Acquisition Environment, Safety, and Occupational Health (ESOH) Lessons Learned from DoD Acquisition Systems Engineering Program Support Reviews (PSRs)

DoD Systems Engineering (SE) Forum

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for the Office of the Deputy Under Secretary of Defense

(Installations & Environment)

Overview

- Purpose of presentation
- Background - The Policy
- Traditional Oversight
- PSR Process
  - PSR policy
  - Notional PSR
  - Example Finding
- Acquisition ESOH Observations
- Path Forward

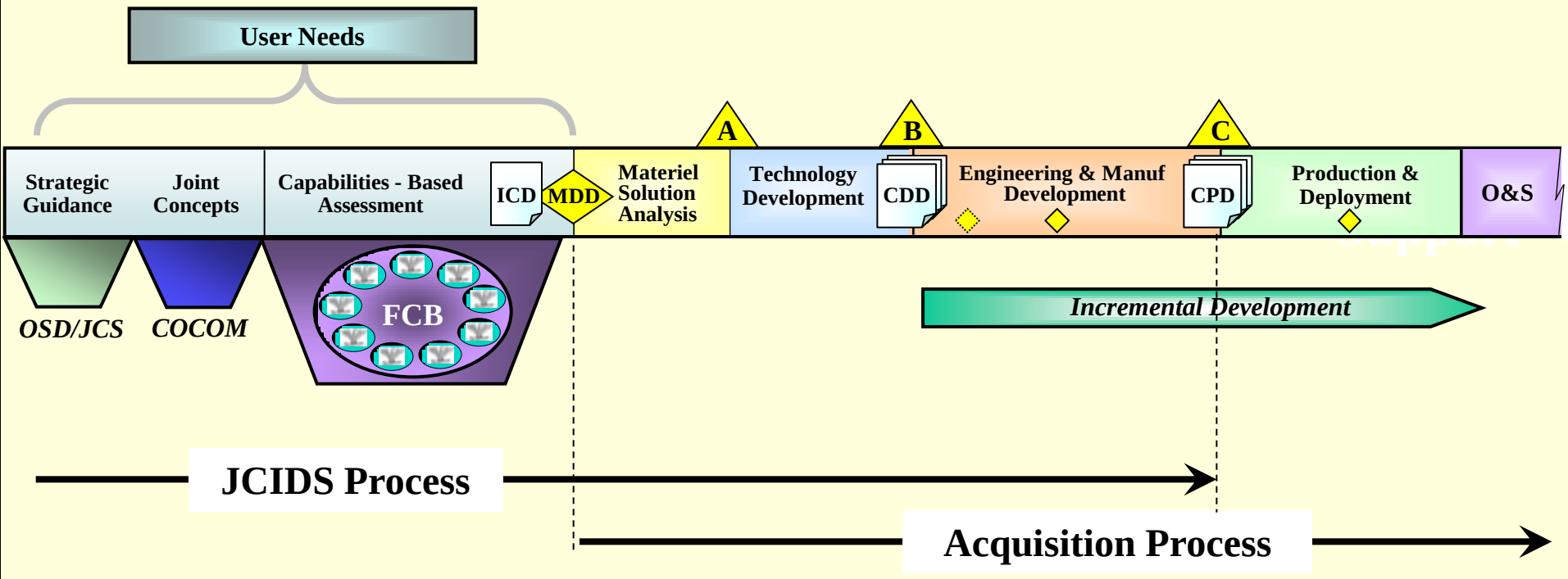
Purpose

- **This briefing provides an overview of the current efforts by the ODUSD(I&E) through the DoD Acquisition Environment, Safety, and Occupational Health (ESOH) Integrated Product Team (IPT) to**
  - Participate in Program Support Reviews (PSRs)
    - » Gauge policy compliance
    - » Assess policy effectiveness
    - » Provide Immediate guidance (improvements) to Programs, as needed

Acquisition ESOH Policy Vision

- **As part of sustaining its mission DoD is committed to avoiding**
  - loss of life or serious injury to personnel
  - damage to facilities or equipment
  - harm to the environment and the surrounding community
  - failure with adverse impact on mission capability, mission operability, or public opinion
- **To accomplish this in systems acquisition we must use the System Safety methodology across ESOH disciplines to identify hazards and mitigate risks through the systems engineering process**
  - ESOH refers to all individual, but interrelated, disciplines that encompass environment, safety, and occupational health

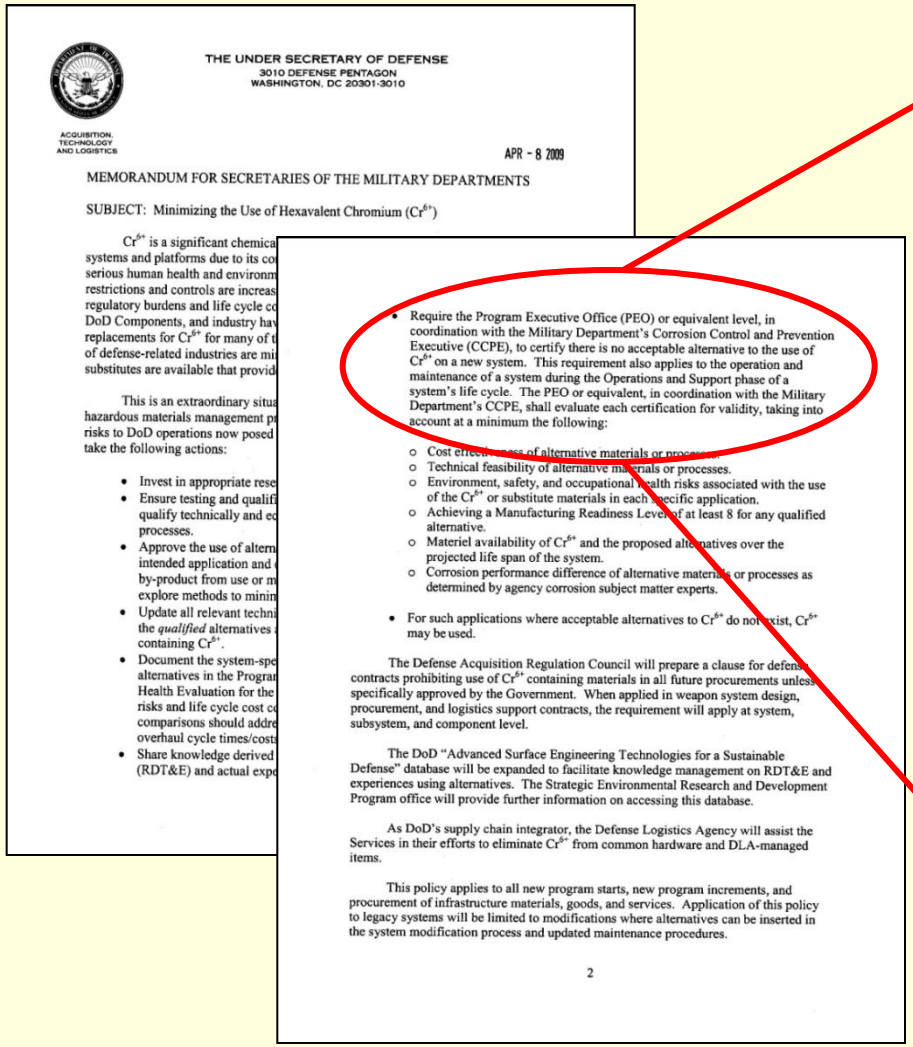
Defense Acquisition Management System



Policy (DoDI 5000.02, E12.6)

- **Use MIL-STD-882D, *DOD Standard Practice for System Safety*, in all developmental and sustaining engineering activities**
- **The PM must report the status of all High and Serious ESOH risks and applicable ESOH Technology Requirements for program reviews and fielding decisions**
- **Prior to exposing people, equipment, or the environment to a known system-related ESOH hazards,**
  - Risks must be accepted by the appropriate authority
  - User concurrence for High and Serious risks.

Policy Memo: Minimizing the Use of Hexavalent Chromium



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ACQUISITION, TECHNOLOGY AND LOGISTICS

APR - 8 2009

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Minimizing the Use of Hexavalent Chromium (Cr^{6+})

Cr^{6+} is a significant chemica
systems and platforms due to its co
serious human health and environm
restrictions and controls are increas
regulatory burdens and life cycle co
DoD Components, and industry hav
replacements for Cr^{6+} for many of t
of defense-related industries are mi
substitutes are available that provid

This is an extraordinary situa
hazardous materials management p
risks to DoD operations now posed
take the following actions:

- Invest in appropriate rese
- Ensure testing and qualif
qualify technically and ec
processes.
- Approve the use of altern
intended application and
by-product from use or m
explore methods to minim
- Update all relevant techni
the *qualified* alternatives
containing Cr^{6+}.
- Document the system-spe
alternatives in the Progra
Health Evaluation for the
risks and life cycle cost c
comparisons should addre
overhaul cycle times/cost
- Share knowledge derived
(RDT&E) and actual expe

- Require the Program Executive Office (PEO) or equivalent level, in coordination with the Military Department's Corrosion Control and Prevention Executive (CCPE), to certify there is no acceptable alternative to the use of Cr^{6+} on a new system. This requirement also applies to the operation and maintenance of a system during the Operations and Support phase of a system's life cycle. The PEO or equivalent, in coordination with the Military Department's CCPE, shall evaluate each certification for validity, taking into account at a minimum the following:
  - Cost effect[illegible] of alternative materials or proce
  - Technical feasibility of alternative materials or processes.
  - Environment, safety, and occupational health risks associated with the use of the Cr^{6+} or substitute materials in each specific application.
  - Achieving a Manufacturing Readiness Level of at least 8 for any qualified alternative.
  - Materiel availability of Cr^{6+} and the proposed alternatives over the projected life span of the system.
  - Corrosion performance difference of alternative materials or processes as determined by agency corrosion subject matter experts.
- For such applications where acceptable alternatives to Cr^{6+} do not exist, Cr^{6+} may be used.

The Defense Acquisition Regulation Council will prepare a clause for defense contracts prohibiting use of Cr^{6+} containing materials in all future procurements unless specifically approved by the Government. When applied in weapon system design, procurement, and logistics support contracts, the requirement will apply at system, subsystem, and component level.

The DoD "Advanced Surface Engineering Technologies for a Sustainable Defense" database will be expanded to facilitate knowledge management on RDT&E and experiences using alternatives. The Strategic Environmental Research and Development Program office will provide further information on accessing this database.

As DoD's supply chain integrator, the Defense Logistics Agency will assist the Services in their efforts to eliminate Cr^{6+} from common hardware and DLA-managed items.

This policy applies to all new program starts, new program increments, and procurement of infrastructure materials, goods, and services. Application of this policy to legacy systems will be limited to modifications where alternatives can be inserted in the system modification process and updated maintenance procedures.

2

"…the Program Executive Office (PEO) or equivalent level, in coordination with the Military Department's Corrosion Control and Prevention Executive (CCPE), to certify there is no acceptable alternative to the use of Cr6+ on a new system."

Document Reviews

- **Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE)**
  - Only required at Milestones B & C and for Full Rate Production Decision
- **Acquisition Strategy**
  - Summary of the PESHE is required

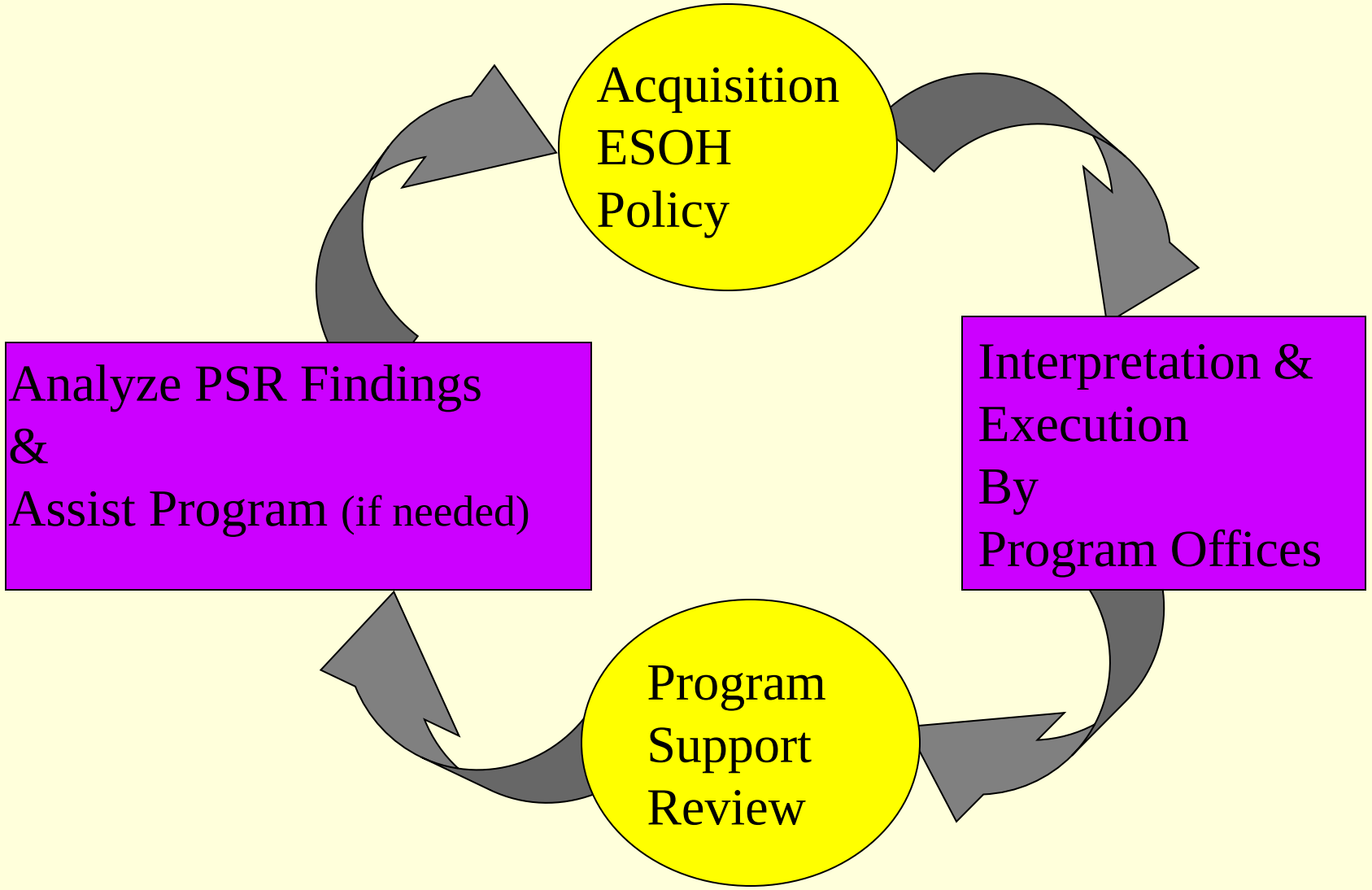
Weaknesses:

- **Limited effectiveness verification**
- **Limited ability to impact early decisions in the Systems Engineering (SE) process.**

PSRs Participation Provides Insight to Policy Implementation

- **Validate program compliance**
  - Determine accuracy of PESHE and fill in unknowns
- **Assess effectiveness of Acquisition ESOH policy and re-enforce reporting of High and Serious category ESOH risks and the status of compliance with ESOH technology requirements at program reviews.**
  - DDR&E prefers this approach
- **Work closely with program teams to provide ESOH guidance and direction**
  - Educates the work force
  - Establishes an “ESOH network”

A Continuous Improvement Approach



Program Support Reviews

- **ODDR&E leads Program Support Reviews (PSRs)**
  - Friendly audit of Program against OSD Policy
  - Examines multiple aspects of Program
- **ODUSD(I&E) is providing ESOH Subject Matter Experts and coordinating with DDR&E**
- **Utilizing body of knowledge from DoD Acquisition ESOH IPT**
  - ODUSD(I&E) leads ESOH SME team
  - Services provide Acquisition ESOH Principal's support to PSRs for which their service is the lead

ESOH in PSRs Guidance Documents

- **Defense Acquisition Guidebook (DAG)**
- **Defense Acquisition Program Support (DAPS) Methodology (Guide)**
  - Section 4.0, Technical Processes
    - » Sub-Area 4.1, Design Considerations
      - Factor 4.1.4, ESOH
      - Factor 4.1.7, Corrosion (Hexavalent Chromium)

Review Areas of PSRs DAPS Methodology

1. Mission Capabilities – Clarity and stability of CONOPS, mission requirements, and implication for system requirements / constraints, program structure and execution.
2. Resources – Budget sufficiency and phasing, staffing, system schedule, and assets available to meet program objectives.
3. Management – Acquisition strategy and planning, criteria, contracting, risk, tools, and techniques used to manage the program.
4. **Technical Processes – Design considerations, requirements development, technical baselines, engineering tools, software, design verification, and producibility and supportability planning for product development.**
5. Performance – Effectiveness and Suitability maturity and adequacy of product(s) and services being acquired (includes hardware, software, production considerations and logistics support).
6. Special Interest Areas – Request For Proposal, etc.

Program Support Review (Stoplight Summary)

Colors:

G: On Track, No/Minor Issues

Y: On Track, Significant Issues

R: Off Track, Major Issues

W: Not assessed

↑: Improvement from initial assessment

Initial assessment: Jan 20XX

Current assessment: Feb 20XY

Note: Roll-up is worst case

DAPS-level results

13 positive findings

16 neutral findings

30 negative findings

57 issues

35 risks

46 recommendations

Top-Level Program Risks (PSR team)

Risk: Cost Increase
Drivers:
- Resource Management Decision (RMD) 802 quantity reduction (C)
- Unknown sustainment strategy (C)
- *Business Case Analysis* (BCA) timeline impact to POM-XY (C)

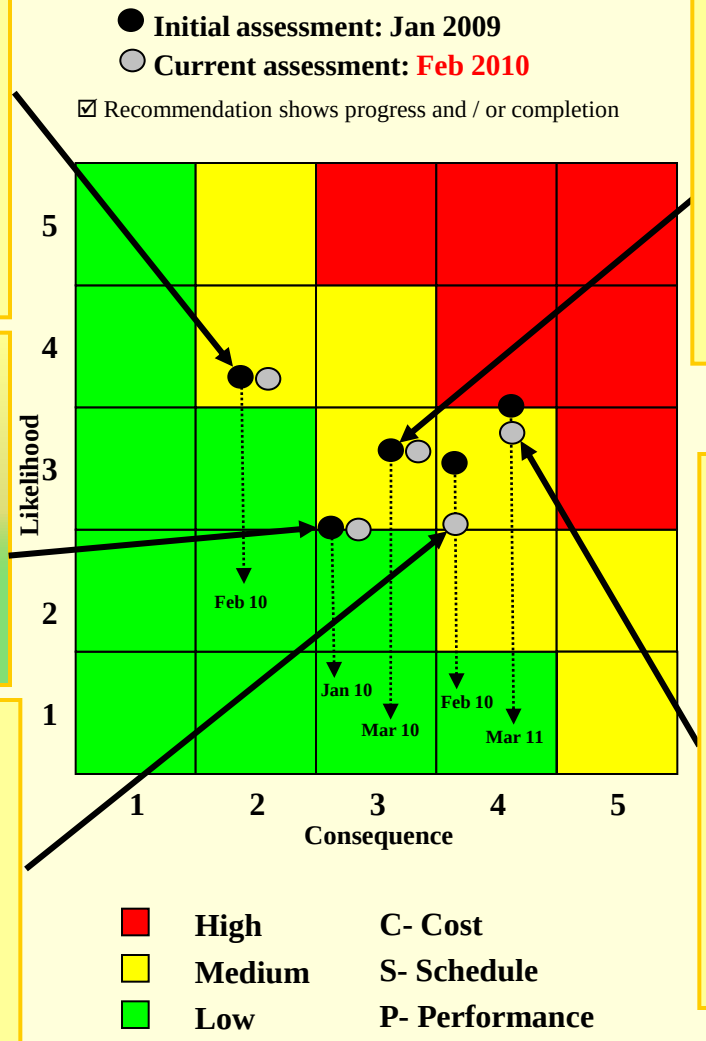
Recommendations:
❑MS budget for highest-cost sustainment alternative, expedite BCA analysis

Risk: Initial Operational Capability Schedule
Drivers:
- Early use of schedule reserve (S)
- Recent training delays (S)
- Limited Production Qualification Testing (PQT) assets (S)

Recommendations:
❑Program office perform schedule risk assessment

Risk: Program Manning
Drivers:
- MS authorization for staffing has not been approved by System Center (S, P)
- NA-1 Aircraft Product Directorate personnel turn-over / vacancies (S)
- Competition for qualified personnel (S)

Recommendations:
❑MS develop high-priority mitigation plan for manning and staffing



Risk: Transition Planning
Drivers:
- *Transition Support Plan* lacks details for adoption of MS processes and procedures
- Potential Concept of Employment (CONEMP) differences (C, S)

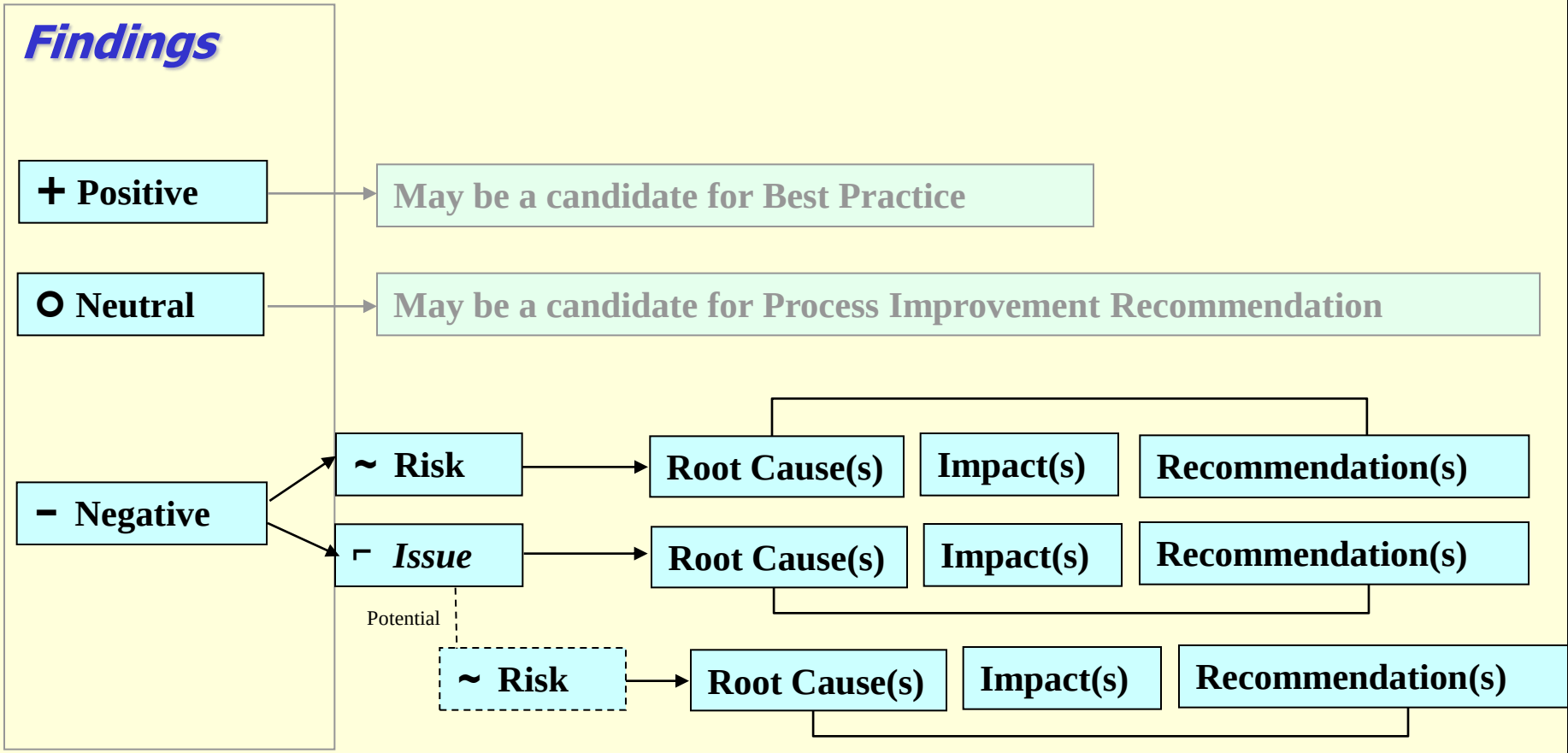
Recommendations:
❑MS get PCO on-board, conduct detailed review of contract, identify / implement changes
❑Program identify process differences and planning gaps in *Transition Support Plan*

Risk: Sustainment Planning
Drivers:
- Inadequate sustainment planning at program inception, RMD 802 forces re-evaluation (C,S)
  - BCA late-to-need for supportability decision
  - No visibility into repairs and FRACAS for components below line-replaceable-unit level
- Insufficient plan for design sustainment (C,P)
  - Lack of defined block-upgrade strategy
  - ESOH, PESHE and Corrosion plans are incomplete

Recommendations:
❑Program update technical documentation: SEP, AS, MOSA, PESHE, etc.
❑MS define block-upgrade strategy
☑MS monitor logistics data / spares, consider adding materiel availability (A_m) goal

+ Positive
o Neutral
– Negative
⌐ Issue
~ Risk

Taxonomy of Classifications



Note: When recording multiple negatives in a PSR report, ensure that each negative has clear linkage with its risk or issue, recommendation, root cause, and impact

+ Positive
o Neutral
– Negative
⌐ Issue
~ Risk

Program Support Review Definitions

Finding. An inquiry by the program support review team into a DAPS methodology area, sub-area, or factor. Findings can be either **known** or **unknown** by the PMO and characterized as…

+ Positive. Programmatic or technical effort that is above normal or expected effort, and which could lead to a strength and/or an institutionalized best practice.

o Neutral. Normal programmatic or technical effort. May be a candidate for process improvement.

– Negative. Programmatic or technical effort that is *lacking positive properties or may introduce variation*. (Generally stated in a broad manner, similar in nature to the statements of positive and neutral findings.) Consequent current or potential future problems are identified as issues or risks, with at least one issue or risk being identified for a negative finding. Multiple issues or risks may be associated with a negative finding.

- ⌐ Issue. Current problem that should be resourced and resolved.
- ~ Risk. A future uncertainty relating to achieving program technical performance goals within defined cost and schedule constraints. Risks are associated with negative findings or may be associated with issues.

+ Positive
o Neutral
– Negative
⌐ Issue
~ Risk

Program Support Review Definitions (continued)

Systemic Analysis:

- Root Cause. Analysis to determine the underlying reason for the negative finding and associated issue or risk. The root cause can be developed using 5 "whys" and should focus on addressing the problem and not the symptom. Three tiers of root cause characterizations are required:
  - Tier 1: Root Cause
    - Textual description aligns with DAPS; documented by PSR team
    - Perceived program root cause
  - Tier 2: Systemic Root Cause
    - Short descriptor (from pre-defined list); assigned by PSR team
    - Something within DoD scope to solve. Can be "Acquisition" or "acquisition"
  - Tier 3: Core Root Cause
    - Short descriptor (from pre-defined list); assigned by PSR team
    - Something outside the Department. Bigger than "Acquisition"
- First Order Impact. The programmatic or technical effect of issue(s) and/or risk(s). Viewed from the "first order" prior to performance, cost, or schedule changes.

❑ Recommendation. Advice or additional insight on how to resolve negative finding(s), and the associated issue(s), or mitigate risk(s).

Root Cause Analysis

Systemic Root Causes	Amplifying Description
1. Baseline Management	Baselines not stable or incomplete
2. Communication	Inadequate external information flow between government and contractor, or internal information flow at the IPT level
3. Competing priorities	Need vs. Schedule vs. Cost vs. Performance vs. Technical / Integration level of effort
4. Contract Structure and Execution	Deliverables/Data required not specified / Insufficient Contract Content and Structure
5. Management	Inadequate Planning / Oversight / EVM / Cost Accounting / Risk mgmt / Supplier mgmt / Accountability / Definition of Enterprise / Tools
6. Organization	Inappropriate/Not defined / Roles and responsibilities / Responsibility w/o Authority
7. Acquisition Practices	Poor Acquisition practices / Fundamentally flawed application of practices
8. Production	Flow / Capacity / Process Control / Process Capability / Quality
9. Program Realism	Unrealistic expectations / Risk acceptance/ Funding, Budget, and Schedule constraints and alignment / Inadequate Capital investment / Poor assumptions- COTS, TRL, etc
10. Requirements	Ambiguity / Stability / JCIDS / No SE in Requirements process / CONOPS incomplete
11. Staff	Qualifications / Skill Availability / Experience level / Continuity / Workload / Slots / Training
12. Technical	Poor SE / Requirements decomposition / V&V / Inadequate system Integration / Inadequate Modeling & Simulation / Logistics/Sustainment late to need in SDD/ Poor Life Cycle Planning
13. Trade Space / Constraints	Excessive Requirements / Insufficient Resources / Insufficient Stakeholder involvement
14. Other[1]	If “Other” provide description of desired Systemic Root Cause term
15. Unknown[2]	Unknown

Root Cause Analysis Cont.

Core Root Causes	Amplifying Description
1. Acq reform: Loss of Gov't capital investment	Inadequate resources (e.g., people, facilities, test assets)
2. Acq reform: Loss of MS A requirement	Programs entering late and with less maturity into acquisition system
3. Acq Reform: Transferred Authority	Gov't transferred too much authority to contractor / Gov't doesn't provide enough guidance to contractor
4. Budget POM process (PBBE)	Inadequate funding and/or phasing to support program
5. Culture	Govt. / Industry do not understand each other / have different motives
6. Enabling Infrastructure	Conditions / Constraints affecting programmatic and technical effort
7. External Influences	Program forced to make decisions about cost, schedule, and performance based on leadership/external influences
8. JCIDS process	Capabilities and/or Requirements not tangible, measurable, or reasonable
9. Human Resource Management	Pool of clearable skilled people; Gov't. / Industry lack qualified, cleared staff to support effort (e.g. software programmers); Rotations / continuity - loss of continuity and knowledge base
10. Business Practices	Govt. / Industry not following best practices / Not using published guides to facilitate program and technical management
11. Other[1]	Provide description of desired Core Root Cause term
12. Unknown[2]	Only select "Unknown" if a root cause cannot be determined

+ Positive
o Neutral
– Negative
⌐ Issue
~ Risk

Example – Notional Aircraft (NA-1)

4.1 Design Consideration

4.1.4.2 ESOH

- Findings
  - Current Programmatic Environment, Safety, and Occupational Health (ESOH) Evaluation (PESHE) document and the Federal Aviation Administration (FAA) Airworthiness Certification process do not fully address the unique safety issues of Military Operations of the NA-1
    - ⌐ The PESHE states once the FAA approves the NA-1, the aircraft will be safe for humans, but this does not fully cover ESOH risks. Additionally, an FAA airworthiness certification does not preclude the requirement to conduct ESOH analyses necessary to identify hazards and associated risks using MIL-STD-882D methodology.
    - ~ Potential for NA-1 Program Office (PO) to improperly identify and manage ESOH risks with potential result of exposing personnel, equipment, and the environment to unknown hazards.
    - ⌐ The PESHE does not address the risk of continued reliance on Halon fire suppression systems.
    - ~ Potential changes in FAA certification requirements or military operational risks may drive changes in the fire suppression systems.
- Systemic Analysis
  - Root Cause Details: Lack of substantiated ESOH hazard / risk data in the PESHE.
  - Systemic Root Cause: 5. Management
  - Core Root Cause: 10. Business Practices
- First Order Impact
  - Ineffective ESOH risk management resulting in the potential for exposing personnel, equipment, and the environment to unidentified hazards with potential cost and / or schedule implications.
- Recommendation
  - Program office revise the PESHE to address findings above.

PSR Participation

- Small Diameter Bomb II
- HC/MC-130
- C-27 Joint Cargo Aircraft (JCA)
- Joint Air Ground Missile (JAGM)
- Joint Air-to-Surface Standoff Missile Extended Range (JASSM-ER)
- F-35 Joint Strike Fighter (JSF)
- Global Hawk
- MQ-9 Reaper
- Mobile Landing Platform (MLP)

Common PSR ESOH Observations (Findings/Issues)

- ESOH risk data and technology requirements not in PESHE
- PESHE does not describe actual ESOH program implementation
- Program Office ‘System Safety’ and ‘ESOH’ efforts not integrated
- Lack of emphasis on implementing ESOH mitigations
- Failure to address USD (AT&L) hexavalent chrome policy

Path Forward

- **Continue to provide ESOH Subject matter experts to participate on PSRs**
- **Provide support to ESOH Practitioners supporting Programs**
- **Make improvements targeted at root cause(s) to address repetitive findings**
  - Policy or Guidance? Share Findings/Issues with DoD Acquisition IPT members
    - PESHE content improvements and/or PESHE timing …
    - Roles and responsibilities …
  - Training (i.e., CLE-009 update, etc.)

Questions?

As of: 26 Feb 09