The Return of Discipline

From Operational Safety, Suitability and Effectiveness (OSS&E)
To
Systems Engineering Implementation at Air Force Materiel Command

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Overview

- OSS&E Policy History
- Policy Execution
- OSS&E Implementation Efforts
- Three "R"'s of Systems Engineering
- Way Forward

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OSS&E Policy History

- Series of aircraft mishaps/ incidents

- Loss of Discipline
  - Loss of Configuration Control
  - Incomplete or outdated Technical Data
  - Unqualified People or Organizations making modifications/changes
  - Unauthorized changes
  - Lack of or incomplete testing
  - Improper procedures/procedures not followed
  - Lack of interface controls
  - Improper integration

OSS&E Policy History

- AFMC Response
  - Discussed with CSAF / SecAF and Subsequent Direction
  - Established Policies for Preserving Operational Safety, Suitability & Effectiveness (OSS&E)
    - Published AFPD 63-12, AFI 63-1201 & AFMCI 63-1201
      - Preserve Established Baseline Characteristics Throughout Operational Life of a System or End-Item
      - Designate Responsibility and Authority
      - Use Disciplined Processes
      - Maintain Baselines Throughout Operational Life

Essentially…Systems Engineering +

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Policy Execution

Assure OSS&E … employ disciplined processes and effective procedures

OBJECTIVES

- Deliver systems/ end-items with OSS&E baseline
- Preserve the baseline over system life
- Update baseline when making modifications or changes

REQUIRED PROCESSES/PROCEDURES

- Disciplined systems management
- Disciplined systems engineering
  - ORM
  - Systems safety
  - Config mgmt
- Certifications
- Effective ops procedures
- Effective training
- Effective supply, inspection, and maintenance procedures
- Quality sources of supply, maintenance, and repair

Policy Execution

The policies require the preservation of operational safety, suitability, and effectiveness baseline characteristics of delivered systems and end-items over their operational life

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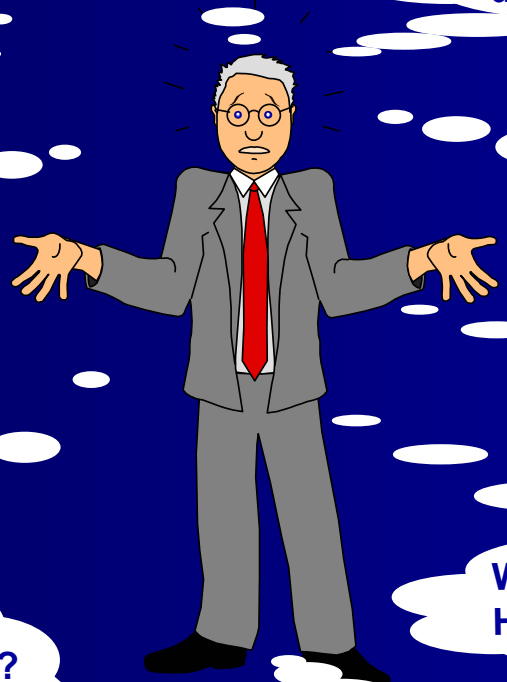
Became an "engineering" focus…and at times…an engineering *sustainment* focus

Single Manager/Chief Engineer must know the answers to the tough questions…



How is the threat changing?

What parts are going obsolete?

What are the Operational Requirements?

Who is making replacement decisions in my supply chain?

What are the certification requirements?

What is the fielded configuration of my system/end-item?

Who buys my Spares and what change authority has been delegated to them?

How is my system aging? How is it performing?

What T.O.s are fielded and are they current?

What modifications are being made? How do they impact my systems?

Who does my maintenance? What change authority has been delegated to them?

How many of what type is fielded (Serial # & Tail #)

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HQ AFMC OSS&E Implementation Levels

- Level 1 - Chief Engineer Assigned
- Level 2 - Configuration Control Processes Established
- Level 3 - Plan to Assure and Preserve OSS&E Documented
- Level 4 - OSS&E Baselines Developed and Coordinated with User
- Level 5 - OSS&E Assessment of Fielded Systems and/or End Items
- Level 6 - Full OSS&E Policy Compliance

Driving the wrong behavior…change is needed

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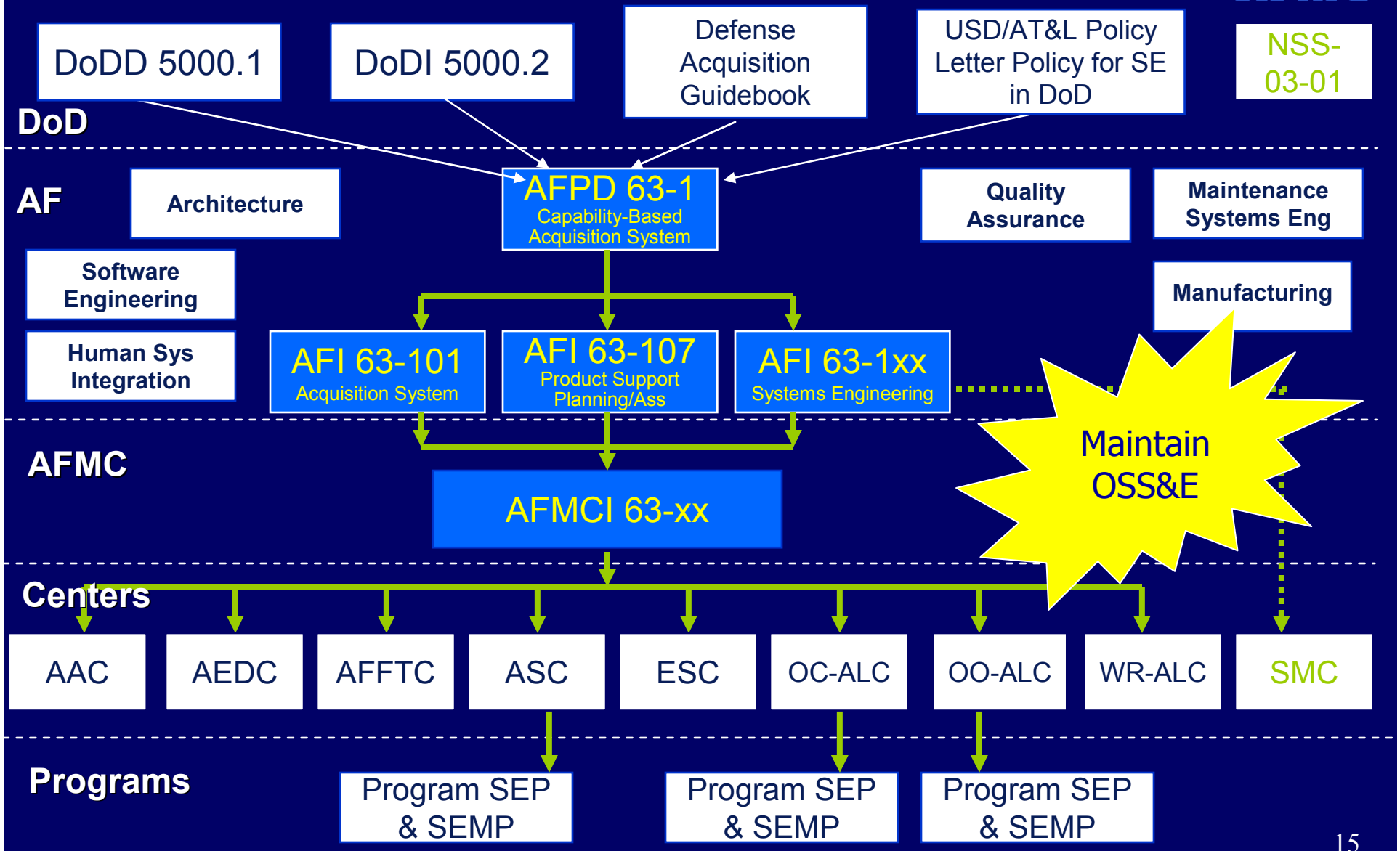
Three "R"'s of Systems Engineering

- Revitalize Processes/Policies
- Restore Technical Rigor
- Review Strategy

Revitalize Processes/Policies

Systems Engineering Policy-Vision



Restore Technical Rigor

- ✓ Development of technical integrity handbook/training
- ✓ Requirement for Systems Engineering Plan
- ✓ Publishing of key criteria for engineers
- Establishment of clear standards/metrics
- Alignment of SE and OSS&E

Review Strategy

- Establishment of clear standards/metrics
- Alignment of SE and OSS&E
  - SE AFI (The Role of Systems Engineering)
  - OSS&E (SE Process Assurance Standard)
  - Standardized Reporting
  - Training

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Integrated Approach

Top-level policy

SE AFI – *The Role Of System Engrg*

Core Elements
- Requirements
- Planning
- CM
- Risk/Safety
- Interop
- Sys Mgmt
- Ops Procs
- Quality Sources
- Software
-

APP
- Other elements

OSS&E
Assurance Standards

Standards
- Requirements
- Planning
- CM
- Risk/Safety
- Interop
- Sys Mgmt
- Ops Procs
- Quality Sources
- Software
- ~~RTOC~~
- Standards for OSS&E baselines & reporting

APP
- Stds for other elements

Standards for OSS&E

Update core elements based on SE AFI, Key elements…

Integrated Approach

SE AFI – *The Role Of System Engrg*

Core Elements
- **Requirements**
- **Planning**
- **CM**
- **Risk/Safety**
- **Interop**
- **Sys Mgmt**
- **Ops Procs**
- **Quality Sources**
- **Software**
-

OSS&E
Assurance Standards

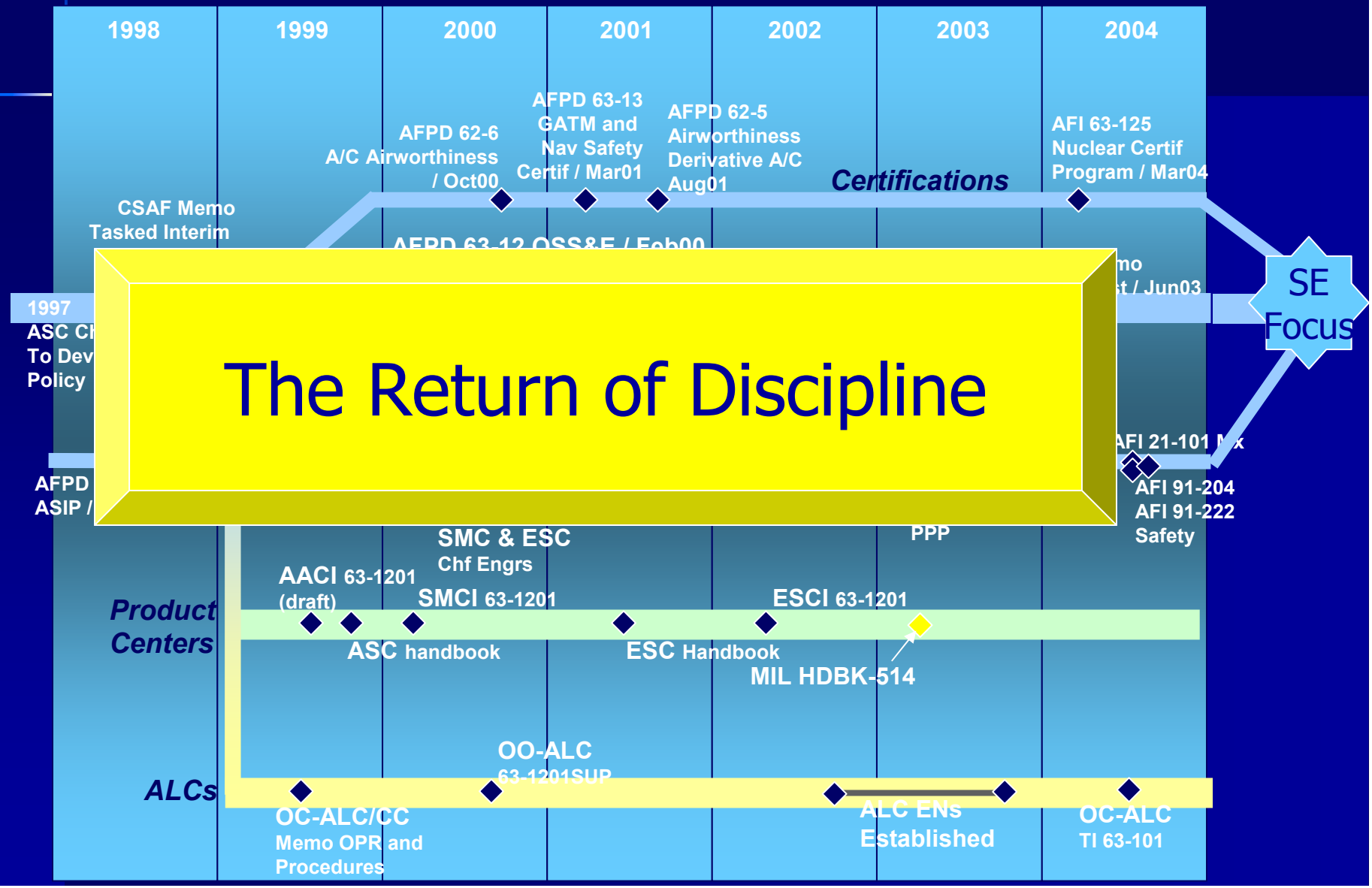
Standards
- **Requirements**
- **Planning**
- **CM**
- **Risk/Safety**
- **Interop**
- **Sys Mgmt**
- **Ops Procs**
- **Quality Sources**
- **Software**
- ~~**RTOC**~~
- **Standards for reporting OSS&E**

Training – *Systems Engineering & OSS&E*

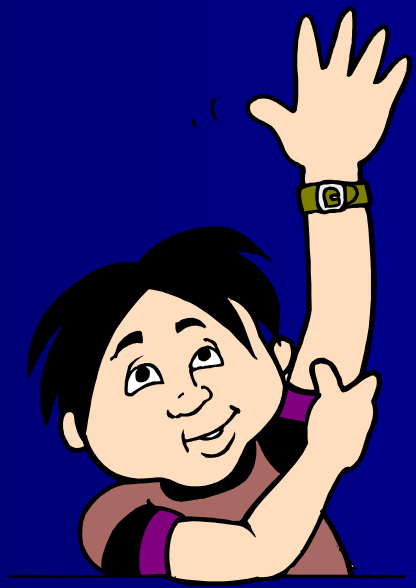
Core Elements
- **Requirements**
- **Planning**
- **CM**
- **Risk/Safety**
- **Interop**
- **Sys Mgmt**
- **Ops Procs**
- **Quality Sources**
- **Software**

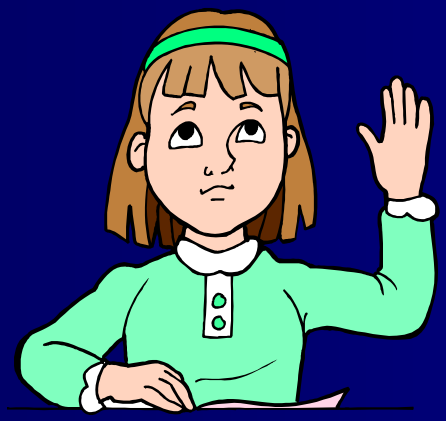
- **Standards for reporting OSS&E**

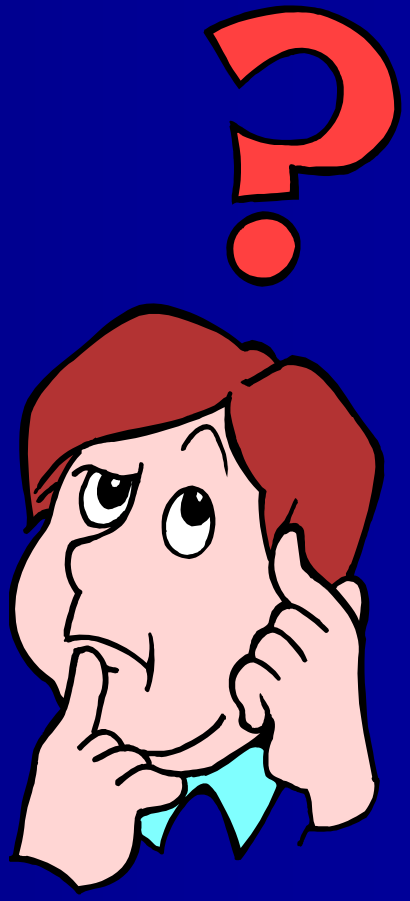
Where we're headed



Questions







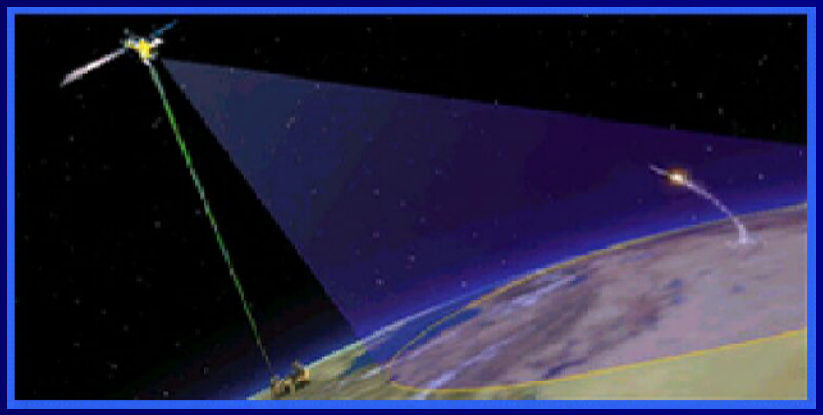
Back-ups

Safety

Operational Safety metrics:
- Air Worthiness Certification,
- Mishap Risk, Loss Rate...

With the operational life of weapon systems often extending 50-70 years, preservation of combat capability is essential. The policy aims to ensure the same low level of safety risk we boast at fielding is maintained across the operational life.

Suitability



Operational Suitability metrics:
Mission Capability Rate,
MTBF, MTBF, MTTR, …

The policy ensures that as the "systems of systems" architecture changes, the weapon system will remain equally suited to the task

Effectiveness

Operational Effectiveness metrics:
Range, Payload, Cargo Capability, …

It also ensures the effectiveness of the system as far as accuracy, endurance, etc., remains constant over the years. To accomplish these ends, clear responsibilities are established both for the single manager, AFMC and the using commands.