Developing and Maintaining the Technical Baseline

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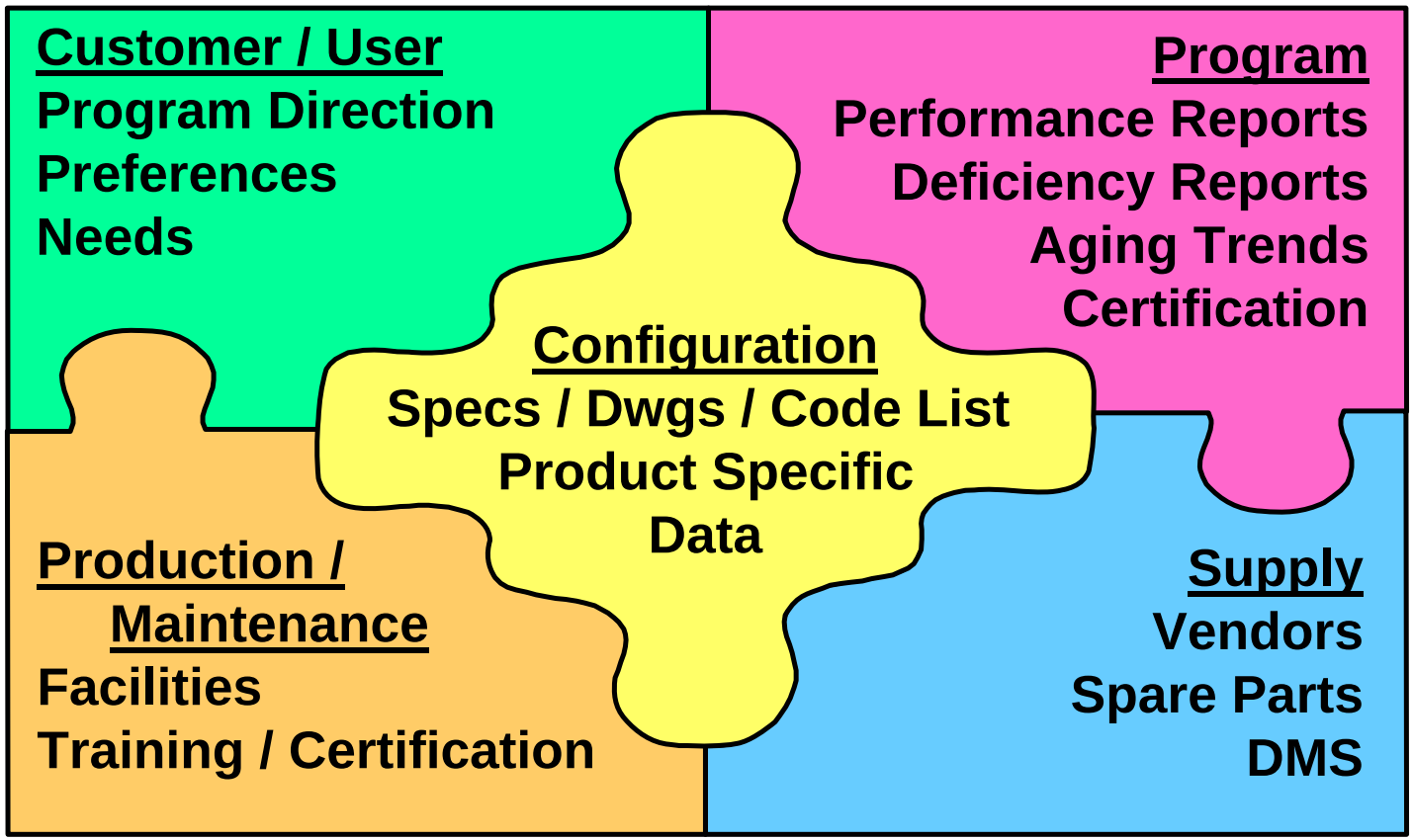
23 Oct 08

Outline

- Technical Baseline
- Configuration Baselines
- Product Specific Data
- Specifications
- Technical Reviews
- Decision Support Data
- System of Systems

Technical Baseline

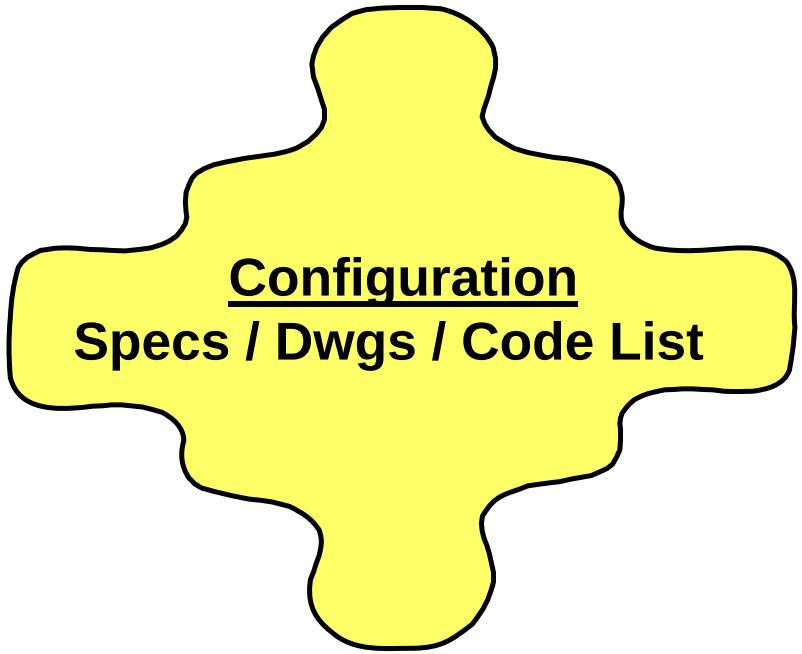


Technical Baseline

- ***Definition*** **–** all of the technical information needed to support a product throughout its life cycle
- **Many different approval processes involved**
  - Configuration change control
  - Maintenance procedures
  - Verification
  - Validation
  - Certification
  - etc
- **All of the information needs to be archived and maintained throughout a product's life cycle**

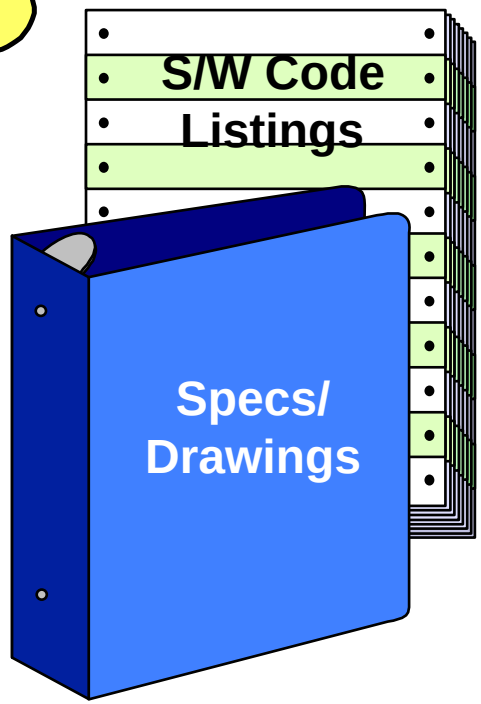
Configuration Baselines

Configuration Baselines



Configuration Baselines

Config Baselines



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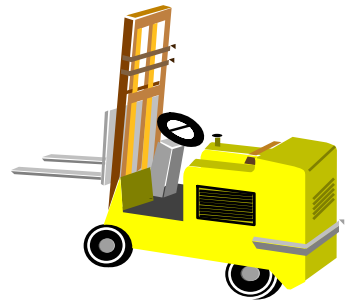
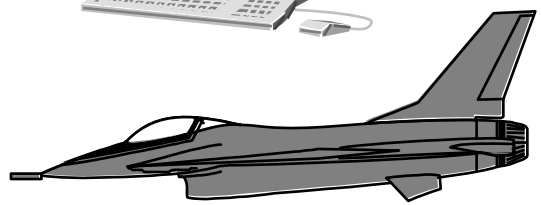
Products / Processes





Configuration Baselines

Performance Based

FUNCTIONAL (CONCEPT) BASELINE
1. Performance Requirements – System
2. Verification Methods (Qualification) – System

ALLOCATED (DEFINITION) BASELINE
1. Performance Requirements – System Pieces
2. Verification Methods (Qualification) – System Pieces

Design Based

PRODUCT (BUILD) BASELINE
1. **Design solutions (dwgs, code listings) – System Pieces**
2. **1st Article Reqts – System Pieces**
3. **Lot / Acceptance & Inspection Reqts – System Pieces**
4. **Verification Methods (1st Article, Lot / Acceptance) – System Pieces**

Configuration Baselines

- **Requirements Management**
  - Document decisions and information generated during requirements development, logical analysis, and design solution processes
  - Has own approval process
  - Mature information incorporated into appropriate configuration baseline
    - Subsequent changes controlled by CCB
- **Interface Management**
  - Document decisions and information generated during development of key interfaces
    - Interface Control Documents developed
  - Has own approval processes
  - Mature information incorporated into appropriate configuration baseline
    - Subsequent changes controlled by CCB from then on

Configuration Baseline Control

- **Configuration Control Boards (CCBs)**
  - Focus on configuration baseline documentation
  - Engineering change proposals (ECPs)
  - Non conformance (waivers, deviations, variances, etc)
  - Can be used to establish baselines

- **ECP Classification**
  - Class I
    - Change form, fit, or function
    - Note: Changing the length of a decal is a Class I change
  - Class II
    - Everything else (minor corrections)

Defining Class I as gov't control and Class II as contractor control is incorrect

Configuration Baseline Impacts

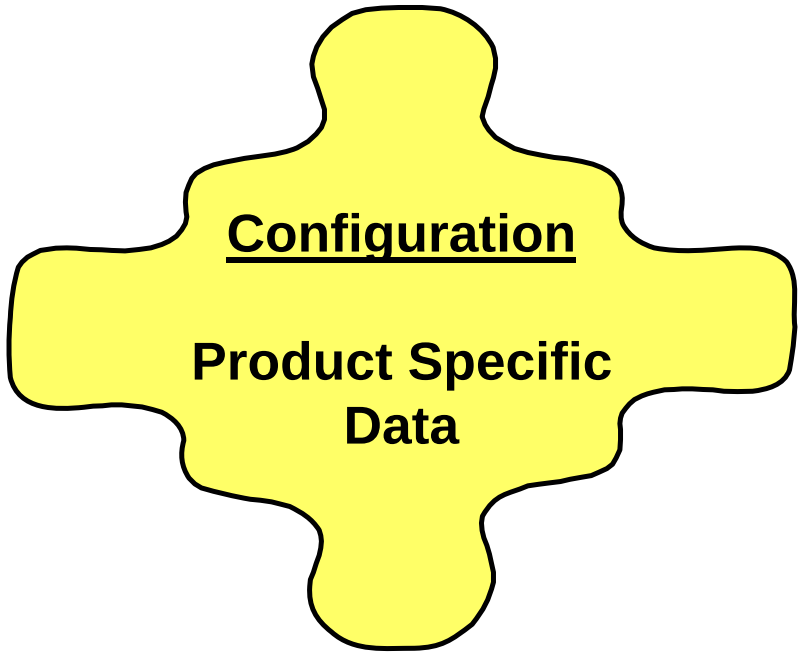
- **COTS**
  - Control with performance spec and source control dwg
    - Must be aware of contractor changes
- **Performance specifications**
  - Allow design changes
  - May require re-qualification
- **Supply prime vendor contracts**
  - May allow parts substitutions
- **Contracts**
  - CCB chair approves configuration changes
    - PCO approves contract changes
  - If only 3rd tier contractually binding, configuration can change

Configuration Baseline Impacts

- **Joint Programs**
  - Three options:
    - Accept configuration
    - Create service variant
    - Don’t participate

Product Specific Data

Product Specific Data



Product Specific Data

- **Requirements and interface management information not incorporated into configuration baseline documentation**
- **Actual product configuration**
  - Product built against a specific configuration
    - Part numbers / serial numbers / lot numbers / stock numbers / etc
    - Maintenance procedures and data
    - Verification / validation reports
    - Etc
- **Verification information / tools**
  - Test plans / procedures
    - Demonstrated performance / market standards
  - Number of test articles / test sequence
  - Modeling and simulation tools
  - Analytical tools

Specifications

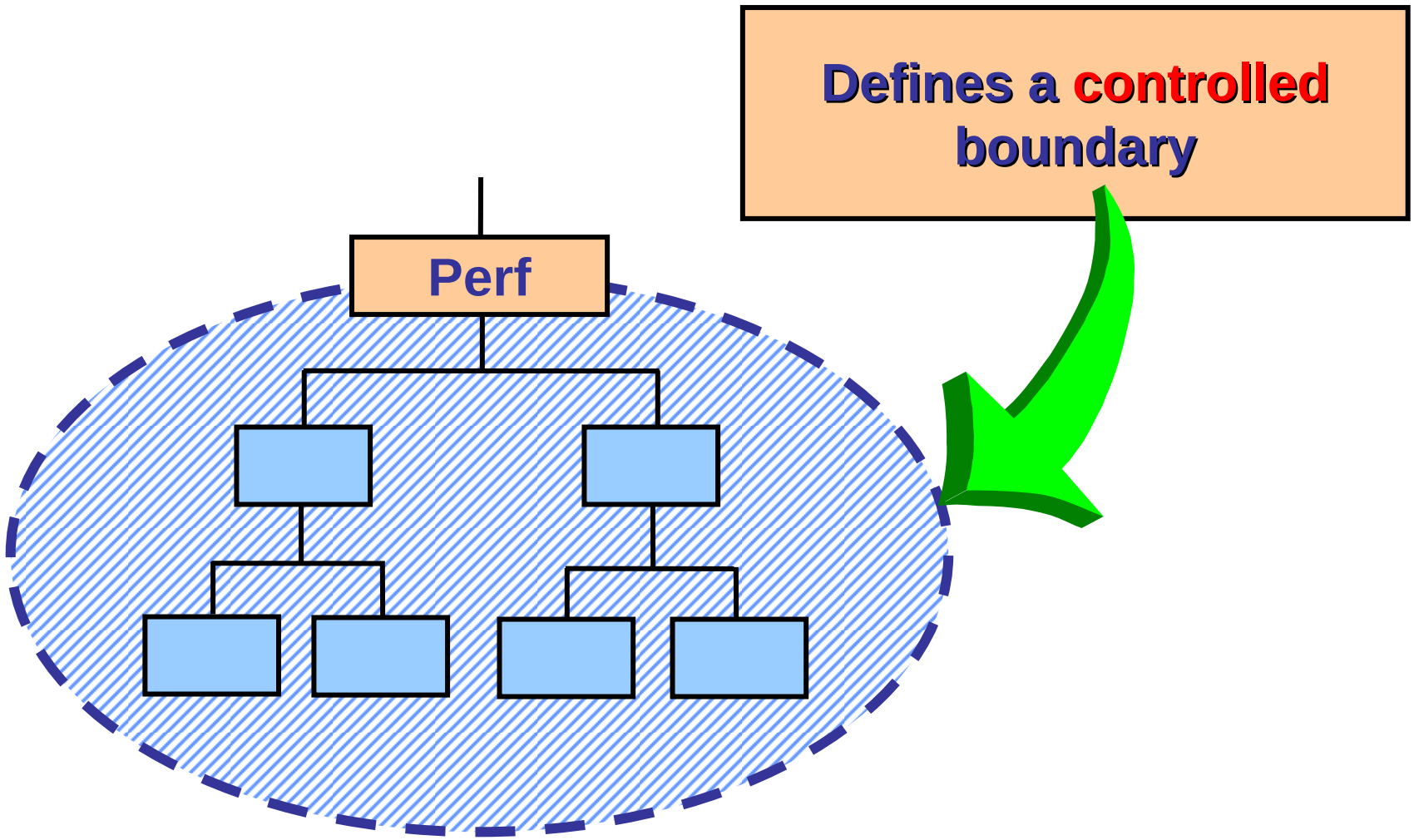
Specifications

- ***Definition*** – contains both requirements and verification methods in one "document"
  - Requirement documents missing verification methods
- **Product types**
  - System
  - Item
  - Software
  - Process
  - Material
- Other types include – Interface
  - Don't buy interfaces -- buy to an interface

Specifications

- **Categorized as:**
  - Perfomance-based
  - Design-based
- **Performance-based**
  - Contains performance requirements only
- **Design-based**
  - Contains both performance requirements and design information (integrated specifications)
  - Contains design information only
- **Integrated specificati**ons
  - Design information added to baselined performance specifications through change management process

Performance Specifications



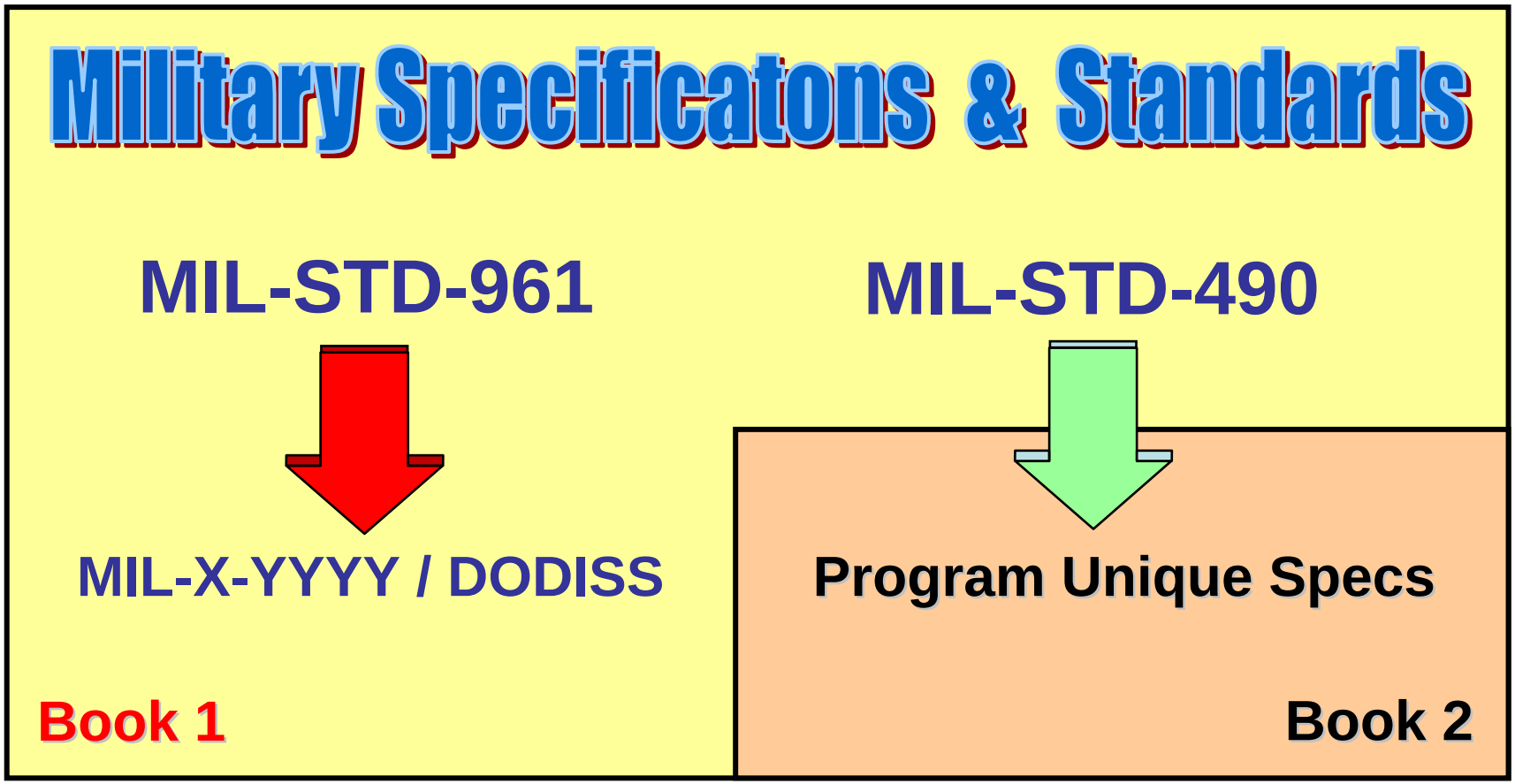
Performance vs Design

Outside Box: **Performance**

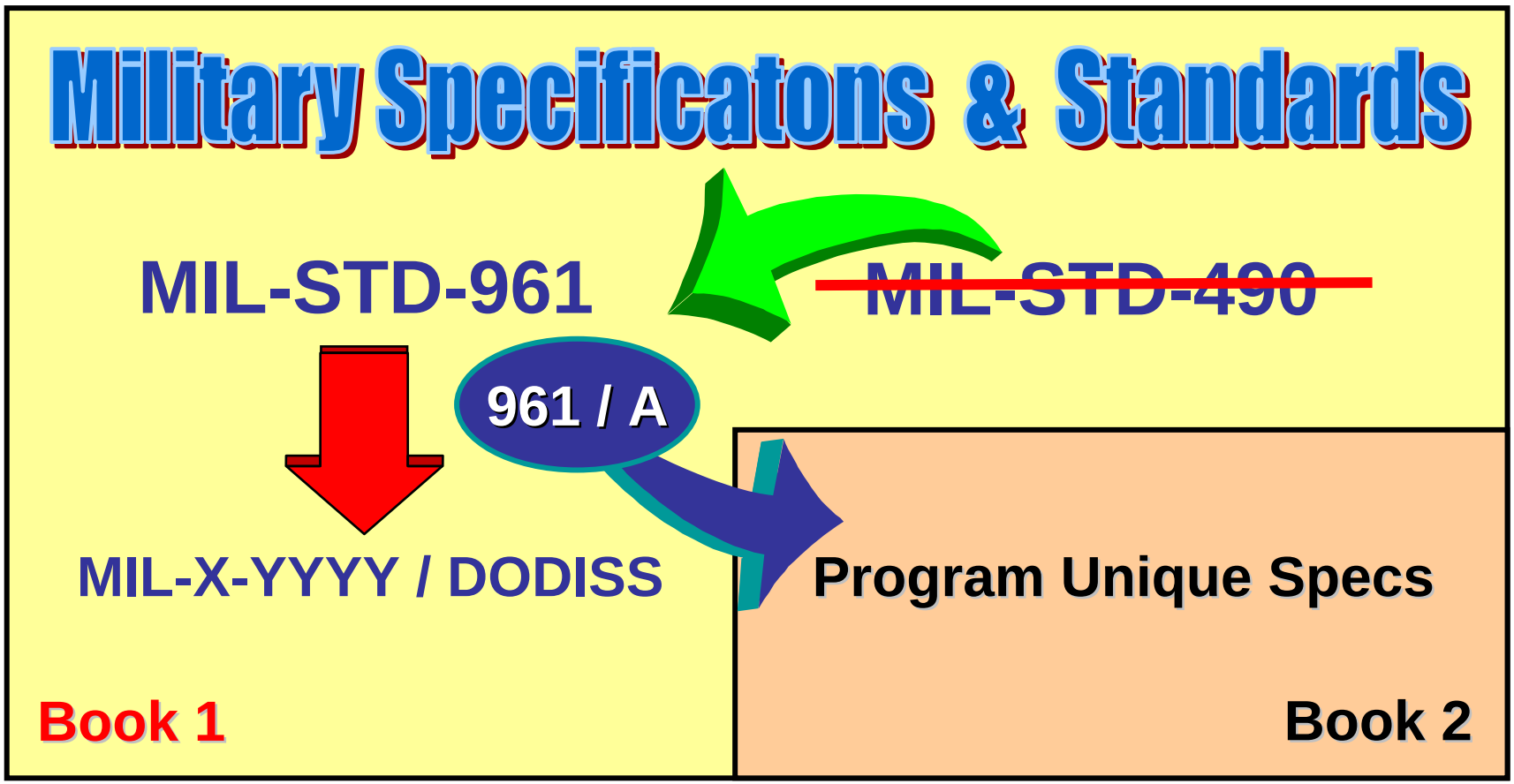
Inside Box: **Design**

Note: Box can represent a system or system piece

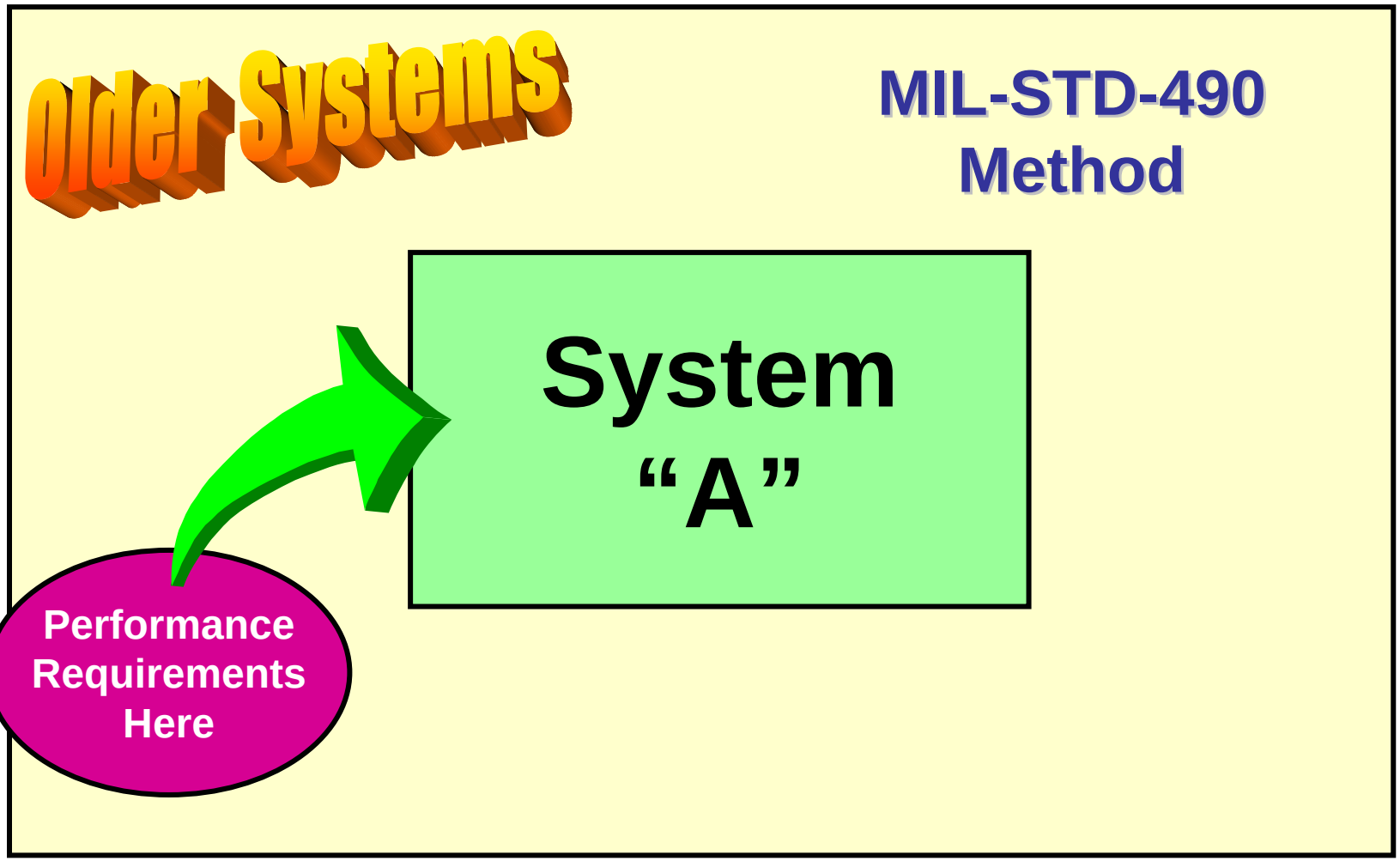
Specifications
Two Sets of Books



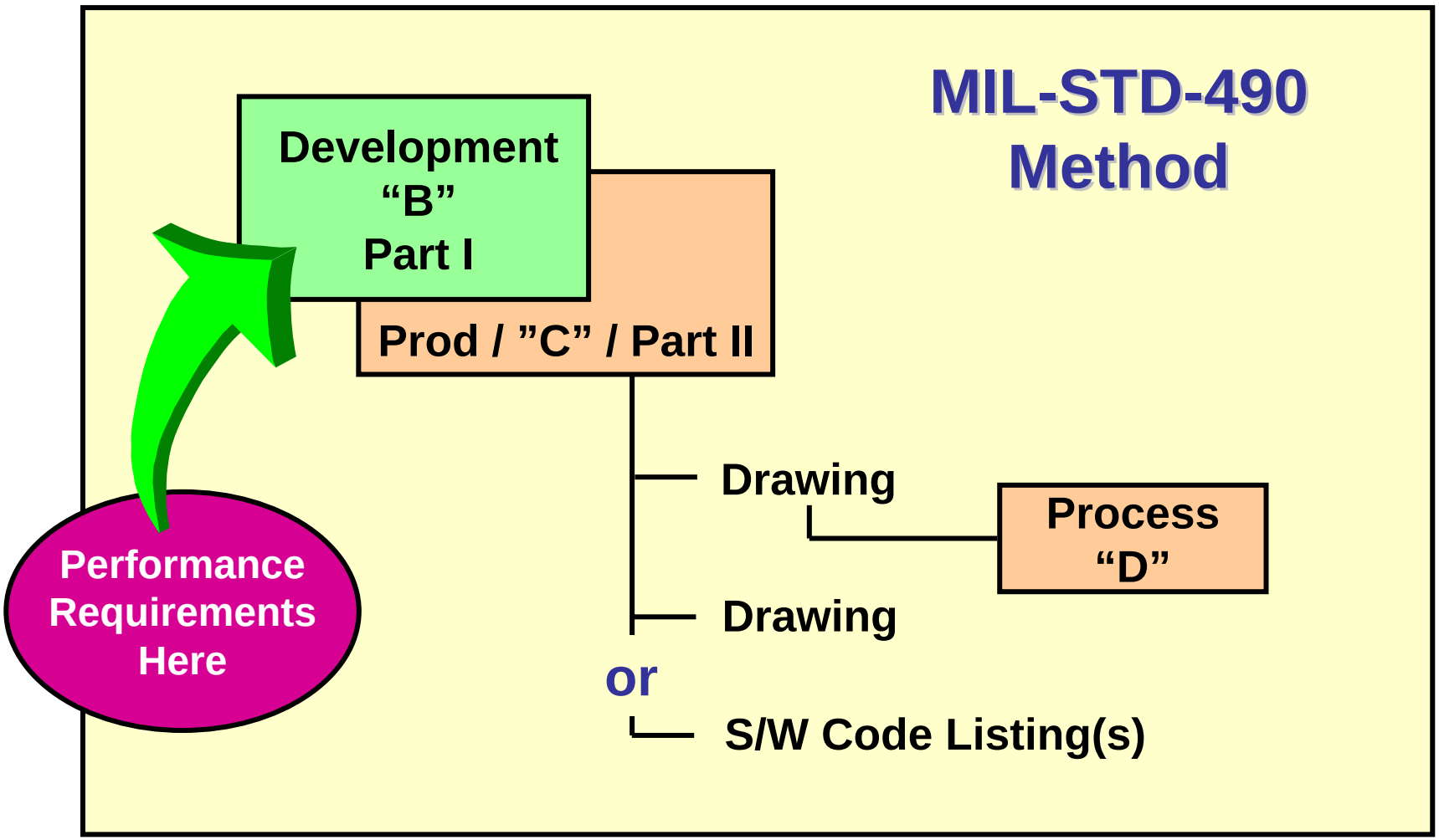
Specifications
Two Sets of Books



Configuration Baselines
System



Configuration Baselines
System Pieces



Technical Reviews

Technical Reviews - Past

FBL

- SFR: Identify system level performance requirements
  - Take control of system specification

- PDR: Identify performance requirements of system pieces
  - Take control of performance specifications of key system pieces

ABL

- SVR: Ensure system qualified and ready to begin production
  - Take control of performance specifications for remaining system pieces

Milestone C

PBL

- PCA: Ensure product design documentation matches product being produced / acceptance procedures adequate
  - Take control of design information (design specifications, drawings, s/w code listings) of system pieces

Technical Reviews - Future

FBL

- SFR: Identify system level performance requirements
  - Take control of system specification

ABL

- PDR: Identify performance requirements of system pieces
  - Take control of performance specifications of system pieces

Milestone B

PBL

- CDR: Identify design solution of system pieces
  - Take control of design information (design specifications, drawings, s/w code listings) of system pieces

ABL must be defined before taking control of PBL

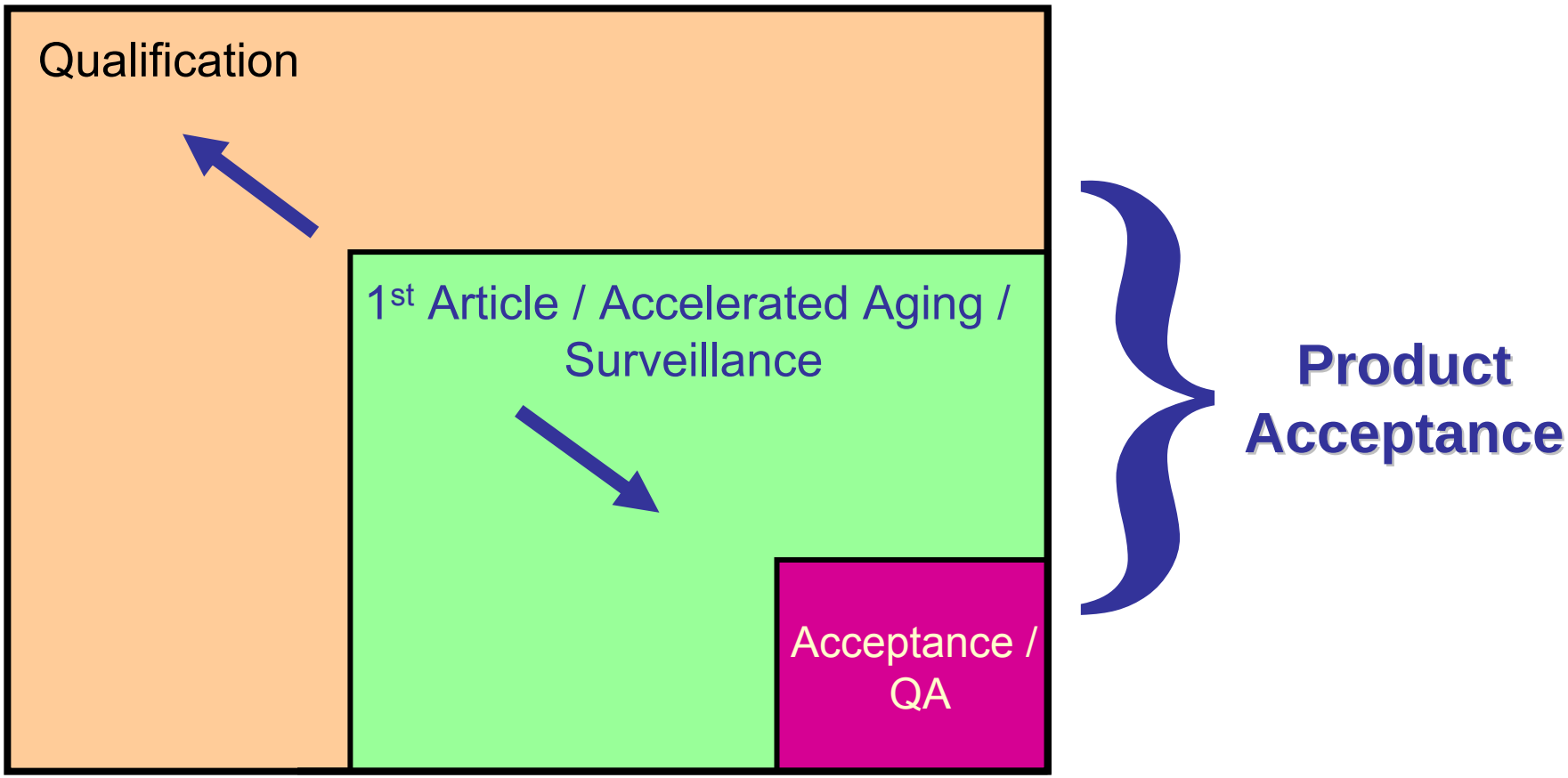
Verification / Validation

Verification / Validation

- ***Verification:*** Satisfies configuration baselines
  - Developmental test and evaluation
  - Usually performed by contractor with government observation

- ***Validation:*** Satisfies customer / operational user needs (i.e. capabilities)
  - Operational test and evaluation
  - Performed by customer or operational user

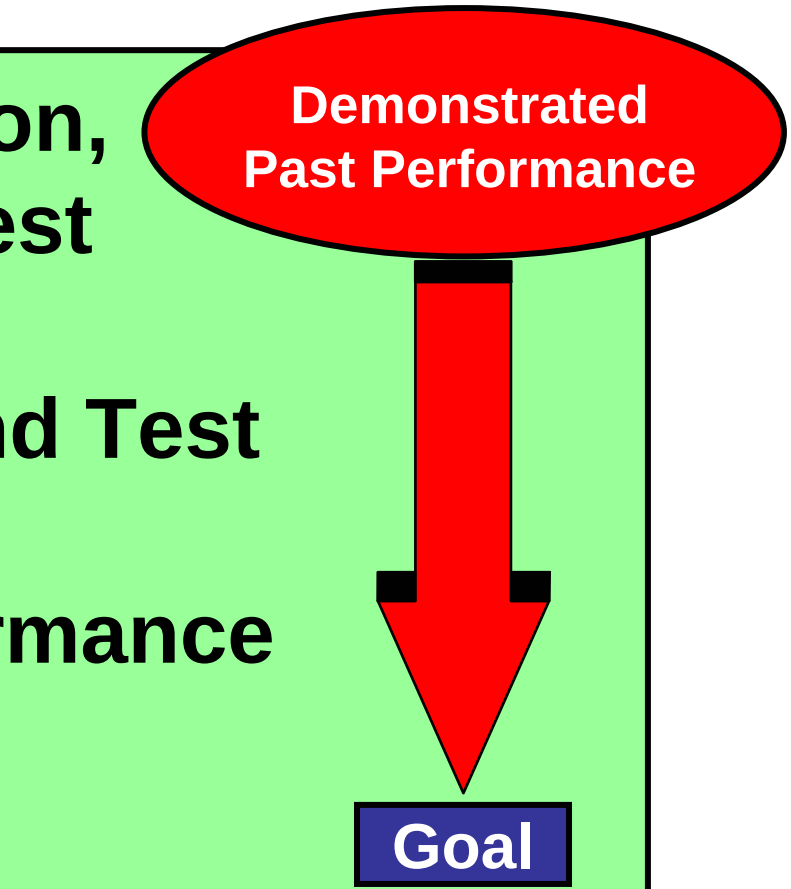
Verification



Verification

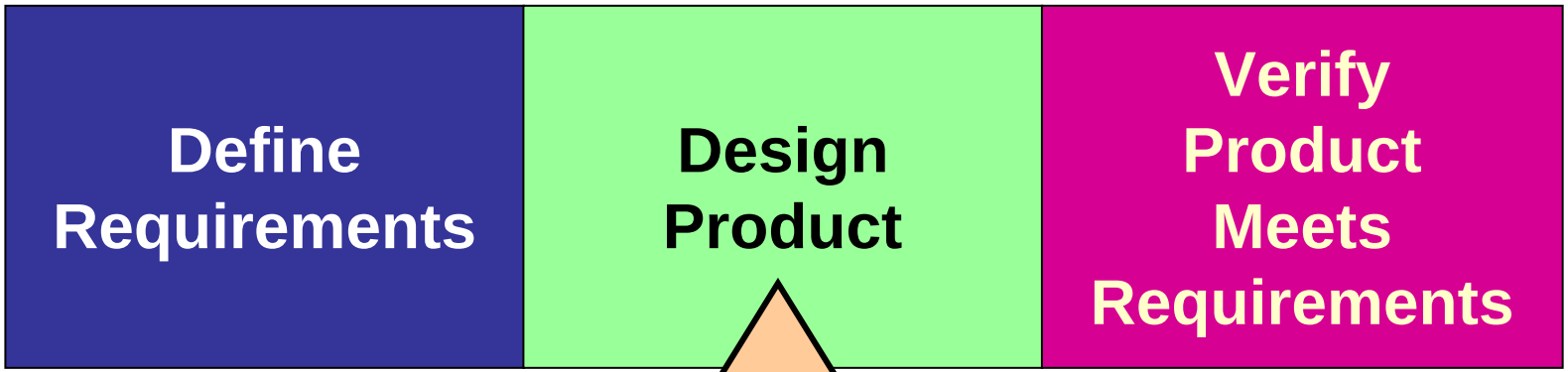
Accomplished By:

- Analysis, Examination, Demonstration, Test
- Model Simulation and Test
- Certificate of Conformance
- Not Required

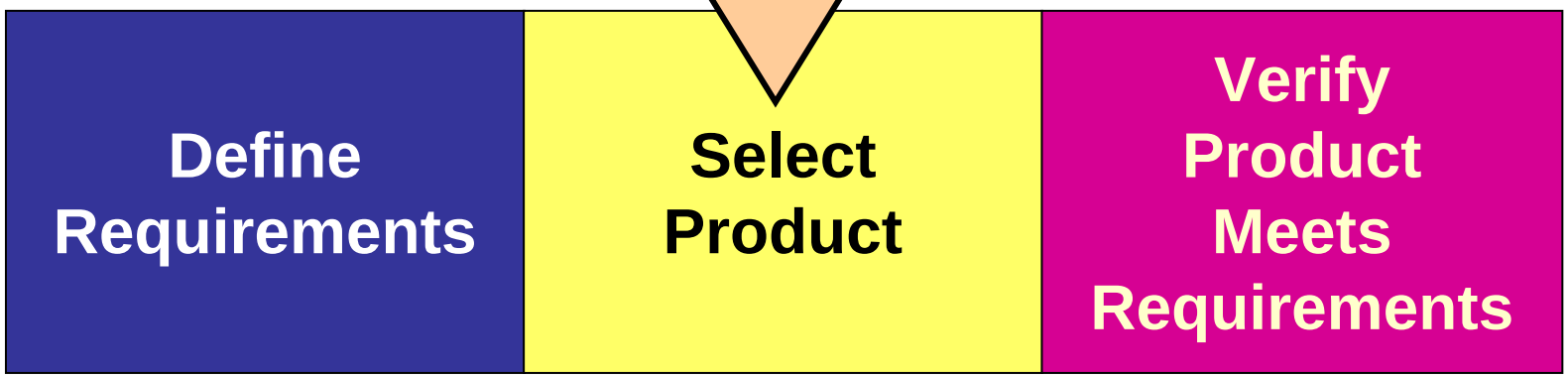


Verification

Gov't Development:

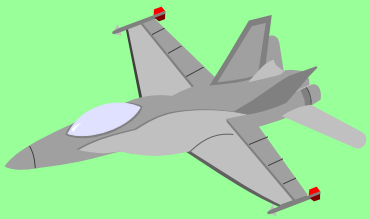


Commercial Buy:



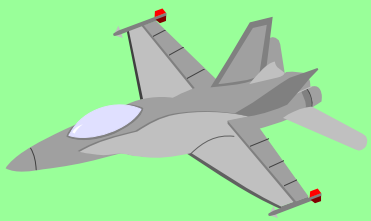
Verification - *CM Audits*

FCA (part of SVR)

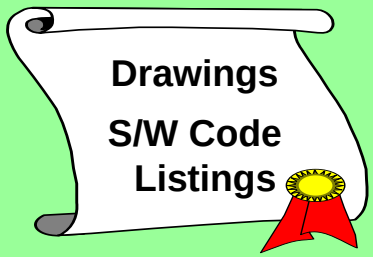


meets

PCA

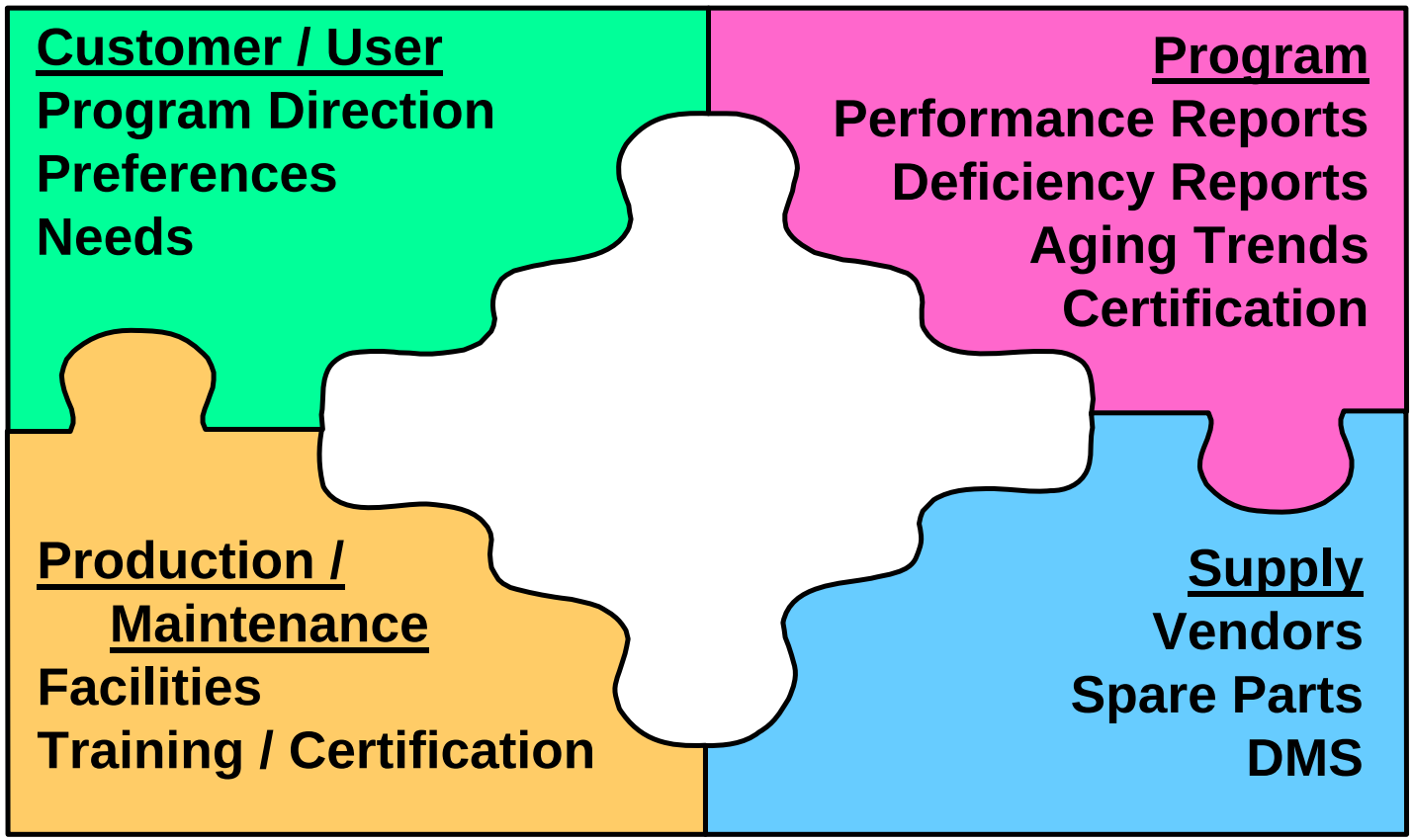


matches



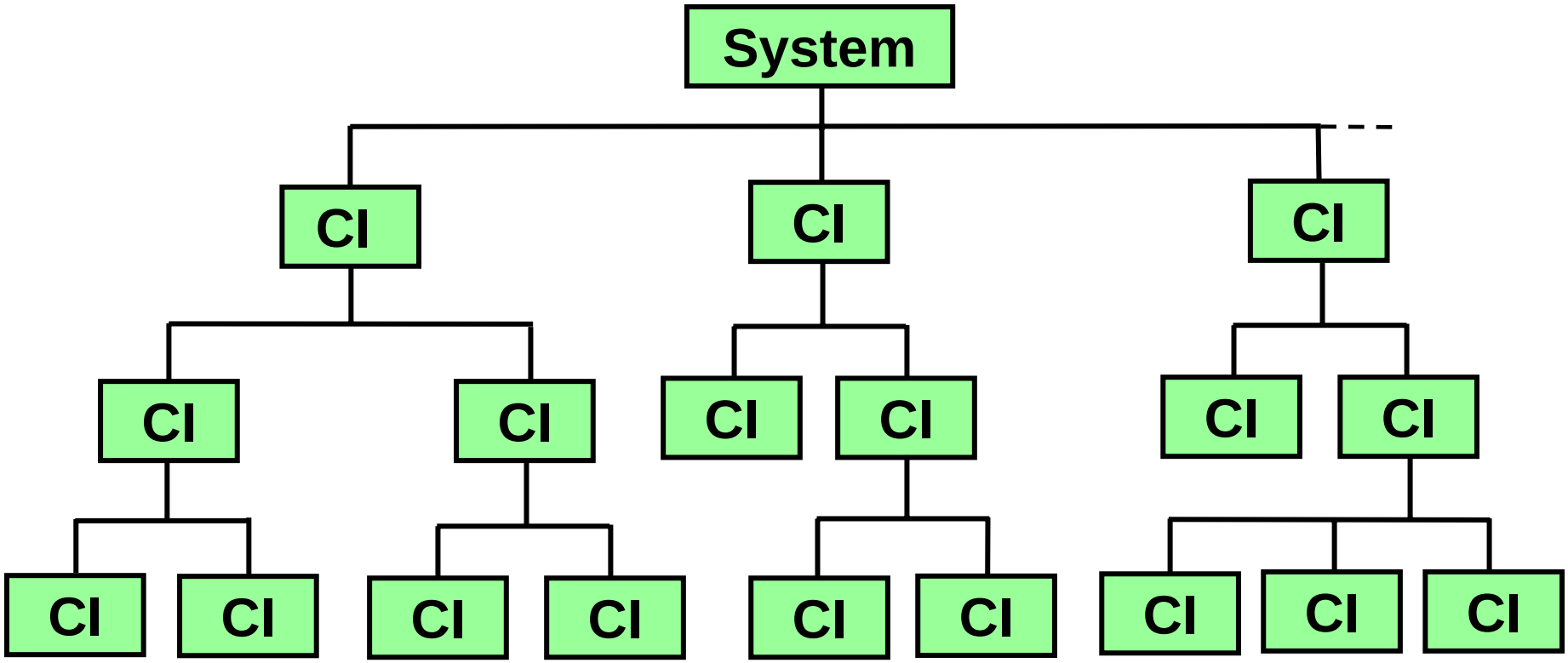
Decision Support Data

Decision Support Data

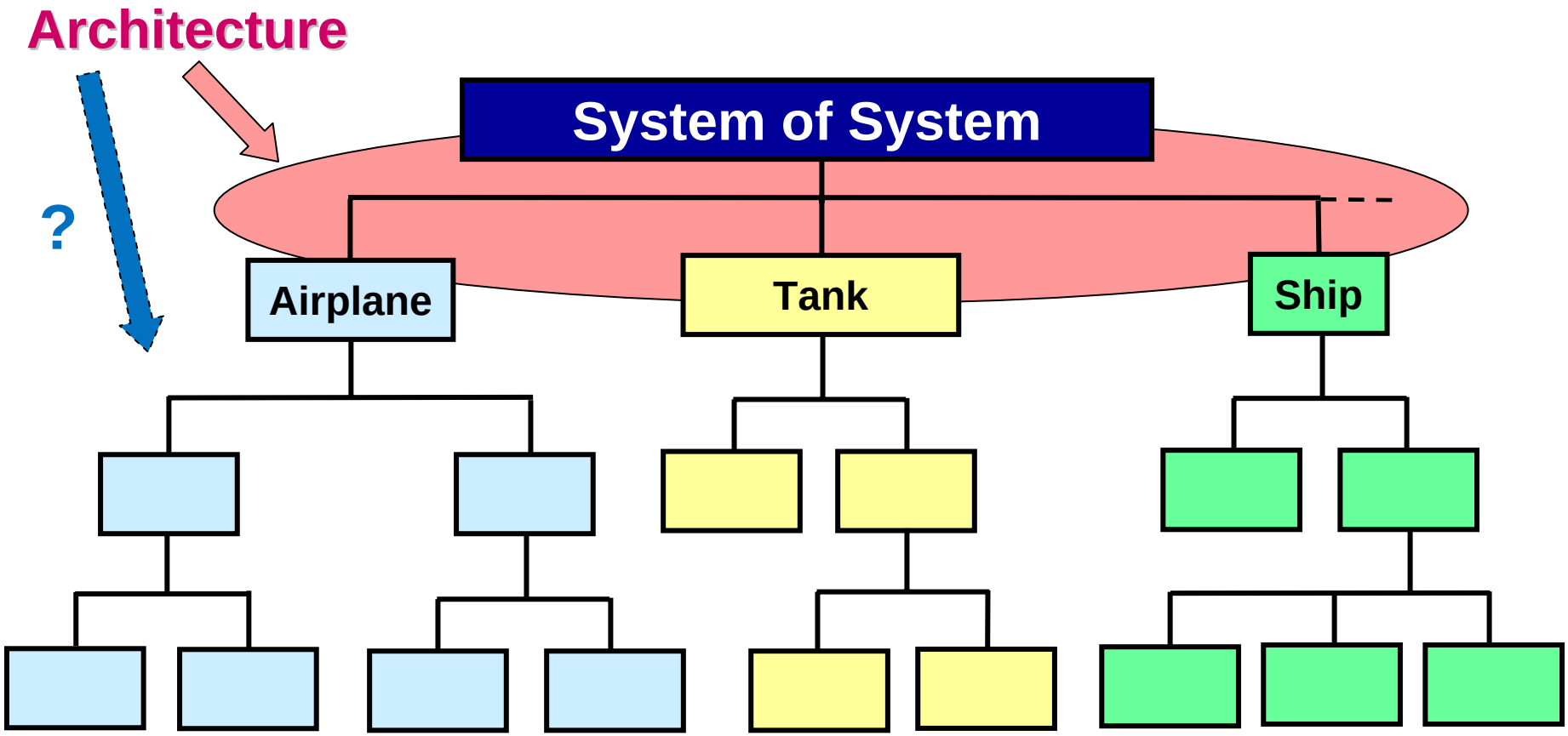


System of Systems

Traditional Specification Tree



Systems of Systems - Spec Tree



Systems of Systems

- **Challenges**
  - Assigning organizational responsibilities
    - Program manager
    - Lead technical authority
  - Applying the systems engineering process
    - System specification
    - Configuration control board (CCB)
    - Requirements allocation vs architectures
  - Developing domain knowledge and expertise
    - Enterprise level
    - Architectures

AFCSE

Questions ?