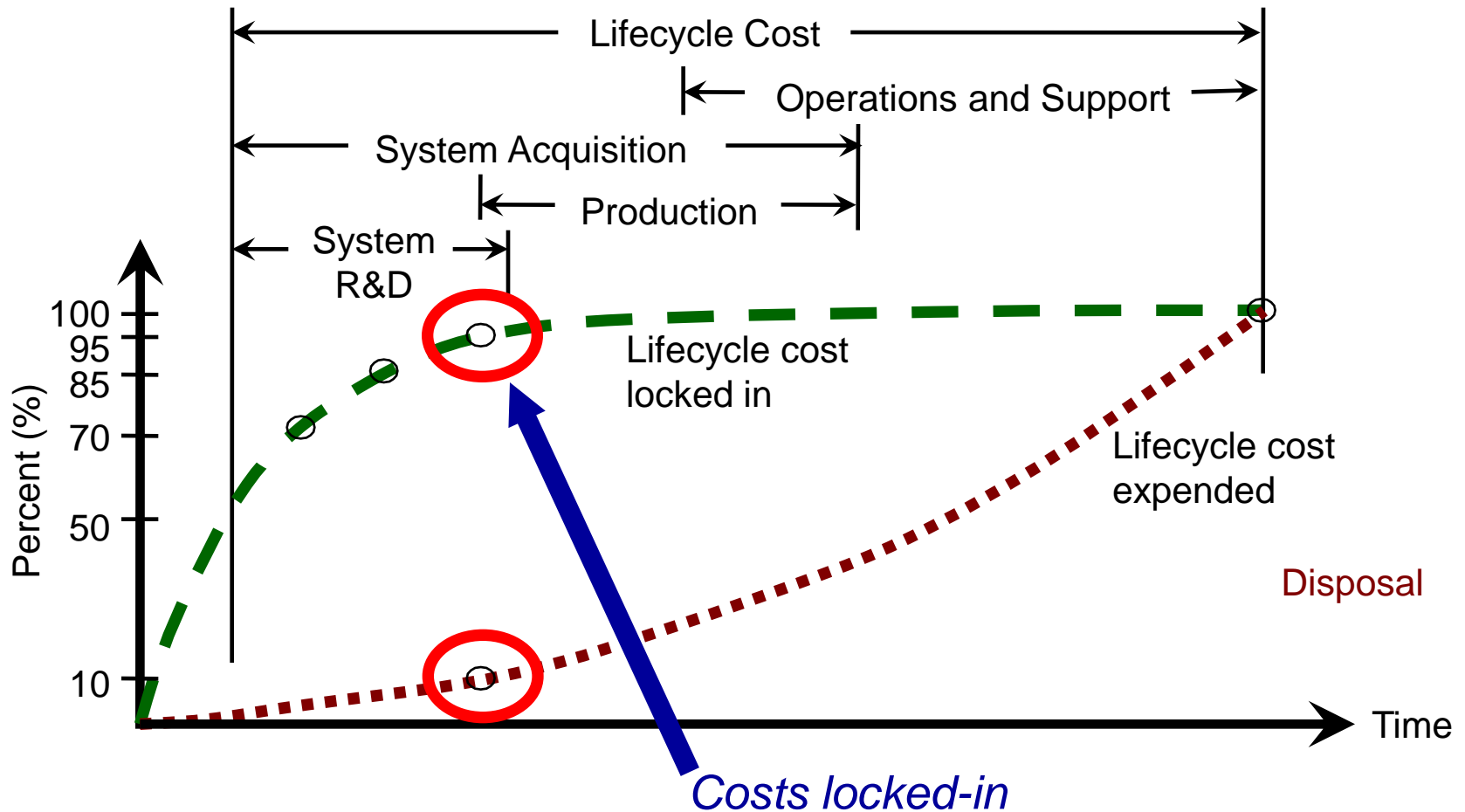
- Helps Define System Architecture and Requirements
- Brings Broad Prospective to the Systems Engineering Team
- Helps Identify and Mitigate System Risks and Issues





Why Integrating ESOH in SE is Important

**** 95% of Life Cycle Cost Locked-In Early ****



From W. J. Larson & L. K. Pranke (1999) *Human Spaceflight: Mission Analysis and Design*

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Acquisition ESOH Policy: Foundation for Achieving Benefits



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Acquisition ESOH Policy Requirements

➤ DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, Enclosure 3 (Systems Engineering)

- Integrate ESOH risk management into the overall systems engineering process throughout the system's life cycle
- Minimize or eliminate ESOH risks
- Use MIL-STD-882E, *Standard Practice for System Safety*, for all engineering and sustaining activities
- Address the status of High and Serious ESOH risk at Program Reviews and Fielding Decisions
- Appropriate risk acceptance authority accepts risks before exposing people, equipment or the environment to known hazards.
 - Include the User Representative
- Minimize hazardous materials, wastes, and pollutants



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Acquisition ESOH Policy Requirements

➤ DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, Enclosure 3 (Systems Engineering)

- Program managers (PM) will document the ESOH planning in the Systems Engineering Plan (SEP)
- PM will document results of their planning and implementation in the Programmatic ESOH Evaluation (PESHE)
 - Hazards and associated ESOH risk data
 - ESOH risk management information
 - Hazardous materials management data, including minimization efforts
- PM will develop a NEPA / EO 12114 Compliance Schedule
 - OK to embed NEPA/EO 12114 Compliance Schedule in PESHE document

ESOH content in the SEP, PESHE, and NEPA/EO 12114 Compliance Schedule is unique. Helps avoid duplication of ESOH content in other documents



Acquisition ESOH Guidance and Resources

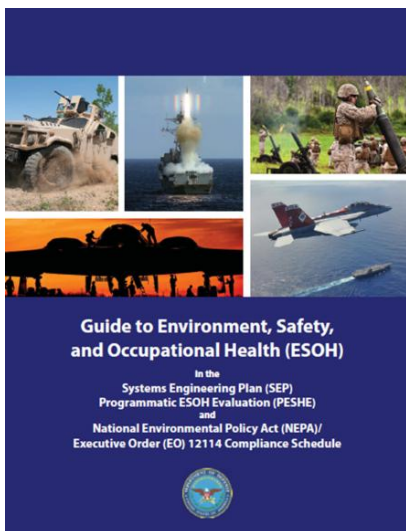


Defense Acquisition Guidebook
Your Acquisition Policy and Discretionary Best Practice Guide

- **Defense Acquisition Guidebook (DAG)-Systems Engineering Chapter**
[<https://dag.dau.mil>]

- **Acquisition Community Connection (ACC) ESOH Community of Practice (CoP)**

ACC Website:
[<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>]



Acquisition ESOH Initiatives: Building on the Foundation to Produce Benefits



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Sustainability – Ensures Resilience & Enduring Performance

Integrating Sustainability

- **Improves operational performance**
 - By **sustaining** land, air, and water **resources**
- **Improves availability of mission-oriented *products***
- **Reduces energy dependence...**
 - On supply lines
 - Electrical grid, gas pipelines, truck convoys in theater
 - On foreign oil
- **Reduces exposure to health hazards**
 - Of our personnel, their families, & adjacent communities
- **Reduces costs – life cycle & compliance**
 - **Minimizes impacts** and **total ownership costs** of systems, materiel, facilities, and operations





Designing for Climate Change/Resilience – Making Systems that Endure

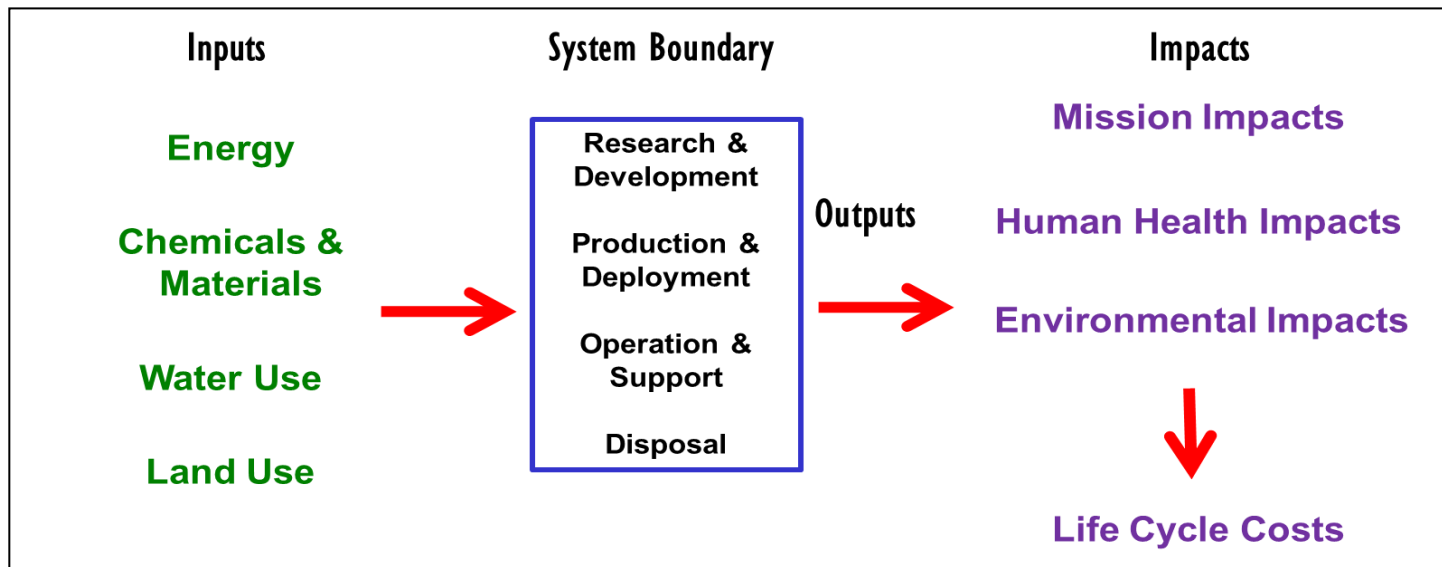
- **Strategy: 2014 DoD Climate Change Adaptation Roadmap establishes three goals**
 - Identify and assess effects
 - Integrate climate considerations across the board and manage associated risk
 - Collaborate: Federal, State, Local, Tribal, International
- **Policy: DoD must be able to adapt current and future operations to address the impacts of climate change in order to maintain an effective and efficient U.S. Military. (See DoD Directive 4715.21)**
 - Climate change will impact operating environments
- **Leverage existing programs to incorporate climate resilience today**
- **Institutionalize consideration of climate effects in all aspects of planning to ensure future mission effectiveness.**





Streamlined Life Cycle Assessment (SLCA) – a Tool to Understand Life Cycle Impacts

- Program Offices can use SLCA to help understand life cycle impacts during the design process and influence decision making
 - Tailored analysis for DoD
 - Can be used to minimize human health and environmental impacts
 - Monetizes Impacts using Life Cycle Costing (LCC) for decision making



For more info on the SLCA Tool see <http://www.denix.osd.mil/esohacq/home/>



Hazardous Materials (HAZMAT) Management – Produces Multiple Benefits

➤ **Promote Hazardous Materials Minimization**

- Effort by the DoD Acquisition ESOH IPT and the Aerospace Industries Association (AIA)

➤ **Address Known Challenges:**

- Multiple management approaches
- Multiple hazardous material lists
- DoD's priorities are not clear to industry
- Lower Acquisition category programs don't have resources to support robust Hazardous Materials Management Program (HMMP)

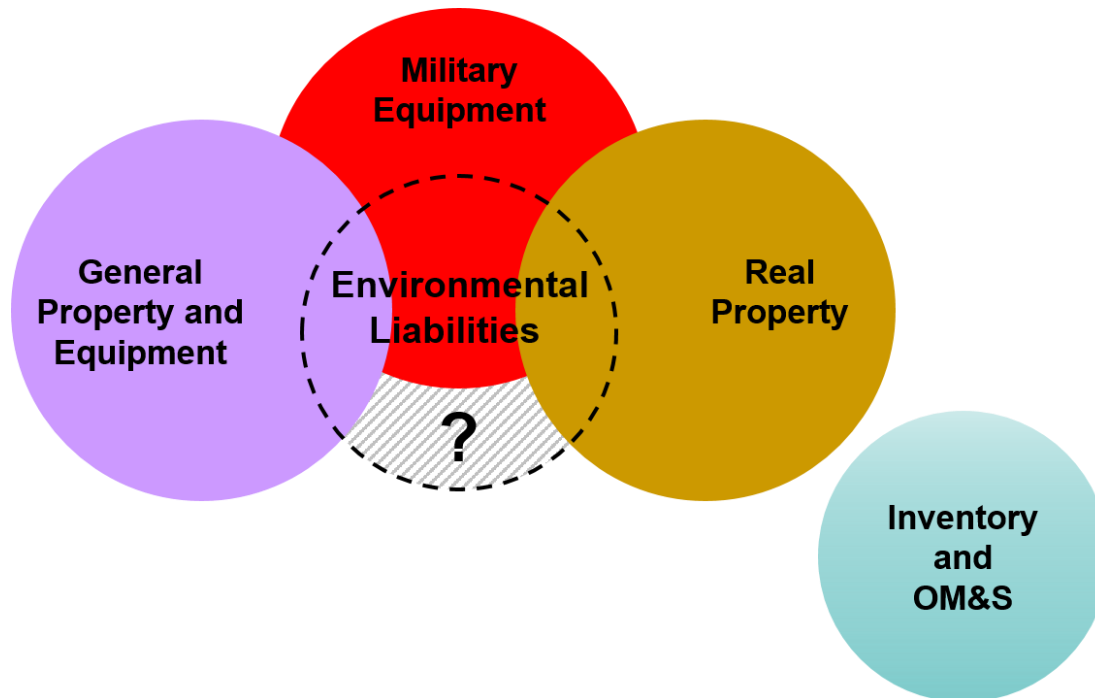
➤ **Background:**

- MIL-STD-882E, Task 108, HMMP
 - Prioritizes efforts to eliminate or reduce hazardous material usage by categorizing targeted materials as Prohibited, Restricted, and Tracked
 - Includes HAZMAT by category as contractual requirements
- National Aerospace Standard (NAS 411)
 - Detailed guidance for implementing MIL-STD-882E, Task 108
- NAS 411-1, Hazardous Material Target List
 - Baseline list of hazardous materials in three MIL-STD-882E categories
 - New publication planned for October 2016
 - Adds a “tracked” list
 - Prohibited materials categorized by family (e.g., hexavalent chromium)
 - Materials are listed by unique Chemical Abstract Society (CAS) numbers



HAZMAT Management – Supports Environmental Liabilities Reporting

- HAZMAT use in systems, including operations and maintenance, can create Environmental Liabilities (EL)
- Federal Law drives Financial Liability Reporting Requirements, driving the need to understand and quantify EL



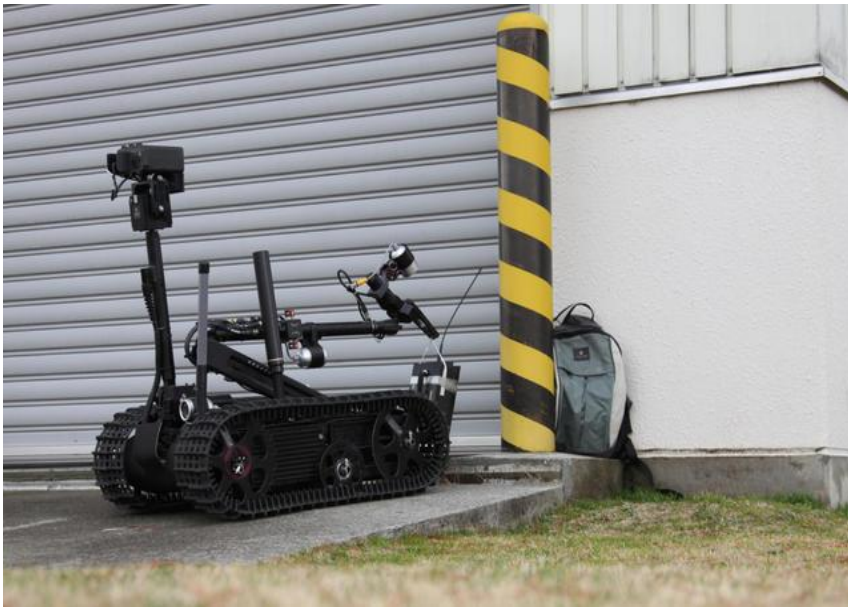


Considering REACH – Ensures Enduring & Marketable Systems

- **REACH is the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) European Union (EU) regulation**
 - Being phased in over time
 - Restricts and bans the import, manufacture, placing on the market, and use of certain chemical substances
 - Places responsibility on industry/users
 - Need to understand the materials and HAZMAT that is part of system, or used during operation and maintenance
- **Potential impact may be to Foreign Military Sales**
 - US Lost Army “Excalibur” system sale to Germany
- **Acquisition ESOH Community is coordinating with the REACH WG to develop DoD’s position and take action if warranted**
 - Current emphasis is on educating program managers and providing resources should they have questions



Acquisition ESOH Validation: Ensuring Program's Achieve Benefits





Acquisition ESOH Program Oversight

Oversight of Acquisition ESOH implementation to ensure Programs meet objectives

➤ Participate in Program Support Assessments

- OASD(EI&E) supported four PSAs in FY 2016
 - Consolidated Afloat Networks and Enterprise Services
 - F-22 Increment 3.2B
 - DDG 51 Flight III Ships
 - Distributed Common Ground System – Navy Increment 2

➤ Participate on Overarching IPTs, Integrating IPTs and Working IPTs

➤ Reviewing Acquisition Documentation (Milestone and Phase Information Requirements)

- PESHE, NEPA/EO 12114 Compliance Schedule, SEP, AS, LCSP

➤ Helping Programs Succeed





Wrap-up

Acquisition Environment, Safety, and Occupational Health (ESOH)

➤ Mission and Benefits

- ✓ Support the War Fighter
- ✓ Objectives of ESOH Integration
- ✓ Benefits (Mission, Program, and Systems Engineer)

➤ Policy: The Foundation for Achieving Benefits

- ✓ Major ESOH Policy Overview

➤ Initiatives: Building on the Foundation

- ✓ Sustainability & Climate Change
- ✓ SLCA Tool
- ✓ Hazardous Materials Management
- ✓ Environmental Liabilities
- ✓ REACH

➤ Validation: Ensuring Programs Achieve Benefits

- ✓ Program Oversight





OASD(EI&E)/ESOH



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Back up

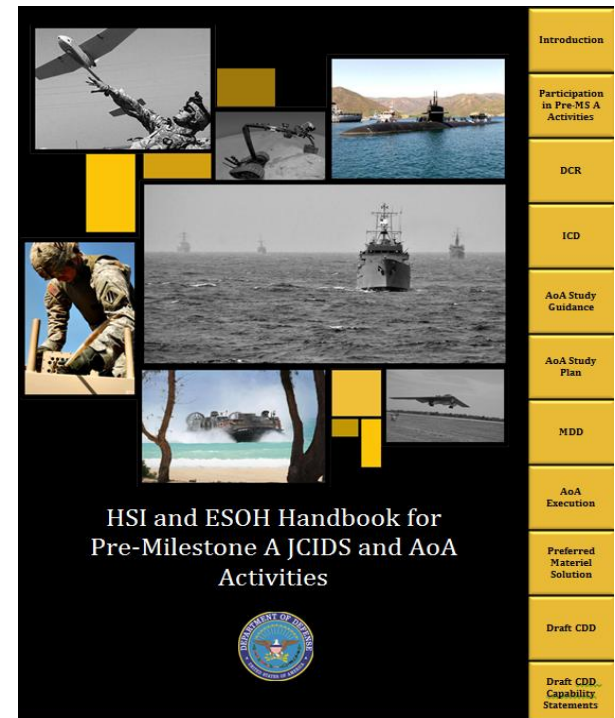




Policy and Guidance - Impacting the Requirements Process

Developed a Human Systems Integration (HSI) & ESOH Handbook for pre-Milestone A Joint Capabilities Integration and Development System (JCIDS) and Analysis of Alternatives (AoA) Activities

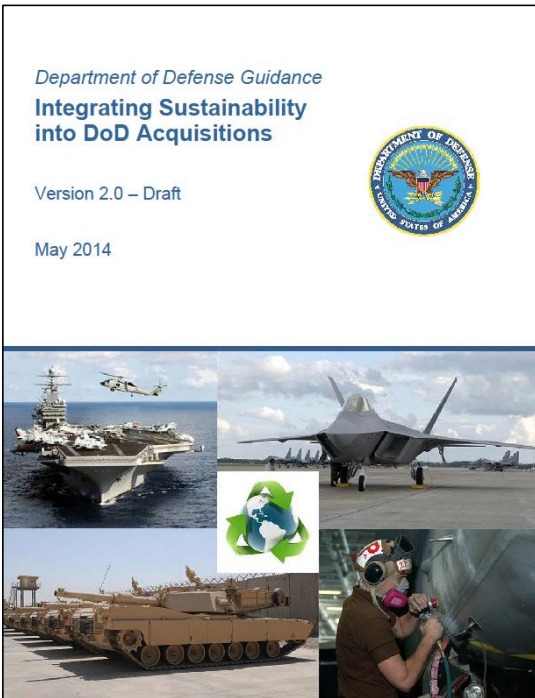
- Published in September 2013
- Handbook is designed to help HSI and ESOH Subject Matter Experts (SMEs) influence systems requirements
 - Focused on Pre Milestone A -- Joint Capability Integration and Development System (JCIDS) and Analysis of Alternatives (AoA) Activities
- Currently located on the ACC ESOH CoP: <https://acc.dau.mil/hsi-esohguide>





What is a Sustainability Analysis?

Sustainability Analysis = SLCA + LCCs



Streamlined Life Cycle Assessment (SLCA)

Gives Relative Impacts

Must be “Doable”

Life Cycle Costs (LCC)

Must be compatible with the DoD cost structure

Used to Compare Alternatives!

<http://www.denix.osd.mil/esohacq/upload/DoD-Sustainability-Analysis-Guidance-Draft.pdf>

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HAZMAT Management – NAS 411 WG

- **In 2013, issued update to National Aerospace Standard (NAS) 411, Hazardous Materials Management Program (HMMP), and developed complementary NAS 411-1, Hazardous Materials Target List (HMTL)**
 - NAS 411 provides detailed guidance for MIL-STD-882E Task 108
 - NAS 411-1 lists baseline hazardous materials in the three categories (Prohibited, Restricted, and Tracked)
 - NAS 411-1 included Prohibited and Restricted materials
- **October 2016, AIA will publish update to NAS 411-1**
 - Adds a baseline Tracked list
 - Prohibited and Restricted lists updated
 - Prohibited materials categorized by family (e.g., hexavalent chromium)
 - Materials are listed by unique Chemical Abstract Society (CAS) numbers
 - To the extent possible, list is harmonized with International Aerospace Environmental Group (IAEG™) Aerospace and Defense Declarable Substances List (AD-DSL)
- **Next: Update NAS 411 to add risk assessment guidance for HAZMAT**
 - Help practitioners consistently apply standard and evaluate HAZMAT



Sustainable Procurement

Promotes sustainable acquisition and procurement by ensuring that each of the following environmental and sustainability factors are included to the maximum extent practicable for all applicable procurements in the planning, award, and execution phases of the acquisition

- BioPreferred/Biobased
- Safer Choice
(non-toxic/less-toxic)
- SNAP (non-ozone-depleting)
- Recycled content
- WaterSense
- ENERGY STAR or FEMP
- SmartWay
(transportation/fuels)
- EPP

EPP = Environmentally Preferable Purchasing
FEMP = Federal Energy Management Program
SNAP = Significant New Alternatives Policy



Acquisition ESOH Program Oversight

Evaluates Acquisition ESOH policy and guidance implementation to help ensure programs meet objectives

- **Programs request tailoring to waiver requirement to produce PESHE due to lack of understanding (e.g., need to evaluate software system safety)**
 - *Impact:* Programmatic risks from lack of ESOH analyses (e.g., software produces unintended consequences)
- **Proposal to use Halon 1301, ozone depleting substance (ODS), for fire suppression**
 - *Impact:* Future supply risks for meeting mission requirements (legacy systems and future systems requiring Halon 1301)
- **Failure to minimize hexavalent chromium**
 - *Impact:* Potential exposure risks to maintainers, increased end-of-life costs to Demilitarization/Disposal
- **Lack of timely National Environmental Policy Act (NEPA) / EO 12114 analyses**
 - *Impact:* Schedule Risks to programs
- **Failure to consider software system safety risks and complete appropriate level of rigor analyses**
 - *Impact:* Potential negative impacts to people, equipment or the environment