

Preliminary Design Review (PDR)

The Preliminary Design Review (PDR) is a multi-disciplined technical review for the candidate design(s) to establish the allocated baseline (hardware, software, human/support systems) and underlying architectures to ensure that the system under review has a reasonable expectation of satisfying the requirements of the CDD within the currently allocated budget and schedule.

This review assesses the allocated design captured in subsystem product specifications for each configuration item (hardware and software) in the system and ensures that each function in the functional baseline has been allocated to one or more system configuration items.

Subsystem specifications for hardware and software, along with associated ICDs, enable detailed design or procurement of subsystems. Configuration items may consist of hardware and software elements, and include items such as structures, avionics/electronics, weapons, crew systems, engines, trainers/training, etc.

Completion of the PDR should provide the following:

- An established system allocated baseline,
- An updated risk assessment for Engineering and Manufacturing Development (EMD),
- An updated Cost Analysis Requirements Description (CARD) or CARD-like document based on the system allocated baseline,
- An updated program schedule including system and software critical path drivers, and
- An approved Life Cycle Sustainment Plan updating program sustainment development efforts and schedules.

It is important to clarify and resolve design conflicts before completing the Systems level PDR and entering detailed design. For complex systems, a PDR may be conducted incrementally for each configuration item. These incremental or subsystem reviews ultimately lead to an overall system level PDR. They should be substantially completed before the systems-level PDR is held.

The PDR evaluates the set of subsystem requirements to determine whether they correctly and completely implement all system requirements allocated to the subsystem. The PDR also determines whether subsystem requirements trace with the system design. At this review, the IPT should review the results of peer reviews of requirements and preliminary design documentation.

A successful PDR is predicated on determination that the subsystem requirements, subsystem preliminary design, results of peer reviews, and plans for development, testing and evaluation form a satisfactory basis for proceeding into detailed design and test procedure development.

Typical PDR success criteria include affirmative answers to the following exit questions:

- Does the status of the technical effort and design indicate operational test and evaluation success (operationally effective and suitable)?
- Can the preliminary design, as disclosed, satisfy the draft Capability Development Document?
- Has the system allocated baseline been established and documented to enable detailed design to proceed with proper configuration management?
- Are adequate processes and metrics in place for the program to succeed?
- Have sustainment and human systems integration design factors been reviewed and included, where needed, in the overall system design?
- Are the risks known and manageable for integrated testing and developmental and operational evaluation?
- Is the program schedule executable (technical/cost risks)?
- Is the program properly staffed?
- Have the program's cost estimate been updated?
- Is the program executable within the existing budget and with the approved system allocated baseline?
- Is the preliminary system level design producible within the production budget?
- Is the updated CARD consistent with the approved allocated baseline?

With the additional emphasis on software development and the critical role it plays in providing system functionality, the following exit questions should also be addressed for the system's software component:

- Has the Computer system and software architecture design been established, and have all Computer Software Configuration Items (CSCIs), Computer Software Components (CSCs), and Computer Software Units (CSUs) been defined?
- Are Software Requirements Specifications (SRSs) and Interface Requirement Specifications (IRSs), including verification plans, complete and baselines for all CSCs and do they satisfy the system/subsystem functional requirements?
- Do the Interface Control Documents (ICDs) trace all software interface requirements to the CSCIs and CSUs?
- Has the computer system and software design/development approach been confirmed through analyses, demonstrations, and prototyping in a relevant environment?

- Has the preliminary software design been defined and documented?
- Have software increments been defined and have capabilities been allocated to specific increments?
- Have software trade studies addressing COTS, reuse, and other software-related issues been completed?
- Has the software development process been defined in a baselined Software Development Plan (SDP) and is it reflected in the Integrated Master Plan (IMP) and Integrated Master Schedule (IMS)?
- Do the software development schedules reflect contractor software processes and IMP/IMS software events for current and future development phases?
- Have the software development environment and test/integration labs been established with sufficient fidelity and capacity?
- Have unique software risks been identified and assessed and have mitigation plans been developed and implemented?
- Have software metrics been defined and reporting process implemented, and are they being actively tracked and assessed?
- Does the Test and Evaluation Master Plan (TEMP) address all CSCI plans, test facilities, and test plans, including testing required to support incremental approaches (e.g. regression tests)?
- Is there a life-cycle sustainment plan and does it include software support requirements?
- Have the software development estimates (i.e. size, effort (cost), and schedule) been updated?
- Have all required software-related documents been baselined and delivered?

The PDR should be conducted when the allocated baseline has been achieved, allowing detailed design of hardware and software CIs to proceed. A rule of thumb is that 10 percent to 25 percent of product drawings and associated instructions should be complete, and that 100 percent of all safety-critical component (Critical Safety Items and Critical Application Items) drawings are complete.

The PDR should be conducted when all major design issues have been resolved and work can begin on detailed design. The PDR should address and resolve critical, system-wide issues before detailed design begins.

The PDR risk assessment checklist is designed as a technical review preparation tool, and should be used as the primary guide for assessing risk during the review. This checklist is available via the "Checklist for Technical Reviews" in the Reference Tab of this course