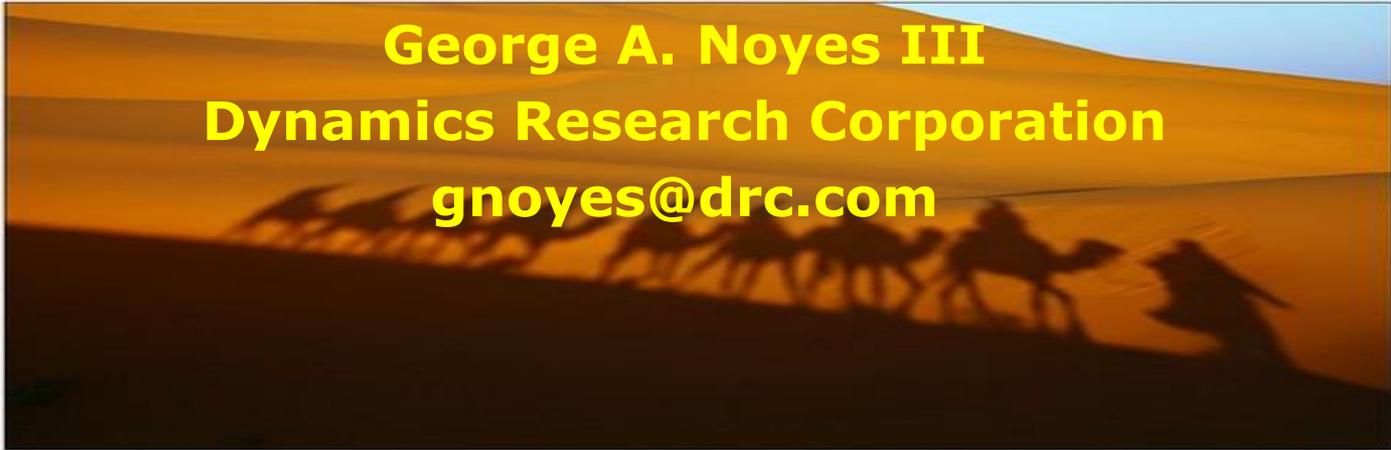


# **PM and their Staffs Does Sustainable Manufacturing mean “Going Green”?**



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# Why are we concerned?

- Our earth and its resources are limited
- DoD acquisition managers tap into these resources to deliver capabilities to the warfighter
- Base and facility managers also tap into these resources
- Field commanders and our warfighters carry out operations

and in doing so may negatively impact the world we live in.

The  
Bottom Line

We can do better. We can deliver more affordable capability, we can operate our facilities and bases, we can operate in the field, without excessive life cycle costs or impacts to the environment.

# Environmental Awakening

*The late 1960's was an era of social and political unrest with movements for civil rights, feminism, anti-war and environmental consciousness.*



***Silent Spring -  
"Can anyone believe it is possible to lay down such a barrage of poisons on the surface of the earth without making it unfit for all life?"***

*- Rachel Carson*

Zager and Evans's song "In the Year 2525" hit the top of the billboard charts in 1969. The song opens with the words "In the year 2525, if man is still alive, if woman can survive, they may find...". The overriding theme of the song is of a world doomed by its dependence on technologies. Each verse provide a disturbing prediction for each selected year from 2525 to 9595 at 1010-year intervals.

*"I'm kinda wonderin' if man is gonna be alive  
He's taken everything this old earth can give  
And he ain't put back nothin'"*

# Environmental Awakening

Environmental Laws are a complex and interlocking body of treaties, conventions, statutes, regulations, executive orders and common law that operates to regulate the interaction of humanity and the natural environment, toward the purpose of reducing the impacts of human activity. The laws may be divided into two major areas:

1. pollution control and remediation,
2. resource conservation and management.

# DoD's Environmental Liabilities

“DoD properties release hazardous substances to the environment primarily through industrial operations to repair and maintain military equipment, and through the manufacturing and testing of weapons...” GAO Report 10-348, dated July 2010.

- As of April 2010, the EPA has 1,620 Superfund sites on their National Priorities List (NPL), of which 141 (almost nine percent) are DoD properties.
- Under the Superfund law, the military service that operated the base is responsible for implementing the cleanup.
- DoD spent **\$29.8 billion** on environmental cleanup and restoration activities between 1986 and 2008.
- This funding came out of a DoD budget meant for the warfighter

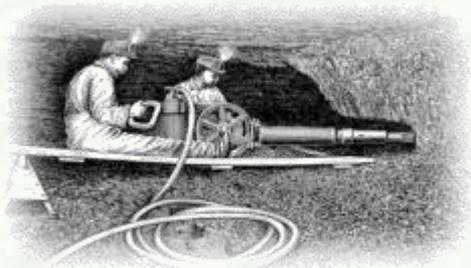
# DoD's Environmental Liabilities



50% of the U.S. population lives within a 10-mile radius of a Superfund site. The above map is of BRAC sites, many needing clean-up.

# The role of the PM

The role of the DoD Program Manager is to turn this (dirt).....



**F-35C**

Carrier Variant (CV)  
Span (ft) 43  
Length (ft) 50.8  
Wing Area (sq) 520  
Internal Fuel (lb) 19,624



into this (a capability),

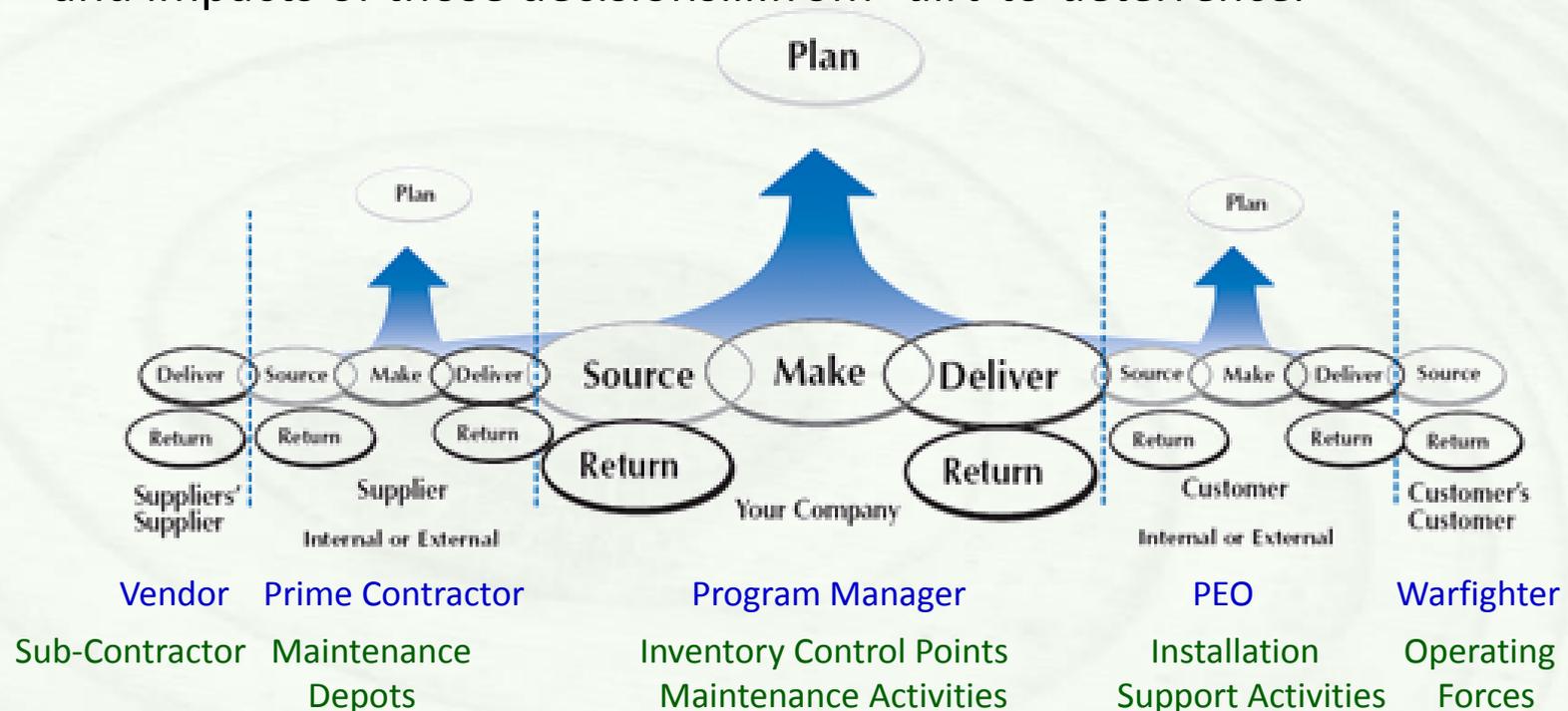


and at disposal,  
back into this.

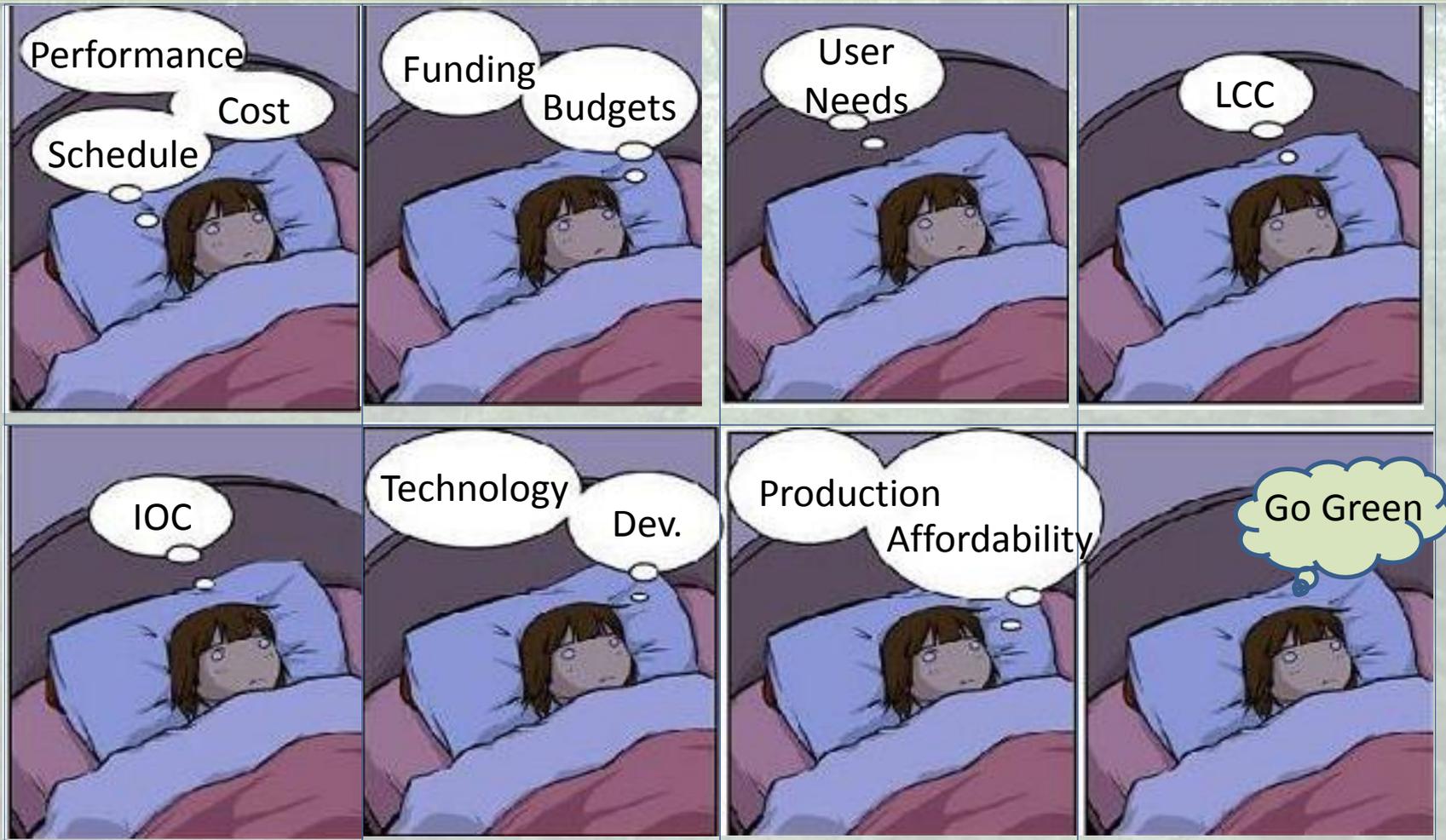


# From Dirt to Deterrence to Disposal

Up and down the entire DoD supply chain (acquisition or logistics), acquisition program managers, facility managers, depot managers, unit commanders and their staffs need to be concerned about their environmental decisions and impacts of those decisions....from “*dirt-to-deterrence.*”



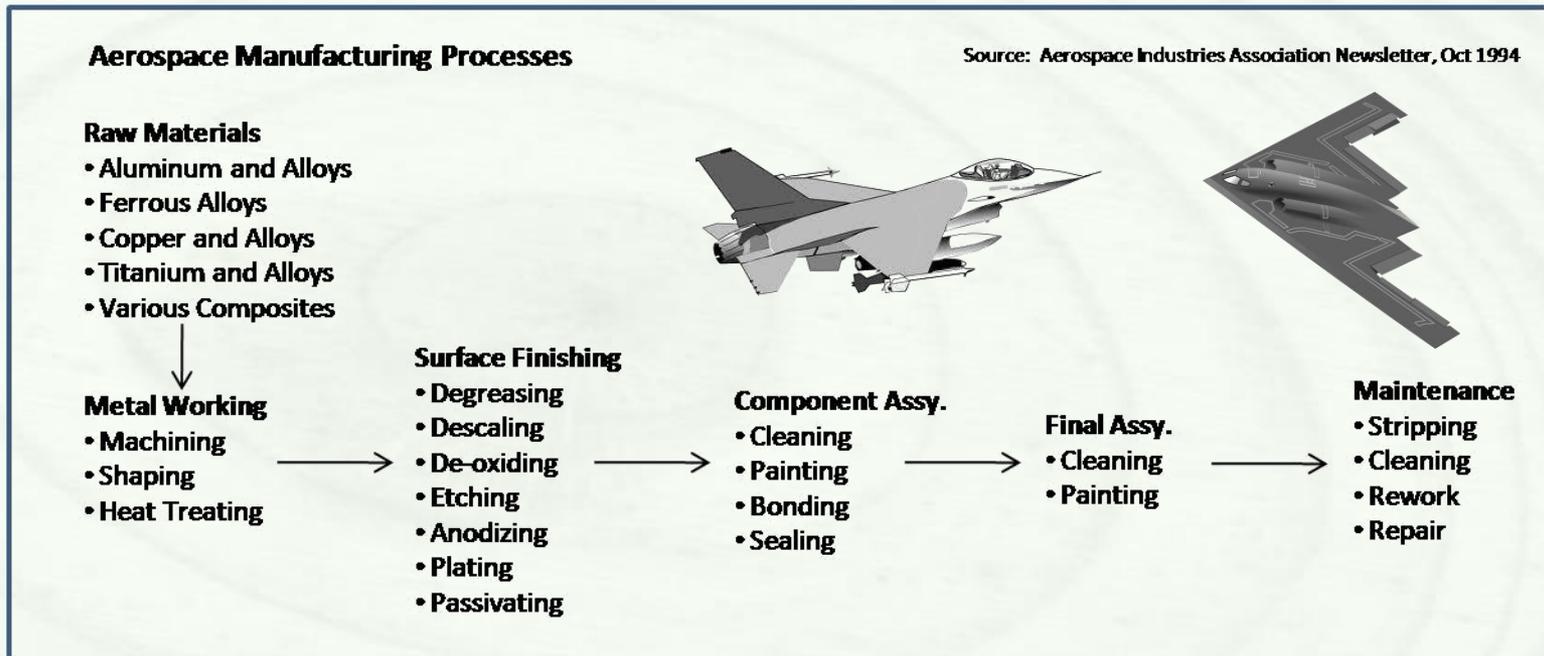
# What keeps PMs up at night?



All of these issues can be impacted through Sustainable Manufacturing

# Aviation Considerations

The EPA conducted a sector study of the aerospace industry and documented the industrial/manufacturing processes associated with aircraft build and repair activities. There are an estimated 15-30,000 different materials used in aircraft manufacturing/maintenance. Many are listed under the Toxic Substances Control Act as requiring special handling and reporting.



# Shipbuilding Considerations

An EPA study of the shipbuilding industry documented many of the manufacturing processes associated with shipbuilding and repair activities.

Process	Materials	Air Emissions	Wastewater	Residual Waste
Surface Preparation	Abrasives, detergents, solvents, cleaners and caustic solutions	Particulates and VOCs from solvents and strippers	Paint chips, cleaning solvents, oil residues from bilges	Paint chips, spent abrasives, surface contaminants
Metal Plating & Surface Finishing	Plating metals, cyanide, solvents, acids and caustic solutions	Metal mist, fumes, VOCs from solvents	Metals, cyanides, acids, alkalis, organics and solvents	Sludge, spent plating solutions, cyanide solutions and bath residues
Painting	Paints and solvents	VOCs, cleaning solvents, overspray	Contaminated with paints and solvents	Waste paint, solvent containers, and paint booth filters
Machining and Metalworking	Cutting oils, lube oils, and solvents	VOC emissions from cleaning and degreasing	Solvents, emulsified lubricants, oils and coolants	Waste cutting oils, lube oils and metal chips and shavings

# Automotive Considerations

Similar to shipbuilding concerns about emissions, water and waste, a study of the Automotive Industrial Base revealed:

- A typical automobile contains uses just over 3,000 lbs. of material to include various types of steel, iron, aluminum, rubber, plastics and composites, glass, copper, brass, zinc, magnesium, fluids and lubricants
- There are between 8,000 to 10,000 parts in a typical automobile that get into 100 major components (suspension system, transmission, engine, etc.)

Military vehicles typically have more material and more parts in the manufacture and overhaul, resulting in an increased environmental impact.

HMWWV



Stryker



Bradley M2 / M3

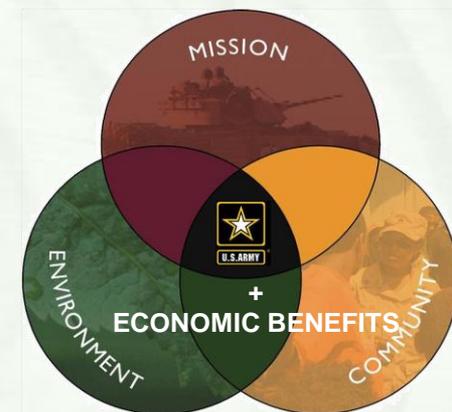


# Common Concerns



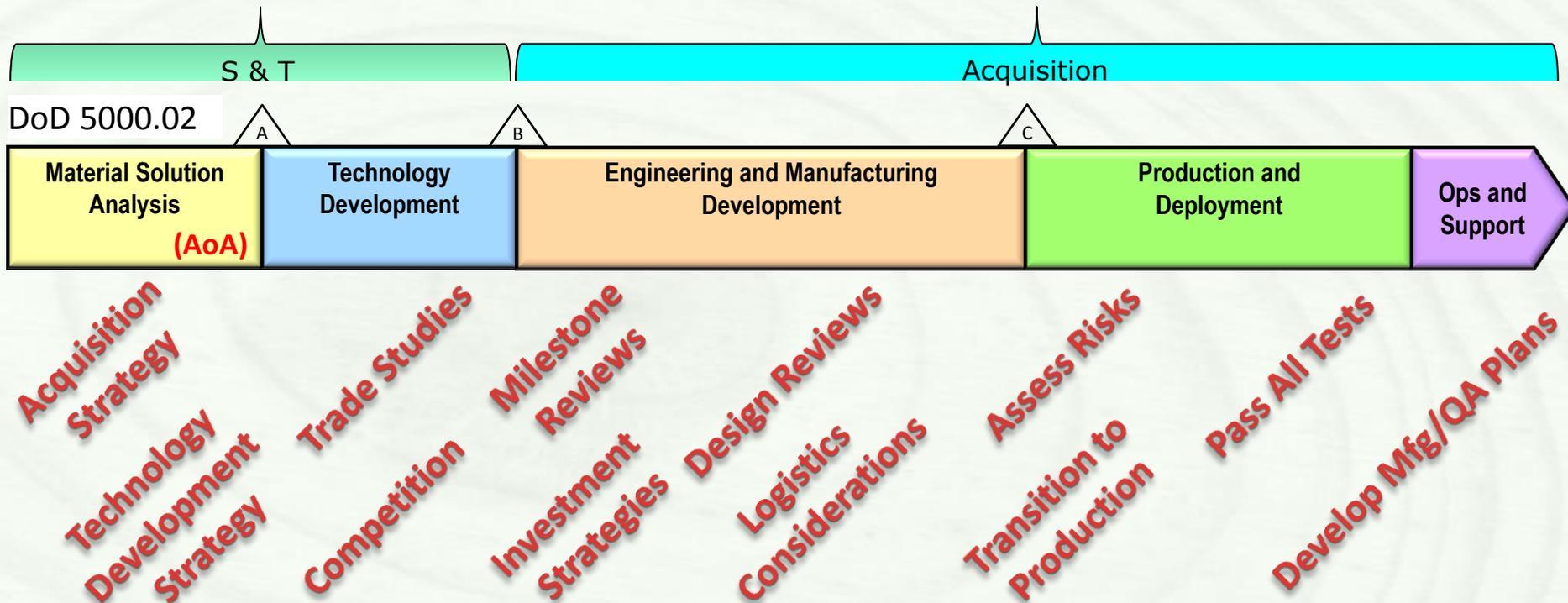
DoD program managers need to be aware of their environmental (Sustainability) responsibilities balanced against the mission:

- Address sustainability considerations in their acquisition documents and strategies, in the products design, and in the hardware that gets fielded and eventually properly disposed.
- Program decisions must be affordable and within the given budget
- While there is some room in the trade space to trade cost or performance for environmental considerations, the mission and safety must come first

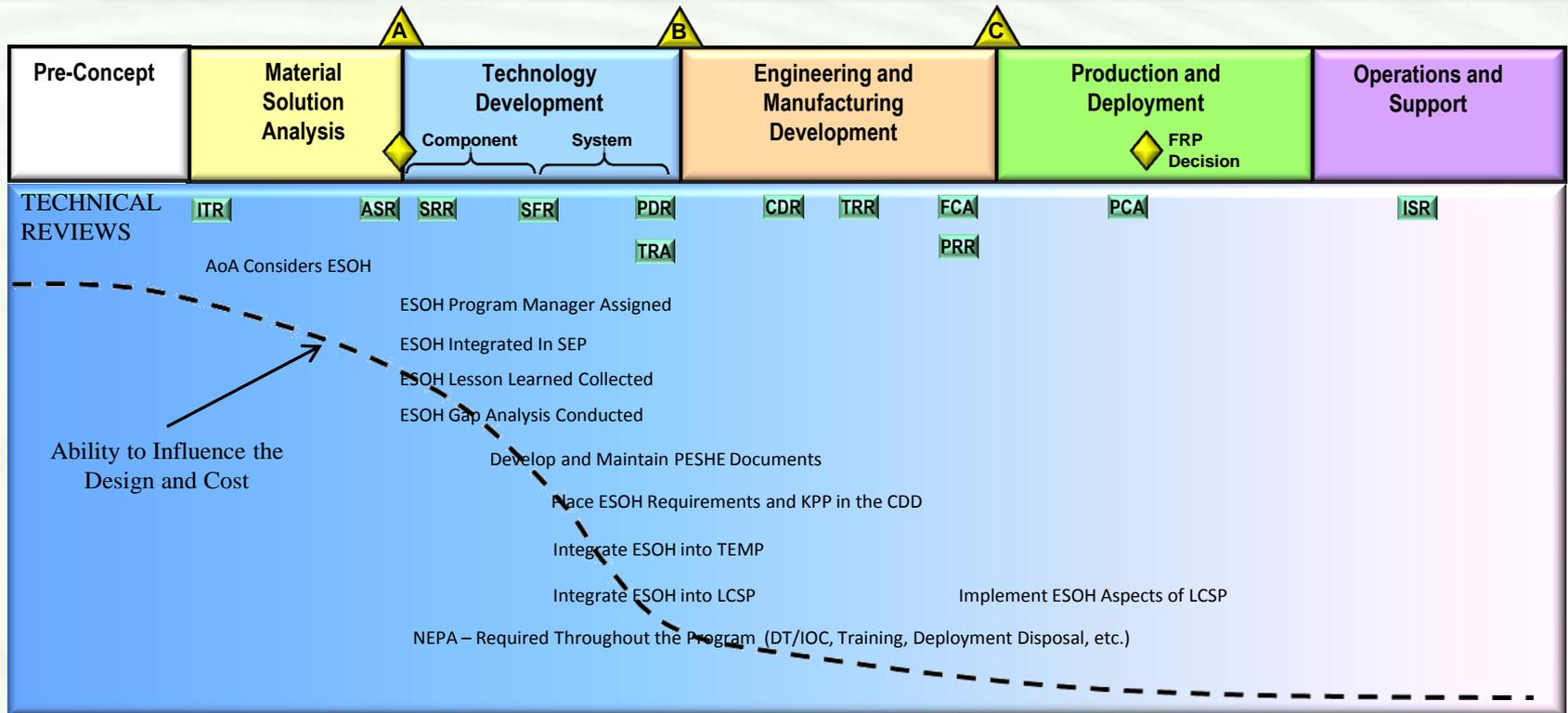


# DoD Acquisition Framework

DoD's acquisition processes are very complex. Going from an Analysis of Alternatives (AoA) through development, production and deployment can take years and billions of dollars. Lets look at some of Sustainment Planning/ESOH activities that can take place during these various phases and what drives those considerations.



# ESOH Lifecycle Considerations



The graphic above illustrates just some of the ESOH considerations a program manager needs to make to satisfy DoD policy and guidance relative to ESOH Life Cycle considerations. As you move to the right, your ability to influence the cost of the weapons system decreases, thus it is important to begin early in the process.

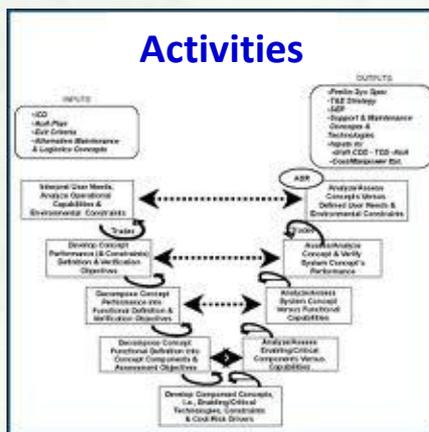
# Material Solution Analysis Phase



The MSA Phase is essentially a trade study to identify materiel solutions to address user capability gaps based on an Analysis of Alternatives (AoA). Risk identification, mitigation, and planning is a major activity during the MSA phase as you begin to assess your ESOH concerns. You can use the Systems Engineering (SE) process to highlight some of the inputs, activities and outputs that will require the program teams attention and are places to insert ESOH considerations.

## Inputs to the MSA Phase

- Analysis of Alternatives (AoA) Plan
- Alternative Maintenance & Logistics Concepts
- Exit Criteria to include Preliminary Hazards List (PHL)



## Outputs of the MSA Phase

- Systems Engineering Plan (SEP)
- T&E Strategy
- Support & Maintenance Concepts & Technologies
- Cost & Manpower Estimates

# Real Example



Beryllium Mirrors vs. Silicon Carbide

Liquid DACS vs Solid DACS:

- Monomethylhydrazine and
- Nitrogen tetroxide

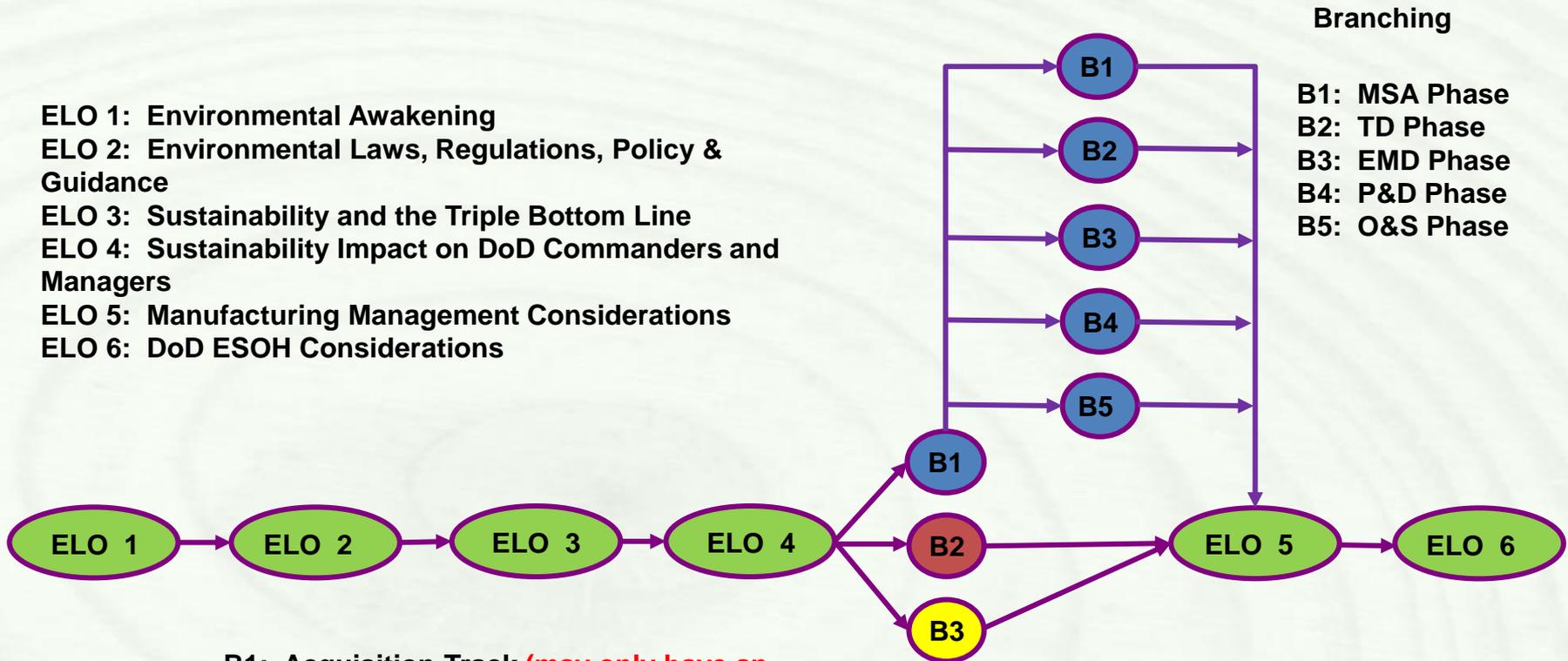
Nozzles made from NARC Rayon vs. Lyocell

- Demonstrate Lyocell as a drop-in replacement



# Pending DAU CLM

- ELO 1: Environmental Awakening
- ELO 2: Environmental Laws, Regulations, Policy & Guidance
- ELO 3: Sustainability and the Triple Bottom Line
- ELO 4: Sustainability Impact on DoD Commanders and Managers
- ELO 5: Manufacturing Management Considerations
- ELO 6: DoD ESOH Considerations



## Branching

- B1: MSA Phase
- B2: TD Phase
- B3: EMD Phase
- B4: P&D Phase
- B5: O&S Phase

- B1: Acquisition Track (may only have an acquisition track)
- B2: Base Commander/Facilities Manager Track
- B3: Field Commander/Field Units Track

# Target Audience

## **Audience: DoD Acquisition Personnel**

### **Learning Objectives:**

1. Introduction to essential laws, policy and guidance for DoD Sustainability and Sustainable Manufacturing
2. Improved awareness of sustainability management, trade offs, and consequence of choices that impact:  
the Warfighter, the Mission, the Environment, and Cost
3. Consideration of metrics and indices to monitor progress in achieving Sustainable Manufacturing
4. Develop understanding that everyone can have an impact on Sustainability

# Additional Resources

## DAU Community of Practice

**Browse**

ACC Home Up one level

- [-] PQM
- [+] Product Design
- [+] Policy & Guidance
- [+] Process Design and Control
- [+] Supply Chain Management
- [+] CPI - Lean - 6 Sigma - TOC
- [+] Lessons Learned
- [+] e-Mfg
- [+] Assessing Manufacturing Risk
- [+] Reports
- [+] Websites
- [+] Industrial Base
- [+] MRO/Depot/CoE
- [+] Tools
- [+] Hot Topics
- [+] Training Center
- [+] Community Connection
- [+] DMC
- [+] M&S
- [-] [Sustainable Manufacturing](#)
- [+] MRL Working Group
- [+] ESOH

**Tags**

acquisition aerospace assembly

### Sustainable Manufacturing

Topic

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#### Long Description

Sustainable Manufacturing is defined as the creation of manufactured products that use processes that minimize negative environmental impacts, conserve energy and natural resources, are safe for employees, communities, and consumers and are economically sound. (source: Department of Commerce)

#### LIST OF ALL CONTRIBUTIONS AT THIS LOCATION

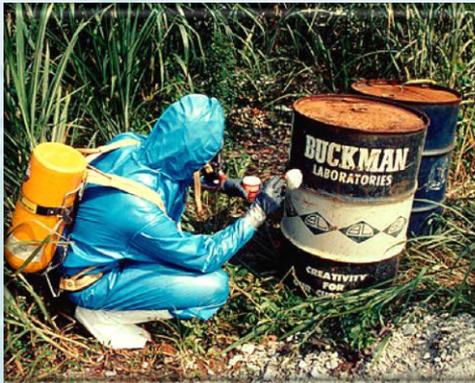
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Helpful	Title	Type	Author	Date Modified	Popularity
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0	Sustainable Manufacturing World	Related Websites	George Noyes	2011-3-11	38
0	What is Sustainable Manufacturing	Presentations	George Noyes	2011-3-11	16
0	NIST Sustainable Manufacturing Portal	Related Websites	George Noyes	2011-3-11	37
0	NACFAM Sustainable Manufacturing	Related Websites	George Noyes	2011-3-11	36
0	Sustainable Manufacturing Initiative	Related Websites	George Noyes	2011-3-11	15

#### Popular Content

- Sustainable Manufacturing Initiative
- What is Sustainable Manufacturing
- NACFAM Sustainable Manufacturing
- NIST Sustainable Manufacturing Portal
- Sustainable Manufacturing World
- Simulation-based Sustainable Manufacturing System Design

# Summary



Sustainable Manufacturing is not about “going green”, it is about delivering a capability to the warfighter without delivering a **toxic legacy**.

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