Can Sustainability be Factored into DoD Acquisition Programs?

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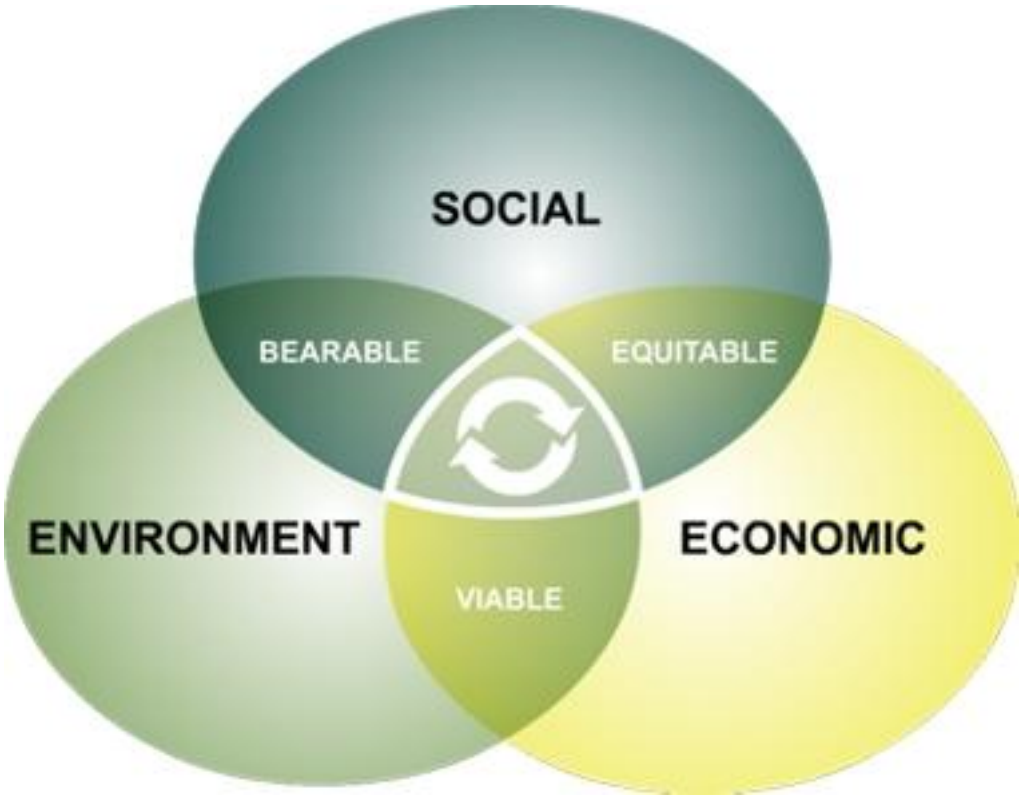
The Vision

DoD developers, program managers, and prime contractors analyze alternatives for meeting mission requirements and make informed decisions that result in:

- **Lower Total Ownership Cost**
- **Sustainable Systems**

How? Use Life Cycle Impact Assessment

Sustainability



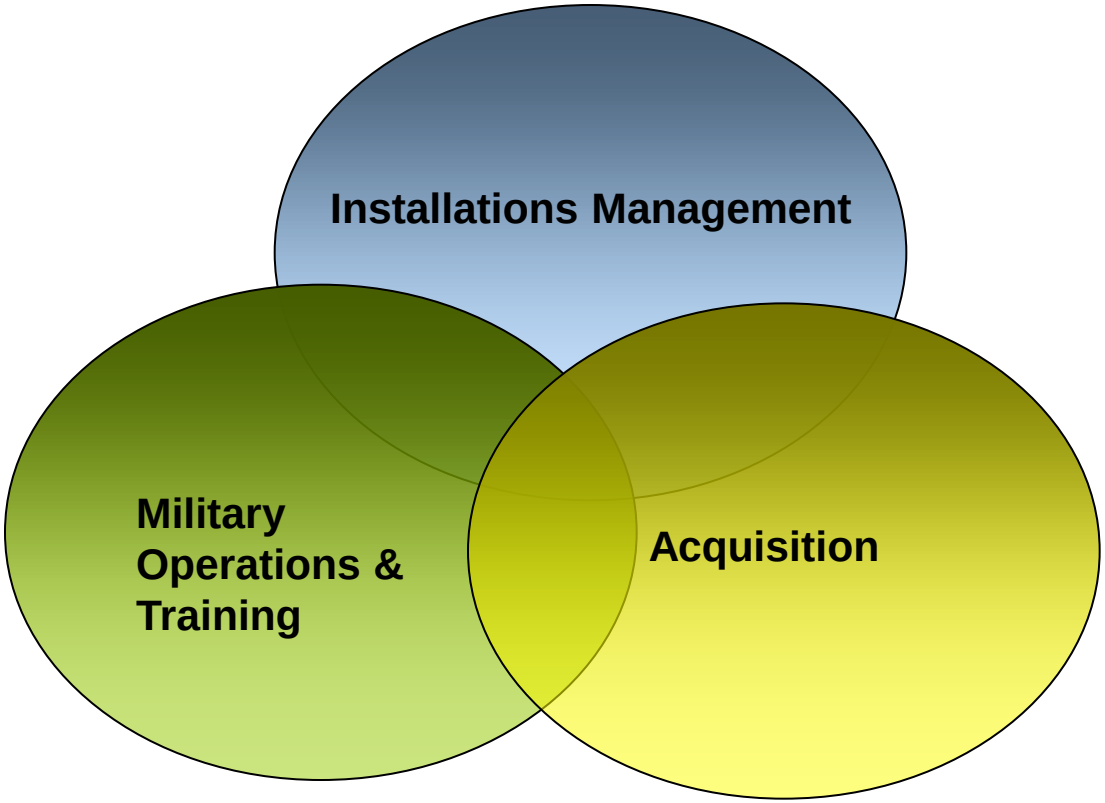
Sustainability is seen as a durable and self sufficient balance between social, economical and environmental factors

Sustainability in DoD

DoD Strategic Sustainability Performance Plan

"The Department's vision of sustainability is to **maintain the ability to operate into the future without decline – either in the mission or in the natural and manufactured systems that support it.** DoD embraces sustainability as a means of improving mission accomplishment. Sustainability is not an individual Departmental program; rather, it is an organizing paradigm that **applies to all DoD mission and program areas.** DoD personnel are learning to apply this mindset to their practices to **improve mission performance and reduce lifecycle costs.**"

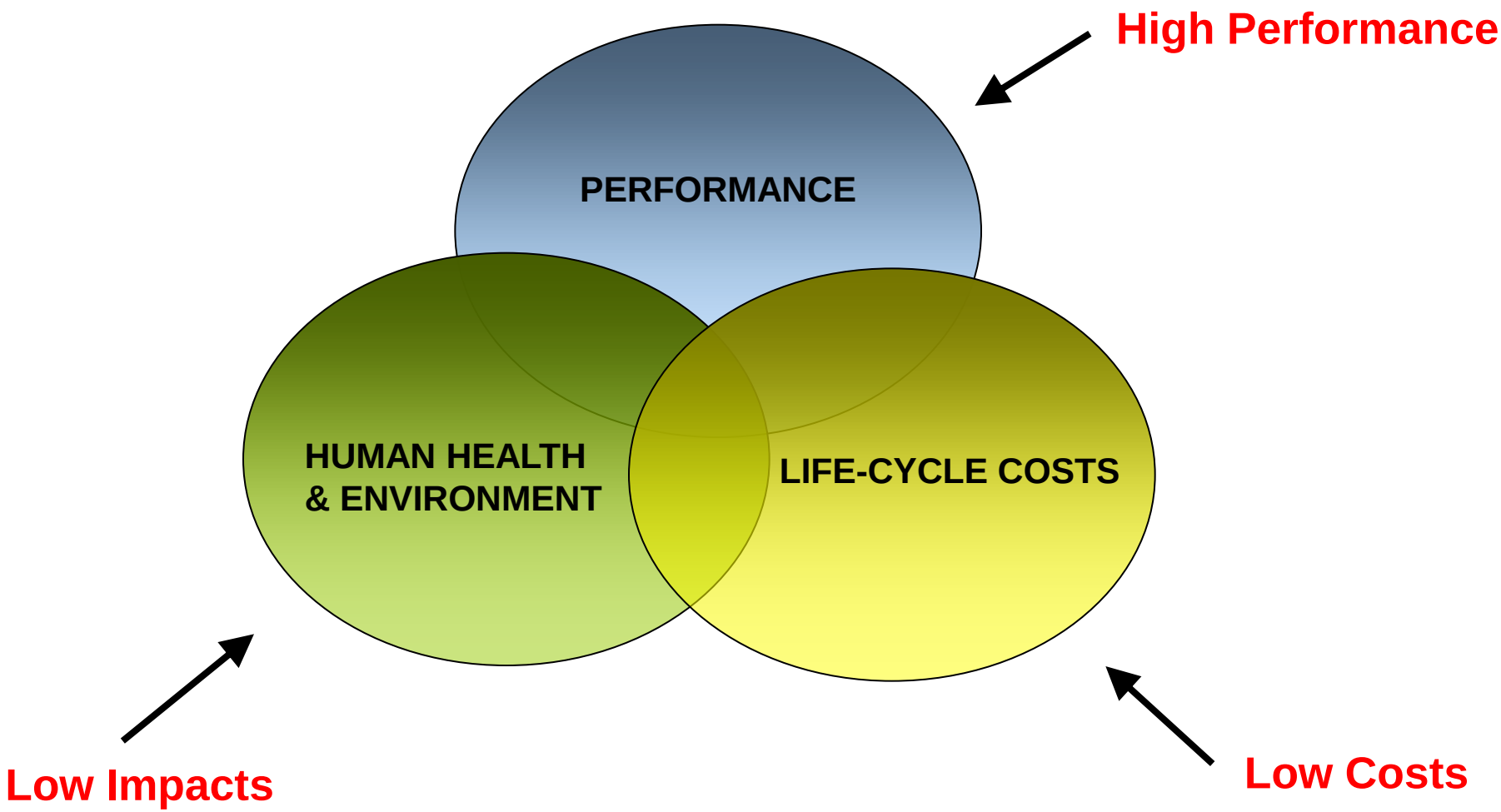
DoD Sustainability Sectors



Sustainability in DoD Acquisition

From Development through Disposal

Acquisition, Technology and Logistics



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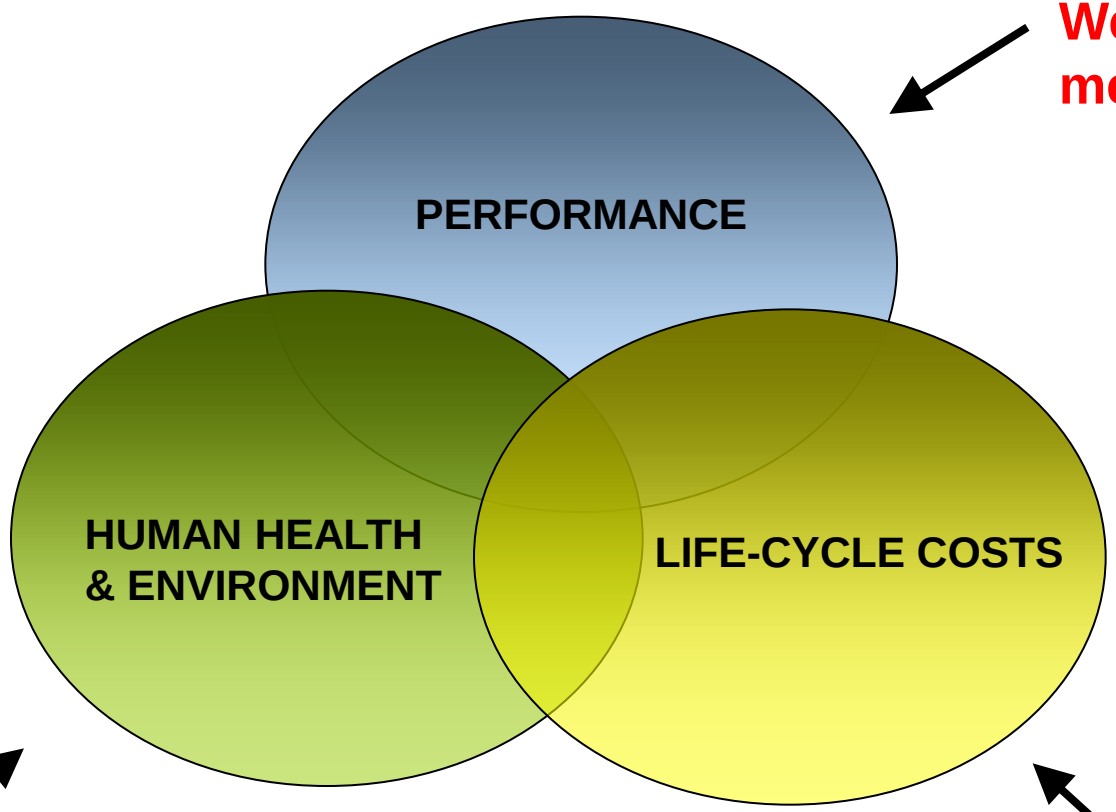
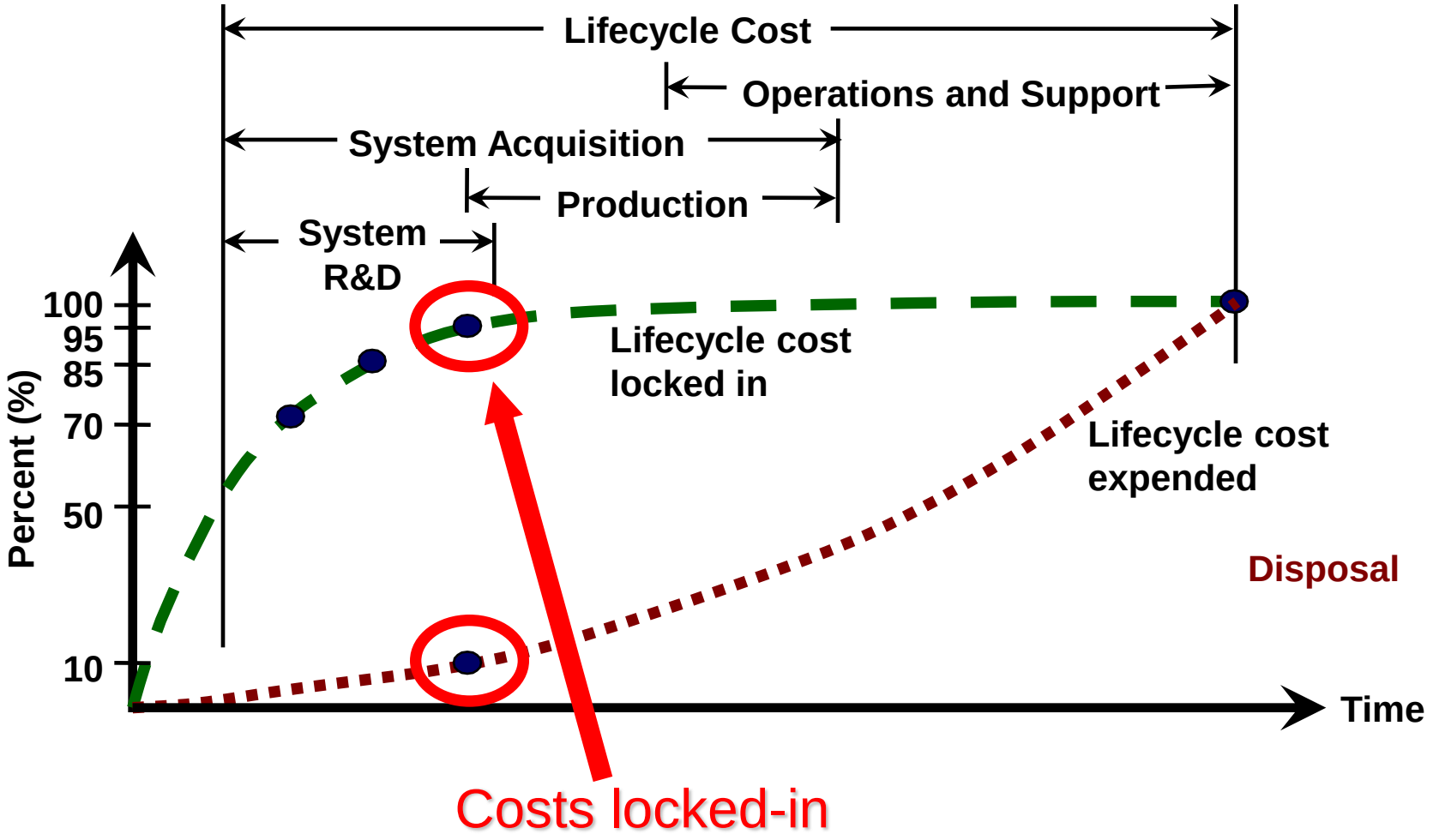


We can test & measure this

We need a consistent method to analyze alternatives

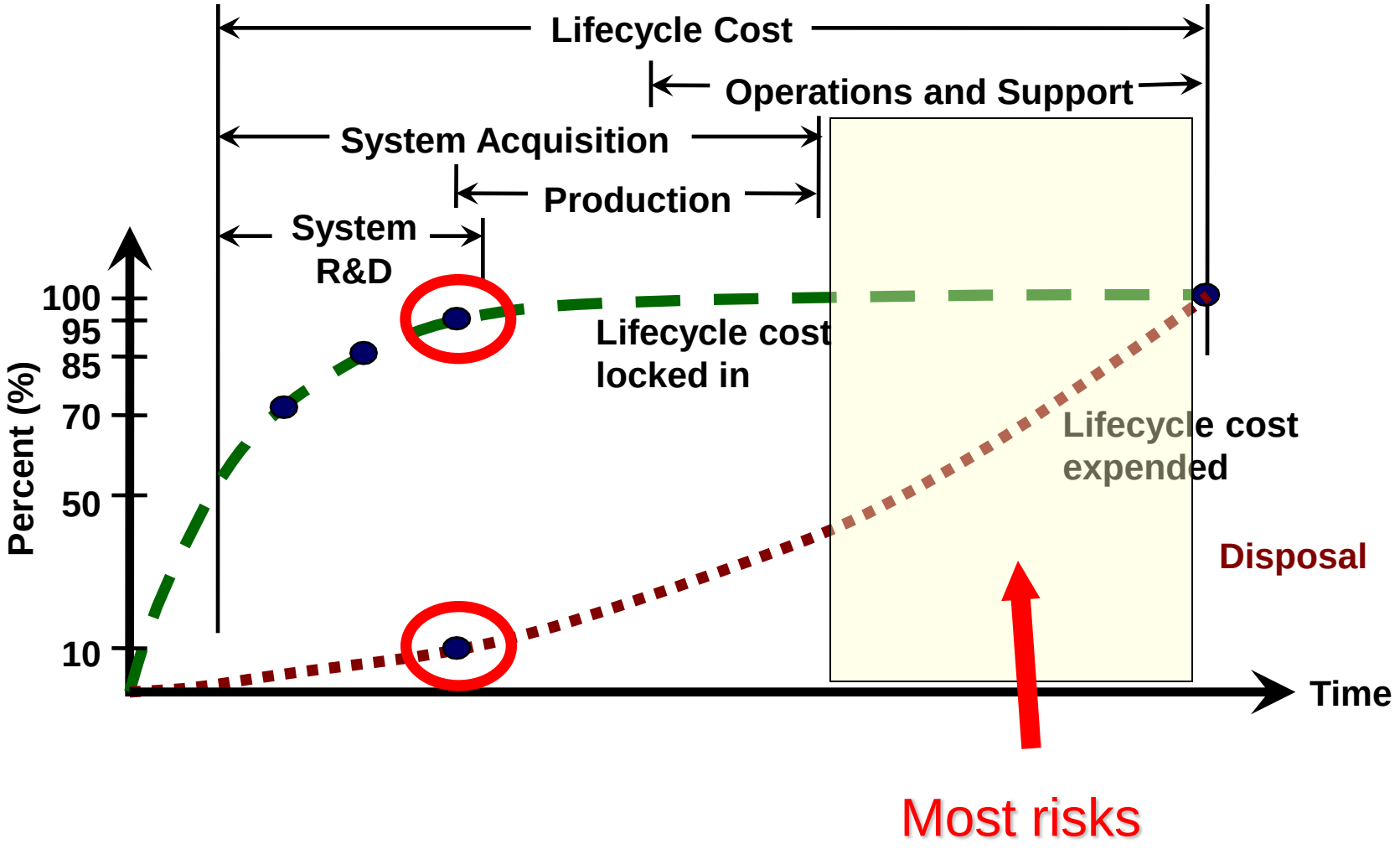
We can calculate this – Need to do better

95% of Life Cycle Cost Locked-In Early



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

Most Risks After System Delivery

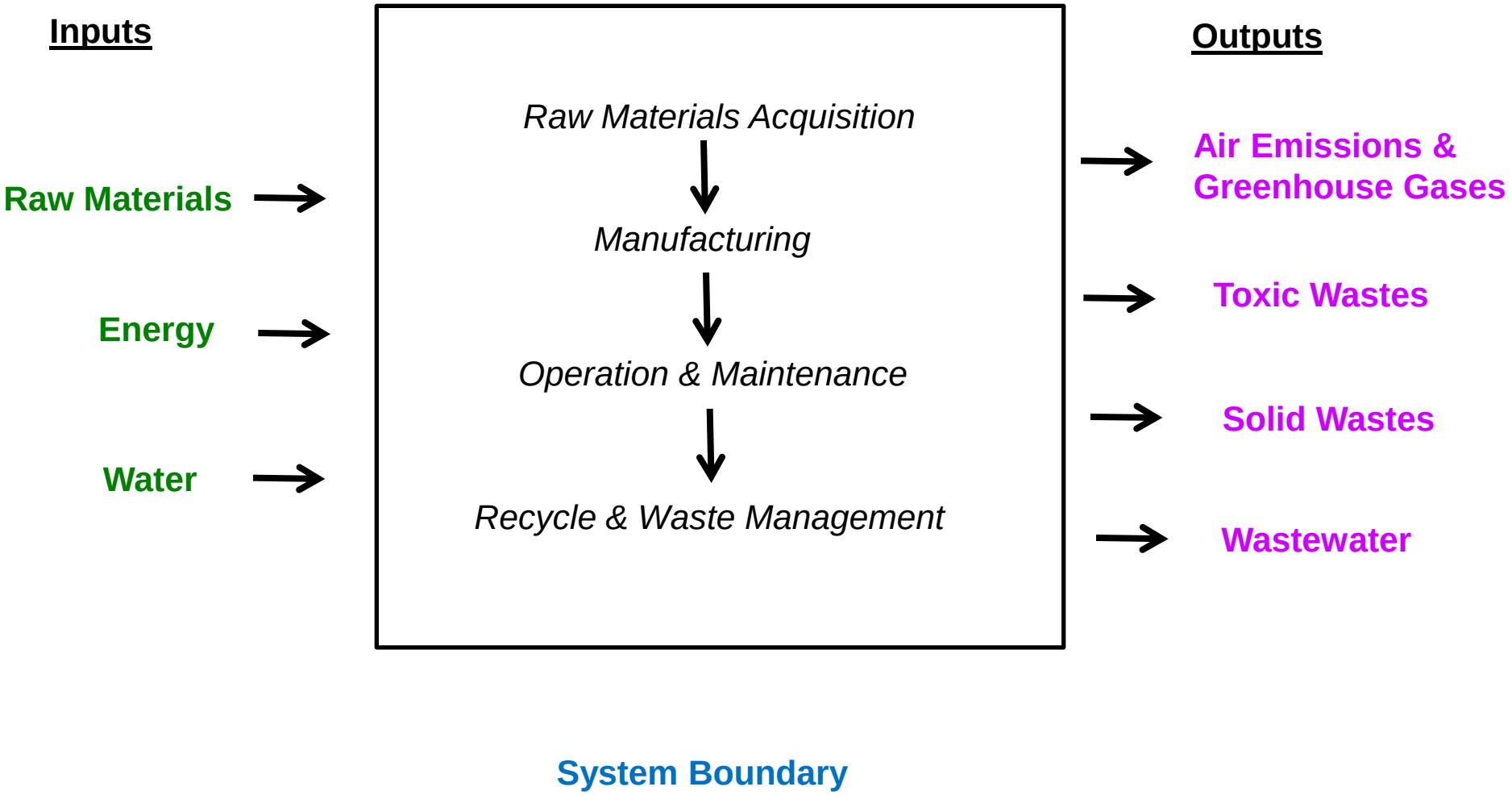


What We've Learned

- Pockets of good practice & results exist
- Some practices stymied
- Sustainability insufficiently considered
  - Water use, energy, noise, toxic chemical use
- Need better Total Ownership Cost estimates
  - Not all life cycle costs (LCC) estimated and analyzed
  - Poor transparency for LCC
  - LCCs often passed to operators due to procurement costs
- We need a consistent DoD methodology for analyzing sustainability & related life cycle costs

Life Cycle Impact Assessment

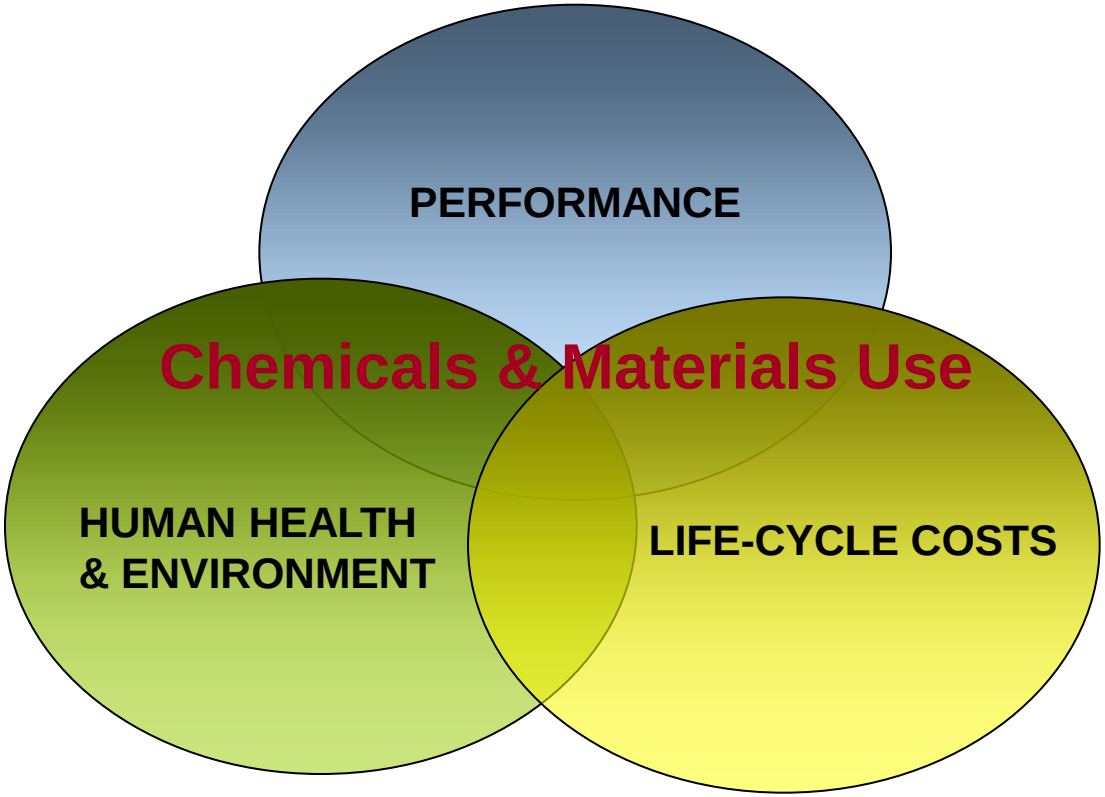
ISO 14040 Series



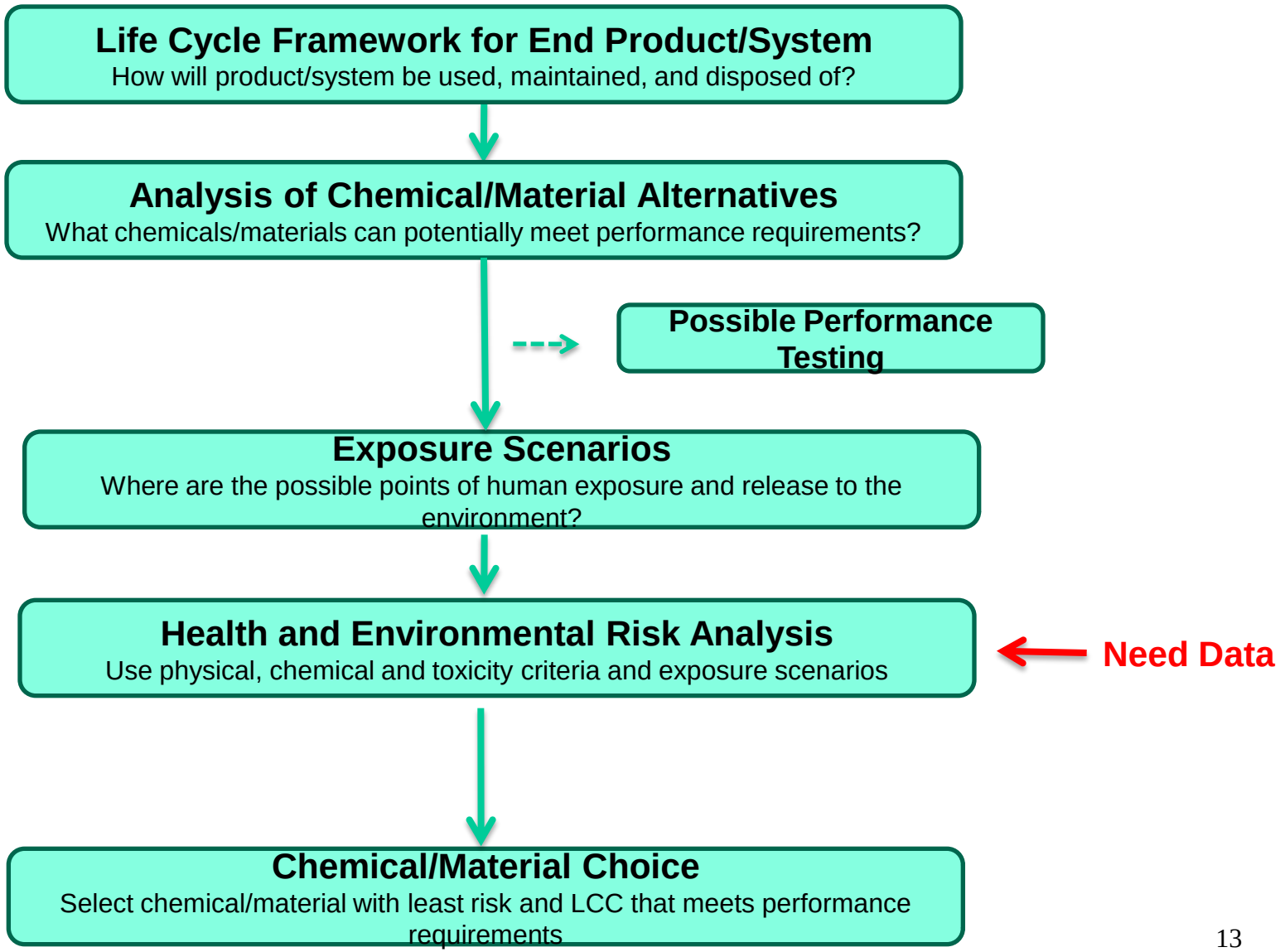
DoD Systems Sustainability

Cross-Cutting Risk & Cost Factor

Acquisition, Technology and Logistics



Making Wise Chemical/Material Decisions



Physical, Chemical, & Toxicity Data Needs

- Five types of data displayed in standard Tables
- Data needs vary based on uses and predicted exposures
- Data can be used to better identify, assess, & mitigate risks

Mammalian Toxicity/Carcinogenicity

Environmental and Non-Mammalian Toxicity

Environmental Fate and Transport Characteristics

Physical-Chemical Information

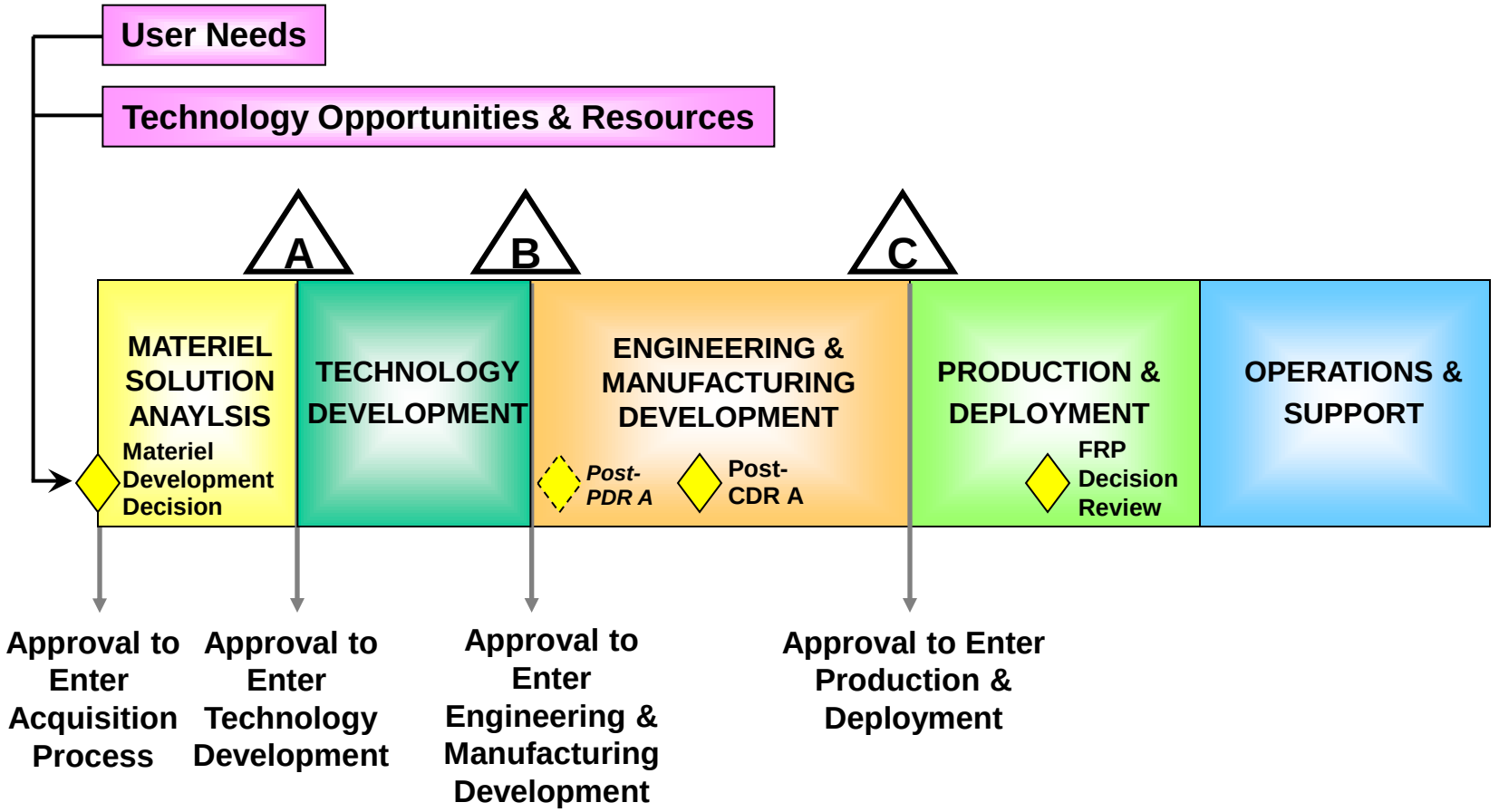
General Chemical, Production, and Use Information

Item #	Evaluation Item	Utility/ Information Provided	Chemical Lifecycle Stage when Data Desirable	Caveats	More Information	Notes
1.01	Chemical name	- identity - communication	Conception		OECD, 2007b	A
1.02	Molecular formula & weight, computational	- chemical identification - exposure characterization	Conception	polymers frequently reported as number-average weight	ASTM, 2008[a] Johnson et al.,2007[a] USEPA, 1997[b] OECD, 2007b[a]	
1.03						

Challenges

- **What phases in the acquisition process can we reasonably assess sustainability?**

DoD Acquisition Process



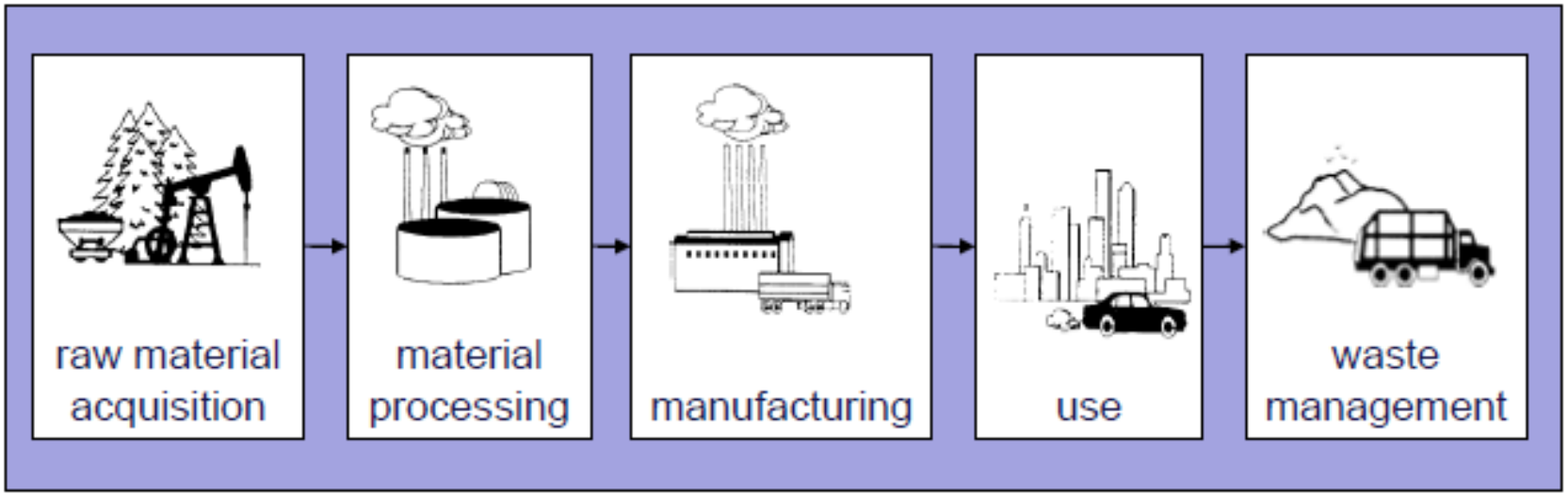
- Materiel Development Decision precedes entry into any phase of the acquisition process
- PDR = Preliminary Design Review CDR = Critical Design Review
- FRP = Full Rate Production

Challenges

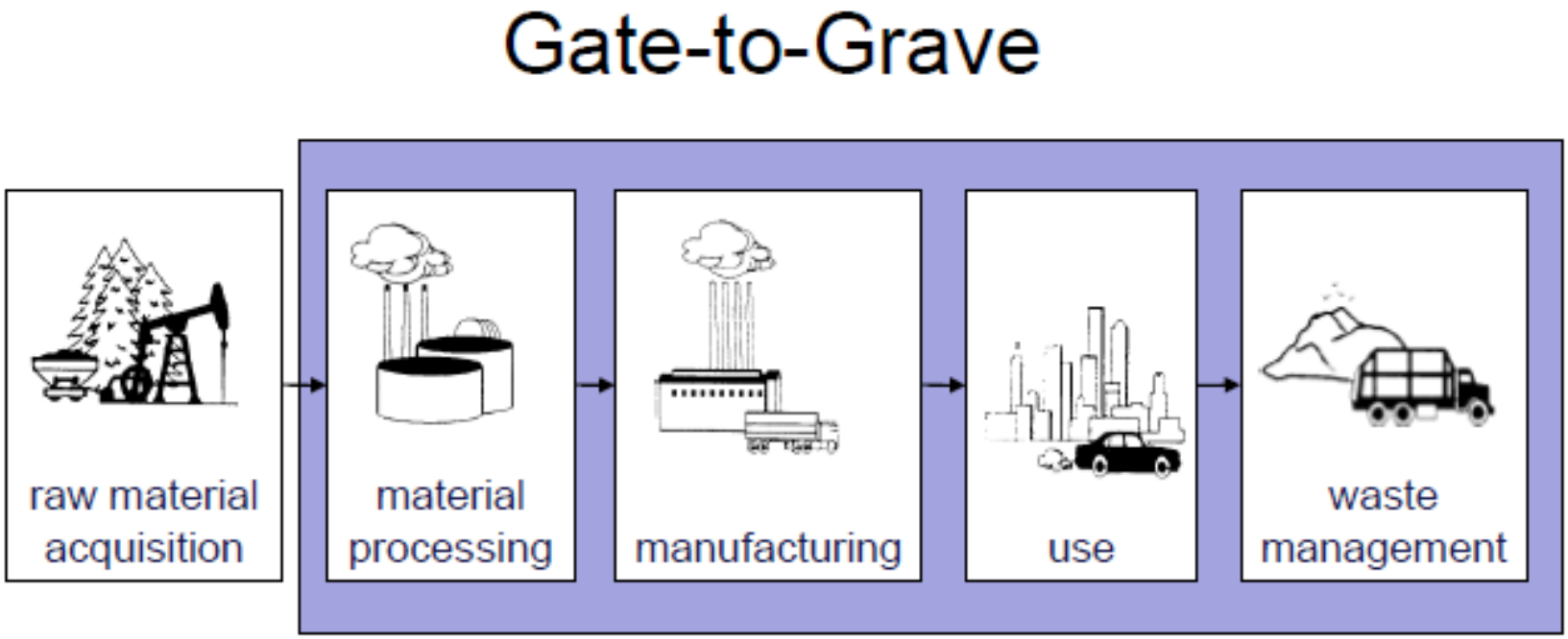
- **What are the life cycle assessment boundaries?**

What are the Boundaries?

Cradle-to-Grave

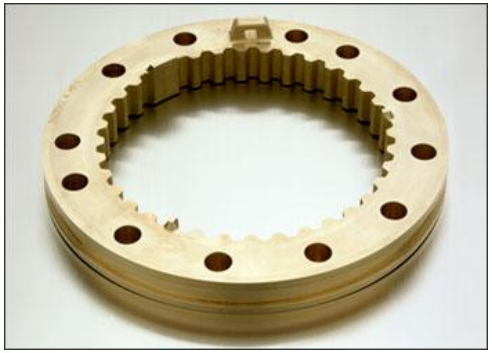


What are the Boundaries?



Challenges

- **Do we assess for whole systems, components, sub-components?**



Challenges

- **What phases in the acquisition process can we reasonably assess sustainability?**
- **What are the life cycle assessment boundaries?**
- **Do we assess for whole systems, components, sub-components?**
- **Where do we get the data to estimate life cycle costs?**
- **There are many players in the acquisition process**
- **The acquisition system is complex & changing**
- **Priorities are acquisition cost, performance, schedule**

Next Steps

- **Convene a DoD steering group…done**
- **Benchmarking study on methods for analyzing sustainability…done**
- **Collect quantitative case studies**
- **Adopt method(s) to DoD acquisition process**
  - **What factors should be considered in the acquisition process?**
  - **What life cycle costs need to be considered?**
- **Pilot/test the process…learn…refine**
- **Develop a Military Standard for "Sustainability in Acquisition"**
- **Develop training module - Defense Acquisition University**

The Horse to Ride

ISO Standard 14040 Series + E.O. 13514 = Military Standard for LCA

(General framework) (Driver) (Uniform DoD methodology)

End Product

DRAFT – Pre-decisional

NOT MEASUREMENT SENSITIVE

MIL-STD-XXX
as of 19 August 2010

DEPARTMENT OF DEFENSE

LIFE CYCLE ASSESSMENT PROCESS FOR SUSTAINABILITY IN DOD ACQUISITIONS

Not for distribution outside the DoD Sustainability in Acquisition Working Group.

Questions & Discussion

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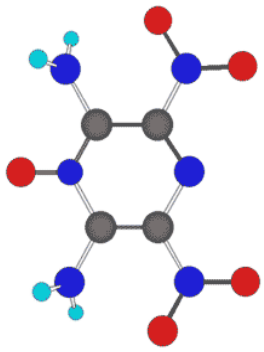
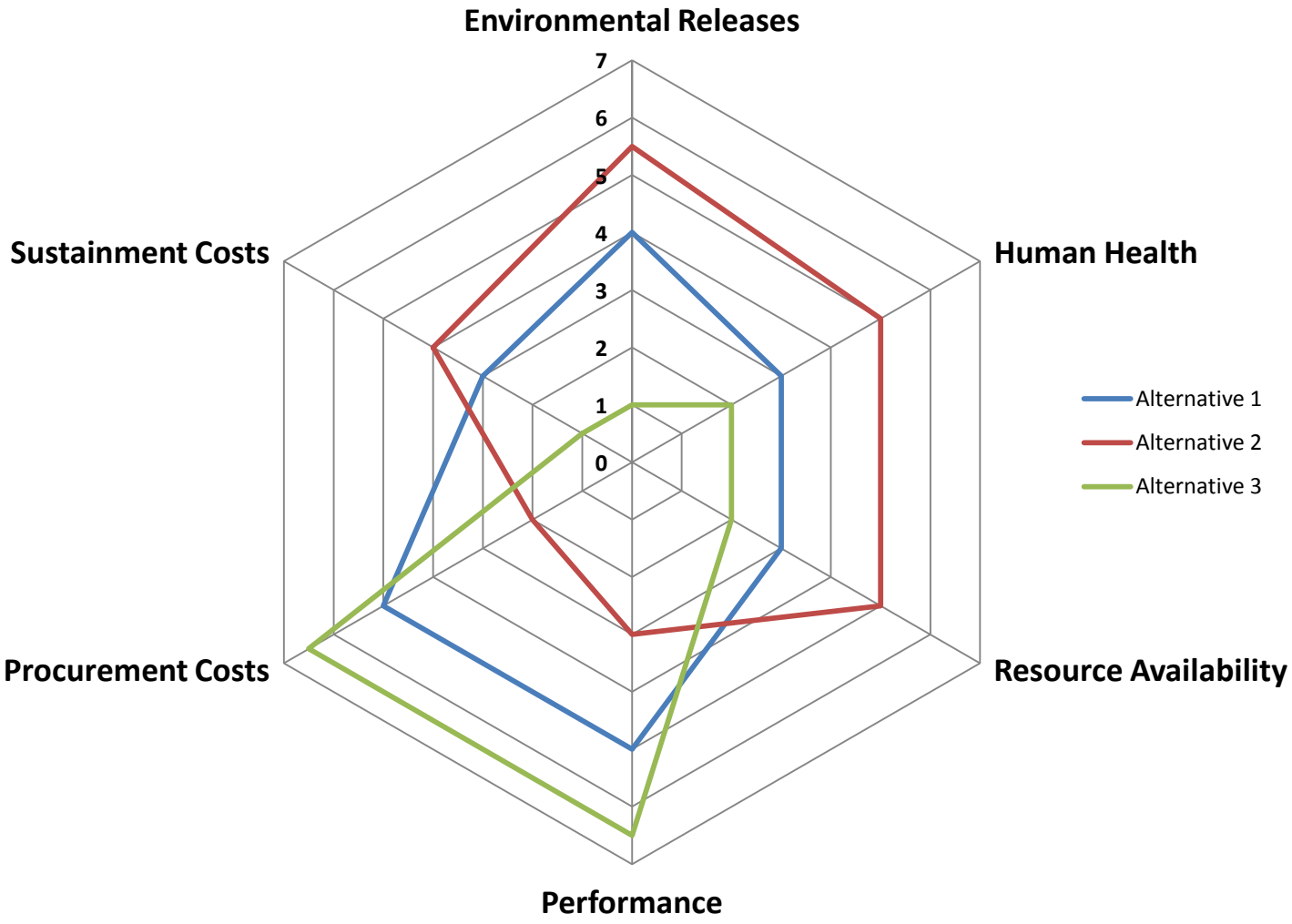


Extra Slides

Comparing Alternatives



DoD Acquisition Policies

- **DoDD 5000.1 – The Defense Acquisition System (2007)**
  - "Safety shall be addressed throughout the acquisition process. Safety considerations include human (includes human/system interfaces), toxic/hazardous materials and substances, …"

- **DoDI 5000.2 – Operation of the Defense Acquisition System (2008)**
  - Programmatic Environmental and Occupational Health Evaluation (PESHE) is required….(at various milestones).
  - As part of risk management, the PM shall eliminate ESOH hazards where possible, and manage ESOH risks where hazards cannot be eliminated. … During system design, the PM shall document hazardous materials contained in the system and shall estimate and plan for the system's demilitarization and safe disposal.
- **MIL-STD-882D, Ch 1 (draft)**
  - Eliminate or reduce risk through alternate designs and materials
  - Manage life cycle risk

Example Sustainability Factors
(Impact Categories in Life Cycle Assessment)

Toxic Chemicals &
Materials Use

Energy Use

Greenhouse Gas
Emissions

Noise

Ozone Depletion

Waste Production

Water Use

Land Use

What LCA Can Do

- **Develop systematic evaluation of environmental consequences associated with a given product**
- **Compare impacts between two or more products/systems**
- **Quantify environmental releases to air/water/land in relation to each life cycle stage**
- **Identify impacts of a specific process**
- **Inform design**
- **Quantify uncertainty in product/system choice**