

# DEFENSE ACQUISITION UNIVERSITY

## Defense Systems Management College

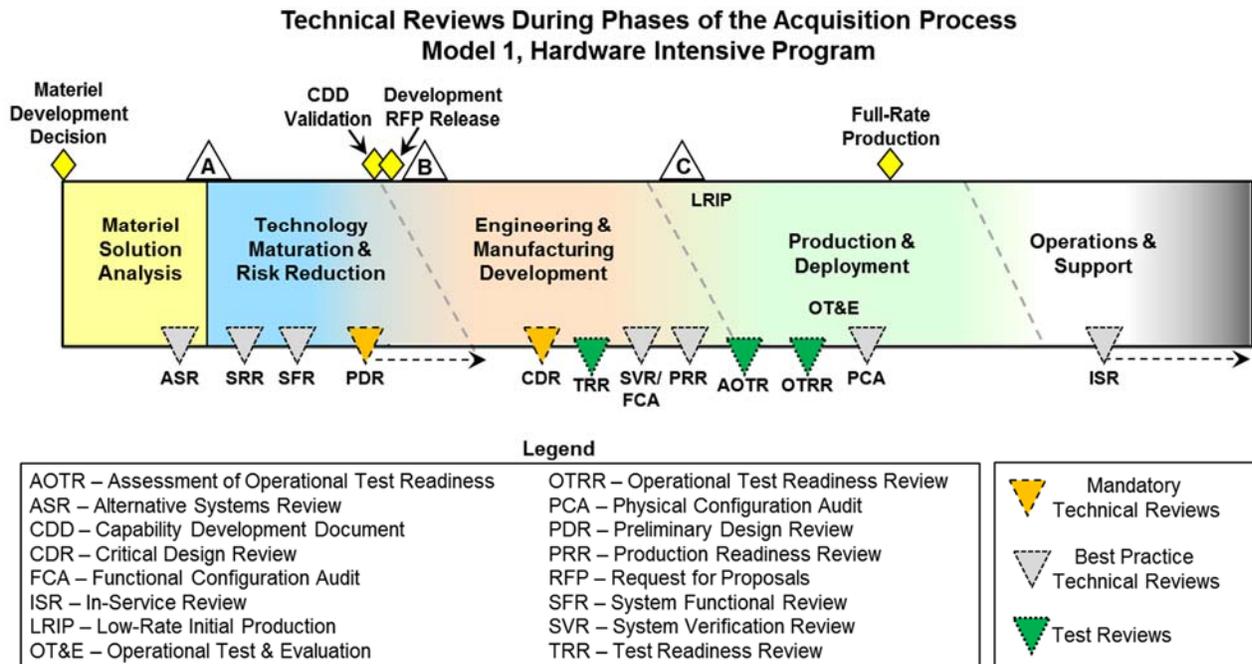
### Requirements Management Department

July 2015

## Technical Reviews

Technical reviews are key events in the systems engineering management process. They primarily deal with the technical design process and gauge its maturity for continued development. The results of technical reviews have an impact on how well the system will meet operational performance requirements. Not every type of technical review is required in every program. DoD Instruction 5000.02, 7 Jan 2015, requires two mandatory technical reviews for Major Defense Acquisition Programs (MDAPs) (ACAT I programs) and Major Automated Information Systems (MAIS) (ACAT IA programs) - Preliminary Design Review (PDR) and Critical Design Review (CDR). Non-major programs also conduct these reviews in accordance with Component policy. The Program Manager (PM) will determine what additional technical reviews are appropriate given the circumstances and technical risks of the program.

The Systems Engineering Plan (SEP) describes the planning, timing, conduct, and success criteria of technical reviews throughout the acquisition life cycle. The SEP also provides the approach for how requirements and technical performance trade-offs are balanced within the larger program scope to deliver operationally effective, suitable, and affordable systems. Requirements Managers should obtain a copy of the SEP. There are six program models illustrated in the DoDI 5000.02. Model 1, below, shows the typical relationship between technical reviews and the milestones and phases of the acquisition process.



The following table lists the technical reviews shown above with a summary description from the Defense Acquisition Guidebook (DAG), Chapter 4, Systems Engineering (SE). An online version of the SE Chapter is posted to [https://acc.dau.mil/docs/dag\\_pdf/dag\\_ch4.pdf](https://acc.dau.mil/docs/dag_pdf/dag_ch4.pdf). The SE chapter of the DAG was updated in 2013; however, DoDI 5000.02, Enclosure 3, should be consulted for the latest information on PDR and CDR. The DAG is expected to be updated to reflect the Jan 2015 version of DoDI 5000.02 by Jan 2016. At the end of the following table additional information is provided for reviews of particular importance to Requirements Managers.

Technical Review	Phase Normally Conducted	Purpose of the Review	Expected Outcome
Alternative Systems Review (ASR)	<b>Matériel Solution Analysis (MSA)</b> , after completion of the Analysis of the Alternatives (AoA) and before Milestone A.	Support a dialogue between the end user and acquisition community and leads to a draft performance specification for the preferred matériel solution.	Whether there is sufficient understanding of the technical maturity, feasibility, and risk of the preferred matériel solution, in terms of addressing operational capability needs from the Initial Capabilities Document (ICD) and meeting affordability, technology, and operational effectiveness and suitability goals.
System Requirements Review (SRR)	<b>Technology Maturation &amp; Risk Reduction (TMRR)</b> If the program includes competitive prototyping, an SRR should be held with each contractor to ensure requirements are thoroughly and properly understood	Ensures the contractor is ready to proceed with the initial system design.	All system requirements and performance requirements derived from the ICD or draft Capability Development Document (CDD) are defined and consistent with cost, schedule, risk, and other system constraints; and with end user expectations.
System Functional Review (SFR)	<b>TMRR</b> <i>For Space Systems only, SFR is a mandatory review. A Post-SFR Report is submitted by the PM to the MDA. The MDA will assess the report to ensure the needs expressed in the ICD have been satisfied during TMRR.</i>	Evaluates whether the system <b>functional baseline</b> satisfies end-user requirements and capability needs. The functional baseline describes the system's performance (functional, interoperability, and interface characteristics) and the verification required to demonstrate achievement of those specified characteristics. It is directly traceable to the operational requirements in the ICD and draft CDD.	A sound technical basis for proceeding into preliminary design.

Technical Review	Phase Normally Conducted	Purpose of the Review	Expected Outcome
Preliminary Design Review (PDR)	<p><b>TMRR</b> and/or early portion of Engineering &amp; Manufacturing Development (EMD). PDR must be conducted prior to Milestone B for Major Defense Acquisition Programs (MDAPs) and Major Automated Information Systems (MAIS) programs. (typically a series of sub-system reviews leading to final system-level review)</p>	<p>Provides the acquisition community, end user, and other stakeholders with an opportunity to understand the trade studies conducted during the preliminary design, and thus confirm that design decisions are consistent with the user's performance and schedule needs prior to formal validation of the CDD. Establishes the <i>allocated baseline</i>. (see DAU Glossary for definition)</p>	<p>Confirms that the preliminary design:</p> <ul style="list-style-type: none"> <li>• Satisfies the operational and suitability requirements of the draft CDD</li> <li>• Is affordable, producible, sustainable, and carries an acceptable level of risk</li> <li>• Is composed of technologies demonstrated in a relevant environment that can be integrated into a system with acceptable levels of risk</li> <li>• Is complete and ready for detailed design</li> </ul>
Critical Design Review (CDR)	<p><b>Engineering &amp; Manufacturing Development (EMD)</b> (typically a series of sub-system reviews leading to final system-level review)</p>	<p>Provide evidence that the system, down to the lowest system element level, has a reasonable expectation of satisfying the requirements of the system performance specification as derived from the CDD within current cost and schedule constraints.</p>	<p>Establishes the initial <b>product baseline</b>. The product baseline describes the detailed design for production, fielding/ deployment, and operations and support. It prescribes all necessary physical (form, fit, and function) characteristics and selected functional characteristics designated for production acceptance testing and production test requirements. It is traceable to the system performance requirements contained in the CDD.</p>
Test Readiness Review (TRR)	<p><b>EMD</b> (typically multiple reviews conducted)</p>	<p>Determines whether the system is ready to proceed into formal test, primarily system-level developmental test; assesses test objectives, methods, and procedures; confirms proper allocation of test resources</p>	<p>Completed and approved test plans; identification and coordination of test resources; identified risk level acceptable to program leadership</p>

Technical Review	Phase Normally Conducted	Purpose of the Review	Expected Outcome
System Verification Review (SVR)/Functional Configuration Audit (FCA)	<b>EMD</b>	The SVR/FCA is used to: <ul style="list-style-type: none"> <li>• Assess whether system development is satisfactorily completed</li> <li>• Prepare the system for OT&amp;E</li> <li>• Confirm that the product baseline meets the requirements of the functional baseline and therefore has a high likelihood of meeting the warfighter requirements documented in the CDD and/or Capability Production Document (CPD)</li> </ul>	Provide a sound technical basis for proceeding into initial production for the system to be used in OT&E
Production Readiness Review (PRR)	<b>EMD</b>	Determines whether the system is ready for production; performed incrementally in a series of PRRs	Executable schedule, producible design, configuration management system in place
Assessment of Operational Test Readiness (AOTR)	<b>Low Rate Initial Production effort of Production &amp; Deployment</b>	Independent assessment by Office of USD(AT&L) of operational test readiness for all ACAT ID programs and special interest programs	
Operational Test Readiness Review (OTRR)	<b>Low Rate Initial Production (LRIP) effort of Production &amp; Deployment</b>	Service Acquisition Executive (SAE) determines whether system is ready for Initial Operational Test and Evaluation (IOT&E)	System is ready for IOT&E
Physical Configuration Audit (PCA)	<b>LRIP effort of Production &amp; Deployment</b>	Formal examination to verify the "to be fielded" configuration of a validated system against its design and manufacturing documentation.	Provides the Milestone Decision Authority (MDA) with evidence that the product design is stable, the capability meets end-user needs, and production risks are acceptably low. At the conclusion of the PCA, the final product baseline is established.
In-Service Review (ISR)	<b>Operations &amp; Support</b>	Multi-disciplined assessment to characterize the in-service health of the deployed system and enabling system elements (training, user manuals, documentation, etc.).	Provides feedback to the Program Manager on how well the system is delivering the capability to the warfighter, with acceptable operational performance. In addition, the feedback substantiates in-service support budget priorities.

**Technical Reviews and the Requirements Manager.** The Requirements Manager (RM) should consider attendance at the following technical reviews for the reasons indicated.

**ASR.** The RM should plan to attend the ASR (or ASR-like meeting(s)) to assist in assessing the AoA final results so that the requirements and acquisition communities are of one mind in support of a preferred solution to be approved by the Milestone Decision Authority (MDA) at Milestone A. The ASR is a Best Practice review. See DAG 4.2.9.

**SRR.** There may be a series of SRR's to determine the status of translating operational performance requirements to technical requirements for system design. RM presence at these meetings may be helpful to the PMO engineers when questions arise concerning the relationship between what the warfighter expects in terms of operational performance and how the engineers can describe that technically. The SRR is a Best Practice review. See DAG 4.2.10.

**PDR.** There are typically a series of PDR's conducted at the subsystem-level leading to a system-level PDR prior to Milestone B. There may be additional PDRs after Milestone B during EMD if the results of the TMRR phase require significant differences in design of the system for the EMD contract. For ACAT ID and ACAT IAM programs, the Deputy Assistant Secretary of Defense for Systems Engineering (DASD (SE)) will participate in the program's PDRs as the basis for preparation of a post-PDR assessment to inform the Milestone Decision Authority (MDA) of technical risks and the program's readiness to proceed into detailed design. For ACAT IC and ACAT IAC programs, the Component Acquisition Executive (CAE) will conduct the post-PDR assessment. For non-major programs, Component policy applies.

RMs should ask the PM for PDR results and assess impact of technical issues on operational requirements. RMs should attend the system level PDR to gain an understanding of the results of TMRR phase activities on performance attributes, and revise the CDD if appropriate. RM's can be particularly helpful at these reviews when performance of TMRR production representative articles indicates that attributes in the CDD are too optimistic (or too conservative), and coordinate trade-offs with the PMO systems engineers for needed revisions to the CDD. The PDR is a mandatory review.

**CDR.** There are typically a series of CDR's conducted at the subsystem level leading to a system-level CDR to establish the initial product baseline. For MDAPs and MAIS programs, a CDR assessment will be conducted, assessing the conduct of the review and the technical risks, and will be provided to the MDA. For ACAT ID and IAM programs, the DASD (SE) will conduct the CDR assessment. This will be accomplished through DASD (SE) participation in the CDR and review of any program artifacts necessary to conduct the assessment. For ACAT IC and IAC programs, the CAE will conduct the CDR assessment. For non-major programs Component policy applies.

The RM should ask for results of all subsystem-level CDRs and attend the system-level CDR. The results of these CDRs may require additional performance trade-offs as the CDD is updated to a CPD for validation prior to Milestone C. There is almost no opportunity to influence final design after CDR. The CDR is a mandatory review.