

Appendix C

Acquisition Milestones and Phases

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The acquisition process described below is diagrammed in figure A-3 in appendix A.

Milestone O: Mission Needs Determination— Milestone O approves the initiation and authority to budget for a new program. It marks the point at which the mission analyses and technology base activities conducted by the Services on an ongoing basis first become focused through identification of a requirement for a system that might plausibly be developed.

A mission need may result either from a deficiency in existing agency capabilities or from the decision to establish new capabilities in response to a technologically feasible opportunity. Prior to initiation of a program, a military Service conducts analyses of projected threats and possible new missions, given the performance of its current systems. If this process identifies a deficiency, if plausible solutions can be envisioned, and if the Service considers those solutions to have a high enough priority to justify a claim on future resources, it prepares a Mission Needs Statement to initiate the acquisition process. Office of Management and Budget (OMB) Circular A-109 specifies that mission needs should be defined in functional terms, “independent of any particular system or technological solution.”

Establishing priority within the Service for solving a mission need generates what can become an intense competition within the Service’s budget preparation process. If the mission need survives this internal competition, the Service reserves funding for meeting the need in its long-range financial plan and its Program Planning and Budgeting System (PPBS) budget submission. Reviewing the Services’ overall submissions, the Defense Resources Board decides whether or not to approve new programs. If approved, the program is assigned a program element number and is submitted to Congress as part of the Department of Defense (DoD) budget.

Primary considerations for Milestone O approval are: adequacy of the mission area analysis; affordability; ability to acquire or modify existing U.S. or Allied systems to provide the needed capability; and projected operational utility of the proposed solution.

Concept Exploration/Definition Phase— Approval of the mission need grants the authority to explore alternative system designs for new systems. It does not automatically mean that a new system will eventually be acquired. Other means of satisfying the need, such as changes in doctrine or training or increases in personnel, may prove to be the best solution. During the concept exploration/definition phase, the program office is established and a Program Manager (PM) is selected. One of the PM’s first tasks is to develop an acquisition strategy, a major part of which is structuring an industrial competition to create, explore, and evaluate alternative designs. This phase typically takes from 0 to 2 years.

Milestone I: Concept Selection-Results of the concept exploration/definition stage are summarized in a System Concept Paper, which describes the acquisition strategy; identifies the best concepts to be carried into the demonstration phase; explains why other concepts were eliminated; and establishes broad cost schedule, effectiveness, and sustainability goals to be reviewed at subsequent milestones. Upon Milestone I approval, these goals become the program “baseline” within which the PM is free to operate—provide the resources are indeed made available.

The primary considerations evaluated by the Defense Acquisition Board at Milestone I include tradeoffs between various alternatives; trade-offs between performance, cost, and schedule; the need for development of a new system versus buying or modifying existing systems, whether military or commercial; appropriateness of the acquisition strategy; the need to prototype systems or components; affordability, including life-cycle costs; and plans for test, evaluation, logistics, and support.

Concept Demonstration/Validation Phase— Concept demonstrations are intended to verify that the chosen concepts will operate in a realistic environment and are technically sound. This phase, typically lasting 2 to 3 years, must provide sufficient information to permit decisions to proceed to full-scale development (FSD) to be made with confidence. Prototypes are built and evaluated during this phase, providing the eventual users with

their first opportunity to see a realization of a system that can meet their needs—some 5 years after their original request.

Funds spent during this phase are generally in budget category 6.3B, system-specific advanced development. Designs and decisions made before approval for FSD will determine most of the future system's total life-cycle cost, with the great majority of that cost actually spent following the FSD decision.

Milestone II: Full-Scale Development Approval—Defense Acquisition Board (DAB) approval at Milestone II not only permits the start of FSD, but also implies approval for production upon successful completion of FSD. Consequently, production of certain long-lead-time items may be authorized, and low-rate initial production of selected components and complete systems may be approved as well to verify producibility and provide test articles.

In its Milestone II review, the DAB considers a number of factors including: affordability (in terms of cost versus value); technical risk; producibility; results of prototyping and demonstration/validation; manpower, training, and safety assessment; procurement strategy; logistics support; and additional requirements for command, control, communications, and intelligence. The Decision Coordinating Paper that summarizes the results of the demonstration/validation phase must “show [that] all significant risk areas have been resolved” and discuss “the extent to which technology is in-hand and only engineering (rather than experimental) efforts remain.” More specific program cost, schedule, and performance thresholds are established, becoming the baseline governing both program development and reporting to Congress.

Since successful completion of FSD implies that production will be approved, the Defense Science Board 1977 Summer Study recommended that “FSD should be limited to those programs that are intended to be, and can be afforded to be, procured within the total defense budget (on the basis of realistic and credible cost estimates).”² At the time of the study,

far more programs were in FSD than could be produced within any reasonable budget. The same situation is true today. The consequences of this finding shortfall are discussed under “Affordability” in chapter 8 of the main report.

Full-scale Development Phase—During full-scale development, typically lasting 3 to 6 years, the system is fully developed and engineered for production, and initial models are fabricated for developmental and operational testing. Developmental testing and evaluation (DT&E) helps the developer complete the design and engineering of the system and verifies that technical specifications are met. Operational testing and evaluation (OT&E) determines the suitability or effectiveness of the system when operated by typical military users in an operational environment.

During FSD, engineering and design changes are inevitable. If not appropriately anticipated, these changes increase the cost and length of the FSD phase. Although some of these changes may be necessitated by changes in the threat that the system is intended to address, according to one analyst, the impact of changes due to “improper, inadequate, or unrealistic definition of operational requirements and insufficiently critical evaluation of candidate system concepts” is often greater. Such changes late in the development cycle, he claims, are likely “the largest single source of delays and cost overruns encountered in advanced and full-scale system development.”³

Milestone III: Full-rate Production Approval—Upon review of the results of FSD, approval is given to proceed to full-rate production. In cases where the Milestone II thresholds have not been exceeded, approval authority is typically delegated to the military Services. By statute, production approval cannot be given until the Director of the DoD Office of Operational Testing and Evaluation has certified that the results of operational testing are acceptable. If the interval between low-rate and full rate production is long enough, an additional Milestone IIIA decision for low-rate production may be broken out from the full-rate production decision.

¹DoD Directive 5000.2, “Defense Acquisition Program Procedures,” Sept. 1, 1987, pp. 4-2.

²Defense Science Board, “Report of the Acquisition Cycle Task Force 1977 Summer Study,” prepared for the Office of the Under Secretary for Research and Engineering, Mar. 15, 1978, pp. 3.

³Alexander Kossiakoff, “Conception of New Defense Systems and the Role of Government R&D Centers,” in Franklin Long and Judith Reppy, eds., *The Genesis of New Weapons: Decision Making for Military R&D* (Elmsford, NY: Pergamon Press, 1980), p. 81.

Full-rate Production Phase-The production phase of a system can last for many years. The system first enters service when the user judges that enough have been produced to provide an initial operational capability, a point typically reached after 3 to 5 years of production. Several additional years of production may be needed before the system reaches full operational capability.

In the past, production has been undertaken concurrently with FSD in the hope of saving time. The risks and benefits of this approach are discussed in the box on “Concurrency” in appendix A.

Milestone IV: Logistics Readiness and Support Review-DoD Instruction 5000.2 specifies that the DAB review the logistics and support requirements of the new system 1 to 2 years after initial deployment. However, no such review has ever yet taken place.

Deployment and Operations Phase-Deployment of a major new defense system typically occurs

10 to 15 years after initiation of the program. Systems can remain operational-albeit with upgrades-for decades. The lifetime of major systems, from the beginning of FSD until the retirement of the last model from National Guard/Reserve inventories, can easily last 40 years. Deploying, operating, and supporting the system over its lifetime can have a cost comparable to the cost of developing and producing it.

Milestone V: Major Upgrade or System Replacement Review-Five to ten years post-deployment, according to Instruction 5000.2, DAB is to review the system’s current operational effectiveness, suitability, and readiness. This review should determine whether major upgrades are needed or whether deficiencies warrant system replacement. However, as in the case of Milestone IV, no Milestone V review has yet taken place.