New Acquisition Policy and Its Impact on Systems Engineering

NDIA 11th Annual Systems Engineering Conference

October 21, 2008

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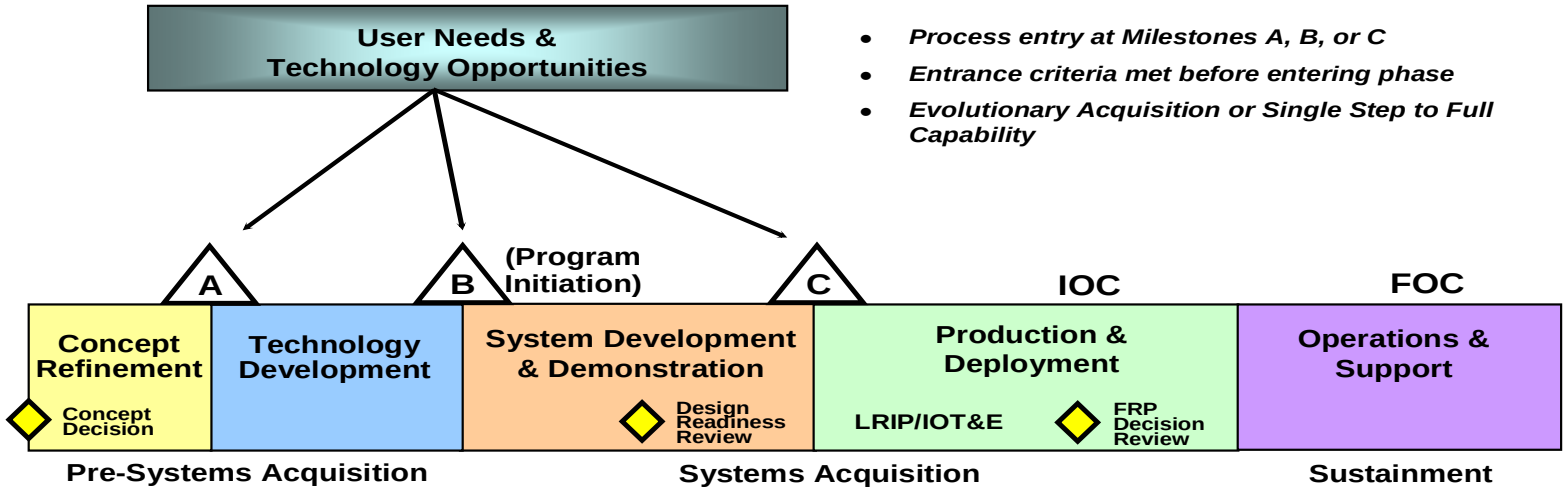
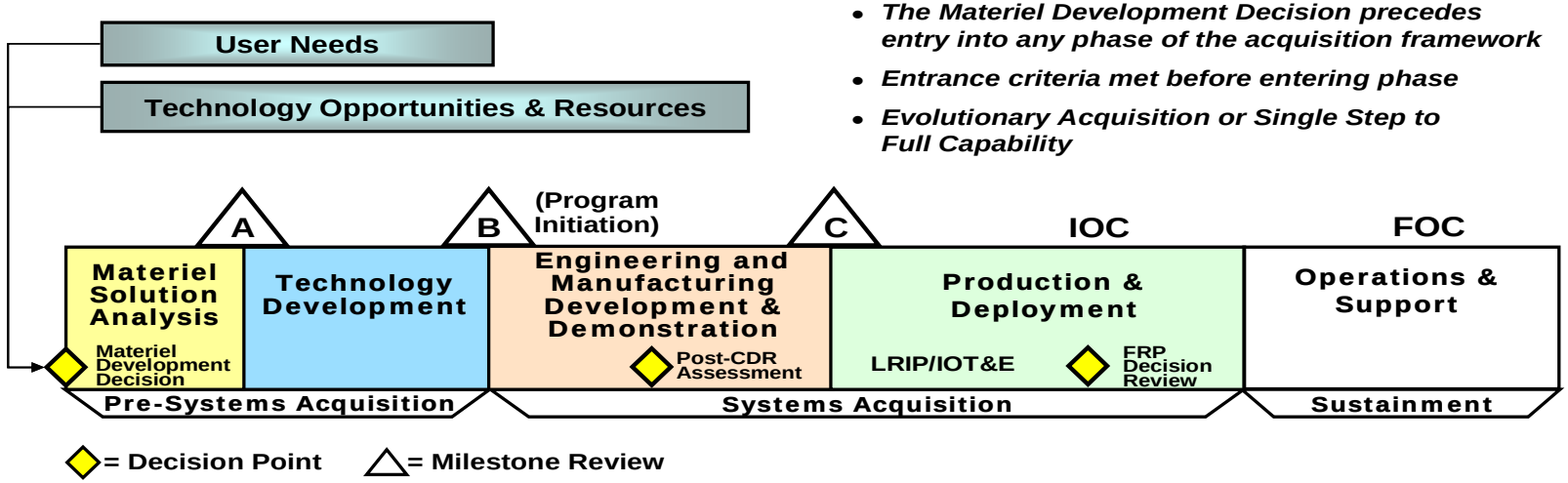
Subtle, But Substantial Changes

Old Life Cycle



- *Process entry at Milestones A, B, or C*
- *Entrance criteria met before entering phase*
- *Evolutionary Acquisition or Single Step to Full Capability*

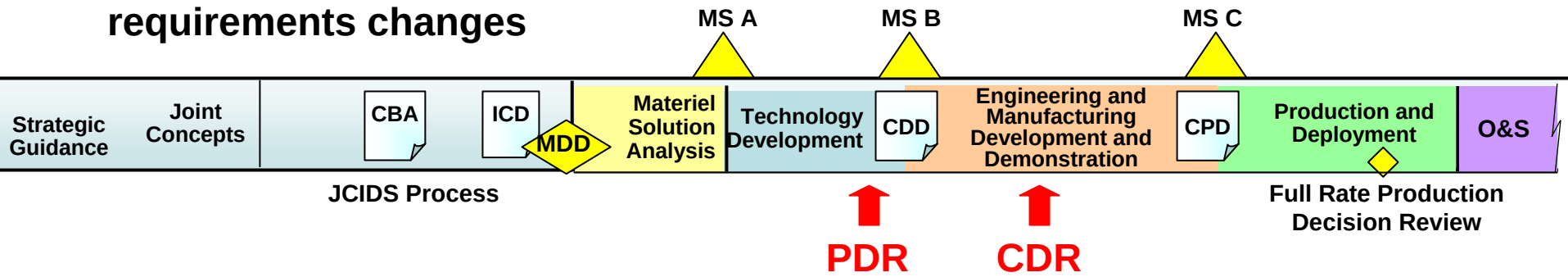
New Life Cycle



- *The Materiel Development Decision precedes entry into any phase of the acquisition framework*
- *Entrance criteria met before entering phase*
- *Evolutionary Acquisition or Single Step to Full Capability*

Overview of Draft Acquisition Policy Changes*

- Mandatory Materiel Development Decision (MDD)
- Mandatory competing prototypes before MS B
- Mandatory PDR and a report to the MDA before MS B (*moves MS B to the right*)
- Configuration Steering Boards at Component level to review all requirements changes

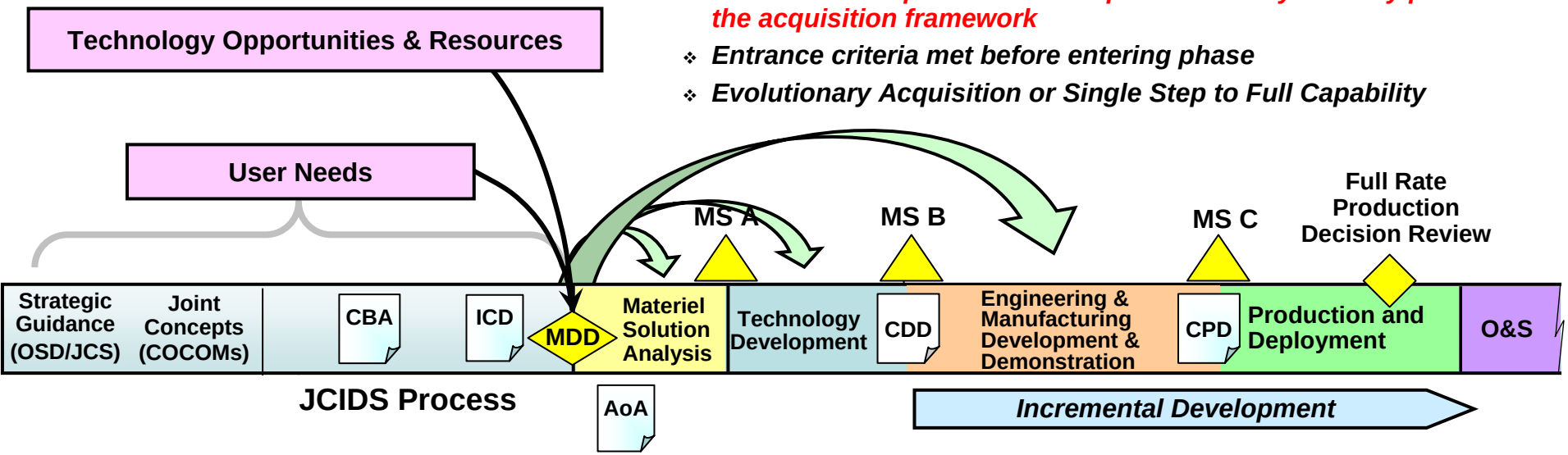


- Renewed emphasis on manufacturing during system development:
  - Re-titles SDD phase to EMDD with two sub phases: Integrated System Design and System Capability and Manufacturing Process Demonstration
  - Establishes consideration of manufacturing maturity at key decision points
- Mandatory system-level CDR with an initial product baseline and followed by a Post-CDR Report to the MDA
- Post-CDR Assessment by the MDA between EMDD sub phases

*Coordination Draft, DoDI 5000.02

Mandatory "Materiel Development Decision"

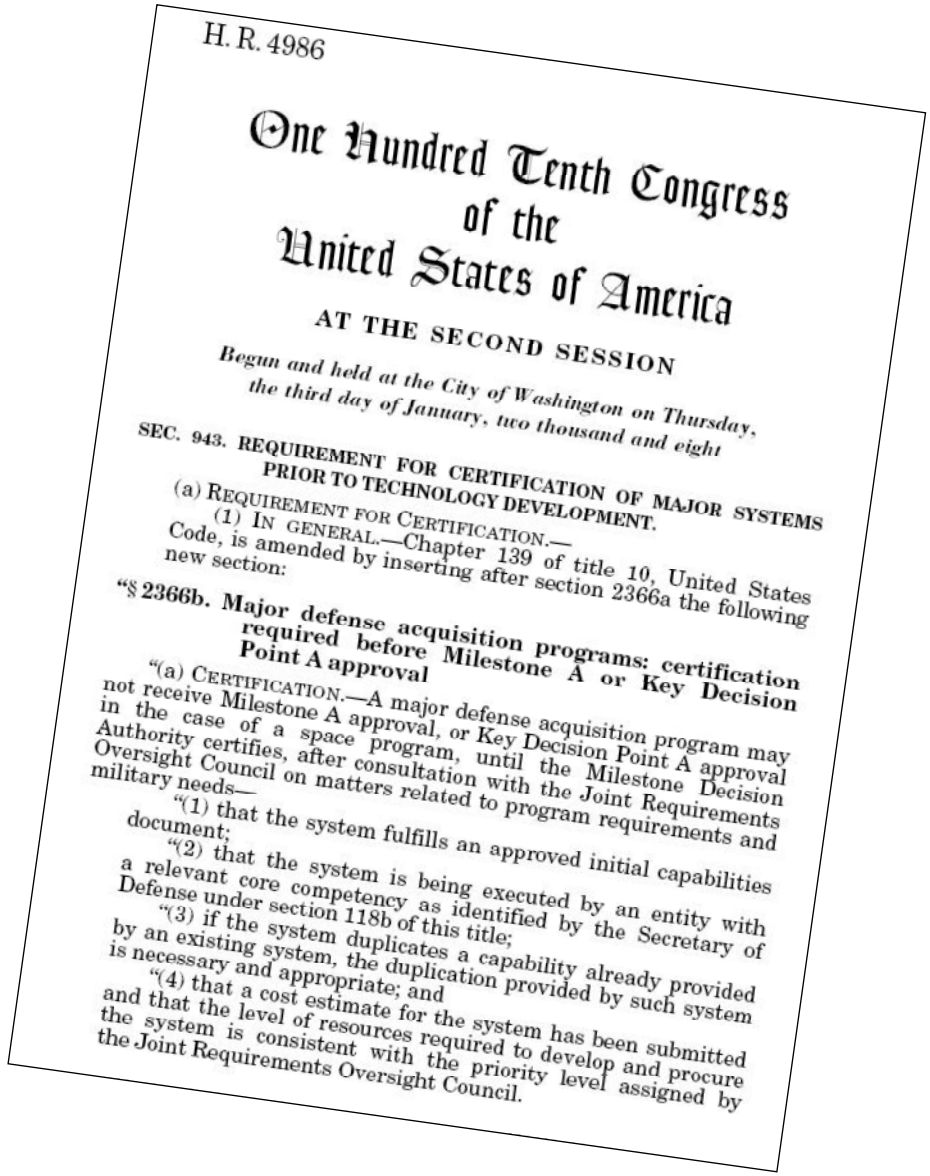
- ***Materiel Development Decision precedes entry into any phase of the acquisition framework***
- ***Entrance criteria met before entering phase***
- ***Evolutionary Acquisition or Single Step to Full Capability***



" When the ICD demonstrates the need for a materiel solution, the JROC will recommend that the MDA consider potential materiel solutions. The MDA, working with appropriate stakeholders, shall determine whether it is appropriate to proceed with a Materiel Development Decision. . . . If the MDA decides that additional analysis is required, a designated office shall prepare, and the MDA shall approve, study guidance to ensure that necessary information is available to support the decision. . . . The Materiel Solution Analysis Phase begins with the Materiel Development Decision (MDD) Review. The MDD Review is the formal entry point into the acquisition process and shall be mandatory for all programs. . . . At the MDD Review, the Joint Staff shall present the JROC recommendations and the DoD Component shall present the ICD including: the preliminary concept of operations, a description of the needed capability, the operational risk, and the basis for determining that non-materiel approaches will not sufficiently mitigate the capability gap. The Director, PA&E, shall propose study guidance for the AoA. . . . The MDA shall approve the AoA study guidance; determine the acquisition phase of entry; identify the initial review milestone; and designate the lead DoD Component(s). The MDA decisions shall be documented in an Acquisition Decision Memorandum (ADM)."

FY08 National Defense Authorization Act

- Mandates Milestone A approval prior to technology development for a major weapon system
- Requires MDA Certification prior to Milestone A for MDAPs
- Changed Milestone B Certification Requirements
- Mandates reporting and notification of program cost changes



H. R. 4986

One Hundred Tenth Congress
of the
United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Thursday, the third day of January, two thousand and eight

SEC. 943. REQUIREMENT FOR CERTIFICATION OF MAJOR SYSTEMS PRIOR TO TECHNOLOGY DEVELOPMENT.

(a) REQUIREMENT FOR CERTIFICATION.—

(1) IN GENERAL.—Chapter 139 of title 10, United States Code, is amended by inserting after section 2366a the following new section:

"§ 2366b. Major defense acquisition programs: certification required before Milestone A or Key Decision Point A approval

"(a) CERTIFICATION.—A major defense acquisition program may not receive Milestone A approval, or Key Decision Point A approval in the case of a space program, until the Milestone Decision Authority certifies, after consultation with the Joint Requirements Oversight Council on matters related to program requirements and military needs—

"(1) that the system fulfills an approved initial capabilities document;

"(2) that the system is being executed by an entity with a relevant core competency as identified by the Secretary of Defense under section 118b of this title;

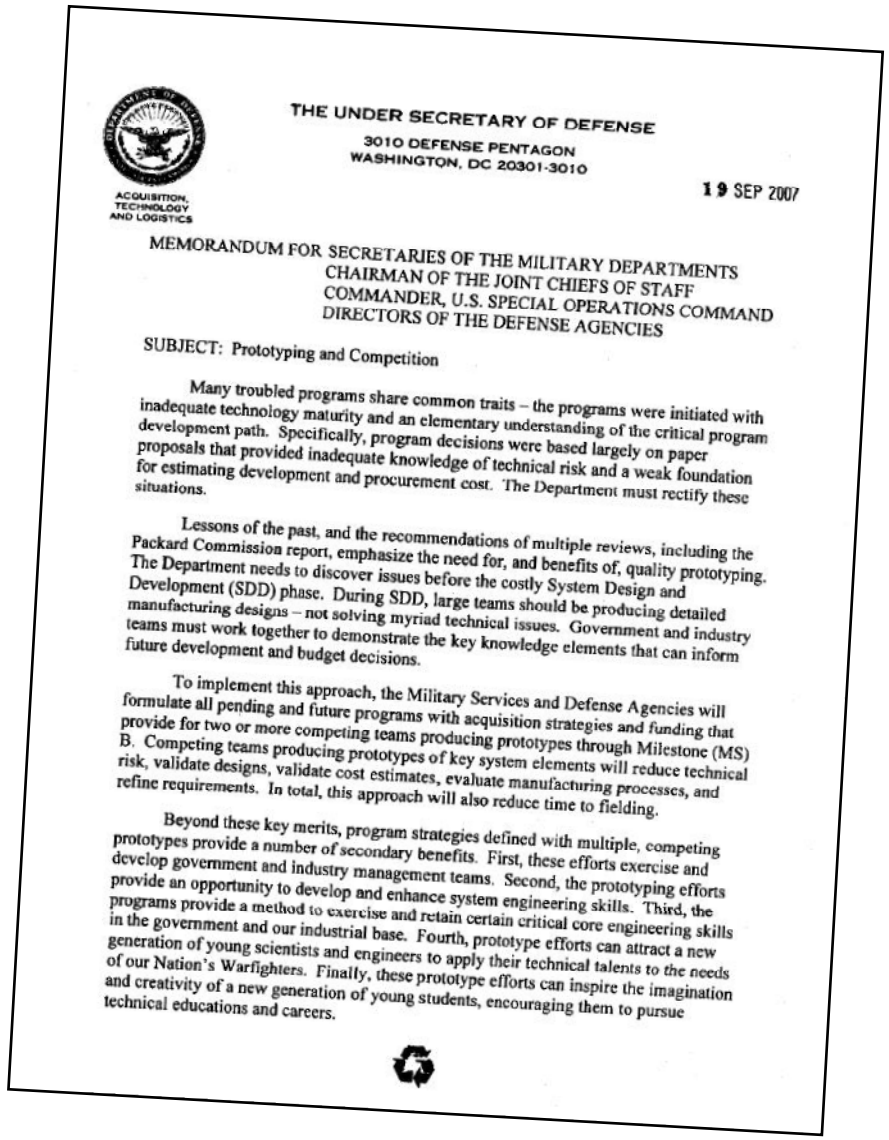
"(3) if the system duplicates a capability already provided by an existing system, the duplication provided by such system is necessary and appropriate; and

"(4) that a cost estimate for the system has been submitted and that the level of resources required to develop and procure the system is consistent with the priority level assigned by the Joint Requirements Oversight Council.

Prototyping and Competition

"Evolutionary acquisition requires . . . Technology development preceding initiation of an increment shall continue until the required level of maturity is achieved, prototypes of the system or key system elements are produced, and a preliminary design is completed. . . ."

"The TDS and associated funding shall provide for two or more competing teams producing prototypes of the system and/or key system elements prior to, or through, Milestone B."



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

19 SEP 2007

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
COMMANDER, U.S. SPECIAL OPERATIONS COMMAND
DIRECTORS OF THE DEFENSE AGENCIES

SUBJECT: Prototyping and Competition

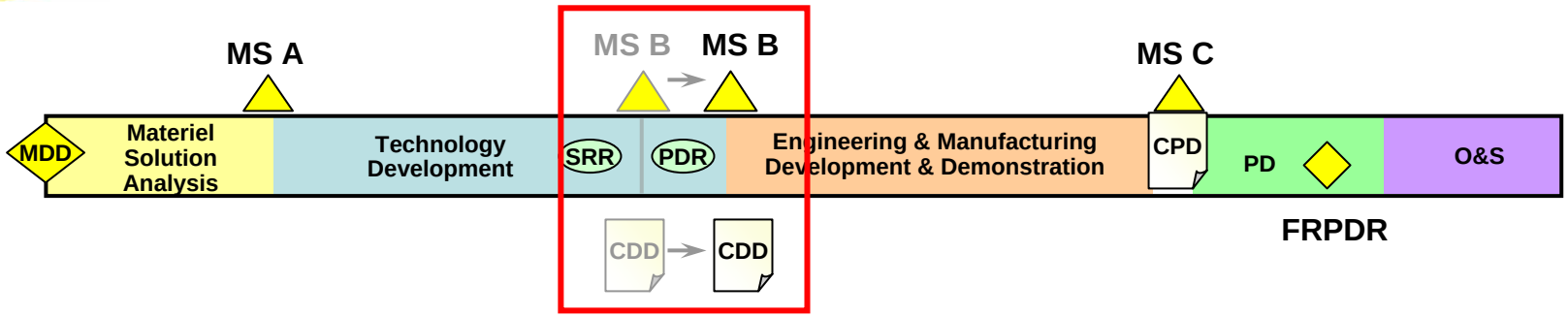
Many troubled programs share common traits – the programs were initiated with inadequate technology maturity and an elementary understanding of the critical program development path. Specifically, program decisions were based largely on paper proposals that provided inadequate knowledge of technical risk and a weak foundation for estimating development and procurement cost. The Department must rectify these situations.

Lessons of the past, and the recommendations of multiple reviews, including the Packard Commission report, emphasize the need for, and benefits of, quality prototyping. The Department needs to discover issues before the costly System Design and Development (SDD) phase. During SDD, large teams should be producing detailed manufacturing designs – not solving myriad technical issues. Government and industry teams must work together to demonstrate the key knowledge elements that can inform future development and budget decisions.

To implement this approach, the Military Services and Defense Agencies will formulate all pending and future programs with acquisition strategies and funding that provide for two or more competing teams producing prototypes through Milestone (MS) B. Competing teams producing prototypes of key system elements will reduce technical risk, validate designs, validate cost estimates, evaluate manufacturing processes, and refine requirements. In total, this approach will also reduce time to fielding.

Beyond these key merits, program strategies defined with multiple, competing prototypes provide a number of secondary benefits. First, these efforts exercise and develop government and industry management teams. Second, the prototyping efforts provide an opportunity to develop and enhance system engineering skills. Third, the programs provide a method to exercise and retain certain critical core engineering skills in the government and our industrial base. Fourth, prototype efforts can attract a new generation of young scientists and engineers to apply their technical talents to the needs of our Nation's Warfighters. Finally, these prototype efforts can inspire the imagination and creativity of a new generation of young students, encouraging them to pursue technical educations and careers.

Preliminary Design Review Precedes MS B



CHARACTERISTICS	MS B moved "to the right" to allow contractor preliminary design to inform requirements, estimated costs, and schedule.
PROCESS	Technology Development extended through formal Preliminary Design Review (PDR). Preliminary design based on DRAFT CDD to facilitate trades before JROC approval. Competitive environment sustained up to and perhaps through MS B. MDA conducts MS B review as described in current policy.
SUPPORTING INFORMATION	PDR Report from PM. Current statutory and regulatory information

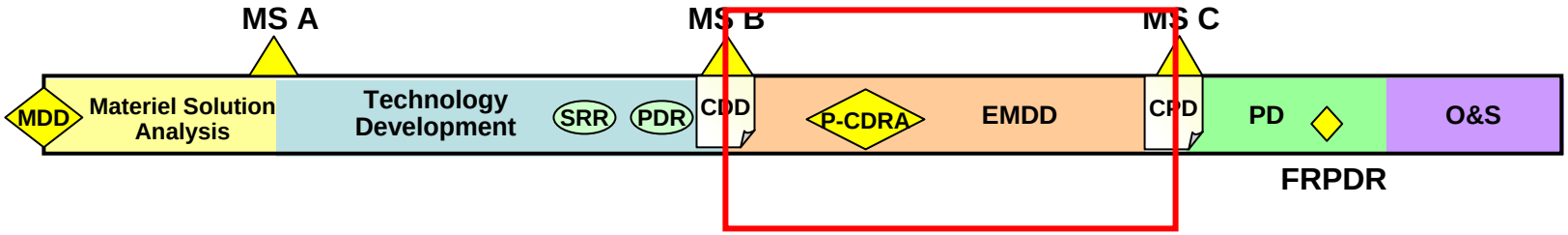
BENEFITS

- Ties program decision to event-based (product-based) technical review
- Most derived requirements surfaced
- Better understanding of cost, schedule, and performance risk when the APB is approved and SAR reporting begins
- Opportunity for MDA to defer (in coordination with requirements authority) unachievable requirements to next increment
- Final requirements informed by detailed design
- Early indicator of manufacturing and production issues
- Logical extension of prototyping and competition policy

Preliminary Design Review

§ 3.5.11. A Preliminary Design Review (PDR) shall be conducted for the candidate design(s) to establish the allocated baseline (hardware, software, human/support systems) and underlying architectures and to define a high-confidence design. All system elements (hardware and software) shall be at a level of maturity commensurate with the PDR entrance and exit criteria. A successful PDR will inform requirements trades; improve cost estimation; and identify remaining design, integration, and manufacturing risks. The PDR shall be conducted at the system level and include user representatives and associated certification authorities. The PDR Report shall be provided to the MDA at Milestone B and include recommended requirements trades based upon an assessment of cost, schedule, and performance risk.

Re-Titled Engineering and Manufacturing Development and Demonstration Phase

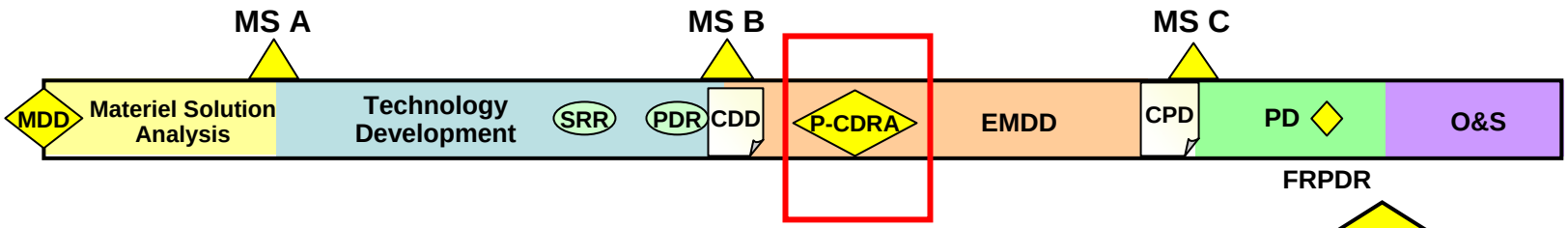


"The purpose of the EMDD phase is to develop a system or an increment of capability; complete full system integration (technology risk reduction occurs during Technology Development); develop an affordable and executable manufacturing process; ensure operational supportability with particular attention to minimizing the logistics footprint; implement human systems integration (HSI); design for producibility; ensure affordability; protect CPI by implementing appropriate techniques such as anti-tamper; and demonstrate system integration, interoperability, safety, and utility. The CDD, Acquisition Strategy, Systems Engineering Plan (SEP), and Test and Evaluation Master Plan (TEMP) shall guide this effort."

"Integrated System Design. This effort is intended to define system and system-of-systems functionality and interfaces, complete hardware and software detailed design, and reduce system-level risk. Integrated System Design shall include the establishment of the product baselines for all configuration items."

"System Capability and Manufacturing Process Demonstration. This effort is intended to demonstrate the ability of the system to operate in a useful way consistent with the approved KPPs and that system production can be supported by demonstrated manufacturing processes. The program shall enter System Capability and Manufacturing Process Demonstration upon completion of the Post-CDR Assessment and establishment of an initial product baseline. This effort shall end when the system meets approved requirements and is demonstrated in its intended environment using the selected production-representative article; manufacturing processes have been effectively demonstrated; industrial capabilities are reasonably available; and the system meets or exceeds exit criteria and Milestone C entrance requirements."

MDA Conducts Post-CDR Assessment



Post-Critical Design Review Assessment

CHARACTERISTICS	Post-CDR Assessment replaces Design Readiness Review.
PROCESS	Post-CDR Assessment is a formal, Milestone Decision Authority (MDA)-conducted decision event. PM describes product baseline, completed build-to packages, a summary of issues and an assessment of program risk based on the CDR report and summarized EVM data. Review considers whether, based on the Program Manager's report, the program is able to provide capability consistent with the Acquisition Program Baseline approved at Milestone B. The MDA determines whether (1) an adjustment should be made, or (2) the program should be permitted to proceed without change.
SUPPORTING INFORMATION	System-Level CDR Report

BENEFITS

- Capitalizes on a well-defined, event-based, technical review
- Decisions based on enhanced knowledge of program and associated contract, all derived requirements surfaced, design uncertainties resolved, development and production costs well defined
- Opportunity for MDA to assess design maturity, e.g., drawings complete
- May provide opportunity to update "current" baseline if consistent with statute ("re-structure")
- An opportunity to defer "derived" requirements if inconsistent with cost / schedule thresholds

Post-CDR Assessment

§3.6.4.2. Post-Critical Design Review (CDR) Assessment. The MDA shall conduct a formal program assessment following system-level CDR. The system-level CDR, which shall be conducted as soon as practicable after program initiation, provides an opportunity to assess design maturity as evidenced by measures such as: successful completion of subsystem CDRs; the percentage of hardware and software product build-to specifications and drawings completed and under configuration management; planned corrective actions to hardware/software deficiencies; adequate developmental testing; an assessment of environment, safety and occupational health risks; a completed failure modes and effects analysis; the identification of key system characteristics, manufacturing feasibility, and critical manufacturing processes; an estimate of system reliability based on demonstrated reliability rates; etc.

Post-CDR Report

§ 3.6.4.2.1. The PM shall provide a Post-CDR Report to the MDA that provides an overall assessment of design maturity and a summary of the system-level CDR results which shall include, but not be limited to:

§ 3.6.4.2.1.1. The names, organizations, and areas of expertise of independent subject matter expert participants and CDR chair;
§ 3.6.4.2.1.2. A description of the product baseline for the system and the percentage of build-to packages completed for this baseline;
§ 3.6.4.2.1.3. A summary of the issues and actions identified at the review together with their closure plans;
§ 3.6.4.2.1.4. An assessment of risk by the participants against the exit criteria for the EMDD Phase; and
§ 3.6.4.2.1.5. Identification of those issues/risks that could result in a breach to the program baseline or substantively impact cost, schedule, or performance.

§ 3.6.4.2.2. The MDA shall review the Post-CDR Report and the PM's resolution/mitigation plans and determine whether additional action is necessary to satisfy EMDD Phase exit criteria and to achieve the program outcomes specified in the APB. The results of the MDA's Post-CDR Assessment shall be documented in an ADM.

Codifies OSD SE Role in Program Oversight

§ 3.9.6. Program Support Reviews (PSR). PSRs are a means to inform an MDA and Program Office of the status of technical planning and management processes by identifying cost, schedule, and performance risk and recommendations to mitigate those risks. PSRs shall be conducted by cross-functional and cross-organizational teams appropriate to the program and situation. PSRs for ACAT ID and IAM programs shall be planned by the Director, Systems and Software Engineering to support OIPT program reviews, at other times as directed by the USD (AT&L), and in response to requests from PMs.

Enclosure 5. § E5.7.2. The DUSD(A&T) shall conduct an independent Assessment of Operational Test Readiness (AOTR) for all ACAT ID programs and special interest programs designated by the USD(AT&L). Each AOTR shall consider the risks associated with the system's ability to meet operational suitability and effectiveness goals. This assessment shall be based on capabilities demonstrated in DT&E, and OAs, and criteria described in the TEMP. The AOTR report shall be provided to the USD(AT&L), D,OT&E, and Component Acquisition Executive (CAE).

§ E5.7.3. The CAE shall consider the results of the AOTR prior to making a determination of materiel system readiness for IOT&E.

New Systems Engineering Enclosure

- Codifies three previous SE policy memoranda
- Codifies a number of SE-related policies and Statutes since 2003:
  - Environment, Safety, and Occupational Health
  - Corrosion Prevention and Control
  - Modular Open Systems Approach
  - Data Management and Technical Data Rights
  - Item Unique Identification
  - Reliability, Availability, and Maintainability
- Introduces new policy on Configuration Management

Enclosure 12. Systems Engineering

E12.1. Systems Engineering Across the Acquisition Lifecycle.

E12.2. Systems Engineering Plan (SEP).

E12.2.1. PMs shall prepare a SEP for each milestone review, beginning with Milestone A. At Milestone A, the SEP shall support the TDS; at Milestone B or later, the SEP shall support the Acquisition Strategy.

E12.2.2. The DUSD (A&T) shall be the SEP approval authority for programs that will be reviewed by the DAB/ITAB.

E12.3. Systems Engineering Leadership. Each PEO, or equivalent, shall have a lead or chief systems engineer on his or her staff responsible to the PEO for systems engineering across the PEO's portfolio of programs. … and shall:

E12.3.1. Review assigned programs' SEPs and oversee their implementation.

E12.3.2. Assess performance of subordinate lead or chief system engineers ...

E12.4. Technical Reviews. Technical reviews shall be event driven, conducted when documented entrance criteria are met, and include participation by subject matter experts who are independent of the program.

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New SE Policy in *Draft* DoDI 5000.02

Enclosure 12. Systems Engineering

E12.5. Configuration Management. The PM shall use a configuration management approach to establish and control product attributes and the technical baseline across the total system life cycle. This approach shall identify, document, audit, and control the functional and physical characteristics of the system design; track any changes; provide an audit trail of program design decisions and design modifications; and be integrated with the SEP and technical planning. At completion of the system level Critical Design Review, the PM shall assume control of the initial product baseline for all Class 1 configuration changes.

E12.6. Environment, Safety, and Occupational Health (ESOH). The PM shall use the methodology in MIL-STD-882D to assess ESOH risk, eliminate ESOH hazards where possible, manage the risks that cannot be eliminated, and report on the status of ESOH risk at technical reviews.

E12.6.1. Programmatic ESOH Evaluation (PESHE). The PM for all programs, regardless of ACAT level, shall prepare a PESHE and summarize it in the acquisition strategy.

E12.5.2. NEPA/EO 12114. The PM shall conduct and document NEPA/EO 12114 analyses, to be approved by the CAE, for which the PM is the action proponent.

E12.6.3. Mishap Investigation Support. The PM will support system-related Class A and B mishap investigations.

New SE Policy in *Draft* DoDI 5000.02
Enclosure 12. Systems Engineering

E12.7. Corrosion Prevention and Control. Each ACAT I program shall document its strategy in a Corrosion Prevention Control Plan at Milestones B and C.

E12.8. Modular Open Systems Approach (MOSA). Program managers shall employ MOSA.

E12.9. Data Management and Technical Data Rights. Program Managers for ACAT I and II programs, regardless of planned sustainment approach, shall assess the long-term technical data needs of their systems and reflect that assessment in a Data Management Strategy (DMS).

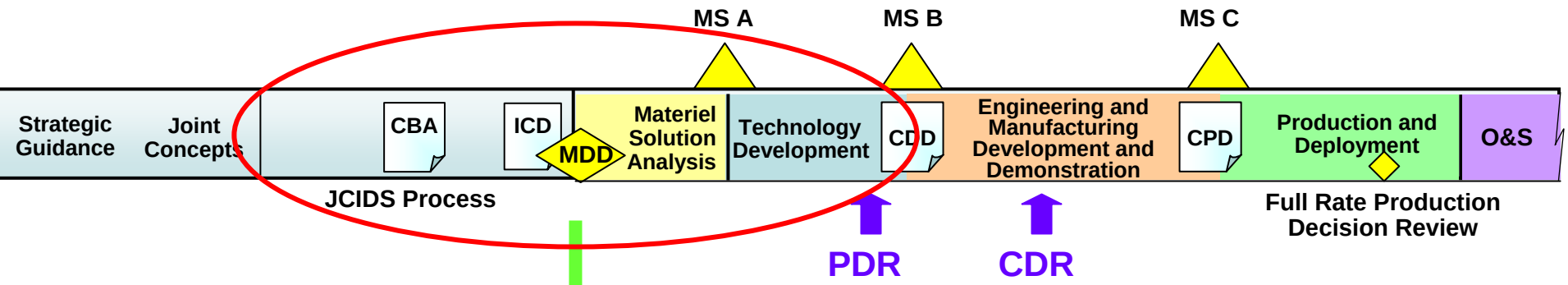
E12.10. Item Unique Identification (IUID). To enhance life-cycle management of assets in systems acquisition and sustainment, and to provide more accurate asset valuation, all PMs shall plan for and implement IUID to identify and track applicable major end items, configuration-controlled items, and Government-furnished property. IUID planning and implementation shall be documented in an IUID Implementation Plan and summarized in the program's Systems Engineering Plan (Reference (an) and DoD Directive 8320.03, Reference (bv)).

E12.11. Reliability, Availability, and Maintainability (RAM). PMs for all programs shall formulate a viable RAM strategy that includes a reliability growth program as an integral part of design and development. RAM shall be integrated within the Systems Engineering processes, documented in the program's SEP and LCSP, and assessed during technical reviews, T&E, and PSRs.

Implications for Systems Engineering

New Opportunities for Enhanced SE – Starting Programs Right

What's relevant: • ***Mandatory*** **Materiel Development Decision**
• ***Mandatory*** **Milestone A for all "major weapon systems"**
• **MS B *after* system-level PDR* and a PDR Report to the MDA***



Pre-MDD "SE Touch Points"

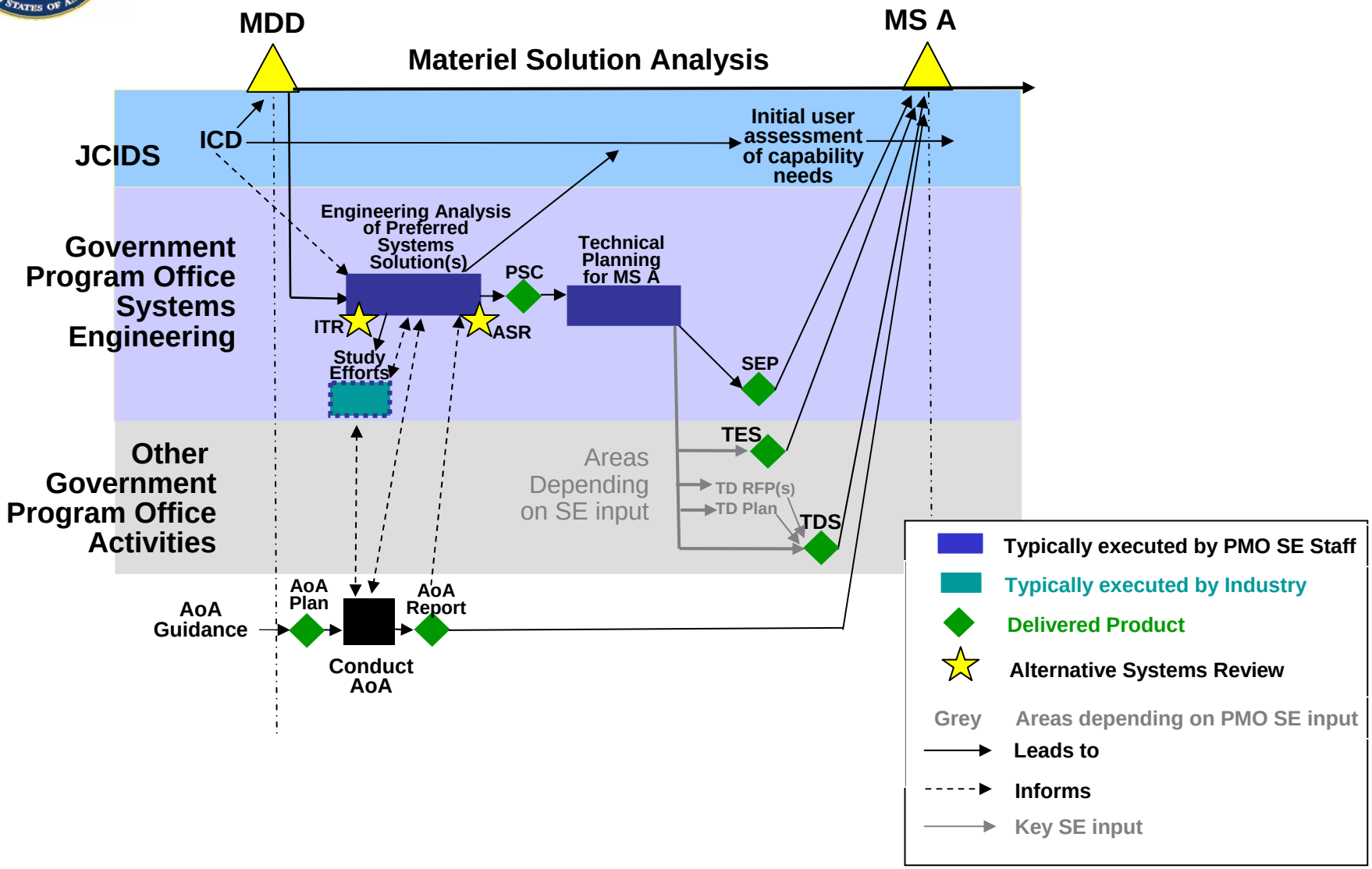
- **Initial Capabilities Document (ICD)**
- **Analysis of Alternatives study plan**

Pre-Milestone A "SE Touch Points"

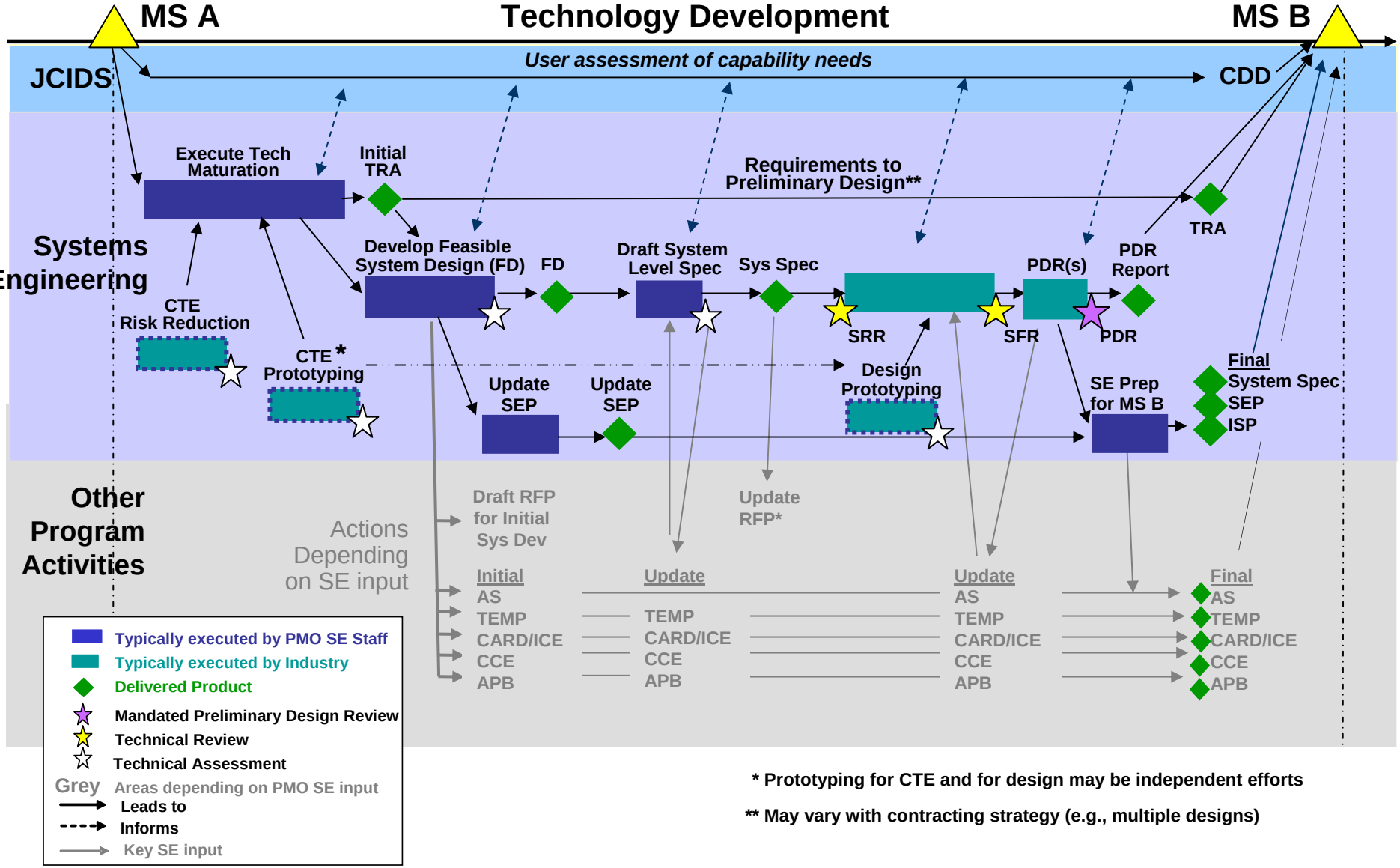
- **Systems Engineering Plan**
- **Technology Development Strategy**
- **Test and Evaluation Strategy**
- **Analysis of Alternatives**

**** PDR – Preliminary Design Review*** **** CDR – Critical Design Review*** **** MDA - Milestone Decision Authority***

SE Focus: Materiel Solution Analysis



SE Focus: Technology Development



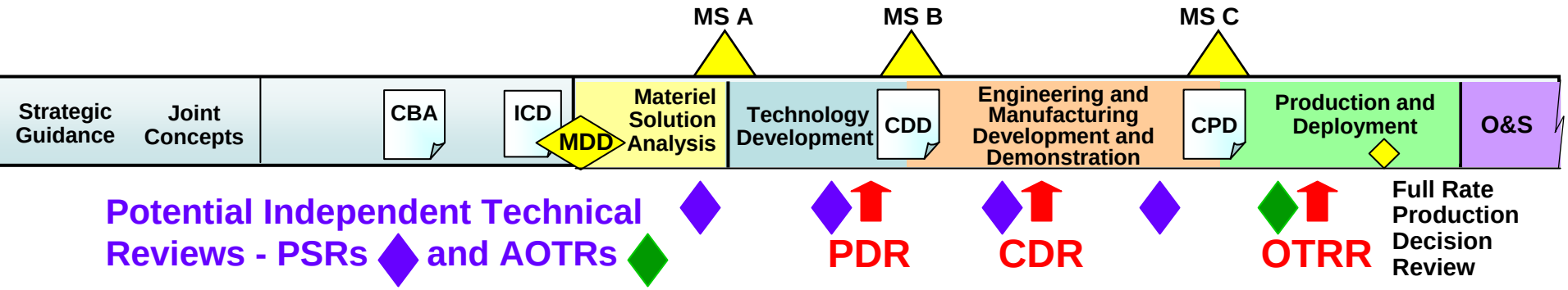
* Prototyping for CTE and for design may be independent efforts

** May vary with contracting strategy (e.g., multiple designs)

New Opportunities for Independent Reviews

What's relevant:

- ***Mandatory*** **Milestone A for all "major weapon systems"**
- **MS B *after* system-level PDR* and a PDR Report to the MDA**
- **EMDD with Post-CDR* Report and MDA Assessment**
- **PSR and AOTR in policy**



Program Support Reviews (PSRs)

- All ACAT ID & IAM
- To inform the MDA on technical planning and management processes thru risk identification and mitigation recommendations
- To support OIPT program reviews and others as requested by the MDA

Assessments of Operational Test Readiness (AOTRs)

- All ACAT ID and special interest programs
- To inform the MDA, DOTE, & CAE of risk of a system failing to meet operational suitability and effectiveness goals
- To support CAE determination of materiel readiness for IOT&E

** PDR – Preliminary Design Review* ** CDR – Critical Design Review* ** OTRR – Operational Test Readiness Review*

Backup

Draft DoD Instruction 5000.02 Extract

Milestone A (per FY'08 NDAA Sec. 943)

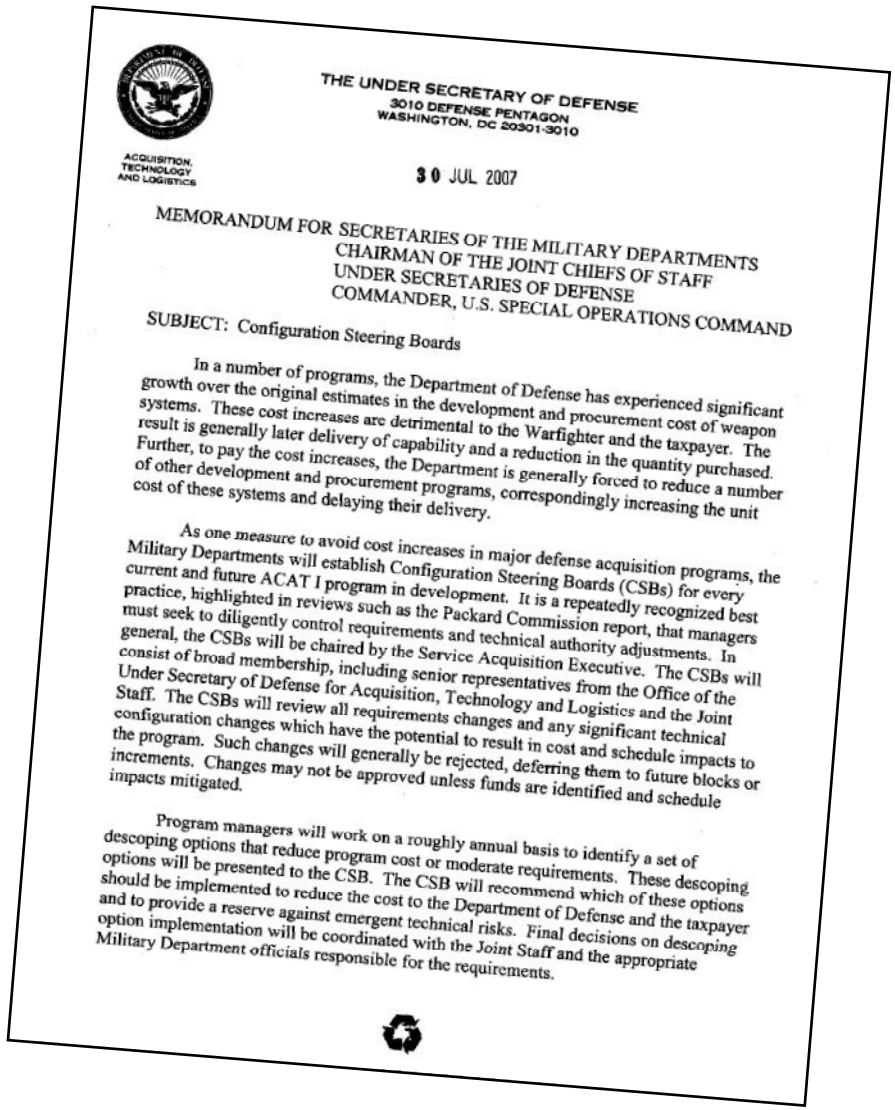
"The project shall enter the Technology Development Phase at Milestone A when the MDA has approved the TDS. The tables in Enclosure 3 identify all statutory and regulatory requirements applicable to Milestone A. . . . The MDA shall comply with the certification requirements at Milestone A as described in Enclosure 10 of this Instruction. This effort normally shall be funded only for the advanced development work. Technology development for a major weapon system shall not proceed without Milestone A approval. For business area capabilities, commercially available solutions shall be preferred. A favorable Milestone A decision DOES NOT mean that a new acquisition program has been initiated."

Configuration Steering Boards

Configuration Steering Boards (CSB). The Acquisition Executive of each DoD Component shall establish a CSB with broad executive membership including senior representatives from the Office of the USD(AT&L) and the Joint Staff.

- **The CSB shall review all requirements changes and any significant technical configuration changes for ACAT I and IA programs in development which have the potential to result in cost and schedule impacts to the program. Such changes will generally be rejected, deferring them to future blocks or increments. Changes shall not be approved unless funds are identified and schedule impacts mitigated.**

- **Program Managers shall, on a roughly annual basis, identify and propose a set of descoping options to the CSB that reduce program cost or moderate requirements. The CSB shall recommend to the MDA (if an ACAT ID or IAM program) which of these options should be implemented. Final decisions on de-scoping option implementation shall be coordinated with the Joint Staff and military department requirements officials.**



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

30 JUL 2007

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
COMMANDER, U.S. SPECIAL OPERATIONS COMMAND

SUBJECT: Configuration Steering Boards

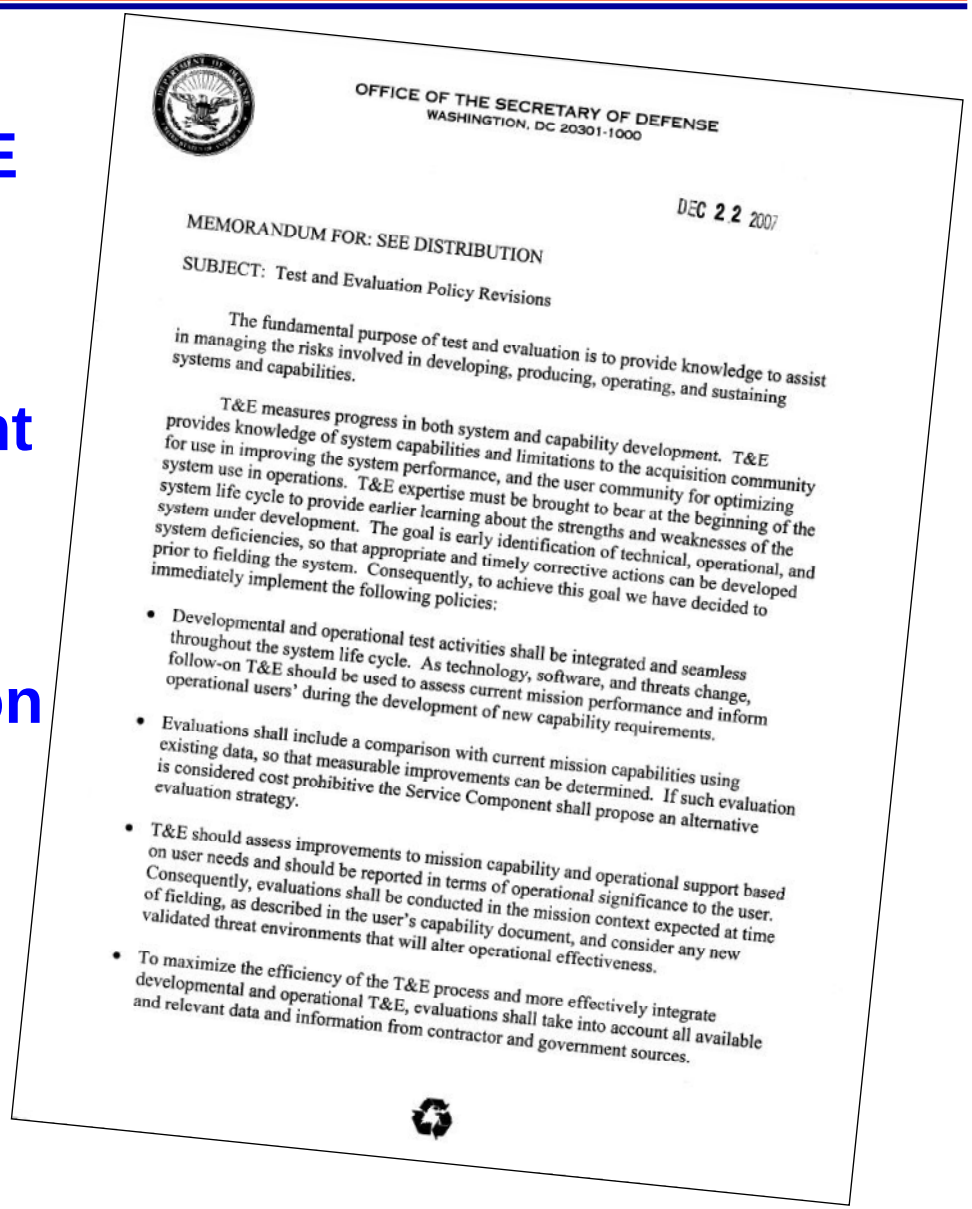
In a number of programs, the Department of Defense has experienced significant growth over the original estimates in the development and procurement cost of weapon systems. These cost increases are detrimental to the Warfighter and the taxpayer. The result is generally later delivery of capability and a reduction in the quantity purchased. Further, to pay the cost increases, the Department is generally forced to reduce a number of other development and procurement programs, correspondingly increasing the unit cost of these systems and delaying their delivery.

As one measure to avoid cost increases in major defense acquisition programs, the Military Departments will establish Configuration Steering Boards (CSBs) for every current and future ACAT I program in development. It is a repeatedly recognized best practice, highlighted in reviews such as the Packard Commission report, that managers must seek to diligently control requirements and technical authority adjustments. In general, the CSBs will be chaired by the Service Acquisition Executive. The CSBs will consist of broad membership, including senior representatives from the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics and the Joint Staff. The CSBs will review all requirements changes and any significant technical configuration changes which have the potential to result in cost and schedule impacts to the program. Such changes will generally be rejected, deferring them to future blocks or increments. Changes may not be approved unless funds are identified and schedule impacts mitigated.

Program managers will work on a roughly annual basis to identify a set of descoping options that reduce program cost or moderate requirements. These descoping options will be presented to the CSB. The CSB will recommend which of these options should be implemented to reduce the cost to the Department of Defense and the taxpayer and to provide a reserve against emergent technical risks. Final decisions on descoping option implementation will be coordinated with the Joint Staff and the appropriate Military Department officials responsible for the requirements.

Test and Evaluation

- **Integrated DT&E / OT&E activities**
- **Evaluations include comparison with current capability**
- **Evaluations conducted in the expected "mission context"**



OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301-1000

DEC 22 2007

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Test and Evaluation Policy Revisions

The fundamental purpose of test and evaluation is to provide knowledge to assist in managing the risks involved in developing, producing, operating, and sustaining systems and capabilities.

T&E measures progress in both system and capability development. T&E provides knowledge of system capabilities and limitations to the acquisition community for use in improving the system performance, and the user community for optimizing system use in operations. T&E expertise must be brought to bear at the beginning of the system life cycle to provide earlier learning about the strengths and weaknesses of the system under development. The goal is early identification of technical, operational, and system deficiencies, so that appropriate and timely corrective actions can be developed prior to fielding the system. Consequently, to achieve this goal we have decided to immediately implement the following policies:

- Developmental and operational test activities shall be integrated and seamless throughout the system life cycle. As technology, software, and threats change, follow-on T&E should be used to assess current mission performance and inform operational users' during the development of new capability requirements.
- Evaluations shall include a comparison with current mission capabilities using existing data, so that measurable improvements can be determined. If such evaluation is considered cost prohibitive the Service Component shall propose an alternative evaluation strategy.
- T&E should assess improvements to mission capability and operational support based on user needs and should be reported in terms of operational significance to the user. Consequently, evaluations shall be conducted in the mission context expected at time of fielding, as described in the user's capability document, and consider any new validated threat environments that will alter operational effectiveness.
- To maximize the efficiency of the T&E process and more effectively integrate developmental and operational T&E, evaluations shall take into account all available and relevant data and information from contractor and government sources.