

# Session 4.0

## The SMC Job: What, Why, Who?

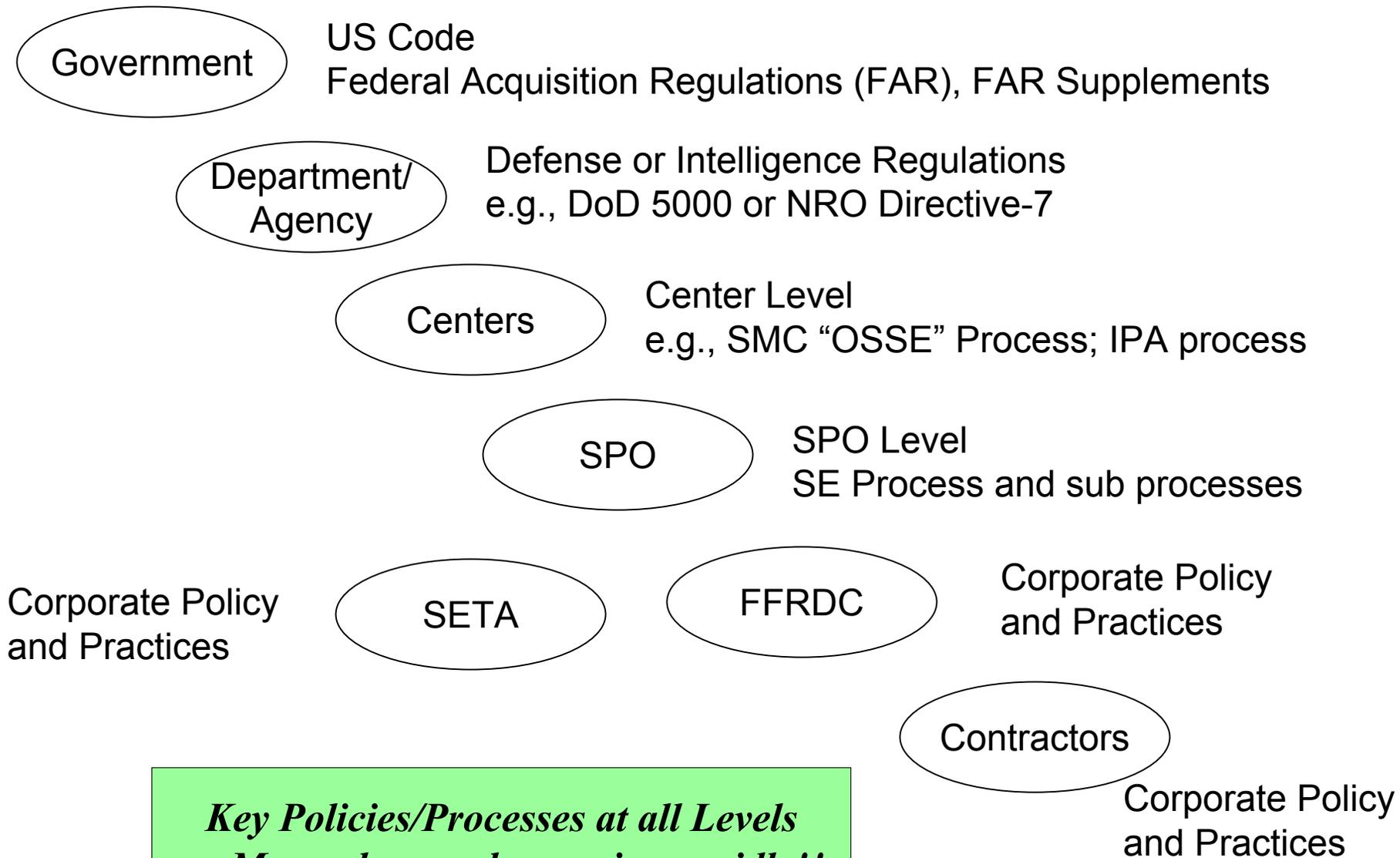


# The SMC Job Key Messages

- **Systems Engineering is a key element in the overall Government acquisition management process**
- **Revitalization is changing the mix of SE products from the SPO and contractors**
- **The Government and Contractor, while jointly responsible for mission success, are responsible for different SE products**
  - Government: “Systems Engineering Management”
  - Contractors: “Space Systems Engineering”
- **The SPO is taking on a greater SEM oversight role to focus on SE issues that make a difference**
- **You should understand your personal “value-added” role in SMC SE/SEM**



# Process Hierarchy

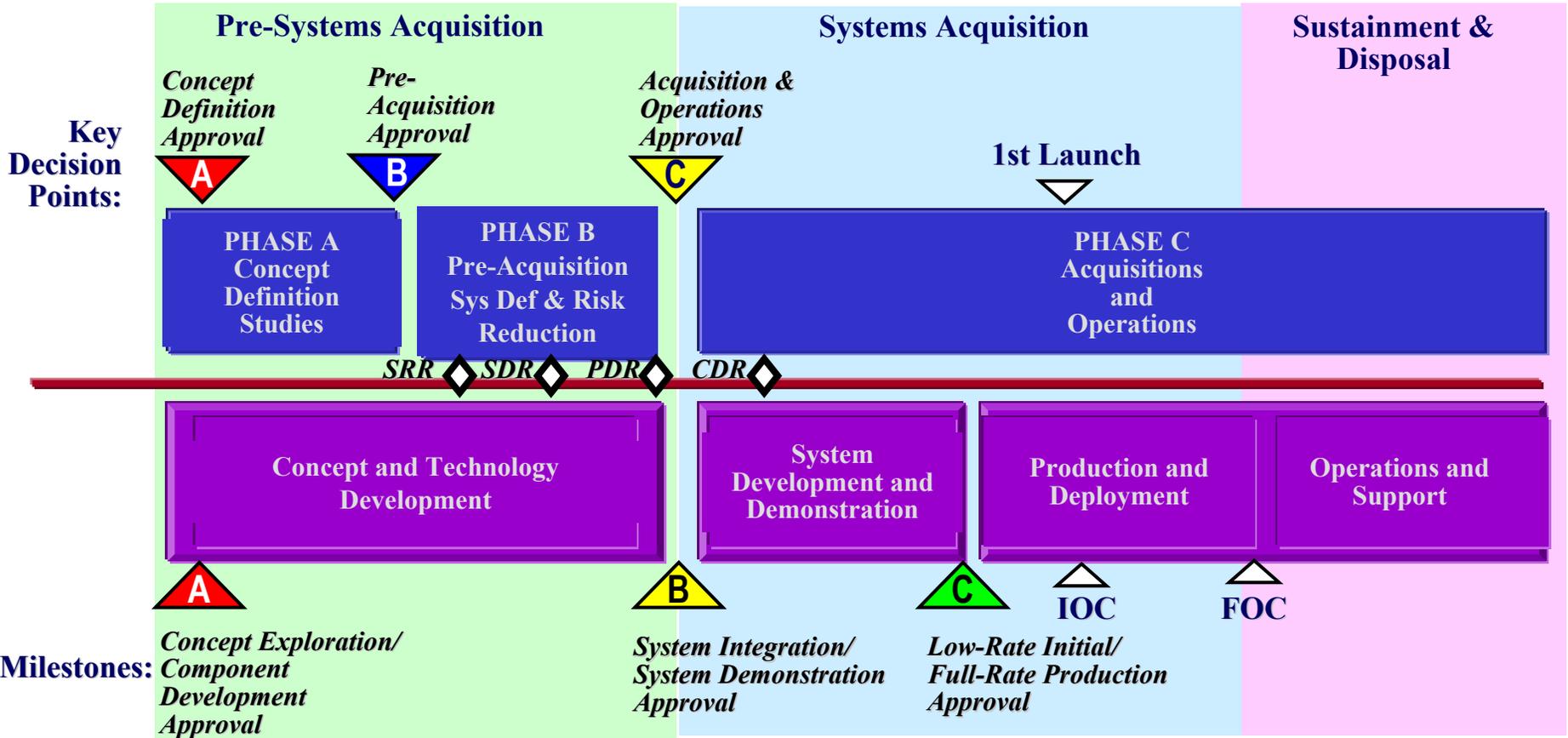


***Key Policies/Processes at all Levels  
... Many changes happening rapidly!!***



# Acquisition Phase Definitions are Evolving

## Draft USECAF Space Acq Policy 02-1



DoD Instruction 5000.2



# **Defense Space Acquisition Board (DSAB) Independent Program Assessment (IPA)**

- **Purpose is to assess program's readiness to proceed into the next acquisition phase and adequacy of the proposed approach at each Key Decision Point (KDP)**
- **IPA is the key preparatory activity for a DSAB review to USECAF as MDA**
- **Based on Information Provided by Program Office**
  - Program and related documentation for appropriate KDP
  - Briefings and discussion with program office and stakeholders/user/mission partners
  - Documented answers to Team questions
- **Compares program accomplishment with program objectives and with previous USECAF guidance, decisions, and/or Congressionally-directed actions.**
- **In-depth Review of those Areas of Particular Criticality, Controversy, or Risk**
- **Aerospace Corporation's Center for Systems Acquisition Development (CSAD), supporting SMC/AXD, serves as the IPA facilitator for all SMC programs and is responsible for providing direct process implementation support to facilitate all SMC IPAs and maintain process**

***"The kind of high-level review that the USECAF would do personally if he had the time available"***

# SE is Necessary for Any Acquisition Process

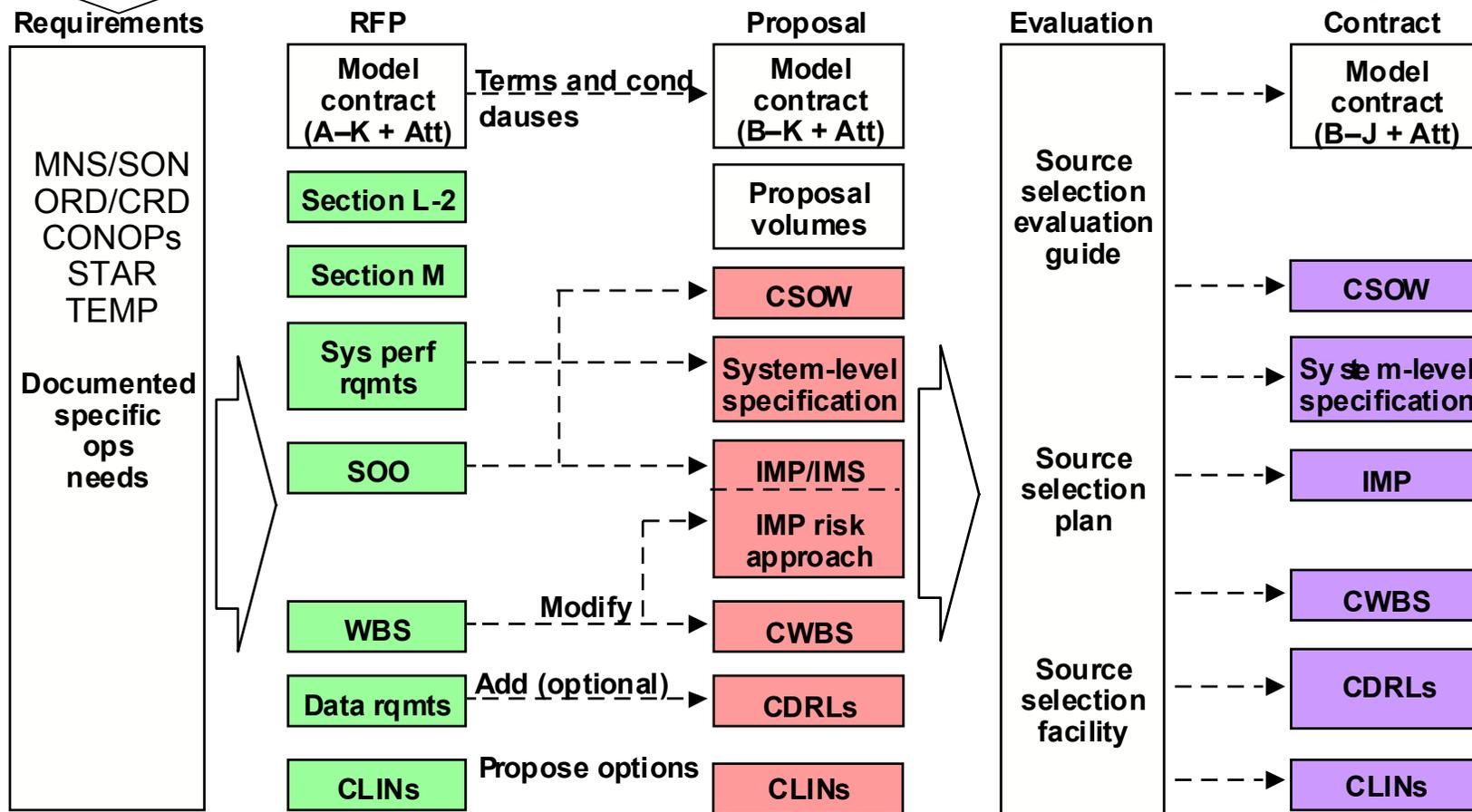
- SE is still viewed as a critical process for assured mission success and customer satisfaction
  - DoD 5000.2R called it out
  - New Draft DoD Space Acquisition Policy
- Proper SE helps manage risk
- Manage relationships among performance, cost, schedule and risk
  - Answer “what if” and budget-driven exercises
- Avoid prior program mistakes



# SE “Products” Play Key Role in Pre-Award Stage

SAMP, Acq Plan or  
IPS SE Portions

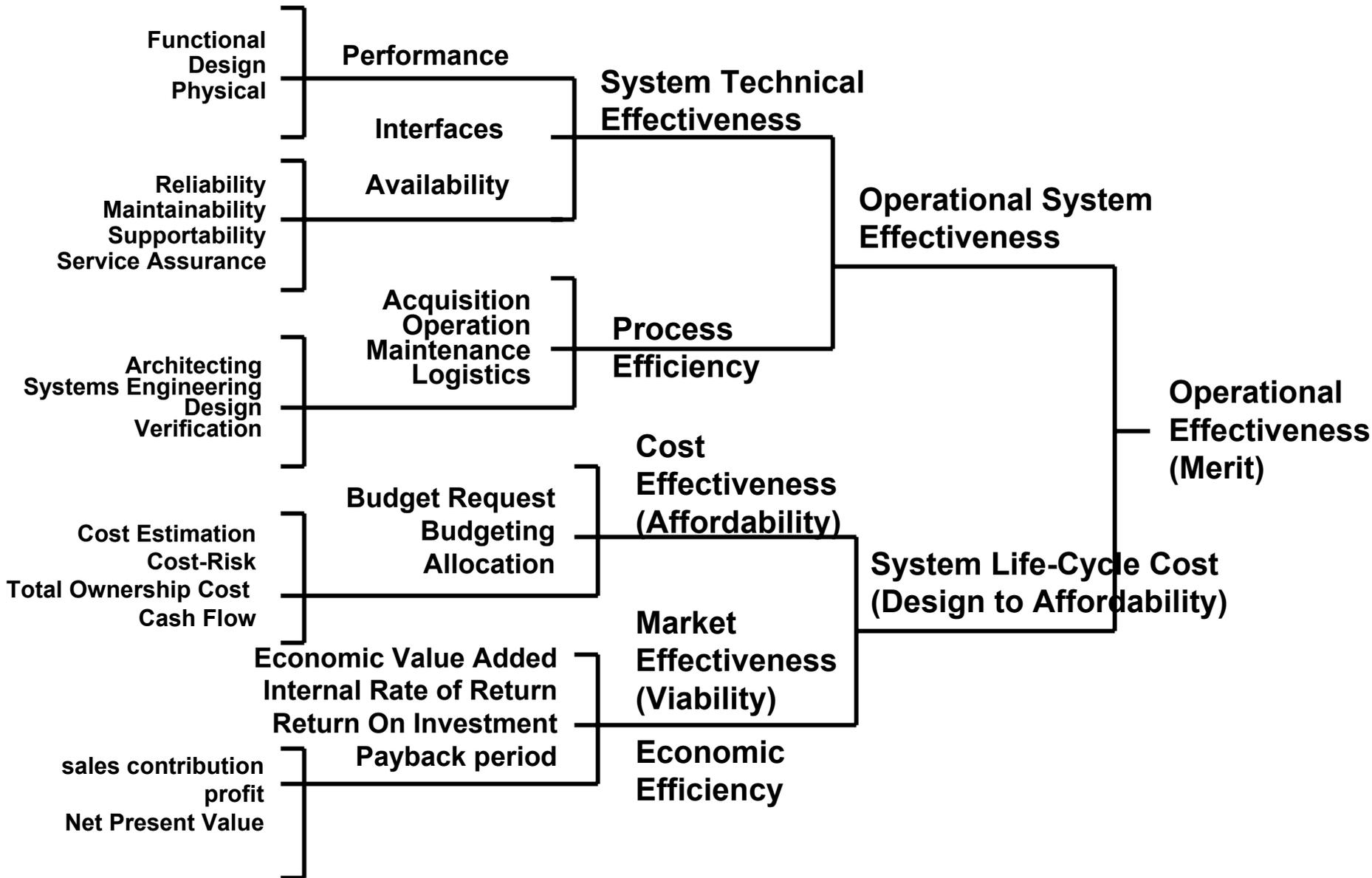
Contractor Team SE  
Policies and Practices



See SMC/AXD and Aerospace / CSAD for more Information

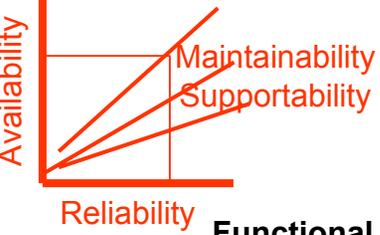
# SE Plays Key Role In Operational Effectiveness

(SE's Purpose: Integration of Components)



# Operational Effectiveness

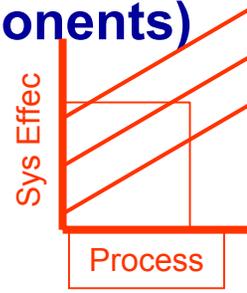
(SE's Purpose: Integration of Components)



Functional Design  
Physical

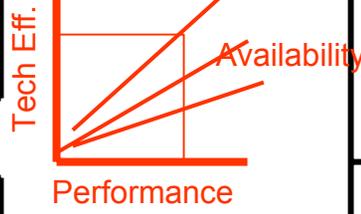
Performance

System Technical Effectiveness



Interfaces

Availability

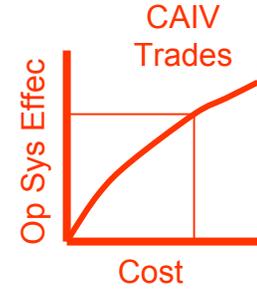


Operational System Effectiveness

Reliability  
Maintainability  
Supportability  
Service Assurance

Acquisition  
Operation  
Maintenance  
Logistics

Process Efficiency



Architecting  
Systems Engineering  
Design  
Verification

Budget Request  
Budgeting  
Allocation

Cost Effectiveness (Affordability)

Operational Effectiveness (Merit)

Cost Estimation  
Cost-Risk  
Total Ownership Cost  
Cash Flow

Economic Value Added  
Internal Rate of Return  
Return On Investment

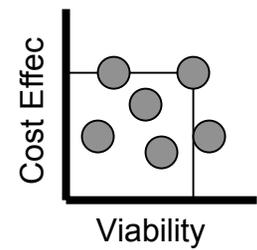
Market Effectiveness (Viability)

System Life-Cycle Cost (Design to Affordability)

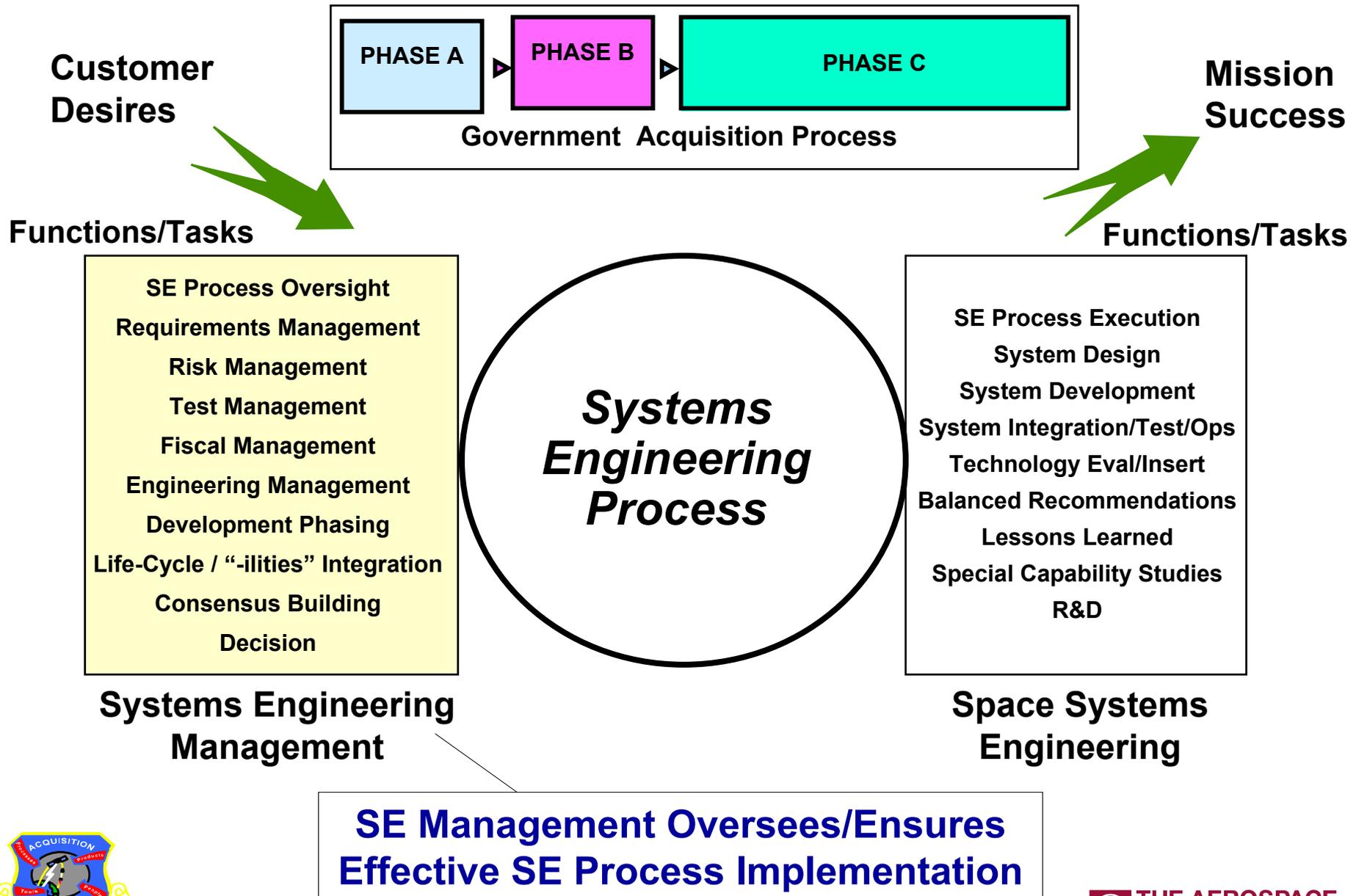
Sales contribution  
Profit  
Net Present Value

Payback period

Economic Efficiency



# Government Team SE Management Functions Play a Key Role



# The Acquisition Team Has Different Responsibilities Implementing SE



- **Government implements SEM (like DoD 5002.R)**
  - JPO/SPO write into their IPS or Acquisition Plan
  - Establish system baselines
  - Manage system performance, cost, schedule and risk relationships
  - Report on the Government team, budget, and schedule
- **Government levies “requirements” on Prime contractor(s)**
  - For acquisitions
    - Via contract; WBS, CLIN, SOW, IMP, Data Requirements, EVMS
  - Case by case for other non-acquisition efforts
- **Prime contractors have their own SE practices**
  - Practice usually based on a “commercial standard”
  - Division specific, job specific, implementation of that standard
  - May or may not levy SE on subs and suppliers
  - What are the contractor motivations for these?
- **Sub Contractors and Suppliers**



# Government Establishes Division of Responsibility

- **Sets Insight/Oversight line**
- **Starts in the Pre-Award**
- **Requires superb communication, resources**
- **Need for specific control points, thresholds and data to make the best decisions**
- **Risk drives the strategy, plan and execution**



# The SMC Job:

## Examples of SEM-Related Products

- **Verification and validation of contractor's SE progress:**
  - Proposals
  - Architecture
  - System requirements,
  - Configuration items, configuration management
  - Specifications
  - Baselines
  - Measurements and control effectiveness
    - TPMs
    - EV analysis
    - Process metrics
    - Risk methodology and assessments
- **Value-added participation in technical and management reviews and decision-making**
- **Trades**



# The SMC Job:

## Application of SEM To Prime Oversight

- Helping users/operators establish requirements
- Operating in IPT environment, your value-added role on the team
- Participating in key boards
- Contract administration responsibilities: Before, during and after award...
- Work breakdown and earned value, how to interpret
- Integrated Master Plans and Schedules
- Technical performance metrics and other control techniques
- Risk management planning and mitigation
- Watch lists and other tools
- Post Awards and roles at various technical reviews, the purpose of each, template questions/checklists to help you participate
- Reviews other plans: SAMP, SEMP, TEMP, OSS&E, Manufacturing and Subcontract, Make or buy



# The SMC Job: Managing System External Interfaces

- **SMC SPOs must work with end-users**
  - Capture and understand operational requirements
  - Conduct analysis to support trade-offs
  - Flow operational requirements to system requirements
  - Manifest system requirements in the RFP
  - Place system requirements on contract
- **Manage system interfaces with other supporting system elements**
- **Interface to the operational testing community**



# Who Sets the SEM Benchmark?

- **SMC Chief Engineer and Chief Engineers Council**
  - Interpret law and regulatory guidance
  - Consider commercial practices, society guidance materials and research to set application policy
  - Supplement information as necessary to help get the job done
    - E.g., Adoption of appropriate specifications and standards
    - E.g., SMC OSSE process definitions
    - E.g., SMC Critical Process Assessment Tools (CPATs)
    - E.g., “retired” but relevant SMC Guidance for Systems Engineering... keep eyes open for latest SMC standards
  - Assist in defining and reviewing acquisition plans
  - Researching better ways to get the job done
  - Sharing lessons learned and best practices
- **Program Offices plan and implement the process**



# Wait! Where do SMC's “Real Engineers” and “Functionals” fit in?

- **Functional specialists**

- PK, JA, FM, AX, IN, etc.
- Work with SE's to perform alternative analysis and make integrated decisions



- **Domain specialists**

- LV, S/C, P/L, TT&C

- **Technical specialists**

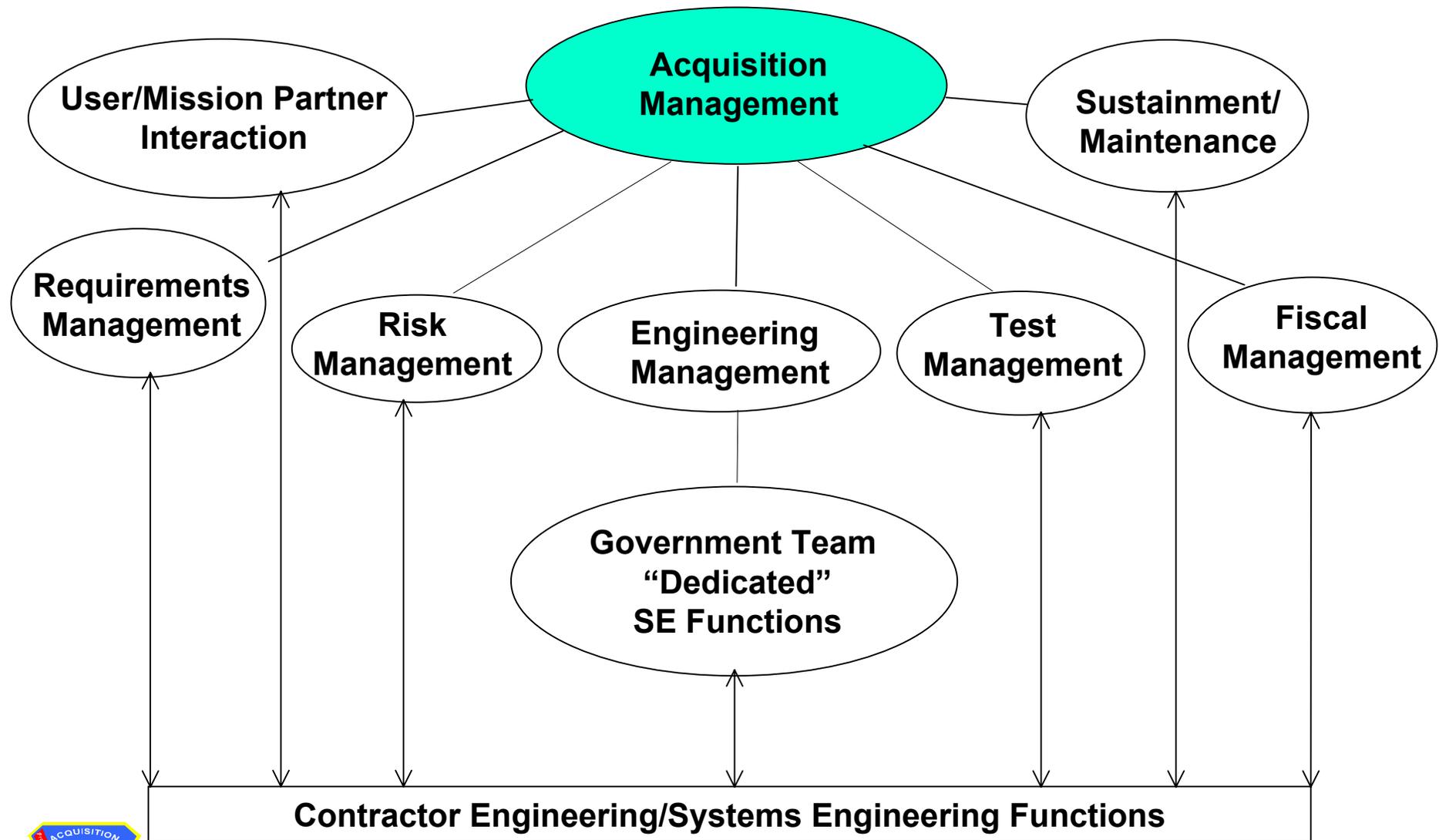
- H/W, S/W, sensors, structures, thermal, controls, avionics, propulsion, power, experimenters, etc.

- **Process shepherds**

- OSSE, Security/Protection, Pre-Award, Test, Range Safety, Frequency Management, etc.

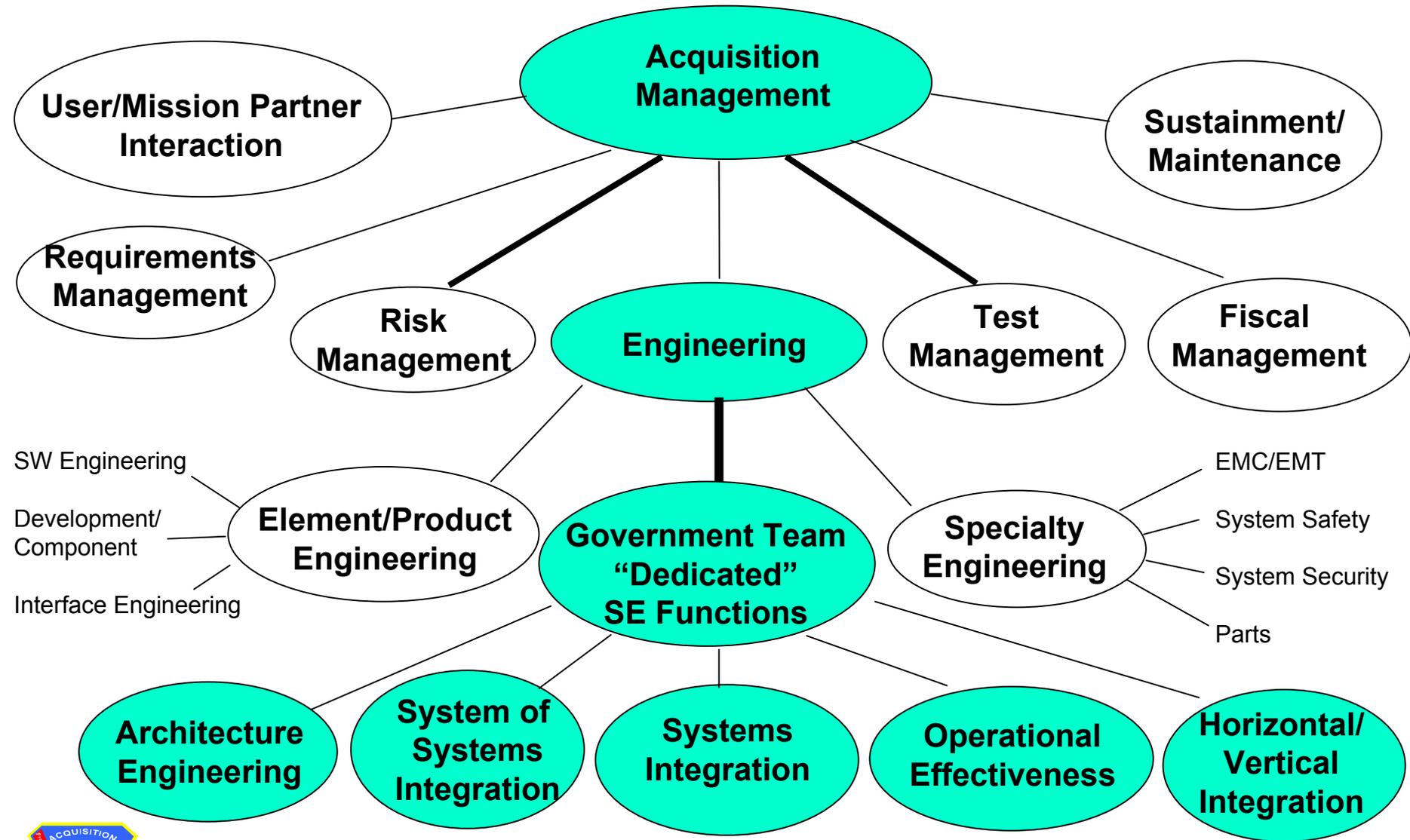
**These “real engineers” and “functionals” bring balance to the SE and SE Management Tasks.**

# SMC Systems Management “Big Picture”

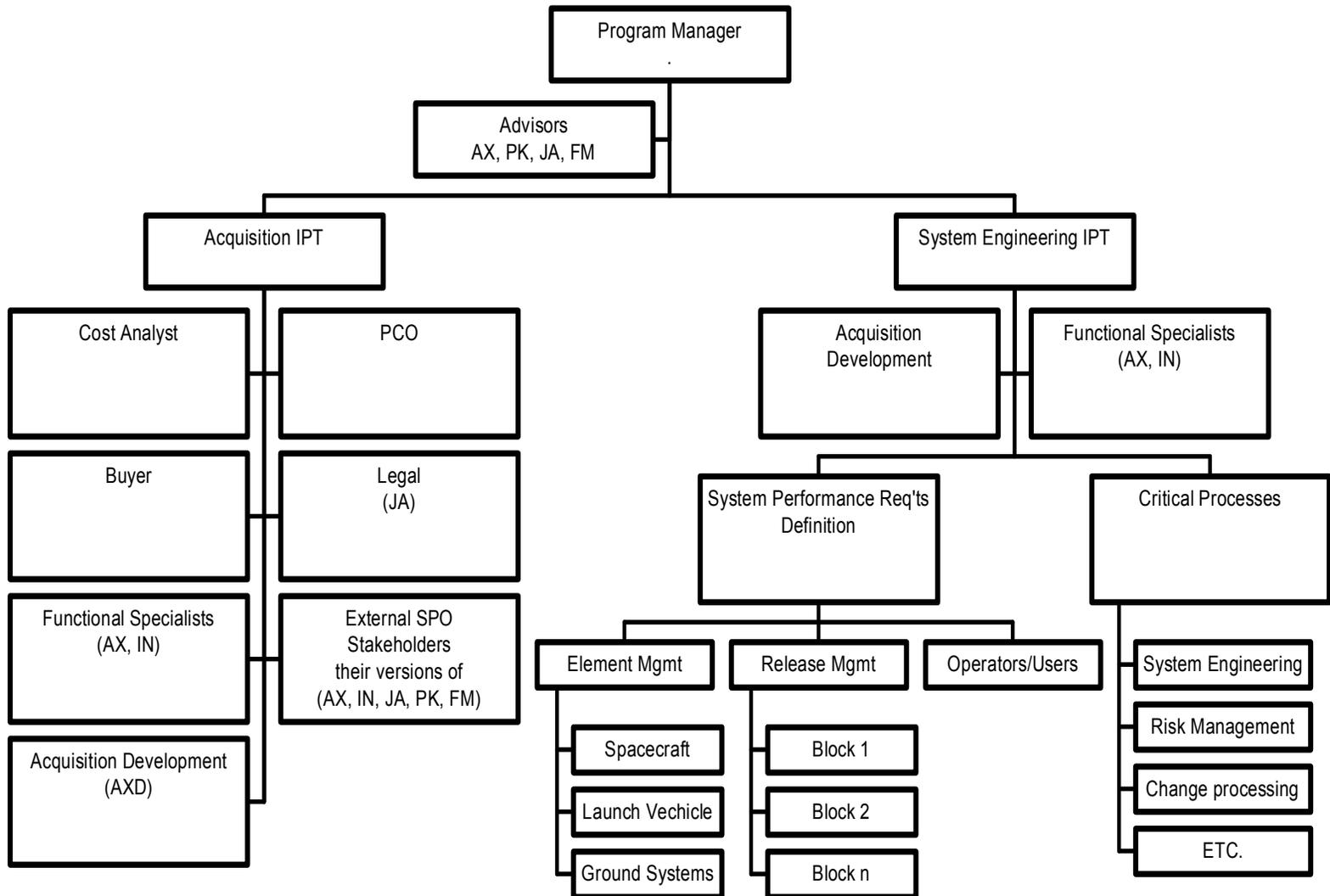


# SMC Systems Management “Big Picture”

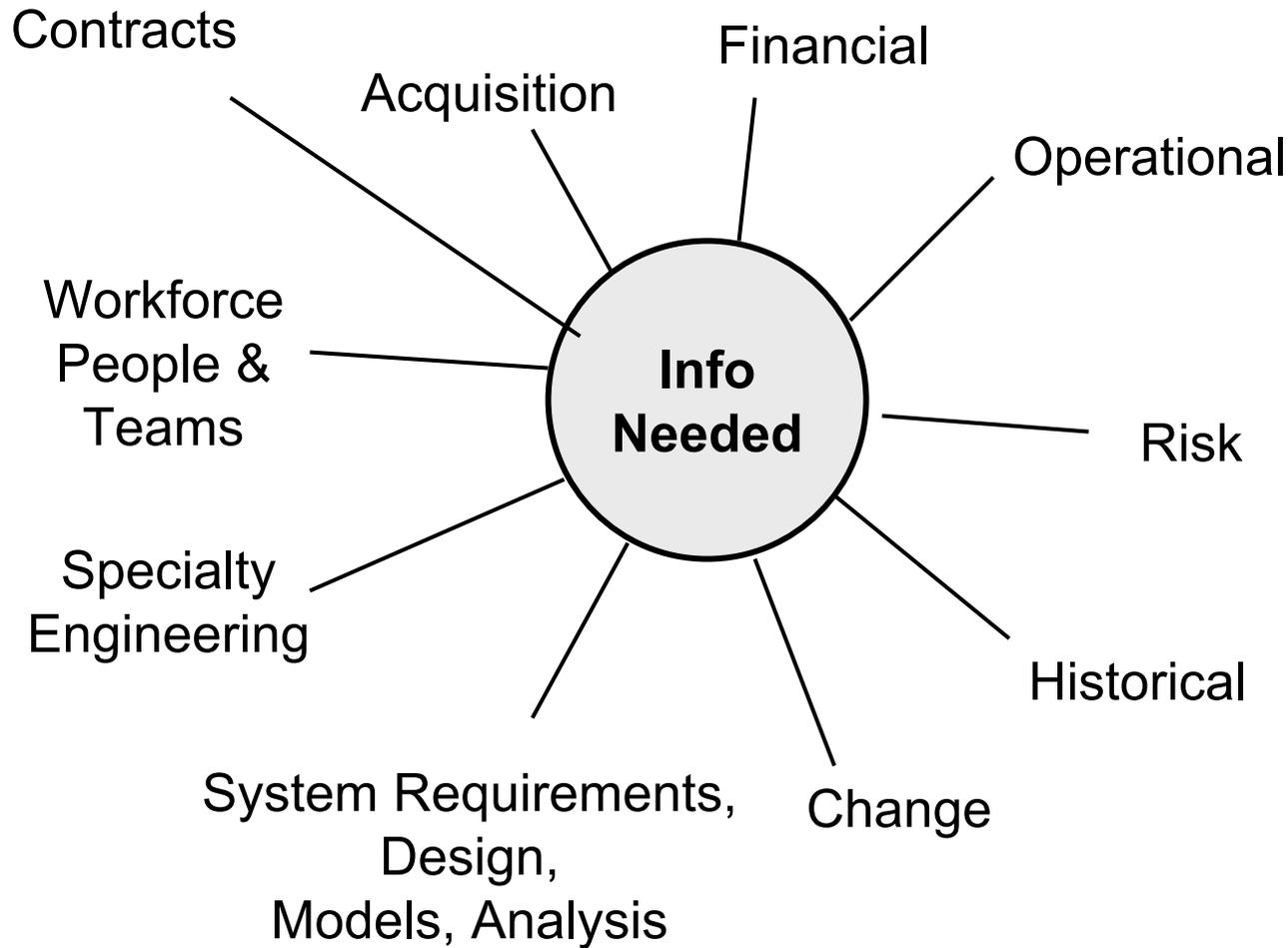
## (Highlighting the Systems Engineering Function Tree)



# SPO IPT Organization



# What Information is Necessary to be Effective?



**Information Properties:**  
Relevance,  
Currency,  
Accuracy,  
Timeliness,  
Acceptance,  
Evidence



# Many Types of Status Information

- **Acquisition**
  - Program Phase
- **Contracts & contract changes**
- **Requirements**
  - Specifications
  - Technical Data
    - Designs, Analysis, Historical Information
- **Financial Data**
  - EVM, CSCSC
- **Risk Data**
  - Watch lists, known risks
- **Change Data**
  - Changes, ECPs, etc.
- **Workforce**
  - Teams, working groups
  - Stability/turnover
  - Qualifications
  - Quality Assessments
- **Go/No-Go Approval**
  - Security Designated Approval Authority (DAA)
  - Operational Suitability Safety and Environment
  - Independent Readiness Team
- **Operational**
  - System Availability
  - Failure data
  - Mission data
  - User products
  - Orbits, or Footprint and HVAC
- **Logistical**
  - Mean time to failure, to repair
  - Spares on hand
- **Other**
  - Political Environment
  - Process and Infrastructure



# Summary

- **Everyone is watching us and wants to “help”**
  - Congress, approval authorities, users, mission partners, etc.
  - They all want “what ifs” answered
- **Understanding the Government Team’s technical oversight/SE roles and products helps to answer the “what-ifs”**
  - Enables SMC to identify and embrace those that want to help and make them part of the solution
  - Enables SMC to bring the right resources to bear on SE problems
    - Intrinsic SMC, mission partners, Aerospace, SETA, contractors
- **Effective performance of Government Team roles requires access to right information at the right time**
  - Need to understand the full scope of information needed/available
- **Your expertise and its continued development and utilization are necessary for this success**
  - Development of core systems management competencies is one of the keys

