THE INTEGRATED PROJECT MANAGEMENT HANDBOOK

Dayton Aerospace, Inc.

Integrated Project Management Handbook

Dated: 8 February 2002

Submitted under:
Contract Agreement: GS-10F-0025J
Delivery Order: DASW01-01-F-4139
Purchase Request: HQ0038-0314

For:
Office of the Undersecretary of Defense
Acquisition Technology and Logistics

Interoperability/Systems Engineering
and
Acquisition Resource & Analysis/Acquisition Management

Authored by:
Robert J. Kayuha
Richard C. Leclaire
Robert H. Matthews
Leslie M. Henry

Dayton Aerospace, Inc.
4141 Colonel Glenn Highway, Suite 252
Dayton, Ohio 45431-1679
Phone: (937) 426-4300
Fax: (937) 426-1352
www.daytonaero.com

Integrated Project Management Handbook

PREFACE

What this handbook is intended for…

This handbook is based on the premise that the multi-functional disciplines inherent to both Government and industry acquisition agencies are integral parts of program management and must be fully integrated to ensure successful Integrated Project Management of DoD programs.

This handbook examines the interrelationships, synergism, and dependencies of the various project management activities leading to contract award and initial program execution. No attempt is made to cover any of the subjects in extensive depth; rather, the intent is to view the composite of the various subjects from a different perspective—that of *Integrated Project Management*. Numerous excellent courses are currently available through Defense Acquisition University (DAU) to strengthen knowledge within individual subject areas. A few courses such as ACQ 101, ACQ 201, PMT 250 and PMT 352 focus on the need for a multidisciplinary approach to specific aspects of program management. Additionally, the DoD Acquisition Deskbook provides extensive process information and a reference library that was used in the compilation of this handbook. ***But the purpose of this handbook is different.*** This handbook emphasizes the key *interrelationships* between pieces within (and between) each stage and *interdependencies* with the parallel and interactive industry efforts. This handbook also provides insights into the *appropriate roles of* both the *Government and industry* organizations within the acquisition phases and each stage of the integrated framework. The handbook is intended to build upon the reader's existing knowledge base of the individual subject and describe how both the Government and industry activities progress from requirements definition areas within the acquisition process through program execution. The handbook is applicable to processes applied within both the competitive and sole source environments.

Who this handbook is intended for…

The target audience for the *Integrated Project Management Handbook* is the Government and contractor **IPT leader** responsible for transitioning a project from program inception to the RFP, contract award and into execution. The presumption here is that this person has already had several DAU courses, is certified Level II (minimum) and has previous experience working in the program management environment. However, significant benefits may also be obtained from Government personnel other than the IPT leader and from contractor personnel.

Junior IPT personnel: Provides an overview of the integrated nature of project management, highlighting the interlinking roles and responsibilities of Government and industry. The handbook illustrates the benefit of establishing meaningful Government-industry communication early in the process.

Senior program office personnel: Provides a concise refresher on the best practices and the interrelationships between program activities and interdependencies between Government and industry activities.

Contractor personnel: Provides valuable insight into the Government processes and shows the interdependencies of industry and Government actions.

How this handbook is organized…

The handbook is organized into three chapters, each addressing a stage of the Integrated Project Management (IPM) framework.

- Chapter 1, **Program Definition** (led by the Government, culminating in the RFP);
- Chapter 2, **Execution Planning** (the Offerors preparing the proposal, culminating in the source selection/contract);
- Chapter 3, **Program Execution** (the period following contract award).

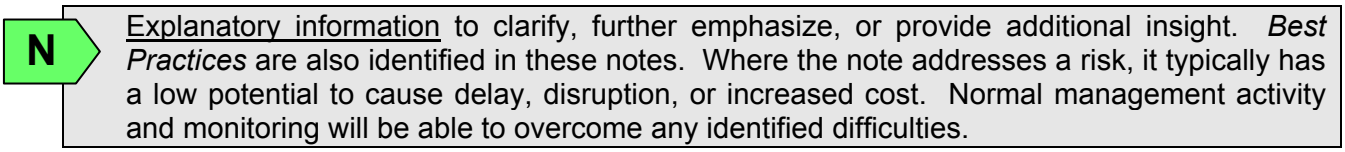
Chapter 1, Program Definition, focuses on how the Government, with industry involvement, can most effectively and efficiently define program requirements and then translate these requirements into an appropriate acquisition strategy and RFP. Chapter 2, Execution Planning, examines how industry takes the Government RFP and builds a proposal. Particular emphasis is placed on the cause and effect relationships between Government actions in the Program Definition Phase and resulting contractor actions in the Execution Planning Phase. Chapter 3, Program Execution, briefly explores how Government actions in the Program Definition Phase and industry actions in the Execution Planning Phase directly impact the ability to effectively and efficiently manage a program.

Throughout the *Integrated Project Management Handbook*, there are recurring key emphasis areas:

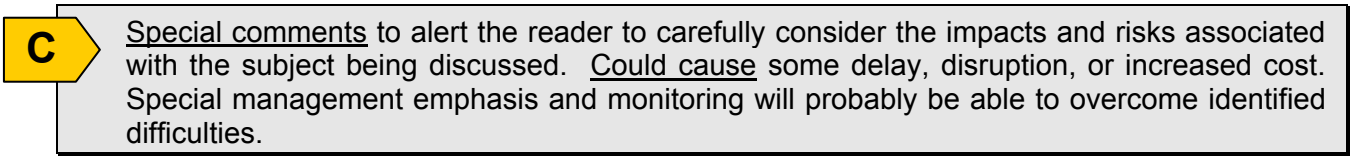
- Multi-functional disciplines and activities are interrelated and should be integrated with one another. Industry activities are interdependent with the Government activities.
- Well-written contracts frequently result from well-written proposals, which can be traced to well-written written RFPs. Poor RFPs produce equally predictable results.
- Good proposals come from performance based requirements, which are most effectively constructed when there is early and continued communication between Government and industry.
- Industry proposal activities must begin well before the RFP is issued.
- Requirements must include cost, schedule and performance (includes supportability).
- Risk recognition and management are fundamental tenets to be used in accomplishing the required activities.

Throughout the handbook, special emphasis items are highlighted through use of "*Notes*", "**Cautions**", and "**WARNINGS**." The samples below illustrate the format differences used to easily differentiate between these emphasis items and contain the appropriate definition descriptions:

Note:



Caution



WARNING:

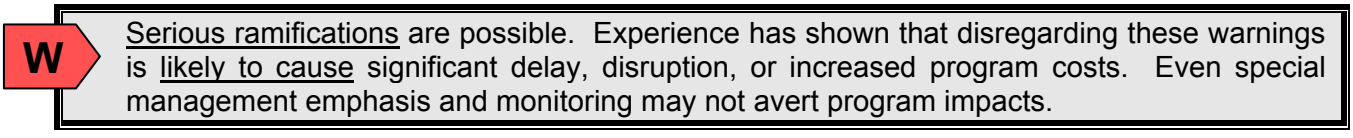


Table of Contents

List of Figures

INTRODUCTION

Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01B and Department of Defense Instruction (DoDI) 5000-2, in aggregate, describe the Defense Acquisition System as five sequential phases within three activities (Figure 1). The *Pre-Systems Acquisition* activity, where user requirements are defined, consists of two phases: *Determination of Mission Need* and *Concept and Technology Development*. The *Systems Acquisition* activity, where systems are developed, acquired and produced, consists of two phases: *System Development and Demonstration* and *Production and Deployment*. The third activity, *Sustainment*, consists of the *Operations and Support* Phase. The acquisition of a capability may begin at any Milestone, depending on the technical opportunities available and the user needs. The approach may also include blocks of capability growth, which evolve to the full planned capability. Significant systems acquisition effort begins prior to the entry Milestone. There are varying degrees of involvement in helping the user develop requirements, but the increase in acquisition related project management effort typically begins sometime between completion of the Mission Needs Statement (MNS) and Operational Requirements Document (ORD), normally in the latter stages of ORD refinement. For ease of presentation, this handbook will normally describe efforts that enter Milestone B, but the basic process is applicable at any entry point. The three stages of Integrated Project Management discussed in this handbook easily map to the framework presented in Figure 1.

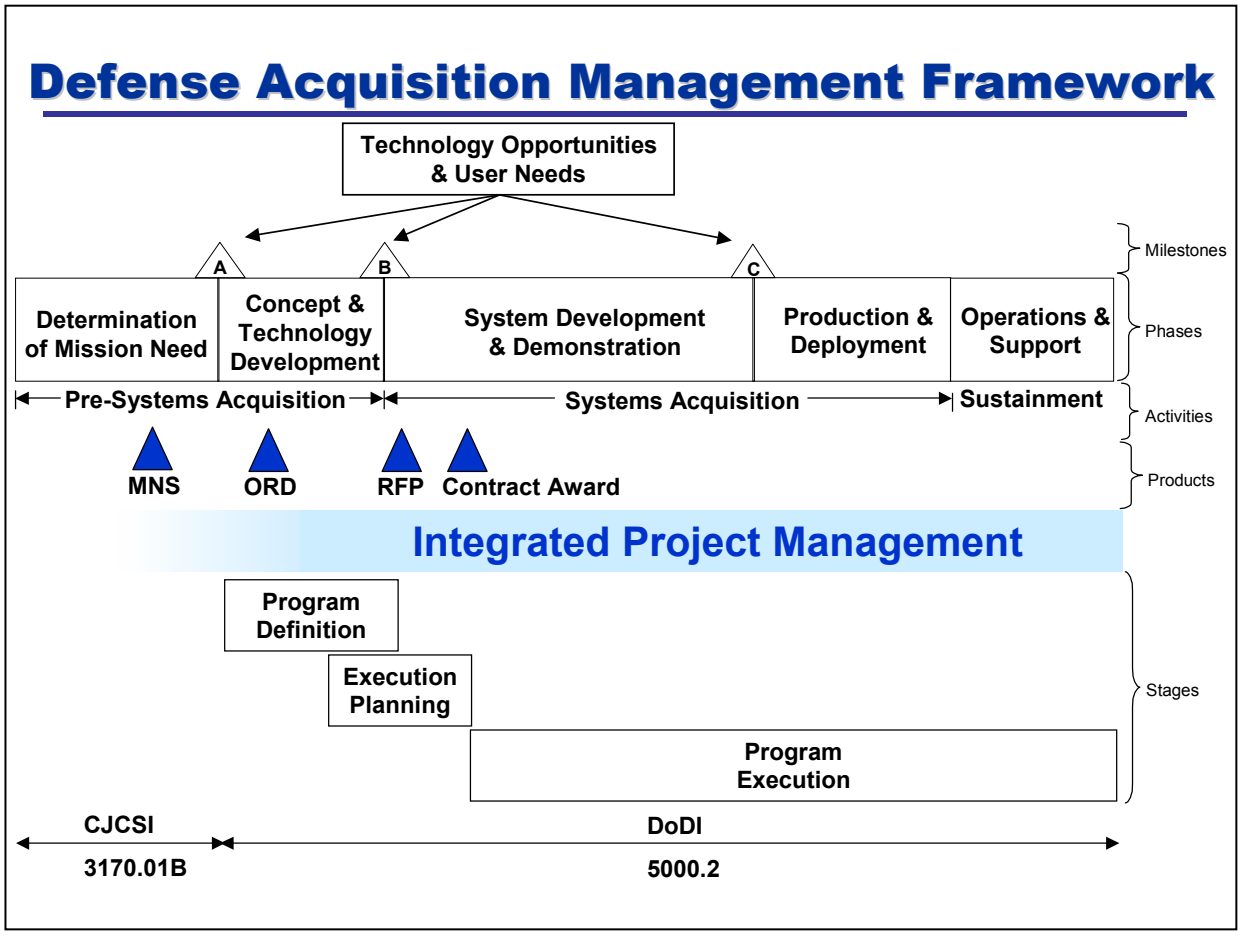


Figure 1 Defense Acquisition Management Framework

The purpose of **Integrated Project Management** is to provide a disciplined approach to effectively and affordably acquire goods and services to meet user needs. This **Integrated Project Management Handbook** provides a focus on the integrated nature of project management and a *time-sequenced framework* for building and executing a program. There is nothing revolutionary about how this framework is structured; the pieces are familiar. A typical project flow follows three stages: program definition, execution planning, and program execution (Figure 2). The first stage, **Program Definition**, is where requirements are solidified, and strategies are developed. During the second stage, **Execution Planning**, industry plans their approach to the program and submits a proposal. The third stage, **Program Execution**, is where the program work is performed. The difference in this presentation is the emphasis on the key *interrelationships* between the pieces within, and between, each stage and the *interdependencies* with the parallel and interactive industry efforts. This handbook also provides insights into the *appropriate roles of* both the *Government and industry* organization within each stage of the integrated framework (Figure 3). The following provide a synopsis of these relationships and highlight the handbook structure.

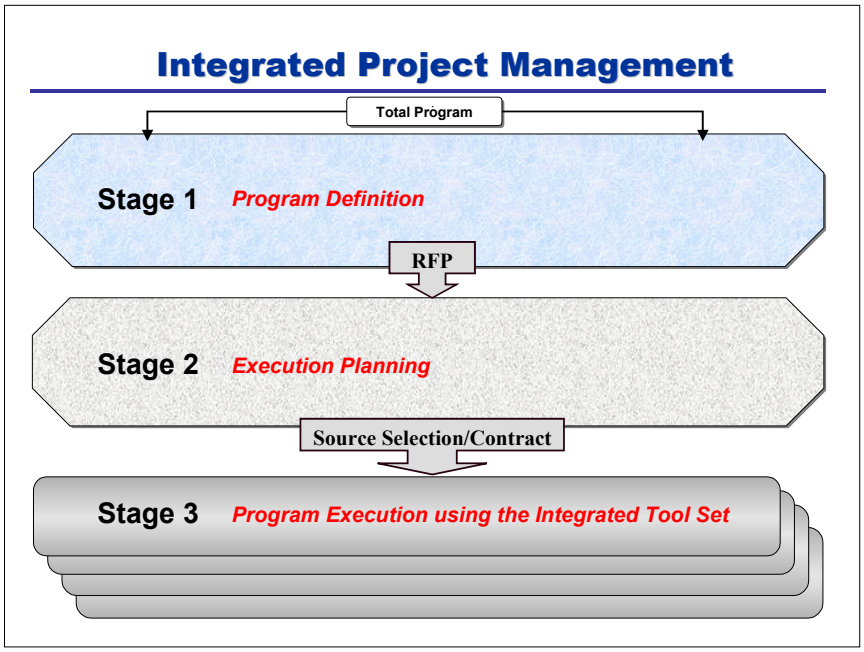


Figure 2 Three Stages

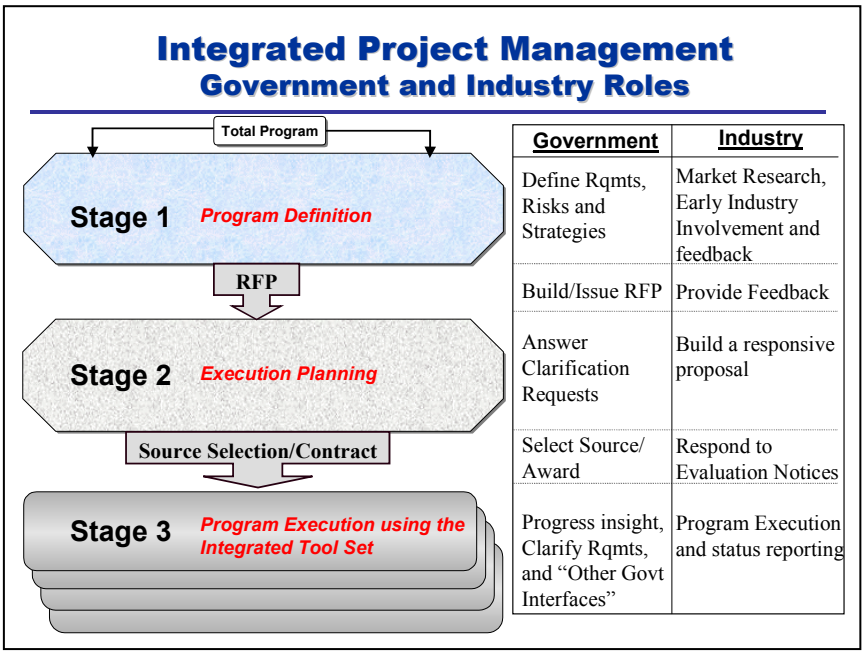


Figure 3 Government and Industry Roles

Program Definition focuses on the initial program definition tasks and strategic development activity, which is ultimately reflected in the RFP. The team documents the programmatic and technical requirements, develops the top level program approach and performs an initial risk assessment. The goal is to develop a program strategy, (for both the total program and any particular contract to support the overall strategy) which can be expected to rea-

sonably meet all requirements, within program budget, at acceptable risk. The Government provides the leadership role in this stage; however early industry inputs can provide critically important insights into both technical challenges and key business motivations. Industry begins working with the users in the early stages of the requirements process. Their program planning activities begin very early in the Government cycle—Industry actually accomplishes a great deal of work during this Program Definition Stage and has insights that can be extremely valuable (Figure 4). Competitors have frequently accomplished the Bid/No Bid decision analysis, structured an approach and perhaps even initiated the draft proposal. Early and frequent industry involvement in the strategy formulation provides valuable insight into both the technical and business aspects of the program. Building the strategy incrementally, with ongoing industry interaction is key to a successful Program Definition Stage and a well-structured RFP.

The second stage is **Execution Planning**, which begins with RFP issuance (Figure 3). However, industry efforts actually begin long before the final RFP (Figure 4). In the initial portion of this stage, industry leads in developing proposals in response to the RFP. In the latter portion, the lead shifts back to the Government for the proposal evaluation, source selection and contract award tasks. During Execution

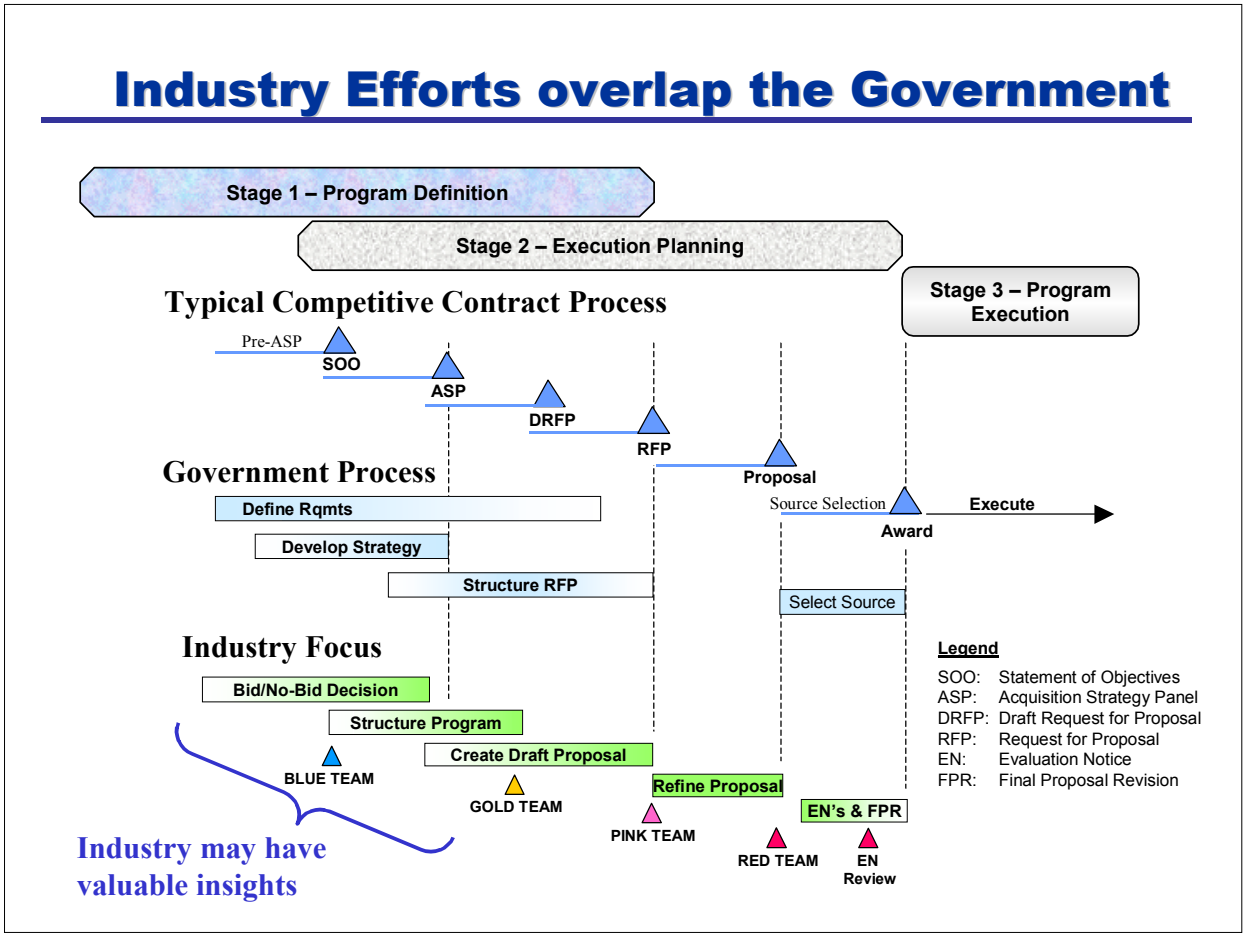


Figure 4 Industry efforts overlap the Government

Planning, offerors finalize their program planning, focusing on the specific items requested in the RFP. They develop Work Breakdown Structure (WBS) and IPT structures, present their program approach in an Integrated Management Plan (IMP) and Integrated Master Schedule (IMS), and expand the System Requirements Document (SRD) technical requirements. Risk management plans are expanded into specific mitigation techniques and the program cost estimate is completed. Contract award provides a closure to the planning stage.

After contract award the industry-Government team enters the third stage, **Program Execution**, where both the Government and industry have key responsibilities (Figure 3). The focus of these program management activities is managing risk and addressing the impact of change. An integrated tool set is used in this stage to provide program insight to all levels of Government and industry management. Contents of the tool set vary with the program, nevertheless includes, at a minimum, the IMS, Earned Value Management System (EVMS), and program metrics.

While the handbook documents Integrated Project Management as three sequential stages with each containing several key products and tasks (Figure 5), IPM is in fact overlapping stages between requirements definition, program definition and execution, and system fielding, which necessitate parallel strategy development, risk management and mitigation, and program management activities. Opportunities for mis-

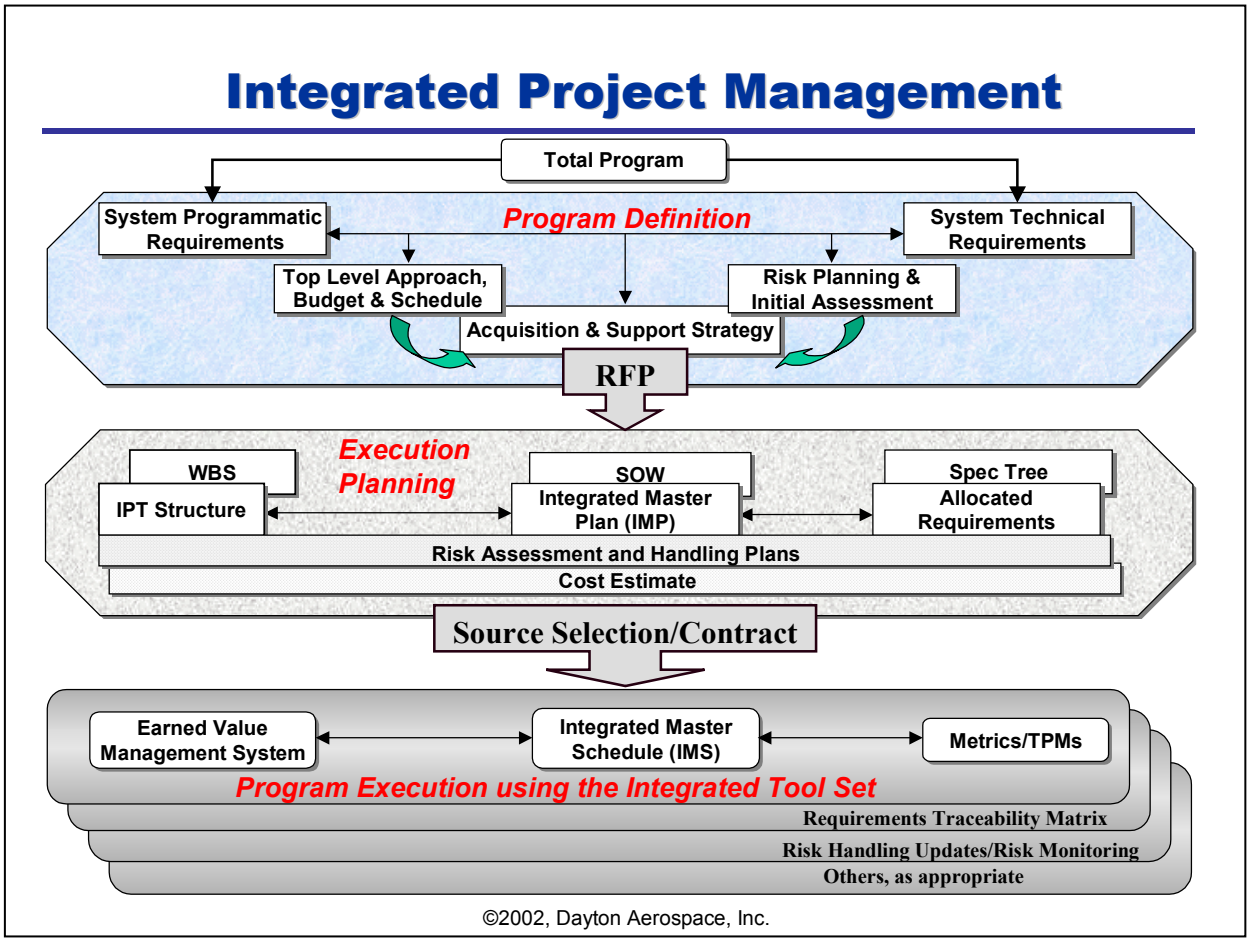


Figure 5 Fully populated Integrated Project Management framework

communication are extensive, while opportunities for program synergism through open communication are equally prevalent. This synergism through parallel development is essential for a successful program implemented in an acceptable and reasonable cycle time. This handbook is divided into three chapters, corresponding to the three stages. Within each chapter there are sections describing each of the major products or tasks. Interrelationships to other products and tasks are discussed, as well as the interdependencies between Government and industry efforts. At the end of each section is a paragraph titled "Principle Linkages within Integrated Project Management" that describes: 1) **Predecessors**: interrelationships or linkages between material and subjects in that specific section and the previous section(s) as applicable; 2) **Interconnects**: interrelationships between material and subjects within that specific section and where activities may be concurrent and interwoven with each other as the material and subject evolve;

and 3) **Successors**: interrelationships between material and subjects in that specific section and the succeeding section(s) as applicable.

Attachment 1 discusses Early Dispute Resolution. Attachment 2 provides a list of Acronyms used in this handbook.

I. CHAPTER 1 – PROGRAM DEFINITION

The first stage of IPM, **Program Definition**, provides the foundation for program success in general, and the Integrated Project Management approach in particular. Program definition is focused on supporting the Government's Planning Phase. During this stage, the user evolves program requirements and the acquisition team translates these requirements into acquisition and support strategies. The objective is to provide a coherent description of program requirements and define a general strategy of how to achieve the requirements. It is incorrect to think that the tasks within the Program Definition Stage can be accomplished purely sequentially; rather there is a task flow, where the bulk of work on one is done substantially ahead of the others (Figure 6). Within this overall hierarchy, however, the entire Program Definition Stage can also be considered an iterative process with refinement of all tasks accomplished in parallel.

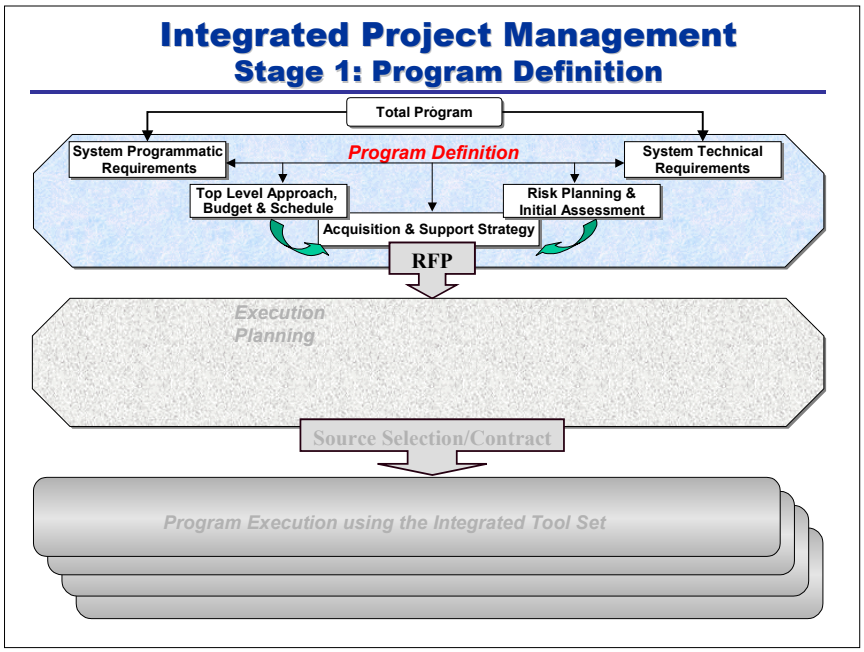


Figure 6 Program Definition Stage is the foundation

As early in the acquisition process as possible, but certainly well in advance of the anticipated contract award, the Government establishes system requirements and top level program plans. **System Programmatic Requirements** address such considerations as projected funding profiles and constraints, whether it will be a joint program, the program office size and structure, etc. The **System Technical Requirements** should be documented in the ORD, which sometimes overlaps programmatic requirements (e.g., a schedule constraint for IOC or FOC).

The program requirements (both programmatic and technical) are used to perform initial program planning in the areas of cost, schedule, performance and risk. Using the program requirements as a basis, there are certain associated risks, determined through **Risk Planning and Initial Assessment.** The **Top Level Approach, Budget and Schedule** may be initially constructed in parallel, or follow, risk planning. Either way, the two are iterative in that risks drive specific program approaches, and each program approach carries with it certain risks. Working with industry and the user, these are balanced to achieve an overall **Acquisition and Support Strategy**.

The program planning requirements to be met by the **Acquisition and Support Strategy** are documented in the Statement of Objectives (SOO) and SRD, which become primary inputs to the **RFP**. It is becoming common practice to attach the actual SOO and SRD to the RFP for further clarification. As part of the strategies, in a competitive situation the Government should have also developed a source selection plan. The key to writing a good RFP is to base it on how the proposal will be evaluated: 1) evaluate only the real discriminators, and 2) ask for only the information necessary to evaluate the discriminators.

The Government acquisition team begins by assisting the user in refining the requirements early in the requirements definition process. Figure 7 combines the information presented in the Defense Acquisition Management Framework (Figure 1) with the description of Government and industry overlap (Figure 4) to focus on the parallel efforts of the Program Definition Stage. Ensuring a performance based ORD helps avoid placing any inadvertent constraints on industry. And, early solicitation and frequent industry inputs help ensure both the user and acquisition team have a complete understanding of both the technical challenges and business environment.

Users are normally made aware of technology opportunities through early interaction with industry. The combination of early market research, discussions, and existing user needs, frequently forms an input to the MNS and ORD. Early POM budgetary wedges are frequently based on industry inputs.

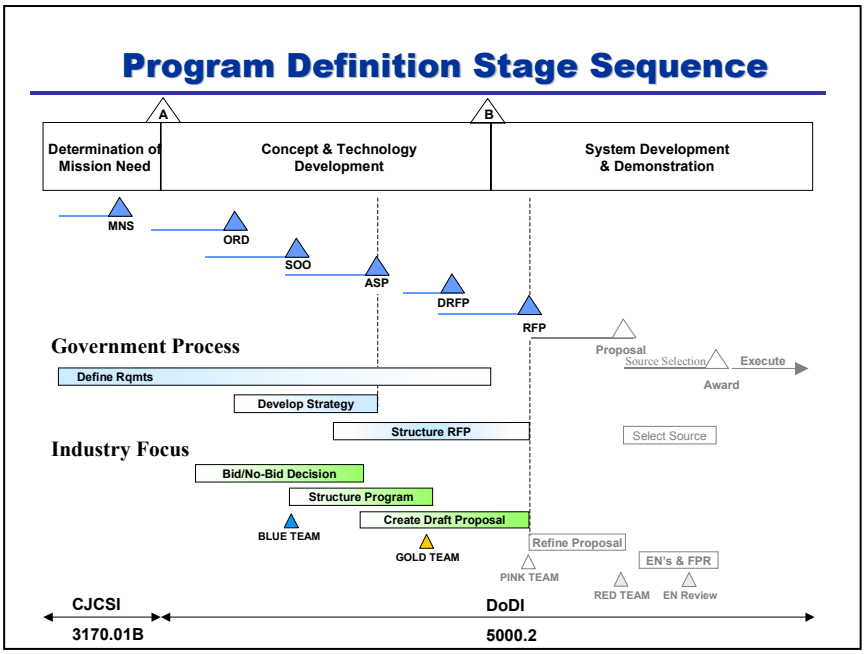


Figure 7 Program Definition Stage sequence

Industry's planning activities have a great deal of overlap with the Government's Program Definition Stage. Industry actually accomplishes a great deal of work, and may spend a great deal of bid and proposal funding prior to the RFP being released. These funds are used to make Bid/No Bid decisions, structuring the approach and perhaps even creating an initial draft of the proposal. Although the Government is coming to grips with an affordable and executable set of program requirements, industry is able to provide feedback on risks and costs for various choices. Throughout the time the Government is preparing the acquisition and support strategies, industry's early program structure efforts provide an opportunity for additional feedback. With an overlap in efforts, now is an excellent opportunity for the Government to capitalize on industry insights, and have a significantly better RFP -- the foundation of a successful program.

I.A. REQUIREMENTS

I.A.1. Requirements--Introduction

Requirements include both **programmatic** and **technical** requirements (Figure 8), which are used in parallel to develop the top level approach, risk planning, and acquisition and support strategy. All requirements, in particular the technical requirements, should be expressed in performance based terms. Operational constraints should be clearly delineated, without making presumptions regarding the specific technical capabilities needed to achieve the underlying requirements. For example, defining the requirement as interoperability with a specified set of radios is more appropriate than requiring a particular frequency range. Within the new framework established in DoDI 5000.2 and CJCSI 3170.01B, Technology Opportunities and user needs may lead to Milestone A, B or C (Figure 9). Regardless of the milestone entry point, the primary effort is the development of user needs, documented in the MNS/CRD/ORD and results in a Milestone. If this occurs prior to Milestone A, it will typically be documented in a MNS. If it is prior to Milestone B or C, it will also include a CRD and/or ORD. Early budget estimates are inserted into the planning cycle during the Pre-System Acquisition activity and often form the basis for all future program budgets.

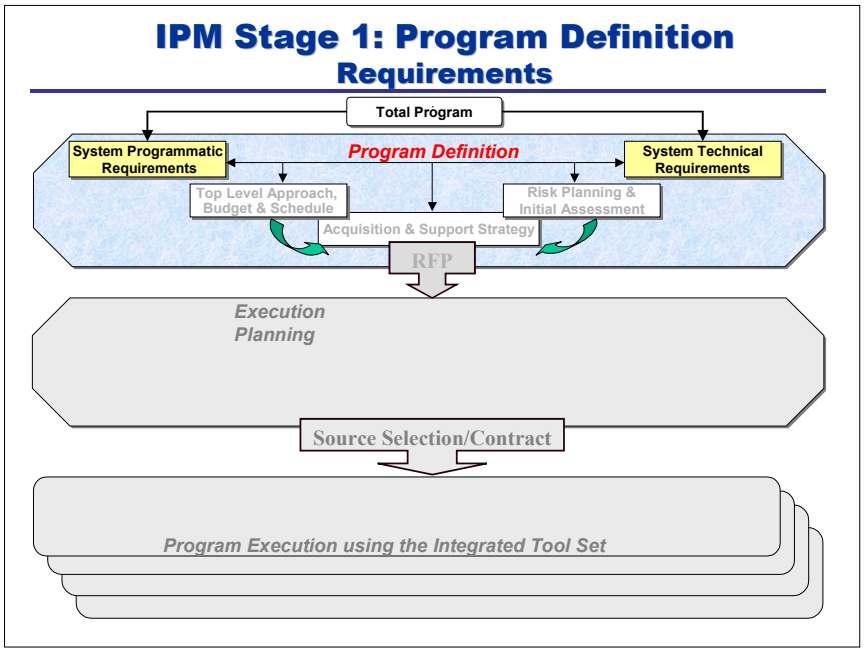


Figure 8 Requirements are both Programmatic and Technical

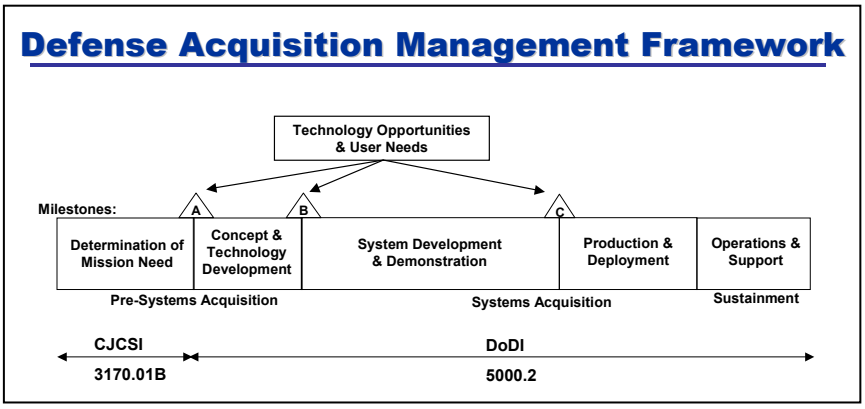


Figure 9 Pre-Systems Acquisition Phase defines user requirements

The requirements determined in the Determination of Mission Need Phase drive program strategies adopted during the IPM Program Definition Stage and the industry solutions generated during the IPM Execution Planning Stage. They must

reflect cost, schedule, and performance requirements and allow tradeoffs by identifying Thresholds and Objectives to permit the use of Cost as an Independent Vairable (CAIV). A "Users Day", where interactive discussions are held between the acquisition and user community, frequently proves very beneficial.

I.A.2. System Technical Requirements Discussion

Requirement: The need of an operational user, initially expressed in broad operational capability terms in the format of a MNS. It progressively evolves to system-specific performance requirements in the ORD. [1]

Developing well defined, performance based requirements during the Pre-Systems Acquisition activity is key to an effective Systems Development and Demonstration Phase. Well-articulated operational requirements are essential in getting to a complete and well-structured SRD for use in the solicitation. Actively participating with the user is important in maturing the MNS and all requirements documentation, including the CRD (if applicable), the ORD and the user's understanding of the end product through the operational view of the architecture. As summarized above, the MNS is a principal entry criterion for Milestone A, which leads to the development of the ORD prior to Milestone B (Figure 10 and 11). The MNS is the first formal documentation of the mission needs (requirements), which are defined in broad operational terms. As shown, the MNS leads either directly to the ORD or indirectly to the ORD through the CRD. The CRD expresses mission area over-arching capabilities for a system of systems or family of systems. The ORD translates the MNS into system level performance capabilities. The SRD is derived from the ORD and it reflects specific system performance and *design to* requirements (typically used in the System Development and Demonstration Phase). In a performance based technical strategy, the SRD must be stated in terms that can be put on contract, including verification requirements.

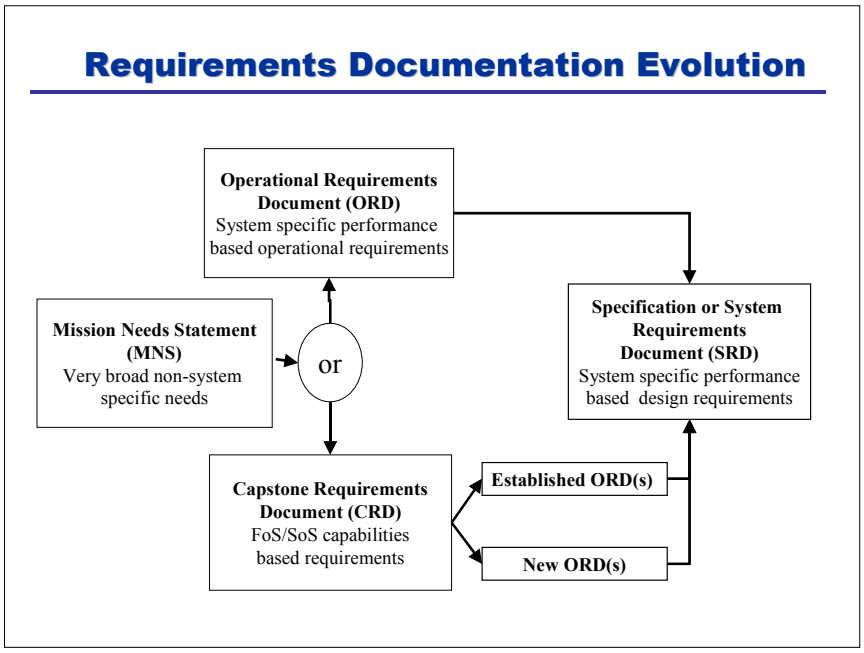


Figure 10 Requirements documentation evolution

Caution:

C It is inappropriate for the SRD to include a solution description or unnecessary references to MIL SPECs, standards or handbooks. Including only performance requirements allows flexibility and innovation during the System Development and Demonstration Phase.

[1] CJCSI 3170.01B, 15 Apr 2001

Note:

N It is important to recognize that requirements definition does not precede the Acquisition Phase; it is part of the Acquisition Phase. There are shared responsibilities between the user community and acquisition community, on defining how to translate operational needs into specific requirements that can be met.

The *Pre-Systems Acquisition Activity* consists of two acquisition phases: *Determination of Mission Need* and *Concept and Technology Development*. Each of these phases consists of numerous overlapping tasks crosscutting through the *Requirements Generation System Process*, *Defense Acquisition System Process*, and *PPBS Process* (Figure 11). The following two sub-sections briefly summarize the various tasks and products of the Pre-Systems Acquisition Activity.

Determination of Mission Need Phase

The Pre Milestone A activities have long been the domain of the user community along with advanced planning specialists within the acquisition organizations. With the downsizing of both the user and acquisition communities there is a need for all acquisition professionals to be familiar with and better understand the program "birthing" process. It is during this initial phase that the groundwork for implementing

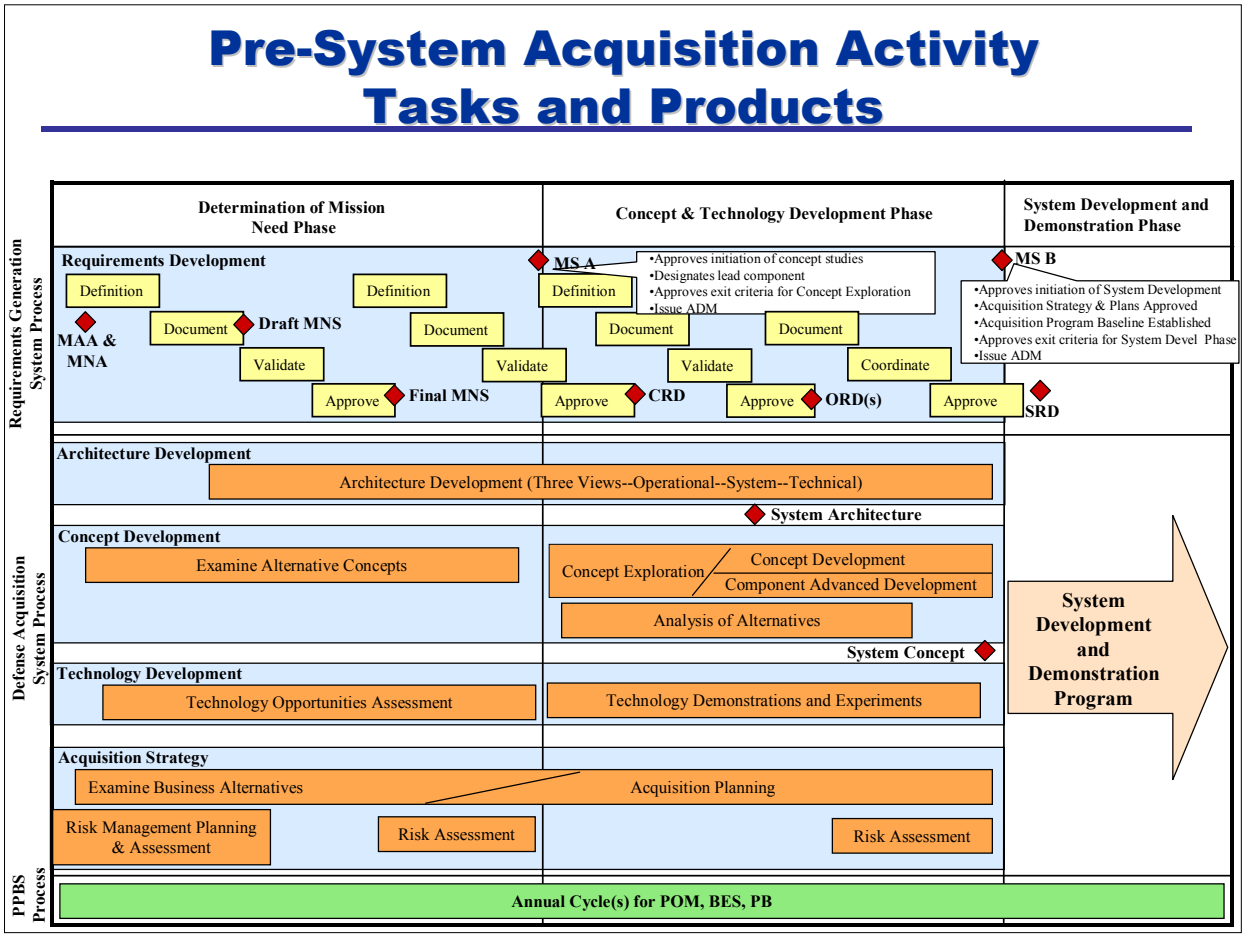


Figure 11 Pre-Systems Acquisition Activities

a performance based acquisition is instituted. Increased awareness and understanding will also help the acquisition professionals to translate the user stated requirements into a performance and capability-based

acquisition. The requirements process first develops the MNS. This is the initial documentation of a specific operational need upon which an acquisition is based and is thus the initial statement of performance requirements that eventually results in the SRD and SOO needed to enter into System Development and Demonstration.

The user is responsible for definition and maturation of the required mission need capability. However, this is best accomplished when it includes input from the Government acquisition community and industry representatives. A well-defined requirements generation process has been established by the JCS[2] to provide policies for the development, review, validation and approval of MNSs, CRDs, and ORDs. The process consists of four phases that are repeated in the generation of each type of requirements document as shown in Figure 11, Definition, Documentation, Validation and Approval.

Lessons learned from past programs suggest that the Pre Milestone A process can be far more productive if an effort is made to create a more collaborative environment involving not only the user and acquisition personnel, but also industry. Industry is very interested and motivated to participate in the early stages of a program. Early blending of the views among participants synergistically improves the basic foundation of the requirements and any future acquisition decisions by the Government through increasing the knowledge base of all and inherently reducing program risk. During this Determination of Mission Need Phase leading to Milestone A and the subsequent Concept and Technology Development Phase leading to Milestone B the Government must take the lead to actively include industry in the requirements development and early acquisition planning. This is typically done via Industry Days and other Government/industry interchanges.

Caution:

C Although Early Industry Involvement is important, it is not an opportunity to press industry to perform work that should appropriately be funded by the Government. Programs should remain cognizant of the Anti-Deficiency Act and New Start Notice Congressional reporting requirements, which are of particular importance with respect to legal obligation of funds.

The MNS is a non-system specific statement of operational capability written in broad operational terms. The Definition Phase often consists of a review of existing policies, guidance, and projected threats that result in a Mission Area Assessment (MAA). The MAA defines the capability deficiency and the time frame the deficiency exists, looks across component boundaries for solutions and examines other related developments or opportunities to exploit technology breakthroughs. If a non-materiel solution cannot fulfill the need, the deficiencies are translated into a MNS. Validation of the MNS is conducted by an authority other than the user and may take place at different organizational levels depending on MNS origination, potential Acquisition Category (ACAT) level and whether it requires joint validation. The approval authority is the JROC or DoD Component, depending on the program. Joint or DoD component acquisition identifies whether CRD development is appropriate and recommends designation of the lead component.

The CRD captures the overarching requirements for a mission area that forms a Family of Systems (FoS) or System of Systems (SoS). It is intended to guide the development of mission needs and operational requirements for future and legacy systems and to facilitate the development of interoperable systems through the overarching capabilities described in the CRD. A CRD is appropriate when a mission area requires more than one ORD and when systems are developed by more than one component.

As shown in Figure 11, and discussed above, the Pre-Systems Acquisition activity parallels the Requirements processes. The Pre Milestone A acquisition process begins to establish the foundation for subsequent program phases through examination of alternative solutions, availability of technology and potential business alternatives. The PPBS process provides the financial means to formally engage in the ac-

[2] CJCSI 3170.01B, Requirements Generation System

quisition of a materiel solution to meet the stated operational need. The acquisition organization is responsible for the initial analyses and tradeoff of concepts, technology business strategy and risk assessment in response to the operational need. Similar to the Requirements Process, this should also include members from user and industry communities due to the considerable interaction needed to structure an executable program and to prepare for a successful Milestone A Review.

In some cases a formal Milestone A Review is not held, however there may still be a less formal review. A successful Milestone B is dependent on tasks starting prior to Milestone A. In many cases, preliminary data is generated prior to Milestone A and there is a continuation of analyses of alternative concepts and/or technology opportunities into the next phase.

At Milestone A, the JROC or DoD Component, whichever is applicable, must have validated the MNS. If there are no existing solutions, such as tactics modification or use of COTS, the MDA approves: 1) the initiation of concept studies; 2) the lead component designation for joint programs; and 3) issues the ADM to continue into Concept and Technology Phase of the program.

Concept and Technology Development Phase

During this phase of a program between Milestone A and B (Figure 11) the principle activities involve five major tracks, i.e., Requirements Development, Architecture Development, Concept Development, Analysis of Alternatives (AoA), and Program Development. These tracks are interrelated and require constant coordination. Risk management overlays all of these elements and should be addressed periodically during the program.

Entry into Milestone B requires completion of several important activities. (See DoD 5000.2) The MNS, which is approved in the early stages of the program prior to Milestone A, is the basis for the requirements, which must be validated (CRD if required and ORD) by the appropriate JROC or DoD Component. The ORD translates the MNS and CRD capabilities and characteristics for a proposed system and forms the specific requirements for the Acquisition Management System and the PPBS processes. All programs must address compatibility and interoperability requirements, but particular emphasis is required for Joint, C4I and Intelligence, Surveillance and Reconnaissance (ISR) programs.

Note:

N

Since CRDs guide the development of supporting ORDs for specific requirements (and subsequent systems) a key overarching requirement is **interoperability.** Interoperability and affordability are required KPPs that must be addressed in the user's requirements documentation.

The activities to develop the System Architecture, started during the Pre-Milestone A Phase of the program, are completed early in the Concept and Technology Development Phase. The concept development and program development activities have to be worked hand in hand. They are the cornerstones of the Milestone B entrance criteria and within these activities there are many statutory and regulatory requirements for emerging programs.

The system architecture must be completed along with the identification of a preferred system concept that comes from the AoA. The SRD must be completed (and in coordination if not approved) for this to become an integral part of the System Development RFP and the keystone of the Performance Based Business Environment.

Note:

N

Industry Days are an important tool to encourage industry involvement during the Concept and Technology Development Phase. The Government must take the lead in encouraging participation. There is a natural tendency for industry to be hesitant since they are soon to be in a competition. The Government must take special care to encourage open communication and to protect all proprietary or competition sensitive data that industry shares.

Concept exploration normally involves multiple short-term studies and analyses. They are frequently contracted study efforts that are competitively selected and involve multiple contractors and/or agencies. The studies are conducted in parallel and used to define and evaluate feasibility of the concepts. The focus is on the performance requirements—the alternative solutions are the vehicle to evaluate the technology application and trade space available to the Government. An important element of this effort is establishing the cost, schedule, and technical risks involved with the concepts, along with modeling and simulation efforts, to determine the relative merits of the concepts. The studies feed directly into the AoA used to facilitate comparison of the alternatives. The requirements for the concepts are derived from the MNS and the CRD/ORD. The most promising concepts are carried into the AoA where the operational merits (meeting the user requirements) are coupled with a business case analysis. The AoA establishes the preferred system concept not the specific concept implementation. The performance requirements are captured while specifics of a solution are left free to evolve and mature until well into the next phase of the program. Maintaining the flexibility to evolve the configuration specifics while identifying and controlling the performance requirements is the backbone of Performance Based Business Environment (PBBE).

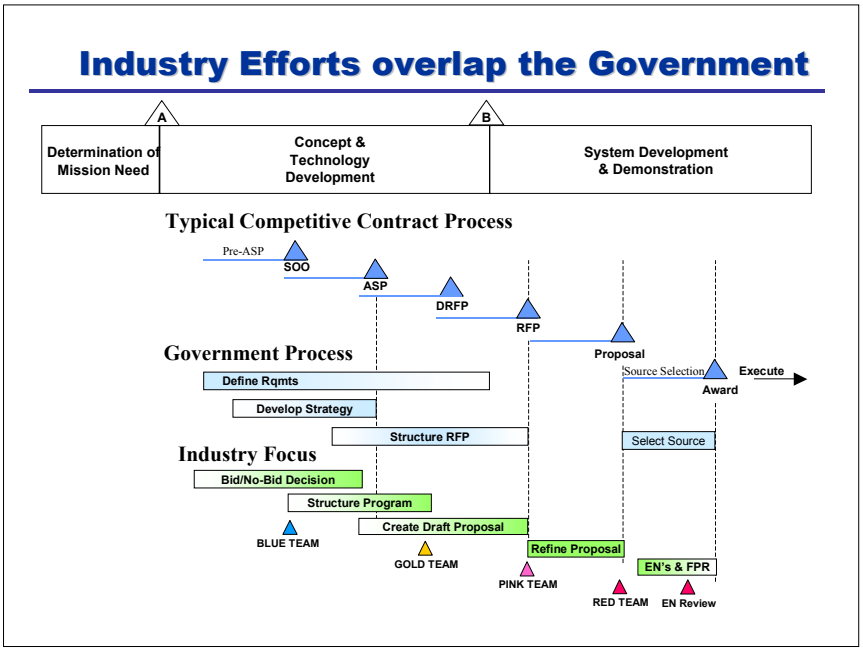


Figure 12 Industry program decision prior to Milestone B

Industry accomplishes much of their program decision-making process well in advance of an RFP release (Figure 12), through parallel involvement with the Governments requirements determination process prior to the Milestone. Industry may frequently have completed the approach to structuring a program to meet the expected requirements before the draft RFP is released. Therefore it is particularly important to keep industry involved earlier than the RFP release. This is accomplished through industry days, announcements in the Commerce Business Daily, etc.

Acquisitions may enter process at a later Milestone, due to technology maturity, a lower level of risk and a clear definition of user needs. This is determined through the industry feedback as discussed above. If so, the same basic process is followed.

I.A.3. System Programmatic Requirements

The Planning, Programming, and Budgeting System (PPBS) is the formal process used to identify and assure the planned system/product has the budget to support its development, production, deployment and operation.

The POM for the C&TD Phase, along with subsequent phases, of the proposed program must be submitted in accordance with the appropriate deadlines for the biannual budget process. This is a significant effort since it must reflect the anticipated work and requires considerable coordination with user personnel. The PPBS is also dependent on some early programmatic decisions addressing how required tasks for the C&TD Phase are to be completed.

Programmatic requirements include such areas as the total ownership costs for the program. An unaffordable perfect system is not acceptable. Further, many programs have schedule constraints due to operational need or projects being interrelated to other projects. They may have to interface with other programs that have their own timeline requirements, such as developing a performance modification for installation concurrently with planned depot maintenance activities. There may be support-planning requirements such as the "Core Determination" for depot source of repair that have to be recognized. All programs are sensitive to the annual budget stream or funding profile limitations, with fiscal year-to-year constraints to adhere to and accommodate.

I.A.4. CAIV

It is critical to understand the trade space between the technical performance (including supportability) objectives, the cost objectives, and the schedule objectives. This is, in essence, CAIV.

CAIV is a strategy that entails setting aggressive realistic cost objectives when defining operational requirements, acquiring defense systems, and managing achievement of these objectives. Cost objectives must balance mission need with projected out-year resources, taking into account existing technology, maturation of new technologies and anticipated process improvements in both DoD and industry. As system performance and cost objectives are decided (on the basis of cost-performance tradeoffs), the requirements and acquisition processes will make cost more of a constraint, and less of a variable, while obtaining the needed military capability. Although much discussion of CAIV is centered on new systems, CAIV principles are applicable throughout a system's life cycle.

The key tenets of CAIV are:

- Requirements are stated in terms of capabilities and may be exchanged, substituted, or adjusted for the sake of another. Capabilities must be established at the system level and not at lower levels.
- Early and continuous customer/warfighter participation in setting and adjusting program goals throughout the program is imperative.
- Trade space (i.e., cost gradient with respect to performance) around the cost objective is encouraged.
- Realistic but aggressive cost objectives are set early and updated for each phase of an acquisition program.[3]

As part of communicating programmatic requirements, and relating them to the technical requirements, as well as the CAIV tradeoffs, an initial draft of the SOO should be developed. This will be refined over

[3] Defense Acquisition Deskbook

time, as the acquisition strategy evolves and industry feedback causes changes to the final contractual requirements of the program.

I.A.5. Principle Linkages within Integrated Project Management

At the end of each section is a paragraph titled "Principle Linkages within Integrated Project Management" that describes 1) **Predecessors**: interrelationships or linkages between material and subjects in the specific section and the previous section(s) as applicable; 2) **Interconnects**: interrelationships between material and subjects within the specific section and 3) **Successors**: interrelationships between material and subjects in the specific section and the succeeding section(s) as applicable.

Predecessors:

- N/A

Interconnects:

- Top Level Approach [Section I.B.] Program requirements must be the underlying foundation for developing the program approach. Programmatic and technical requirements lead to the top level approach.
- Risk Planning [Section I.C.] Risk planning is done in parallel with the top level approach and is also based on the programmatic and technical requirements.
- Acquisition and Support Strategy [Section I.D.] The technical and programmatic requirements are incorporated in the acquisition and support strategies.

Successors:

- Allocated Requirements and the Specification Tree [Section II.C.] Once the total technical requirements are determined they can be further allocated.
- Work Breakdown Structure [Section II.A.] The WBS is based on the system and product decompositions and the systems engineering processes evolve from the user requirements.
- Metrics [Section III.C.] Key program requirements, as defined in the SOO and SRD, provide a list of potential areas to be measured and tracked during the Program Execution Stage.

I.B. DEVELOPING A TOP LEVEL APPROACH, BUDGET AND SCHEDULE

I.B.1. Top Level Approach Introduction

Establishment of the System Programmatic and System Technical requirements (Section I.A.) lays the foundation for a **Top Level Approach, Budget and Schedule**. This provides the initial definition of how products will be acquired and supported, including a refined cost estimate and schedule. This is a two-step process. The first step is developing the top level "architecture" which includes the Top Level Approach, Budget and Schedule. It is constructed within the bounds of the existing funding profile, risks, and other known constraints. This information is fully explored with industry and refined into a top level "approach". Processes for developing both the structure and "approach" are discussed in the following sections.

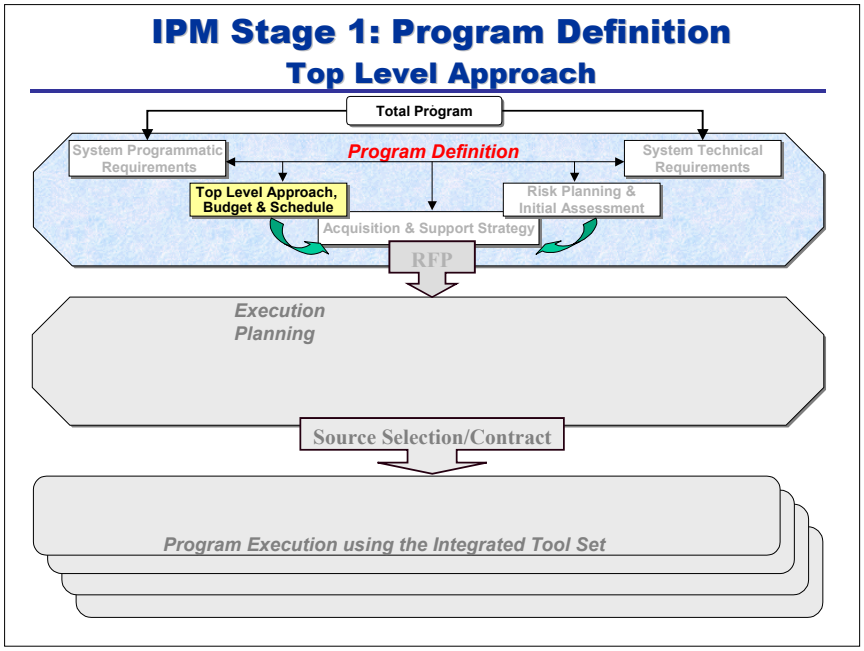


Figure 13 Top level approach is requirements based

The PPBS cycle and its long lead times result in budgetary planning numbers being developed far in advance of specific program planning or full interaction with industry. These estimates are frequently accomplished several years prior to program execution. Although the early program budget planning makes a good attempt at properly phasing the associated industry efforts, it suffers from the obvious lack of timely information. Subsequent budget cycles and the inherent DoD funding reallocation normally result in funding profile reshaping, frequently to the extent the program is either unexecutable or inefficiently structured. This data must be refined prior to issuance of an RFP to industry.

As early in the acquisition process as possible, well in advance of the anticipated contract award, the Government uses updated programmatic and technical requirements to refine program planning. The refinement is accomplished in parallel with the initial Government risk planning, and is a multi-step process making significant use of industry inputs. The resulting **Top Level Approach, Budget and Schedule** is used as the basis for developing the Acquisition and Support Strategy, which leads to the RFP (Figure 13).

I.B.2. Top Level Program Architecture

The top level architecture portrays the Top Level Approach, Budget and Schedule—it reflects broad program requirements, including planned contract award, user mandated operational dates, broad support requirements, and known funding profiles. It should be developed in parallel with, and as a fundamental

part of, initial risk planning since the top-level approach is highly dependent on specific program risks. The top level architecture describes the constraints within which the ultimate program must fit.

An overarching program architecture, showing how the program is to be constructed, is critical for obtaining meaningful industry input and ultimately developing an effective acquisition and support strategy. The top level architecture must delineate the entire program, reflect the major products delivered, and highlight the key activities to be accomplished. It captures the initial funding, plus any operational constraints and assumptions. There is no required template, however, it must provide visibility into the relationships between program efforts and adequate insight into any required time phasing. This forms the basis for discussions with industry and should be based only on firm requirements: the ORD, budget, programmatic requirements, and the planned contract award date. Additionally, programs may have inherited constraints because of the interface with other programs that already have timeline requirements (e.g., performing modifications concurrently with planned depot maintenance activities). A good rule of thumb for all programs is that this can be clearly portrayed on a one-page chart (Figure 14 illustrates a sample of an initial top level program architecture).

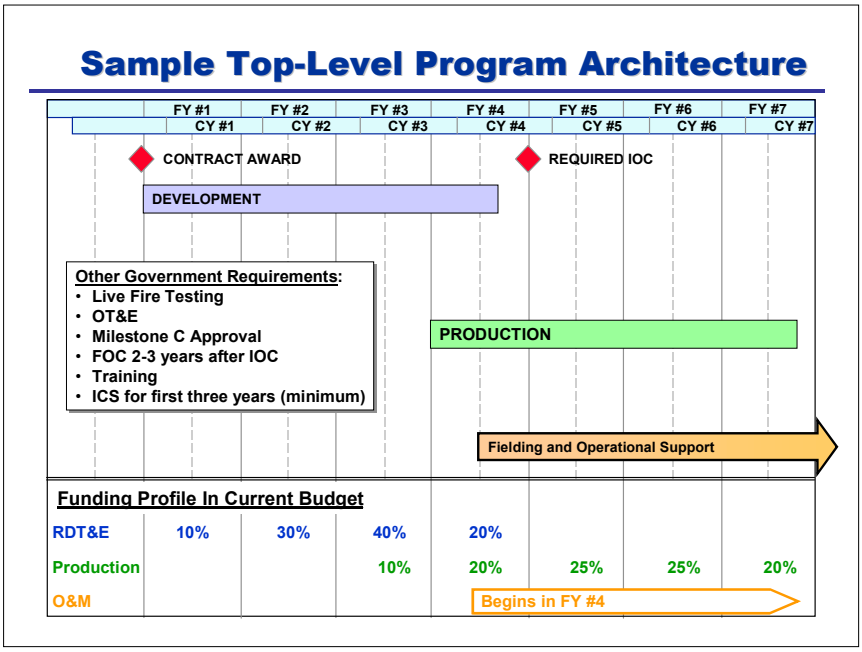


Figure 14 Top level program architecture

Caution:

C This initial estimate of the program cost and schedule typically occurs very early and is often the only information available for budget planning. Although later updates to the program may refine both, frequently they define the program budget and constrain possible solutions. However, overly conservative or overly aggressive estimates may result in program approval delay or unrealistic cost objectives.

The SOO is drafted, or updated, after construction of this initial top level architecture. It reflects top level, performance based, program requirements. Concurrent informal dialogue with industry ensure enough information now exists to have an "Industry Day", in which the Government explains the proposed program, elaborates on user requirements and programmatic constraints, and solicits industry input on all aspects of program planning.

I.B.3. Top Level Program Approach

Successful establishment of the top level program architecture, further market research, and industry inputs significantly improve program planning. Program constraints, that limit offeror flexibility and are inadvertently included in the program strategy, can be avoided through open dialogue with industry.

Caution:

C It is critical the Government not proceed too quickly developing a top level program approach. Failure to build a strategy incrementally, with early and continuous industry feedback to the strategy, may jeopardize program success or sub-optimize the result.

As illustrated earlier (Figure 3, Government and industry activities overlap) industry is well advanced in their program planning prior to the Government finalizing the top level program approach or the acquisition and support strategies. Due to the historically compressed RFP and proposal schedules, industry has frequently made their tentative Bid/No Bid decisions and began to structure the program approach prior to the Government RFP. Although this almost inevitably generates larger amounts of scrap, rework, and bid and proposal expenditures during the proposal process, this approach provides significant opportunities for the Government Program Manager to gain additional insight into program possibilities, constraints, alternatives and risks prior to finalizing the strategies and issuing the RFP.

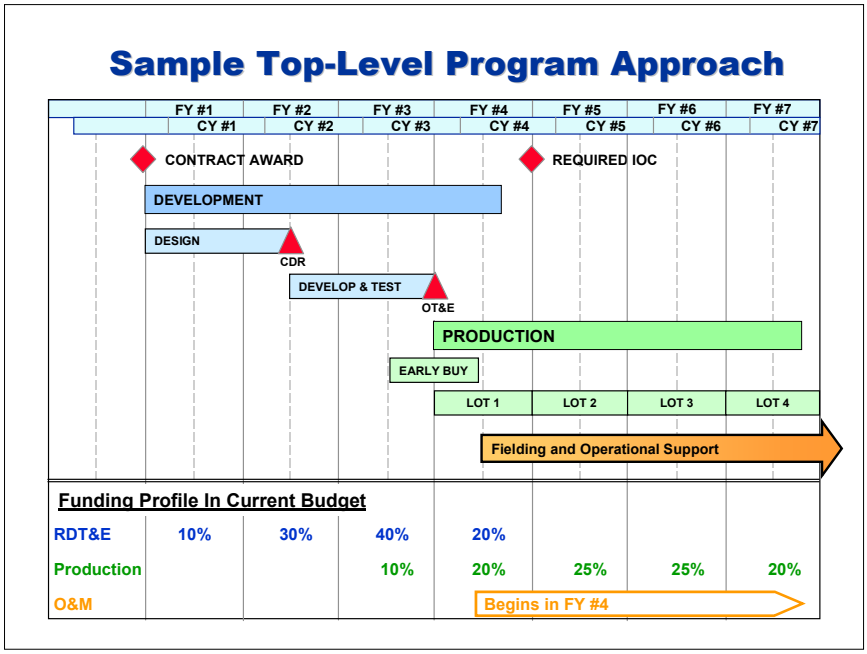


Figure 15 Industry inputs help determine the top level approach

The next level of planning addresses information necessary for the contractor to bid the program with a clear understanding of the key relationships, which items are mandatory items, and where flexibility in the approach exists. Figure 15 illustrates an example of a top level program approach. The top level approach should reflect both schedule and budget level assessments and identify any interfaces or interoperability needs that are required in order to execute the program. To the extent items are included in the top level approach for clarity (such as the placement of CDR), it should be made clear which dates are mandatory and which are notional. For instance, it is not critical to the Government when OT&E occurs; only that it does occur and has the proper entry and exit criteria identified. The objective is to allow industry the maximum flexibility to develop an efficient plan in the proposal by dictating as few milestones as possible.

WARNING:

W Too little time is normally spent developing the top level approach. There is a rush to work the details. Significant scrap and rework can be avoided if the full team (user, acquisition and industry) irons out the top level interrelationships early.

Further detail on the final acquisition and support strategy (Section I. D.) is defined once the risks have been considered (Section I. C.). Specific details of "how" the program delivers the products is part of the Execution Planning Phase (Chapter II of this handbook), not the Program Definition Phase. The key is that when the overall business strategy is developed, there is a consensus on how program personnel in all

disciplines are going to execute the program. The approach must recognize the technical and management needs, the time requirements, the funding requirements, and any interfaces over program life cycle.

The top level schedule should cover the entire program, and reflect the best judgment of how the fully integrated program planning convenes. During this timeframe initial "storyboards" of program flow are drafted, argued, and resolved to appropriately satisfy all multi-functional requirements. Although the Government has the lead for developing this, it is critical to work closely with industry to understand the risks associated with individual approaches and the credibility of budget and schedule assessments.

Successful programs typically follow a sequential, but iterative, process by answering three fundamental questions:

1) What are the program requirements? This is the list of goods and services to be provided to the ultimate user. It reflects the requirements.
2) When are the requirements met?
3) How are we going to get there? The "how" is usually first described in macro terms, for instance a development phase followed by a production or modification phase. Later, during the Execution Planning Phase, each contractor further breaks these efforts down into some variation of the classic program structure; such as SRR, PDR, CDR, ground test, flight test, production decision, etc.

In parallel with the schedule effort, the budget estimate for each of the elements should be created or updated to cover the entire spectrum of the acquisition program from the technical solution, to the schedule of planned work accomplishment, to the funding required over its full life cycle. This must be checked to ensure the program meets the financial requirements, both on an annual and overall program basis. Early in acquisition programs, only limited data is available for a specific technical solution so parametrics and analogies are routinely used. Generally, cost models (e.g., Price-S, Kokomo, SEER, etc.) should be used to develop a cost estimate early in the planning process. There is a wide range of choices on selecting the basis of estimate, but it must track to the desired approach, the desired performance, and the desired schedule. In general, no one model provides a complete estimate where multiple sources of data are to be used. Obtaining industry's honest insight and input is critical to an accurate budget.

Caution

C All program costs must be included in the budget estimate, many of which are not part of the contracted effort. These include things such as program office operations, funding for integration responsibility, and test support or data requirements for other organizations. These "Other Government Costs" can be a significant portion of the overall program cost.

Caution

C Industry may have access to total budget numbers, however will need an understanding of how much the Government is allotting to the contract and the spread by Fiscal Year. Ensure the contractors understand and appreciate "Other Government Costs". Otherwise, there will be inconsistent information being provided by the Program Office and the contractors to the user, undercutting both where unaffordable programs will be proposed.

Every program must be sensitive to the annual budget stream or funding profile limitations. There may be fiscal year to year constraints that must be accommodated. One of the possible outcomes of this process is to determine the budget is insufficient, or improperly phased, to accomplish the performance and schedule requirements. The "how" provides an initial assessment of budgetary costs, assigned to each element of the program deliverables. The alternative then exists to reduce requirements and/or convert requirements to contract options. Defining a perfectly performing, yet unaffordable system is of little value to the user community. There is a difference between competitive pressures, and asking industry to achieve unrealistic program milestones.

WARNING:

W When it becomes apparent that a planned program is not realistically achievable, delaying the notification to the System or hoping for a miracle will not help. The System can take bad news and respond appropriately, but does not tolerate and cannot respond well to surprises.

This estimating process, leading to a budget, occurs annually in order to affect the next PPBS cycle and must be accomplished at the right time. Otherwise, the updated data will not be used until the next step in the cycle and may delay or severely constrain program alternatives.

Caution

C Program budget estimates must be accomplished at the right time in the PPBS. Otherwise, the updated data will not be used until the next step in the cycle and may delay or severely constrain program alternatives. This will drive the need dates for industry feedback and when to accomplish the initial program planning.

The annual update serves to incorporate changes in program technical requirements, changes in business strategies, and include incurred cost actuals that increase the confidence level of the budget. The process is arduous but its ultimate result is an executable budget that provides the funding necessary for the execution of the program.

Note:

N Numerous examples exist where an RFP has been issued with unrealistic cost, schedule, and performance requirements…only to have the proposals come in with none meeting the financial constraints or doing so at high risk.

The possible **contracting approaches** (competitive development with sole source production and support, dual source production, award fee, etc.) should be addressed as part of any discussions during Industry Days. As a part of this effort, the Government needs to ensure the responsibilities the Government organization is to assume are supportable with available manpower. For instance, an Award Fee contract, with multiple short-period evaluations including mid-term assessments, is very labor intensive and may significantly impact a small program office.

Caution:

C The acquisition and support approach which balances program risk and contract type must recognize the real world manpower limits of the program office, and not constitute a plan the Government nor industry cannot realistically support.

I.B.4. Principle Linkages within Integrated Project Management

Predecessors:

- Requirements [Section I.A.] The technical and programmatic requirements must form the basis for establishing a top level approach. The approach should identify the key products and reflect the major schedule constraints in an affordable manner.

Interconnects:

- Risk Planning [Section I.C.] The top level approach is highly dependent on specific program risks. The top level schedule should cover the entire program, and reflect the approach to manage and reduce program risks to an acceptable level.

- All of Section II efforts "Early Industry Involvement" Industry members are making Bid/No Bid determinations and doing the initial work on structuring their program plans concurrent with the effort. They can provide important feedback.

Successors:

- Acquisition and Support Strategy [Section I.D.] The acquisition and support strategy is the detailed implementation of the top level approach over the life of the program. It fleshes out the Government/contractor roles and responsibilities, contracting and competition strategy, incentive approaches, integration responsibilities, and any evolutionary acquisition plans.
- The RFP [Section I.E.] The CLIN structure and the required schedule must reflect the products defined in the approach and reflect the overarching schedule presented.
- IMP/IMS [Section II.G.] Industry will use the top level approach as a guide for developing the expanded top level approach, ultimately culminating in an IMP/IMS.

I.C. RISK MANAGEMENT PLANNING AND INITIAL ASSESSMENT

I.C.1. Risk Planning and Initial Assessment Introduction

Risk is a measure of the ability to achieve overall program objectives within defined cost, schedule, and performance constraints. The two components used as criteria for Risk Planning and Assessment are: (1) the *probability* of the risk occurring and (2) the *consequences* of the risk occurring. *Risk management* is a process to control and maintain risk at an acceptable level—it is the centerpiece of program management. It includes risk planning and assessment, developing risk-handling options, and risk monitoring. It begins during the earliest portions of the Program Definition Stage and continues maturing throughout Execution Planning and Program Execution Stages (Figure 16). Early risk planning establishes the program risk strategy and directly supports the program Acquisition and Support Strategy. Everything from contract type, to performance incentives selection, to IPT structure is affected by early assessment of program risks and strategies. The goal is to achieve an effective balance between all program risks—cost, schedule and performance.

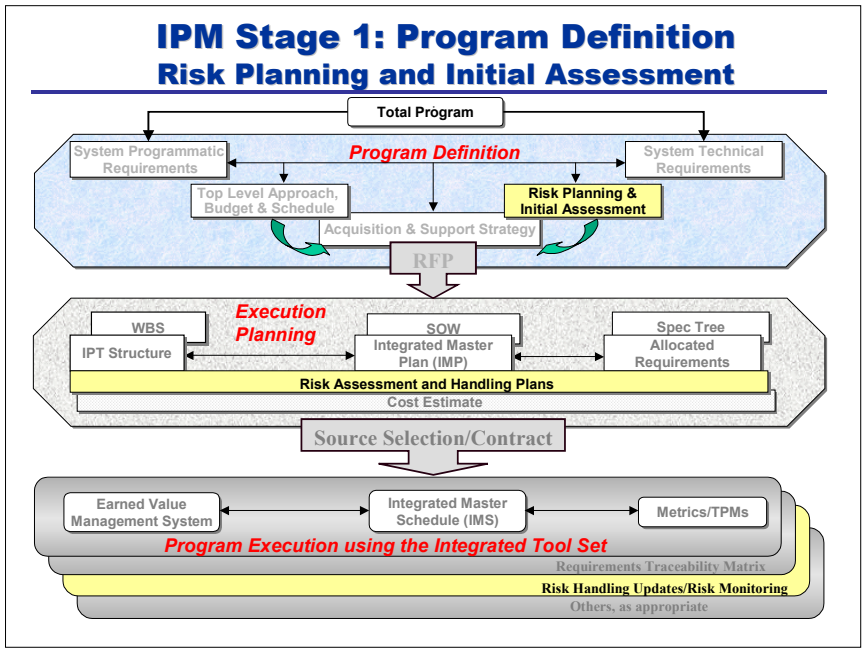


Figure 16 Risk management is a fundamental part of each stage

Historically, achieving user performance requirements has been paramount, even when it was accomplished at the expense of increased cost or schedule risk. Typically, performance requirements were considered inviolate while schedule and cost were treated as dependent variables. Cost and schedule are allowed to adjust, and typically increase, during the course of the program in order to meet performance needs. However, current policy emphasizes the importance of performance while also recognizing the realities of cost and schedule constraints. CAIV (Section I.A.4.) is one tool used to help balance risk. It encourages cost-performance-schedule tradeoffs in order to set risk at an acceptable level and meet cost objectives.

DoD policies and procedures that address risk management for acquisition programs are contained in four key DoD documents. DoDD 5000.1 contains the policy on risk management and is amplified further by the information in DoD 5000.2-R. The latter document integrates risk management into the acquisition process, describes the relationship between risk and various acquisition functions, and establishes some reporting requirements. DoDD 5000.4 and DoD 5000.4-M specifically address risk and cost analysis guidance as they apply to the Office of the Secretary of Defense Cost Analysis Improvement Group (CAIG) and its relationship to the Program Office's risk assessment and the DoD Component Cost Analysis (CCA).

The DoD Risk Management Guide provides an excellent reference for "dealing with system acquisition risks." Similar to the other sections of this handbook, the focus is to highlight the interrelationships to the other aspects of Integrated Project Management. Risk management matures throughout the Integrated Project Management stages. The fundamental assumptions, and underlying premises, of risk management are the user is more likely to receive a product meeting their expectations, the contractor better executes the program, and the Government receives better proposals if risks are more realistically addressed as a key part of the RFP preparation process, proposal development, and source selection processes. Figure 17, Risk Management Maturation, illustrates the notional flow of the risk management processes through the three stages of Integrated Project Management.

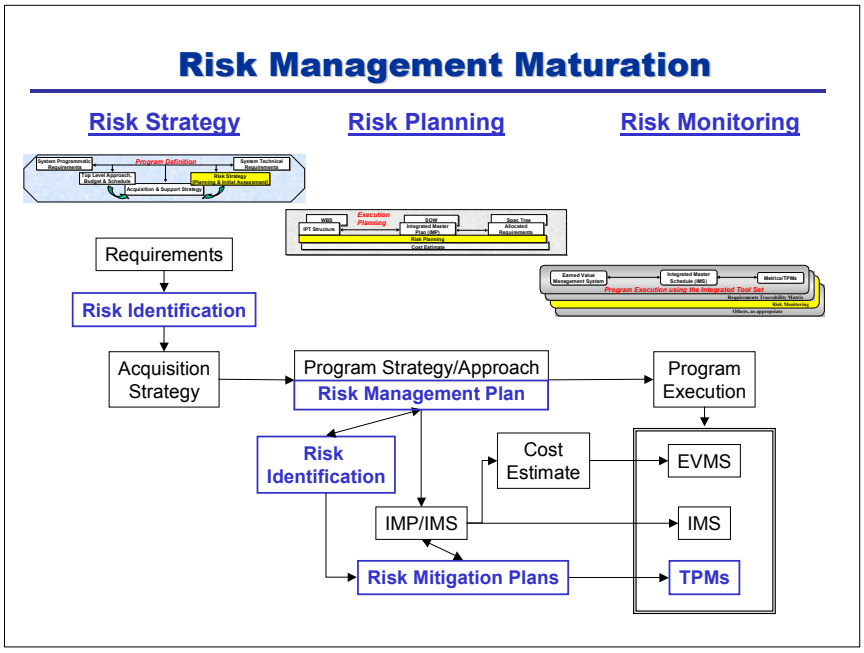


Figure 17 Risk management maturation

As discussed above, the program risk strategy is developed during the Program Definition Stage. It is based on the overall program Requirements, Top Level Approach Budget and Schedule. This leads directly to development of the integrated Acquisition and Support Strategy.

This program strategy is the basis for the RFP and the contractors detailed planning in the proposal. During risk planning, additional risks are identified, some of which generate refinements to the approach. Ultimately, the risk mitigation plans should be incorporated in the IMS, and become the basis for the program cost estimate (further discussion in Chapter 2, Execution Planning). The Program Execution Stage is where risks are monitored (further discussion in Chapter 3, Program Execution).

This section explores ways to effectively manage risk, focusing specifically on Risk Planning and the Initial Risk Assessment. Subsequent chapters address the remainder of the risk management process, included in the IPM Execution and IPM Program Execution Stages. The appropriate Government and contractor roles are also discussed. This also includes the industry's view of Government provided risks and how the industry identifies both program risks and the risk of winning a competition.

I.C.2. Risk Planning and Initial Assessment Discussion

Effective risk management is an integral part of the overall Integrated Project Management process. DoD acquisition history is replete with examples of programs, which were pushed through development too quickly, only to have unidentified or unresolved risks surface later. Time and again we have relearned the same lesson. Programs need to be transitioned to the next phase only if realistic risk assessments determine risk can be kept within an acceptable level and, the risk assessments must be realistic. DoDD 5000.2 makes realistic risk management one of the centerpieces of both program planning and execution.

"... PMs and other acquisition managers shall continually assess program risks. Risks must be well understood, and risk management approaches developed, before decision authorities can authorize a program to proceed into the next phase of the acquisition process."

System programmatic and technical requirements are the foundation for program planning, and therefore become the principle inputs for developing the risk planning and initial assessment. A DSMC study conducted a few years ago highlighted a strong correlation between realistic risk assessments and ultimate program success. It correlates realistic risk assessments with future program success, highlighting that major programs assessed as moderate risk at Milestone B (called Milestone II then) are more successful in terms of meeting cost and schedule goals than those unrealistically assessed as low risk. Initial risk assessments are made during the Concept and Technology Development Phase and become a primary focus of the System Development and Demonstration Phase. As the program progresses into System Development and Demonstration Phase, the risk assessments become more focused.

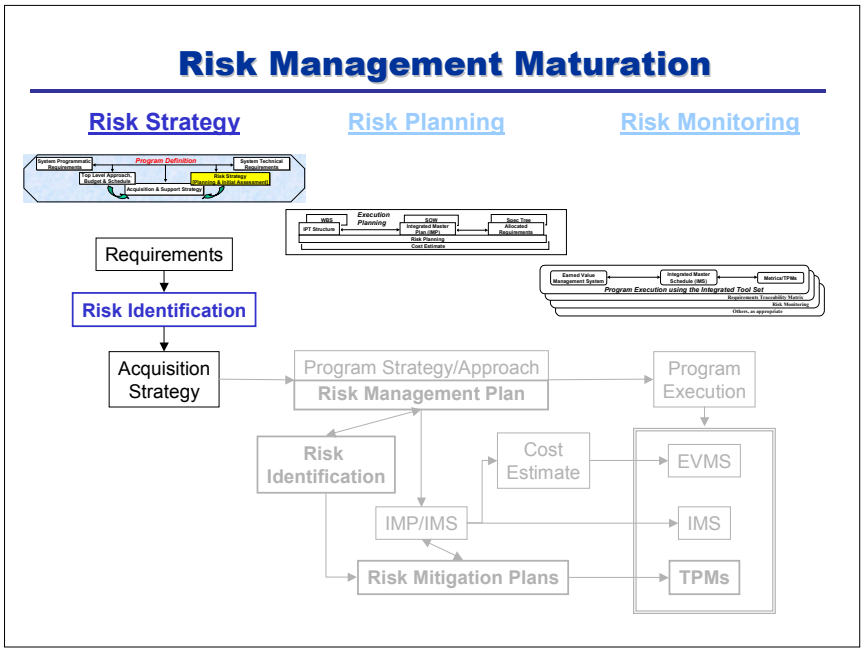


Figure 18 Risk Strategy is developed during Program Planning

Since the program's actual risk is a reflection of the contractors ability to develop, manufacture, and test the system, early industry involvement is critical to program and risk planning. The industry's developmental and manufacturing processes and tools, the availability and skills of personnel, and the previous experience of the Government and contractor team all influence the ability to handle system development and production. An effective risk management process includes the evaluation of the potential source's capabilities. This requires getting industry involvement in program planning as early as feasible. The Government needs to understand the industry views of program risks, and how industry can be most effectively motivated to address those risks early in the planning process.

WARNING:

W Both the Government and industry often minimize risks during pre-proposal activities. The Government wants to ensure proposals meet the available funding profiles. The potential offerors want to be seen as the logical choice, having already "solved" all major risk areas. Early industry involvement with open, frank and frequent communication can mitigate program executability challenges resulting from unrealistic risk assessments. Incomplete or non-existent ongoing risk management will most likely result in major program cost, schedule and performance impacts.

Risk management is a critical ingredient to a well-structured acquisition strategy. The acquisition strategy provides the framework for program planning and execution, and benefits appreciably from risk management key outputs such as:

- Provides a master schedule for critical events in the acquisition cycle.
- Gives a master checklist of the important issues and alternatives that must be addressed.
- Assists in prioritizing and integrating functional requirements, evaluating alternatives, and providing a coordinated approach to integrate diverse functional issues, leading to the accomplishment of program objectives.
- Provides the basis for the development and execution of the various subordinate functional strategies and plans.

WARNING:

W Encourage and incentivize risk management. Encourage realistic risk assessments by both the Government in developing the program strategy and industry in developing proposals. Risk is a reality and inherent in all activities to varying degrees. Risk is not the problem—failing to identify, understand and manage risk creates major program impacts.

The strategy should ensure a sound program through the management of performance, schedule, and cost risk. A high quality acquisition strategy acknowledges and identifies program risks, and forms the basis for implementing a forward-looking, effective risk management effort.

The program acquisition and support strategy should describe how risk is to be handled. It will also identify the risks that are shared with the contractor and those that are retained by the Government. The key concept is that the Government shares, not transfers, the risk to the contractor. The Government program office always has the responsibility to the system user to develop a capable system, and can never pardon itself of that responsibility. Therefore, all program risks, whether managed by the Government or the contractor, must be assessed and managed by the Government program office. The strategy should encompass the accepted general principles and top level guidelines for effective risk management.

- Assess program risks and develop strategies to manage the risks.
  - Focus on the real drivers. Identify them early and intensively manage those design parameters, which critically affect capability, readiness, design cost, or Total Ownership Costs (TOC).
  - Use technology demonstrations, modeling and simulation, and prototyping to reduce risks.
  - Include incremental test and evaluation as part of the risk management process.
- Include industry participation in risk management. Offerors must identify risks and develop plans to manage the risks as part of the proposals.
- Use a proactive structured risk assessment and analysis process to identify and analyze risks.
  - Identify, assess and track technical, schedule, and cost risk areas.
  - Establish risk mitigation plans.
  - Provide for periodic risk assessments throughout each program phase.
- Establish a series of “risk assessment events," where the effectiveness of risk reduction conducted to date is reviewed. These events are to be tied to the IMP at each level and clearly define the entry and exit criteria.
- Include processes as part of risk assessment. This includes the contractor's managerial, development, and manufacturing processes.
- Use objective metrics to track and manage risks.

- Clearly define a set of evaluation criteria for assigning risk ratings (low, moderate, high) for identified risk areas.

The final risk allocation between Government and industry is partially defined by agreed-to contract types. Further, the Government has all the risks associated with future contracts or contract changes, bounded only by the willingness of either party to "stay the course" with the program.

I.C.3. Principle Linkages within Integrated Project Management

Predecessors:

- System Requirements [Section I.A.] The underlying technical and programmatic requirements bring with them certain inherent risk areas. Risk planning and initial assessment activities should consider the inherent risks in the context of the planned approach.

Interconnects:

- Developing a Top Level Approach [Section I.B.] Determining the Government's recommended top level approach is an iterative approach, which considers cost, schedule, and performance risks, which may be introduced. The program approach brings with it certain benefits—and additional risks and constraints.
- Acquisition and Support Strategy [Section I.D.] The acquisition and support strategy is the detailed implementation of the top level approach to include risk planning. It is iterated until the strategy has acceptable risk.
- The RFP [Section I.E.] The source selection focuses on program discriminators—the RFP focuses on the aspects of program planning essential for a good source selection. How offerors handle the program identified risk areas will normally be key discriminators in the source selection.

Successors:

- Risk Mitigation Planning [Section II.E.] Risk areas, both Government identified and offeror identified, generate specific risk mitigation plans that are reflected in the IMS, explained in the proposal, and included in the cost volume.
- Risk Management and Updates [Section III.E.] Risk mitigation plans ultimately lead to the handling of the plans during the Execution Phase.

I.D. ACQUISITION AND SUPPORT STRATEGY

I.D.1. Acquisition and Support Strategy Introduction

The project Acquisition and Support Strategy describes solutions to meet the program cost, schedule, and performance requirements throughout the program life cycle (Figure 19). An effective project strategy should harness available competitive forces while creating a business approach and incentives consistent with the risk assessment. It recognizes and capitalizes on the interrelationship between acquisition and support to provide a total systems solution. It should clearly define the allocation of responsibilities between the Government and industry. The business environment is key; established at the very inception of the program and manifested in the program strategy and flow into the RFP for competitive or sole source procurements. The program team must balance all the independent factors and considerations when arriving at the project strategy. Adopting an Integrated Project Management approach at the core of the program has implications in all other aspects involved with acquisition strategy, support strategy, user critical performance requirements, program resources and risk assessment.

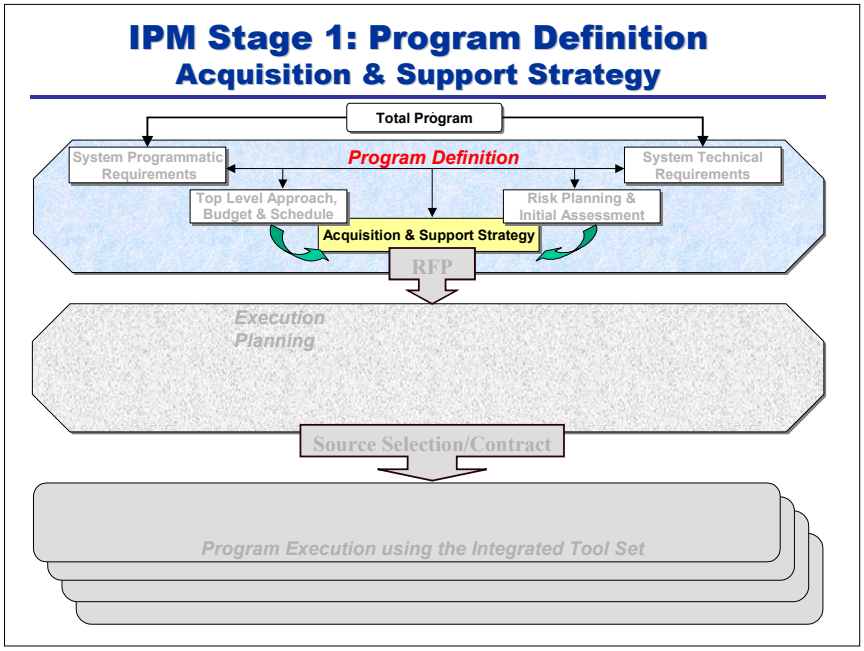


Figure 19 Program definition yields acquisition and support strategy

Acquisition and support strategies must be developed within the context of the total program strategy. Similar to what degree subsystems relate to systems, or in what manner a system fits within a system-of-systems, there are strategies within strategies. The significance is that each level of strategy must be supportive of the higher-level strategy and be responsive to both acquisition and support considerations.

1. Every program has a Top Level Approach, which normally results in multiple contracts through the life cycle, each with its own acquisition and support strategy; e.g., an overarching strategy to use block capabilities upgrade approach or an evolutionary acquisition approach.
2. Each of the multiple contracts are individual projects. Each has a *project strategy*, which originates from requirements and contains acquisition and support strategy components. The Integrated Project Management framework discussed in this handbook is meant to address the considerations of one of the contracts—a single RFP, source selection and contract award process. The acquisition and support strategy, or *project strategy,* is derived in an iterative manner addressing the program requirements (Section I.A.), the top level approach (Section I.B.) and risk strategy planning (Section I.C.).

Note:

N The acquisition and support strategy must be documented and address all topics required by DoD 5000.2-R. The specific details of the documentation can and should be tailored, based upon the unique program characteristics. The acquisition and support strategy may be a stand-alone, single purpose document, or it may be included in a more comprehensive, multi-purpose document (e.g., a Navy Master Acquisition Program Plan (MAPP) or an Air Force Single Acquisition Management Plan (SAMP)). The DoD Deskbook contains suggested contents.

The theory of Integrated Project Management is easily understood, however transition of the theory to practice becomes a challenge. Successful Integrated Project Management relies not on the writing of performance based documents (specifications, RFPs, SOOs, etc.) but on the formulation of an appropriate business environment within which to operate. Creating a business environment to enhance program success is normally one of the major challenges. The individual elements that must be satisfied have different, and frequently conflicting objectives. And, at this point they are frequently ill defined. Successfully reconciling and balancing the needs is only achievable by a carefully crafted business deal and building a team approach that is anchored in mutual trust and responsibility among program participants. The old adage, "A chain is only as strong as its weakest link" can be adapted for programs: "The programs success is governed by the weakest partner." The Government team must work to make the contractors successful and vice versa. This means creating a joint, non-adversarial environment where the team capitalizes on each partner's strengths and works to improve their weaknesses. There is no single approach to successfully achieving such an environment, but there are several key lessons that have been learned, and relearned, over the years. Key lesseons learned are briefly discussed in the following paragraphs.

I.D.2. Understand Total Program Requirements Across the Life Cycle

The genesis of an appropriate acquisition and support strategy is requirements definition (discussed in Section 1A). The total program requirements, over the complete system life cycle, must be thoroughly understood by both Government and industry. Program requirements should include both acquisition and support considerations since they are interdependent. Each decision in the development area has dramatic effects on support. The ability to impact the overall Total Ownership Cost (TOC) is highest early in the program. This is the time available program knowledge is lowest (Figure 20). Maintaining competition as long as possible is desirable to increase program knowledge prior to a final source selection decision.

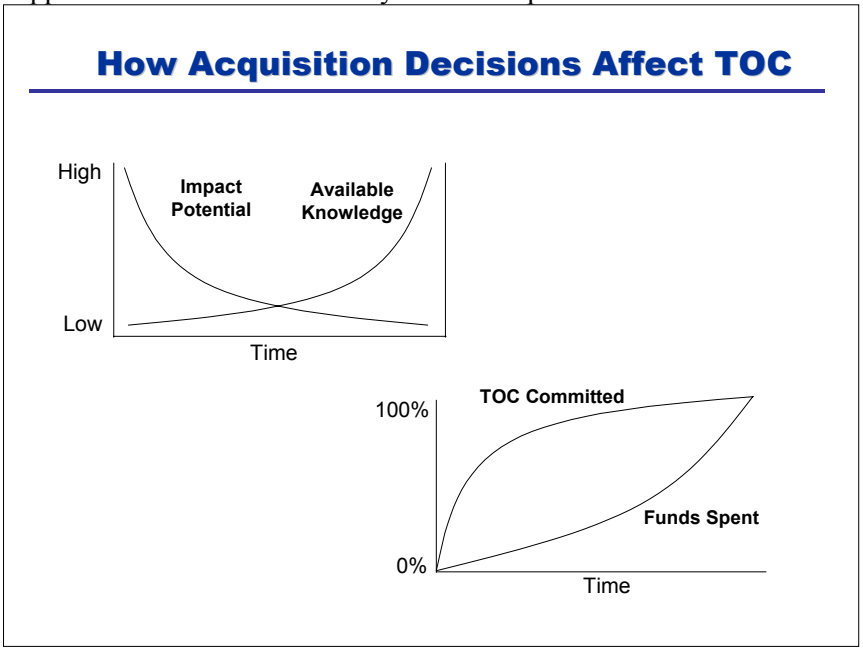


Figure 20 Total ownership cost commitments are made early

Without a total program focus, strategies will invariably be sub-optimized. For example, if the objective is to develop a replacement system to reduce the *cost* of accomplishing an existing mission, the acquisition strategy may be different than if the objective is to de-

velop a replacement system that must be 50 percent more *capable* than the existing system. Similarly, if requirements dictate system interoperability with 10 other systems, five of which are also being developed, the acquisition strategy differs significantly from that for a system that must only be interoperable with two well-established systems.

It is frequently enticing to decouple acquisition strategies from support strategies; however, development decisions are inextricably linked with the support strategy, and vice versa. For example, the key supportability drivers such as maintenance accessibility and component reliability are really driven by the system design.

WARNING:

W Decoupling the acquisition and support strategies often results in Total Ownership Cost suboptimization. Large gains in reliability can often be achieved through slight increases in development costs. Conversely, relatively minor development savings results in significantly higher OandS costs.

Development contracts are most effective when they are structured to incentivize the contractor to seek a balanced approach. It is important to allow the contractor to make tradeoffs between the design choices. This is accomplished by a performance based RFP which enables industry to optimize around their specific approach.

I.D.3. Structure the Program to Foster Cost/Performance Tradeoffs

Cost, schedule and performance are the three principal variables in any project acquisition and support discussion. They are interdependent -- fix any two and the third must be allowed to float. There are predictable relationships that represent the majority of cases:

- Cost increases as either schedule or performance increase.
- Schedule increases as performance requirements increase.
- Performance increases require increased schedule and cost.

Each project must strike its balance between increased performance, reduced costs, and quicker availability. The ORD, SRD, SOO, and specifications contain the cost, schedule and performance requirements…or parameters, typically expressed in terms of the [desired] objectives and [minimum acceptable] thresholds. The area between the objectives and thresholds is the “trade space”, the design flexibility to optimize life cycle performance. The trade space is more complicated than simply defining two points. It is not a linear relationship, but more appropriately a three-dimensional curved surface embedded with bands of increased importance. There may be a few very highly desirable performance characteristics just above the threshold, but only opportunities of significantly lesser utility beyond that point. Similarly, schedule delays might be thought of as having an exponential impact. Costs may be bounded by annual constraints, each with its own set of bands. The task is to achieve the best balance through appropriate tradeoffs—applying CAIV.

Note:

N Achieving a performance based family of requirements is best accomplished through interactive and recurring industry participation. Too many parameters, or parameters with very constrained trade space, yields an extremely constrained solution set and frequently precludes innovative solutions.

Acquisition Program Baselines (APBs) contain a subset of objectives and thresholds, the key cost, schedule, and performance parameters. Key Performance Parameters (KPP) are those which, failing to meet established thresholds, require a reevaluation of alternative concepts or design approaches.

The Government and industry program management teams, in consultation with the user, can tradeoff cost, schedule, and performance within the "trade space" without obtaining MDA approval. Tradeoffs outside the trade space require MDA approval. In addition, trading-off key performance parameters require JROC approval, or Principal Staff Assistant (PSA) for ACAT IA programs.

Note:

N Encourage performance based requirements with maximum flexibility between threshold and objective values. Structure acquisition and support strategies to incentivize cost, schedule, and performance tradeoffs. CAIV should be an integral part of the approach.

It's important to remember that contracting structure is not the strategy, but it is a primary enabler for establishing a successful business environment. It will help to align the interests and motivations of the parties, and ensure that business incentives focus on, stimulate, and ensure Government and contractor success. Any and all contracting structures must be structured to conform to the overarching strategy and reflect the identified program risks, while not losing sight of the market and business conditions that are operating and serving as a backdrop to your program.

I.D.4. Business Approaches Consistent with Realistic Risk Assessments

Each project operates within the overall business environment. Program risks are an integral part of the environment and, conversely, the environment drives a number of program risks (e.g., business downsizing reduces surge capability and increases risk). Within this overall environment the business arrangements, including contract types and incentives, must be appropriate and reflective of program risks (see Risk Planning, Section I.C.). For instance, if significant development is required, the cost risks should be shared between industry and Government. Contracts are more than administrative vehicles for obligating funds and taking delivery of products; properly structured they incentivize superior performance by appropriately recognizing risk. Realistic risk assessments become the foundation for future planning.

There are four program structure models that may be considered, depending on program specifics. The models are "traditional", "grand design", "incremental", and "evolutionary". The models, appropriately tailored, describe program structures suitable for the vast majority of programs.

The traditional model uses the generally defined "Milestones and Phases" reflected in DoDI 5000.2, and represents the typical approach to major acquisition development programs.

The grand design model is characterized by acquisition, development, and deployment of the total operational capability in a single increment. The required operational capability can be clearly defined and further enhancement is not foreseen to be necessary. The grand design model is most appropriate when the user requirements are well understood, supported by precedent, easily defined, and assessment of other considerations (e.g., risks, funding, schedule, size of program, or early realization of benefits) indicates that a phased approach is not required.

Note:

N The grand design model should be reserved for projects with well-defined technologies and requirements. It may also be used for very high priority programs that require a completely new approach or technology.

WARNING:

W Attempting to achieve the total solution, ignoring alternate approaches, for ill defined or challenging requirements will certainly result in cost growth and schedule delays.

The incremental model is generally characterized by acquisition, development, and deployment of capability through a number of clearly defined stand-alone system *increments*. The number, size, and phasing of the increments necessary to meet the user requirements is defined by the user and the Program Manager. An incremental model is appropriate when user requirements are well documented and easily defined. Assessment of other considerations (e.g., risks, funding, schedule, size of program, or early realization of benefits) indicates a phased approach is more valuable.

The evolutionary model is characterized by the design, development, and deployment of a preliminary capability using current technology, with provisions for the evolutionary addition of future capabilities as requirements are further defined and technologies mature. Evolutionary Defense Acquisition (EDA) combines and collapses the development and production phases through maximizing the use of proven technology and concurrent manufacturing and design. EDA strategy differs from the incremental model strategy in that the total functional capability is not completely defined at inception, however evolves as the system is built. This model offers an alternative to the traditional model for those programs not requiring a leap in technology, where the design process includes technology maturation, and where a program can make use of an interim solution with successive upgrades.

Spiral development is not limited to a specific model, but is probably more applicable to the incremental and evolutionary models.

Caution

C For both the incremental or evolutionary model, the user must define the expected capabilities at incremental steps in the ORD or other requirements documents. Otherwise, the test community will be unable to verify if the delivered capability meets the requirements or may report the delivered capability is unacceptable.

Note:

N Open architecture is a technical approach that is ideally suited for both the incremental or evolutionary model. This approach facilitates the use of standard products (from multiple suppliers) and leverages the benefits of the commercial marketplace. Risks such as diminishing sources are often significantly mitigated by using an open architecture. However, open architecture design is often more complex and may add schedule risk. Further, it may increase early program costs, even though it may cause a Total Ownership Cost reduction.

The contract type or pricing arrangement, its incentive structure and fee structure are the primary means available to influence contractor performance. However, any contracting and business approach will only work as intended if the realistic program risk picture is capture. Once the program office has determined the quantity of each risk to be shared by the contractor, it assesses the total risk assumed by the developing contractor and subcontractors. The business approach and the associated contract structure are fundamental in the implementation of the programs overall acquisition strategy. For each contract, there are a variety of choices between contract types and incentive structures. These range from fixed price to cost reimbursement and may include indefinite delivery, time and material, letter contracts, and agreements. These variances are driven by the degree and timing of the responsibility assumed by the contractor for the costs of performance and the amount and nature of the incentive offered to the contractor for achieving or exceeding specified standards or goals. The incentives can range from cost incentives to subjective performance incentives to objective performance incentives. Both subjective and objective tools can be included within the same contract and utilized in conjunction with cost incentives.

Caution

C

Choosing the most appropriate contract type and incentive structure is critical to long-term program success. Industry inputs, early in strategy development, are very valuable. The Government frequently does not really understand the contractor business environment, or what motivations are most effective. Ask them. Structuring a program where the contractor and Government motivations are not aligned creates future problems.

Cost incentives to motivate performance are frequently incorporated and include alternatives such as Firm Fixed Price or cost/price incentive contract types: fixed option pricing for longer term cost incentive; and long term price commitment curves.

Subjective performance incentives include such options as Award Fee (money provided) or Award Term (contract extension provided).

Caution

C

Award fee and award term contract incentive clauses can be very labor intensive for both the Government and contractor teams, especially if the evaluation period is short. Although these incentives can produce positive effects, the effort required to do mid-term analyses, final analyses, and reports for each period must also be considered—particularly when using smaller program teams. Avoid overkill; if you measure everything, you motivate nothing.

Objective performance incentives are based on metrics, with a defined formula based on measurement and payment calculations. This structure is most applicable when the contractor has FULL control over all aspects of the performance and it is easily quantifiable.

Regardless of the incentive method chosen, the measures of merit to determine the contractors performance must be defined, and they can be either output "results orientated" measures or input "process orientated" measures and captured in the project Technical Performance Measures (TPM) (Section III.C.).

WARNING:

W

Contractors optimize their performance to satisfy the contract. Incentives and motivations must support the overall program needs rather than sub-optimizing. For example, small increases in incentivized performance may have serious impacts on elements like reliability or durability that may not be incentivized, and vice versa.

I.D.5. Obtain Industry Feedback and Harness Competitive Forces

DoD 5000.2-R clearly states the importance of competition: *"For industry, competition to win business, along with attendant business profit, is by far the most powerful incentive. Therefore, competition shall be maintained for as long as practicable in all acquisition programs."*

Acquisition and support strategy development require continuous focus on the structural and procedural methodology available to ensure continuing competition. Market research is key in assessing the competitive health of the industry. For example, competition can be an effective tool for driving risk out of a program and achieving performance targets within a reasonable timeframe (e.g., down-selecting strategies). If risks are significant at the outset, and must be managed/mitigated by the next decision point, maintaining competition until that decision point is undoubtedly an excellent tool.

An early and close working relationship among the user, acquisition team, and contractors/industry is essential to developing the most appropriate acquisition and support strategy.

The perceived hindrances to early industry involvement in the program formative stages are easily mitigated through open, honest, and frequent communication. The Government must take the lead in establishing an environment of mutual trust where ideas are exchanged and proprietary rights are protected, as industry is performing their early efforts (Bid/No Bid decision, program structure, etc). Industry feedback can be obtained through a variety of means including the use of Industry Days, and request for information through the Commerce Business Daily. Program efforts should be structured to foster industry inputs into the program planning process. Meaningful inputs arrive when the Government invites industry into the planning process, rather than doling out the results of decisions. This should continue even after the basic strategy is agreed to. Industry feedback on the RFP, and its success in reflecting the desired strategy is critical.

Caution

C It is difficult, if not impossible to reach the optimum acquisition and support strategy in one pass. Iterative strategy development, and making use of industry feedback, will provide the greatest results. This allows closure on a balanced answer that provides the best probability of creating a win-win contract structure.

Examples of the questions that might be pursued include:

- Business and contract strategies should always contemplate possible approaches to assist in maintaining competition for as long as possible. Given that possibility, and the fact that there is a cost for maintaining competition, how long should multiple potential sources be supported?
- What does the industry believe is realistically achievable and what are the potential tradeoffs?
- Is there an industry base willing to perform program activities, including the follow-on support efforts such as Contractor Logistics Support (CLS)?
- Should this more appropriately be set aside for small business?
- What are the risks to industry and to the Government? How might an acquisition or support strategy change help mitigate these risks?

Caution

C Always consider available Government personnel resources when developing acquisition and support strategies—such things as award fee incentives and joint IPTs can be very labor intensive.

Caution

C While discussing the available budget with industry, ensure there is no misunderstanding regarding whether the amounts discussed are total budget or the amount planned for the contract (i.e., without the other Government expenses). Industry often has access to the total budget amount, but needs to understand how much is planned for the contract in order to scope their effort.

I.D.6. Relate Strategy to Acquisition Phases and Milestone Decision Points

The scope, intended products, critical events, and exit criteria must be known for each phase to help make decisions regarding how much concurrency makes sense, how long to maintain competition, how to structure contracts, and what prerequisites need to be establish for the exercise of options. Keep the program structure chart in front of you, and refine it along with the acquisition strategy so they constitute an integrated, coherent whole.

For additional considerations review the following:

- What are the test impacts to the program strategy?
- Is it required to be production representative for operational tests?
- Are there required reports prior to milestones authorizing movement into the next phase of the program?

The Governments PPBS system and other rules for use of appropriated funds (the full funding principle, misappropriation of funds, etc.) may result in significant constraints to program plans. The contract structure needs to reflect these requirements.

WARNING:

W Funding availability must be phased consistent with the contract structure and required delivery schedule. This applies to the total amount, each annual increment, and each appropriation. Otherwise, a restructure will be required prior to Contract Award.

I.D.7. Alpha Contracting Implications

Alpha contracting is a concept for transforming sequential, iterative business processes into a concurrent and parallel exchange of information and understandings. It is used primarily in sole source negotiated circumstances (either new contracts or modifications), but the underlying principles are certainly applicable to the entire Government-industry contracting relationship. The key is that Alpha contracting relies on a team approach to meet the Government and contractor objectives of IPM Stage I (Program Definition) and IPM Stage 2 (Execution Planning). Alpha contracting is also known by several other terms, such as One Pass or Concurrent Fact-Finding and Negotiation.

Traditionally, the Government program/project office develops requirements, with or without significant contractor input and incorporates them into an RFP provided to industry. The contractor then develops and submits a proposal in compliance of the requirements, after which the Government evaluates technical and cost merits of the proposal. Following the evaluation, iterative revisions and updates are made through the fact-finding process, and each party does its own internal business clearance(s). Negotiation and contract award then follows. All activities occur in a sequential manner.

The Alpha contracting processes starts by establishing a Government/contractor IPT to mutually define and understand the requirements and scope of the associated effort. This is similar to the Industry Days participation in the competitive environment. The IPT develops the scope of work, schedule, performance, and other requirements in response to user requirements. IPT members typically include all program office disciplines, functional specialties, Defense Contract Management Command (DCMC), Defense Contract Audit Agency (DCAA), and others, as appropriate. Sub-IPTs develop and agree on technical requirements, terms and conditions, and cost/price. This results in a fully (or near fully) negotiated cost position for the scope of work. Post-alpha negotiations, if any, are usually limited to and focused on any remaining areas of disagreement (e.g., profit). Although this degree of advanced finalization cannot occur in a competitive solicitation, similar benefits may be accrued by jointly achieving overarching conceptual program understandings prior to RFP release.

Alpha Contracting brings with it numerous successes—and lessons learned. Some of these are:

- Overarching written agreement on alpha principles and processes help in ongoing relationships.
- Government and contractor management oversights must be defined and understood on both sides.

- Specific written plan, with schedule, committed to and signed by IPT for the contract action helps processing of required contract actions.
- Train teams as teams, including expectations and roles.
- Empowerment must be real, but within process limits.
- Perfect agreement is not necessary for the alpha process to be of substantive value.
- *Joint Government-Industry C*ost Models can be excellent negotiation enablers.

Caution:

C

Alpha contracting is not the panacea for successful negotiations. There are problems, pitfalls, and challenges. It requires dedicated, skilled personnel and the front end is very labor intensive. Obviously, on-going programs with integrated IPTs can apply this technique the easiest; it is harder to do in programs/projects without established on-going IPTs. Higher level or functional second-guessing reduces both motivation and success probability—this may occur on both the Government and industry side. In addition, failure to achieve an early resolution on the Forward Pricing Rate Agreement (FPRA) can cause substantial delays in achieving a final negotiated price.

I.D.8. Principle Linkages within Integrated Project Management

Predecessors:

- Requirements [Section I.A.] The technical and programmatic requirements should form the basis for establishing an approach.
- Developing a Top Level Approach [Section I.B.] The approach needs to identify the key products and reflect the major schedule constraints in an affordable manner. Provides the "60,000 foot view" of how the overall program should be established. It was established through an iterative development with the risk assessment. It provides an adequate foundation to develop the acquisition and support strategy, which is a more complete "20,000 foot view" of the overall program management structure.

Interconnects:

- Risk Planning [Section I.C.] The Acquisition and Support Strategy is highly dependent on specific program risks. The top level schedules should cover the entire program, and reflect the approach to manage and reduce program risks to an acceptable level.

Successors:

- The RFP [Section I.E.] The model contract structure, contents/requirements and schedule should reflect the products defined in the approach and replicate the overarching schedule.
- All of Section II efforts "Early Industry Involvement" Industry members are making Bid/No Bid determinations and doing the initial work on structuring the program plans concurrent with this effort. This will enable them to provide significant feedback.

I.E. THE REQUEST FOR PROPOSAL (RFP)

I.E.1. RFP Introduction

When the Army Signal Corps decided to purchase an aircraft, it issued a one-page request for proposal. Following a 40-day competition between 41 bidders, the Wright brothers' proposal was selected. The resulting fixed-price incentive contract was 2 pages long. (*Augustine's Laws*, American Institute of Aeronautics and Astronautics, Inc., 1982.)

The RFP translates the requirements, constraints, and program strategies into guidance for the contractor. Weak proposals, poor contracts, and adverse business arrangements are often the result of deficient RFPs. The root cause is often inconsistent, incomplete, and unclear information. Further, the entire proposal and source selection process, from requirements definition to contract award, is too long and expensive. On a large program it is not uncommon for industry to spend $500,000 per month during proposal preparation.

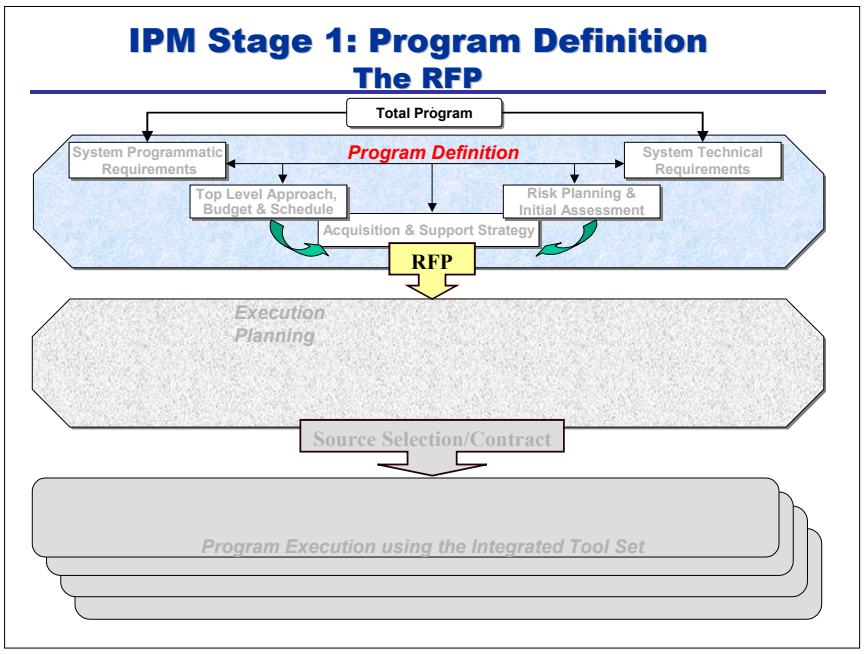


Figure 21 The RFP is the transition to Execution Planning

Successful RFPs clearly capture and articulate the requirements definition, any programmatic constraints, and a succinct explanation of the overall strategy and priorities. A well-structured acquisition and support strategy is an essential precursor to a good RFP. As discussed in the previous section, open discussion and freely exchanged information between the user, acquisition team, and contractors, is essential in developing the optimum program strategy. RFPs are the transition points to the formal Execution Planning Stage, building upon earlier Government/contractor efforts and establishing an integrated, motivating, and performance oriented business environment (Figure 21).

Significant improvements have been made in the RFPs, however the following issues still remain:

- RFPs are too large, with critical detailed information buried or obscured.
- Too much information is requested, and instructions are often unclear or contradictory.

This section will discuss FAR Part 15 (contracting by negotiations). Similar, but simpler requirements apply if the final acquisition strategy involves FAR Part 12 (Acquisition of Commercial Items).

I.E.2. DRFP and RFP Evolution

As discussed earlier, industry proposal efforts generally precede the Government RFP. This is largely due to the lack of time allotted to produce a quality proposal. Typically, proposals are due to the Government 45-60 days after final RFP release, and that is not enough time to produce a quality proposal. Industry however begins early, even prior to the DRFP, to structure their program and begin writing the proposal. In general they plan to have a good first draft of the proposal about the time the final RFP is released. This enables industry to make last minute adjustments, finalize pricing, obtain corporate level approvals, and produce the final documents. In many cases significant changes during the DRFP process result in significant scrap and rework (Figure 22). Industry prefers the DRFP process, when it is an evolutionary growth to the final RFP, not the wholesale changes that too often characterize the DRFP process. The key is having a good draft, which can be further refined for the final RFP. This is not to say changes will not, or should not, occur between the DRFP and final RFP. Rather, the purpose is to emphasize the need for something more mature than a "first draft" to preclude massive scrap and rework.

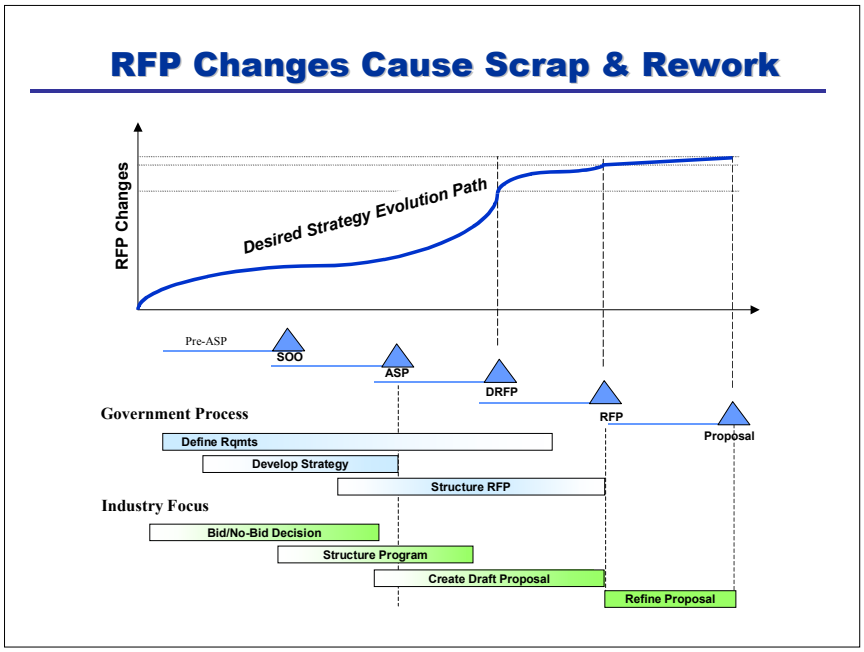


Figure 22 RFP changes cause scrap and rework

WARNING:

> The DRFP must be relatively mature if it is to meet the intended purpose of obtaining industry feedback on an approach and related requirements, enabling a shorter response time to the final RFP while not over burdening industry. Some DRFPs appear to be little more than a copy from prior RFPs. Frequently clauses that are obviously inappropriate are included and there are numerous inconsistencies between the contract structure, delivery schedule and funding profile. This has two related impacts: 1) diverts industry resources to submitting DRFP changes, and 2) delays work on the proposal.

Keeping industry actively involved in the acquisition strategy evolution is the best way to avoid the pitfalls described above. Industry Days, one-on-one meetings, and early drafts are effective ways to solicit early industry inputs and feedback. Issuance of the DRFP is the initial opportunity for the competitors to see the complete document. As a goal, the DRFP needs to be a fine-tuning opportunity prior to release of the final RFP.

I.E.3. RFP Content

To better understand the RFP, it's important to keep it in the context of the overall objectives. The purpose of the RFP is to solicit proposals, from which the source selection process will select a source(s). In its simplest form, the purpose of source selection is to select the offeror(s) who meets the requirements and provides a best value solution at acceptable risk. Meeting the requirements is a much more straightforward measurement than is the value or risk assessment. Meeting minimum requirements can be thought of as a "gate" through which proposals must pass in order to be continued in the evaluation process. Deficiencies are areas where a proposal fails to meet requirements. These are addressed early in the source selection process and must be successfully resolved to enter into the source selection. Discriminators are the important variables, such as exceeding technical requirements with benefit to the Government, risk mitigation plans, and the use of CAIV. The variables become the focus of the source selection process and, as such, a central RFP theme (Figure 23).

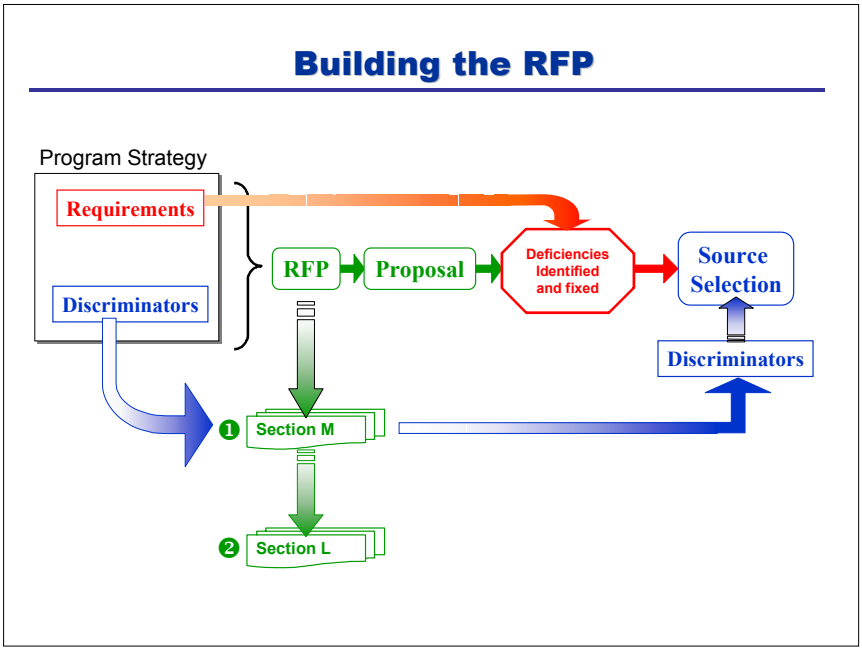


Figure 23 Discriminators are a central RFP theme

As discussed earlier, the RFP process is an evolutionary maturation of both the acquisition and support program strategy through the DRFP to the final RFP. When issued, the DRFP should be of high quality, with all sections complete and internally consistent. Industry needs to be actively involved in making inputs to the DRFP. There is a natural flow of information from the program strategy, to RFP, to proposal, and the resulting contract. Some items requested are for source selection purposes only; e.g., the proposal volumes or past performance information. Some items will become parts of the contract; e.g., the IMP or system specification (Figure 24). Each program must tailor the RFP around the program strategy. The key points to remember are: 1) specify in Section M only the discriminators <u>needed</u> for the selection of the best value, and 2) request in Section L only the information

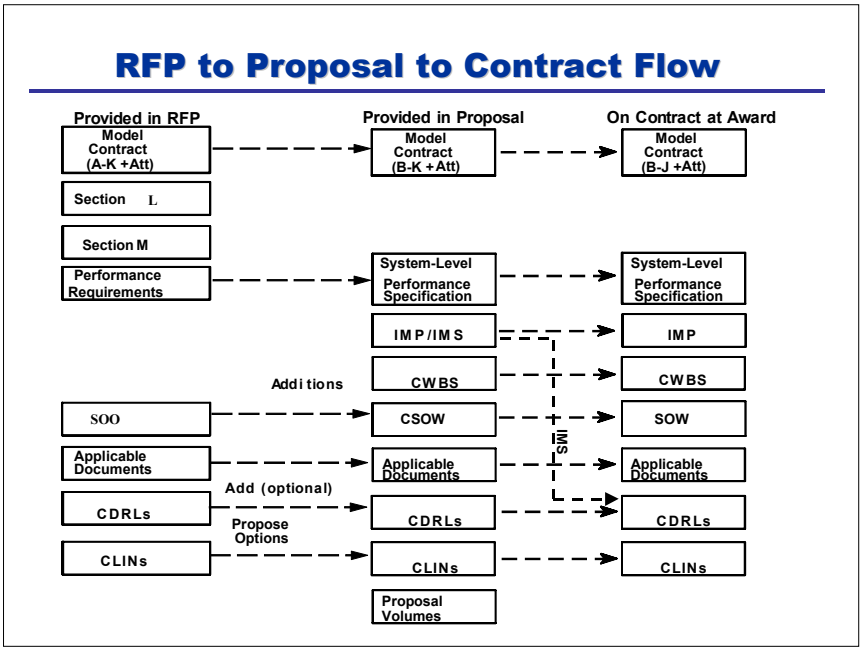


Figure 24 RFP to Proposal to Contract flow

necessary to accomplish the evaluation in Section M, or to award the contract. In other words, information not needed to verify meeting a requirement or as a discriminator, should not be requested in the RFP. Technical curiosity does not constitute a valid reason for requesting information.

Section L and Section M are two critical RFP sections, but they are by no means the only ones. The FAR specifies solicitations and contracts are prepared in accordance with specific guidelines (Figure 25). This handbook discusses several RFP sections individually, but an integrated approach will result in a high degree of synergism and cross coupling among all RFP and proposal elements. For instance, the SOW, IMP, IMS, model contract, and the critical processes are all interrelated. RFP guidance should foster this synergism. In an integrated approach for program risks, for example, the risk mitigation tasks are reflected as tasks in the IMS, metrics in the TPM system and budgets in the EVMS.

Uniform Contract Format

Part I – Schedule
- A. Solicitation
- B. Supplies or services and prices/costs
- C. Description/specifications/SOW
- D. Packaging and marking
- E. Inspection and acceptance
- F. Deliveries or performance
- G. Contract administration data
- H. Special contract requirements

Part II – Contract Clauses
- I. Contract clauses

Part III – List of Documents, Exhibits, and Other Attachments
- J. List of attachments

Part IV – Representations and Instructions
- K. Representations, certifications, and other statements…
- L. Instructions , conditions, and notices to offerors or respondents
- M. Evaluation factors for award

Table 15.1, FAR Para 15.204-1

Figure 25 Uniform contract format

The following subsections discuss some of the core RFP documents along with the applicable companion proposal documents. Although not strictly a part of the RFP preparation process, these proposal responses should be considered when writing the RFP.

Section M of the RFP. Section M should be written before Section L and carefully structured to address only those project facets determined to be keys to success. The criteria in Section M should be focused on the source selection discriminators, taking into account early industry input, to select the best value proposal with acceptable program risk. Do not include proposal criteria that are not valued added to the source selection. Weigh each and every lesson learned from previous programs and RFPs before they are included. Section M should outline the evaluation criteria upon which the source selection will be based.

WARNING:

W Section M must be consistent with the source selection plan. Write the source selection plan with Section M in mind. The surest way to a valid protest is for the Government to evaluate proposals differently than as specified in the RFP.

Section L of the RFP. Section L instructs the offerors how to respond. It should be written after Section M, and tracked to the evaluation factors. Avoid asking for unnecessary data in the proposal to "satisfy technical curiosity". All data submitted in the proposal needs to tie to the evaluation criteria in Section M, or be necessary to award the contract (e.g., model contract, Contract Line Item Numbesr (CLINs), etc.).

Caution:

C The source selection evaluates those program discriminators found in Section M. Request proposal information (Section L) only to the extent it is necessary to support the evaluation or is required in the contract. Otherwise both the contractor's proposal team and the Government reviewers will spend time proposing and reviewing unnecessary information.

Note:

N Many successful RFPs use a common numbering system between Section M and Section L to ensure there is no misunderstanding as to what is required for each evaluation factor. Another "Best Practice" is to include a cross-reference table in the RFP relating Section L instructions to specific M evaluation criteria.

Government SOO and contractor SOW and CWBS. The SOO is derived from previous efforts described in Sections I.A. to I.D., Requirements, Approach, Risk and Strategy, and should succinctly and clearly delineate the overall program objectives. The SOO, combined with the SRD covering the technical performance objectives, guides the contractor in proposing a program meeting the users needs. Offerors should be encouraged to expand the Contractor Work Breakdown Structure (CWBS) to reflect how the work is going to be performed, and identify all elements at any level that are expected to be high cost or high risk. Offerors should also be encouraged to identify any elements of the CWBS provided in the DRFP that are not consistent with the planned approach.

> [Corresponding proposal content: The contractor responds with a detailed SOW that delineates the work and tasks necessary to accomplish the program. An IPM approach relies heavily on contractor's processes and practices. The Statement of Work (SOW) should address the application of the processes during the design, development, test, manufacturing, delivery, and sustainment as applicable to the program. It is generally not the intent to put the specifics of the contractor's individual processes and practices on contract, but the SOW should recognize the application of key functional processes on the program. The SOW tasks must support the contractual IMP and demonstrate how the proposed work effort will satisfy the exit criteria (see further discussion in Section II.B.).]

CDRL. For most programs it is desirable to minimize the amount of deliverable data. Development, delivery, and control of the product definition data and the management and technical reporting data are governed by the acquisition and support strategy along with the contract provisions. The program must address the requirements for the follow-on maintenance of the technical and program data over the life of the program and the method the Government uses to access that data or if required, take delivery. The mechanics of the Contractor Data Requirements List (CDRL), used on the contract to deliver data, etc., is not changed by IPM. Use of a "Data Accession List" approach ensures access to all program data and has been a successful vehicle in the past to secure program data.

Note:

N Best practices include creating a digital/electronic environment (e.g., "intranet") to facilitate the archiving and delivery of electronic data. If the Government elects to use an Integrated Data Environment (IDE) as the mechanism for electronic access to both deliverable and non-deliverable data, then it should be delineated in the contract. Use of IDE is highly encouraged. This real-time access to program information, reports, status, etc., saves time, money and the frustration associated with "paper", as well as providing the same data to all team members (Government and industry).

Caution:

C Generating data is very expensive, so every data requirement (both content and format) should be challenged to insure it is absolutely necessary for inclusion into the RFP. Consider using a "Murder Board" composed of the IPT leads and senior functional leadership to scrub for unnecessary data requirements and eliminate unnecessary costs.

Government SRD and contractor system specification. The SRD should be program specific and reflect the essential system performance requirements. It should not include statement of work type language (i.e., "how to's") nor reference military specifications and standards unless they are necessary to meet program requirements. The SRD should capture and embody all applicable ORD requirements.

> [Corresponding proposal content: The contractor normally responds with a top level specification and any number of sub-tier specifications depending on the program technical strategy. The important issue is to clearly delineate those specifications that are intended to be included in the contract and those submitted for information in his proposal. PBBE philosophy suggests the Government controls only the top level specification unless the sustainment and support concept for the product, a technology insertion strategy or a program risk management strategy, justifies added Government involvement (see further discussion in Section II.C.).]

Note:

N The technical requirements document (SRD, system specification, etc.) should not include SOW language, tasks, guidance, data requirements etc. References to MIL Specs, Standards and Handbooks need to be eliminated unless important to meeting program objectives. System requirements should be performance based—not solution specific.

Caution:

C Contractors responding to the RFP have a tendency to parrot back the SRD in the format of a system specification. They are hesitant to revise the content and format, and are especially cautious to respond with revised requirements for fear of being judged non-responsive. If the Government is serious about considering revised performance requirements that are cost effective then this has to be clearly delineated in the RFP along with how these "trade-offs" will be evaluated.

Many of today's programs are modifications or modernizations of a legacy system, while major new system developments are few and far between. For those programs a true "system specification" is inappropriate. In such cases, typically the top level specification identifies the legacy portion of the system (i.e., unmodified portion) using the original model specification Technical Orders (TO) to describe the existing functional baseline. These programs typically identify requirements for new functionality and require performance is not degraded from the baselines after the modification or modernization is completed. The top level or system specification will be included in the contract. If sub-tier specifications are to be submitted, they too need to be based on the principles of performance based product definition. Lower tier specifications remain under contractor control to promote design flexibility, innovation, and reduced administrative overhead during development. Eventually they are rebaselined and become part of the contract, normally after Functional Configuration Audit (FCA) or Physical Configuration Audit (PCA) discussed in Chapter III. The evaluation of the system specification along with the proposed system configuration and approach to meet the system specification is the heart of the technical evaluation that will be accomplished in the source selection.

Government top level schedule and contractor IMP and IMS. The RFP should contain an event-based top level schedule depicting the major program elements and key milestones, such as contract award, Development, Test and Evaluation (DT&E) flight test, Operational Test and Evaluation (OT&E) flight test, production or long lead decisions, and system delivery.

Caution:

C

The Government's top level schedule should not be overly detailed. This top level schedule must contain any "hard" constraints that the Government imposes on the program, and clearly indicate which events are shown with notional (flexible) dates. To the extent schedule and program content flexibility are allowed or encouraged these conditions need to be explicitly stated, otherwise the offeror might blindly follow the Governments RFP schedule.

The intent of the IMP and IMS is three-fold:

- Obtain a functionally integrated understanding of the proposed program, an important input to the source selection evaluation process;
- Define the event-driven activities to which both the Government and industry agree, and therefore go on contract; and
- Establish a mechanism for effective program execution.

The IMP and IMS should clearly demonstrate the program is structured to be executable within schedule and cost constraints, and with acceptable risk. A direct correlation should exist between events in the IMP and IMS. Thus, both the IMP and IMS are key elements to proposal preparation and source selection. There needs to be a high correlation between the cost basis of estimates and information within the IMS.

[Corresponding proposal content: The proposal usually includes a contractually binding IMP and a more detailed IMS used for source selection purposes and later expanded as a CDRL submittal (see further discussion in Section II.G.). The IMP and IMS should be structured to reflect the actual approach the contractor will implement to execute the program and integrate with the contractor's EVMS and the WBS.]

WARNING:

W

Avoid arbitrary limitations on the number of activities allowed in the IMS. Any constraints should be carefully established and not inhibit the offeror from describing his proposed program and approach to managing risk. The offeror should be provided the maximum freedom to describe the program as he plans on executing it. Failure to do so causes the Government to forego the key opportunity to get valuable source selection information.

Note:

N

The IMP and IMS are submitted to provide a database of information to evaluate proposals. Some Government and industry members of the program office appear to view this as the only purpose. It should also be used to manage the project after contract award, and the IMP should be contractually binding.

Critical Supplier Processes. Program risk analysis, program complexity, scope and technical performance requirements, determine key program processes which are appropriately discussed in the proposal. Many RFPs include Section L and M factors associated with the following program processes depending on their criticality to program success.

- Program Management Process
- Systems Engineering Process
- Risk Management Process
- Configuration Management and Data Management

- Manufacturing process
- Logistics Support Process
- Subcontract Management Process

[Corresponding proposal content: Offerors should be required to identify the critical processes and describe their essential elements. Offerors should also identify the process metrics that will be used to monitor the "health" of each process.]

Technical Supporting Data. Technical supporting data usually involves describing the proposed solution and the resulting performance, along with supporting rationale. The requested technical data needs to be carefully weighed against the technical strategy, with focus on the most critical issues. Trade studies and analyses supporting the proposed solution should be presented. The application of an "affordable architecture" or "open system design" principles has become very important to meeting affordability TOC or Reduced Total Ownership Costs (RTOC) objectives. To demonstrate the open system design features and supporting life cycle management processes, the RFP could require the offeror to bid a "Case Study." The case study suggests the program encounters a future condition where a change such as parts obsolesce, Diminishing Manufacturing Sources (DMS), evolving requirements, or a combination of these elements occurs. This case study can be used to demonstrate the integrated management features of the offeror's program while at the same time highlighting the technical features of the design. The systematic conduct of trades and analyses demonstrate two important elements to the source selection team:

1) The offeror understands the important performance elements and their relationship to cost and risk associated with arriving at a proposed solution. It demonstrates that the full spectrums of possible solutions were examined before arriving at a solution that is balanced with the program objectives. These trades and analyses need to clearly tell the story of "why" the solution was selected.

2) It demonstrates the systems engineering process was used in developing the solution. The solution in the proposal represents the first iteration of the application of the processes described in other sections of the proposal. In a sense, it is evidence that the processes are being applied and used on the program, and will continue to be used since refinement of the proposed solution will be one of the first tasks during the development program supporting PDR.

Incremental Verification. The application of incremental verification manifests itself throughout the proposal and assumes a robust requirements flow down process to allocated requirements. This links performance and verification requirements at each level of the product hierarchy. During the development test program this linkage is preserved and product performance is demonstrated at the lowest level practical within the product hierarchy. The objective of incremental verification is to minimize unnecessary testing at higher levels within the product hierarchy (especially during system testing which are generally the most expensive tests). The incremental verification approach influences several proposal elements.

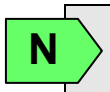
[Corresponding proposal content: The IMP reflects the exit criteria for the program milestones and reflects the incremental buildup during the development program. The IMS contains the incremental verification tasks that support the IMP criteria while the System Test Plan describes the essential elements and philosophy, as well as the content and conduct of the system testing. Section 4 of the appropriate specifications beginning with the top level program specification reflects the specifics of incremental verification linked to the performance requirements.]

Past Performance. Contract past performance has taken on a dramatically enhanced role. With the reduced reliance on Government specifications and standards as well as reduced Government oversight, it is imperative the contractor have internal processes proven effective on past contracts. Further, the Government in its insight role must rely upon the prime contractor and their team in more diverse ways than

in the past to meet the needs of the ultimate users of the equipment or service being acquired. The RFP should emphasize relevancy of offeror submittals.

[Corresponding proposal content: The past performance volume is a significant part of the overall source selection, and discussed in Section II.H.]

Note:



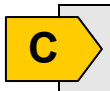
Comments (including questions, suggestions, challenges to requirements and general remarks) are requested in response to the DRFP for the purpose of improving the quality of the final RFP, eliminating conflicts, ensuring only minimum and essential requirements, reducing proposal preparation time, and reducing the time required for Government evaluation. A formal process for comment resolution helps to implement beneficial comments as well ensuring fair disposition of comments.

DRFP comments may represent the industry's last communication with the Government prior to release of the final RFP. It is therefore critical that a clear and convincing response is prepared communicating not only the final disposition of the comment, but the thinking process used in making the determination. This will give the potential offerors greater insight into the needs and desires of the Government.

WARNING:

Although each industry DRFP comment or suggestion must be addressed, the team must ensure that incorporating a comment into the RFP does not give an unfair competitive advantage to an offeror. Such behavior is grounds for a valid protest.

Caution:



The final RFP should contain only refinements to information already available to the offerors. Since the proposal is typically well underway prior to final RFP release, and the time between RFP release and proposal submittal is short, there it not enough time to make major proposal revisions. Responses to DRFP comments should be rapidly disseminated to all offerors (e.g., posted on the internet site) in parallel with the Government's efforts to incorporate them into the final RFP package. In this way the final RFP will contain no surprises.

I.E.4. Principle Linkages within Integrated Project Management

Predecessors:

- Requirements [Section I.A.] The technical and programmatic requirements should form the basis for establishing an approach.
- Developing a Top Level Approach [Section I.B.] The approach should identify the key products and reflect the major schedule constraints in an affordable manner. Provides the "60,000 foot view" of how the overall program should be established. It was established through an iterative development with the risk assessment. It provides an adequate foundation to develop the acquisition and support strategy, which is a more complete "20,000 foot view" of the overall program management structure.
- Risk Planning [Section I.C.] The top level approach is highly dependent on specific program risks. The top level schedule should cover the entire program, and reflect the approach to manage and reduce program risks to an acceptable level.

- Acquisition and Support Strategy [Section I.D.] Defines the approach and contents, which will be reflected in the RFP.

Interconnects:

- All of Section II efforts "Early Industry Involvement" Industry members are making Bid/No Bid determinations and doing the initial work on structuring their program plans concurrent with this effort. They offer important feedback, and will be developing initial drafts of proposal documentation.

Successors:

- All of Section II efforts. A deficiently written RFP will result in an inadequate proposal, and a poorly executed program

I.F. CHAPTER 1 SUMMARY

The **first** stage (Figure 26), Program Definition, provides the essential foundation for the success of the Integrated Project Management approach. The front end planning accomplished at this time provides the basis for successful program execution. In this stage, the Government Program Manager performs the initial program definition, and develops the overarching acquisition strategy. The objective is to provide a coherent description of program requirements and define a general strategy of how they will be achieved. In this stage, the Government develops and documents the **programmatic and technical requirements**, develops the **top level approach** and performs **risk planning and initial assessment**. The information is used to draft a program **acquisition and support strategy** and iterate it until the strategy has acceptable risk. In the Program Definition Stage, the Government has the leadership role--defining requirements, as well as risk and acquisition strategy, while industry provides early feedback on the Government plans as they are developed. Industry's planning activities for proposals have a great deal of overlap with the Government's Program Definition Stage. They accomplish a great deal of work at significant cost, prior to the RFP being released. These funds are used to make Bid/No Bid decisions, structuring their approach and perhaps even creating an initial draft of their proposal. With this overlap in efforts, there is an excellent opportunity for the Government to capitalize on industry's insights. While the Government is coming to grips with an affordable and executable set of program requirements, industry is able to provide feedback on risks and costs for various choices. This assists the Government in having a better understanding of the impacts, while enabling the industry teams to identify their best business deals and attempt to gain competitive advantages.

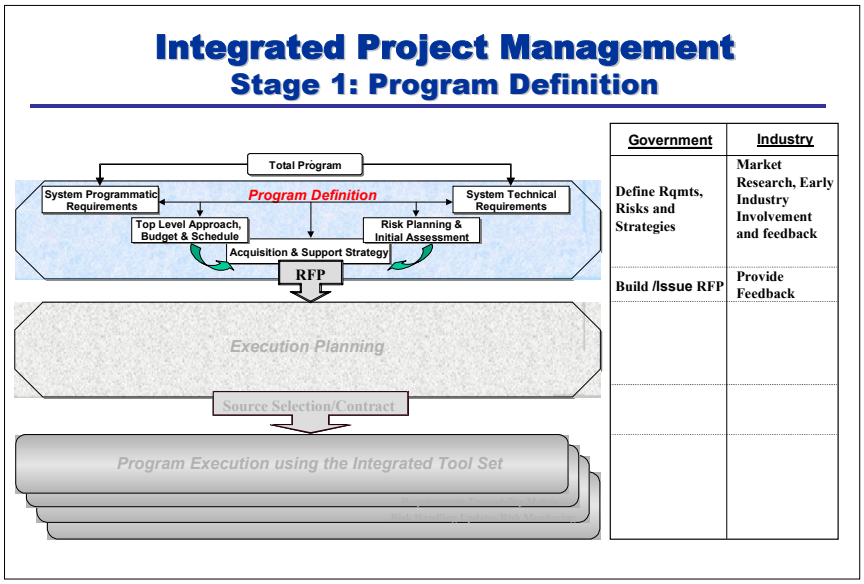


Figure 26 RFP transitions from Program Definition to Execution Planning

The key output of this first stage is the **RFP**; it is the transition into the second stage of the Integrated Project Management approach, where the more detailed approach to executing the program is defined by industry. Since there are potentially many industry organizations with interest, it is useful to build the final RFP in an iterative manner.

II. CHAPTER 2 – EXECUTION PLANNING

During Stage 1 the Government, with industry participation, defines the program and issues the RFP. The second Stage of the Integrated Project Management approach is Execution Planning, the proposal preparation and evaluation period between RFP release and contract award (Figure 27). Here, contractors explain their approaches for turning the overall programmatic and technical requirements into an executable program. This stage explores how the program structure is developed, risks continually assessed, and cost estimates refined. As discussed in Chapter 1, much of this effort actually starts prior to the final RFP release. These pre-RFP activities provide the basis for the contractor's industry feedback during Stage 1. During Execution Planning, the first step is for the contractor to expand and customize the top level approach to reflect their particular approach, incorporating any risks peculiar to their planning. For example, an approach with significant development to provide a specified capability, with commensurate risk would result in one approach. A plan to integrate existing sub-systems to provide a capability would result in a different approach and set of risks. This is the departure point for **WBS** development—the structure around which the program will be executed and costs captured. Next, the **IPT** structure is established to decide how best to manage the program, build a WBS structure to get it accomplished, and then structure the program team to complement the WBS. The **SOW** and the **IMP** can be thought of as synonymous in many ways. Except for the level of effort tasks, virtually all SOW contents will be contained in a well-structured IMP. Top level technical requirements flow directly down to the contractor developed specification, **specification tree** and **allocated requirements**. Throughout the process of defining the approach, **risk assessments and mitigation plans** are created and updated and **cost estimates** are developed and refined. The Execution Planning Stage objective enables industry to provide an acceptable proposal and provides the Government the ability to conduct a source selection and enter into a contract with the selected offeror to execute a successful program. The remainder of this chapter discusses each of these processes in detail.

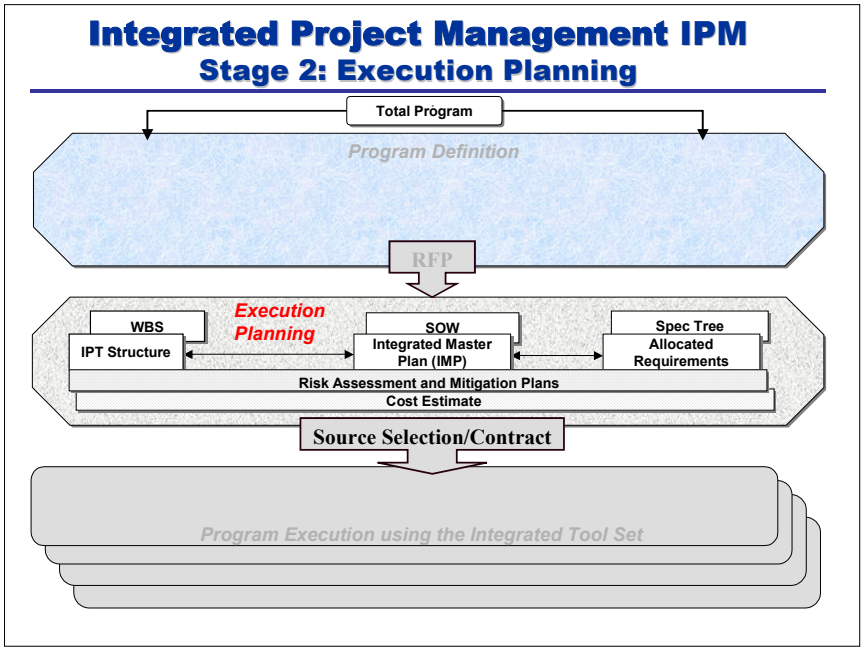


Figure 27 Execution planning is primarily a contractor focused activity

During the requirements definition process in Stage 1, the Government defined the minimum acceptable limits for cost, schedule, and performance thresholds, and established the relative priorities (see Section I.A.) which were communicated to the offeror(s) through the RFP. These limits were established using both CAIV and PBBE principles:

- PBBE—Requirements stated in terms of capabilities established at the system level.
- CAIV—Trade space (i.e., cost gradient with respect to performance) around the cost objective.

II.A. THE WORK BREAKDOWN STRUCTURE (WBS)

II.A.1.WBS Introduction

The WBS is the organized method used for breaking down a project into logical sub-divisions—a hierarchical outline of the planned work, based upon the underlying program requirements [ref. Section 1.A.]. The WBS provides a consistent and visible framework to define program content. The WBS is a basis for communication throughout the acquisition process and the common link unifying the planning, scheduling, cost estimating, budgeting, contracting, configuration management, and performance reporting disciplines. It is the basis upon which Government and industry managers evaluate progress in terms of contract performance.

WBS policy supports three key objectivesby providing: 1) a consistent yet flexible program definition; 2) a framework for integrating total program cost, schedule, and technical requirements and reporting; and 3) a consistent framework for applicable contractor's way of doing business.

The basic purposes of the WBS are:

1. **Organizational**: The WBS provides a coordinated, complete, and comprehensive view of program management. It establishes a structure for organizing system development activities, including IPT design, development and maintenance.
2. **Business**: It provides a structure for budgets and cost estimates. It is used to organize collection and analysis of detailed costs for reports such as Cost Performance Reports or other EVMS reporting.
3. **Technical**: The WBS establishes a structure for:
   - Identifying products, processes, and data.
   - Organizing risk management analysis and tracking.
   - Enabling configuration and data management. It helps establish interface identification and control.
   - Developing work packages for work orders and material/part ordering.
   - Organizing technical reviews and audits.

There are two fundamental and interrelated work breakdown structure types, pre-contract it is the program WBS and post-contract it is the CWBS:

1. The **program WBS** is provided as part of the RFP and covers the entire program, providing a framework for specifying the objectives. The initial WBS levels are specified for several reasons: consistent consolidation of costs across multiple Government programs during execution, ease of evaluating proposals, etc. The Program WBS usually consists of at least three levels, but should not overly constrain contractor development of the remaining information.
2. The **Contract WBS (CWBS)** is an extension of the program WBS to the agreed contract reporting level plus any discretionary extensions to lower levels necessary to highlight risk areas. It includes all the elements for the products (hardware, software, data, or services) for which the contractor has responsibility.

This CWBS is placed on contract and forms the framework for the contractor's management control system. Subsequent to contract award this is often referred to simply as the WBS.

Properly developed and implemented, the WBS summarizes data for successive levels of management and provides the appropriate information on the projected, actual, and current status of the elements for which they are responsible. This provides a natural link between the WBS and a properly constructed Integrated Product Team (IPT) structure. Since a WBS is closely aligned with the cost accounting system, aligning IPTs with the WBS often makes it easier for the IPTs to monitor and take responsibility for cost, schedule and performance. The WBS keeps the program's status constantly visible through the EVMS (Section III.A.) and provides Government and contractor Program Managers capability to identify and implement changes necessary to assure desired performance.

II.A.2. WBS Discussion

Many people think of the WBS as a means to collect contract costs—used properly it is much more than that. The WBS is a means of organizing system development activities based on the system and product decompositions produced by the systems engineering process. The WBS is intended to clearly translate the system requirements into a statement of the technical objectives and the end item(s) or end product(s) of the work to be performed. These product architectures, together with associated services (e.g., program management, systems engineering, etc.) are organized and depicted in a hierarchical tree-like structure that is the work breakdown structure.

In order to use the work breakdown structure as a framework for the technical objectives of a program, in addition to its use as a management tool for cost and schedule control, the work breakdown structure must be product oriented. Its elements should represent identifiable work products, whether equipment, data, or related service products.

DoD Directive 5000.2-R stipulates that a program WBS "*...shall be established that provides a framework for program and technical planning, cost estimating, resource allocations, performance measurements, and status reporting.*" It further specifies that both the WBS and associated WBS dictionary will define the total system to be produced, using a product-oriented family tree. MIL-HDBK-881 is a DoD handbook addressing the mandatory procedures for those programs subject to DoD Regulation 5000.2-R and also provides guidance to industry in extending contract work breakdown structures.

The **Program WBS** is developed by the Government early in the conceptual program stage and encompasses the total program life cycle. The intent is to describe the DoD plan to build, integrate, field, and support the system throughout its life cycle until it is removed from the inventory. It evolves through iterative analysis of the program objective, functional design criteria, program scope, technical performance requirements, proposed methods of performance (including acquisition strategy, drawings, process flow charts), and other technical documentation. It consists of at least three levels.

1. Level 1 is the entire defense materiel item; for example, an electronic system. An "electronic system" might be a command and control system, a radar system, a communications system, an information system, a sensor system, navigation or guidance system, or an electronic warfare system. Level 1 is usually directly identified as a program or a sub-element of a program.
2. Level 2 elements are the major elements of the defense materiel item; for example, a fire control system or an automatic flight control system. These prime mission products include all hardware and software elements, aggregations of system level services (like system test and evaluation, or systems engineering and program management), and data.
3. Level 3 elements are elements subordinate to level 2 major elements. For example, a radar data processor, a signal processor, an antenna, a type of service (like development test and evaluation, contractor technical support, or training services), or a type of data (like technical publications) would be typical level 3 elements for an electronic system. Lower levels follow the same process.

Note:

N Within a competitive solicitation, it's valuable to elicit industry views on the WBS structure during early industry involvement sessions. For non-competitive situations, industry should be deeply involved in developing the Program WBS to ensure it maps to the contractor's particular approach, and cost tracking system.

Just as a program evolves during various phases, so does its unique WBS. All programs, no matter how different their end products are, share common elements, such as program management, data, and training. After the Program WBS has been developed to reflect both its unique and common elements, it becomes the basis for the **Contract WBS –** the discretionary extension by the contractor(s) from the Program WBS to include all the products for which a given contractor is responsible.

Caution:

C The Contract WBS should be developed consistent with the contractors' way of doing business in order to facilitate effective use of the EVMS. Otherwise, there will be difficulty mapping cost data to the project organizational structure. It will also be difficult to identify who is responsible for problems and their resolution.

Although the Government typically uses MIL-HDBK-881 for developing tailored programs WBS's, the handbook is cited within solicitations and contracts 'for guidance only" relative to the contractors extending the program WBS to a Contract WBS.

Note:

N The ultimate objective is for the WBS to serve three purposes: 1) Provide a structure to estimate and capture costs for the program, 2) support consistently collecting data across all programs and 3) collect data consistent with the industry internal accounting and EVMS.

As part of developing a Program WBS, the Program Manager also develops a WBS Dictionary listing and defining work breakdown structure elements. Although initially prepared by the Government Program Manager, the contractor expands the dictionary as the Contract WBS is developed. The dictionary shows the hierarchical relationship of the elements, describes each work breakdown structure element and the resources and processes required to produce it.

During the process of developing the WBS, there is a tight interrelationship with the allocated requirement and specification tree development [Section II.C. of this handbook]. As requirements are "allocated" to the various products, this same hierarchy is represented within the WBS. Changes in requirements allocation normally yield WBS changes.

Because any work breakdown structure is a product structure, not an organization structure, complete definition of the effort encompasses the work to be performed by all participants.

Caution:

C Develop the proper WBS structure first, then fashion the IPT structure best suited to manage the program defined by the WBS. Otherwise, there is a tendency to use an organizational structure that may be ill suited to meet the specific program needs.

The WBS forms the basis for reporting structures used for contracts requiring compliance with the EVMS criteria and reports placed on contract such as Contractor Cost Data Reporting (CCDR), Cost Performance Reports (CPR), Contract Funds Status Reports (CFSR), and Cost/Schedule Status Reports (C/SSR).

II.A.3.Principle Linkages within Integrated Project Management

Predecessors:

- System Requirements [Section 1.A.] The WBS is based on the system and product decompositions the systems engineering processes evolve from the user requirements.
- Acquisition and Support Strategy [Section I.D.] Acquisition strategy provides some foundation for the WBS.

Interconnects:

- Allocated Requirements and th Specification Tree [Section II.C.] As the design and requirements allocation matures, so will the associated WBS.

Successors:

- Statement of Work [Section II.B.] The SOW is derived from the WBS.
- Integrated Product Teams [Section II.D.] IPTs should be formed to best manage the program defined by the WBS, not the other way around. Do not use the structure of the program office or the contractor's organization as the basis of a work breakdown structure.
- Cost Estimates [Section II.F.] The cost estimates need to be structured around, and consistent with the WBS.
- Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) [Section II.G.] The WBS is structured to reflect how the program work will be accomplished and aggregated. Similarly, these same activities form the underlying structure of the IMS—phased over time (the events).
- Earned Value Management System (EVMS) [Section III.A.] The EVMS uses the WBS as the basis for cost accumulation.
- Metrics [Section III.C.] The WBS provides a structure to correlate product metrics with EVMS and IMS progress information during the Program Execution Stage.

II.B. THE STATEMENT OF WORK (SOW)

II.B.1. SOW Introduction

The program SOO should provide the basic, top level objectives of the acquisition, their relative importance, consistent with Section M of the RFP, and key risk areas the offeror needs to address in their proposal. Historically, the Government wrote the SOW and provided it in the RFP. The currently accepted practice is to now provide the SOO in the RFP in lieu of a Government-written SOW.

The SOW, if required, is submitted as part of the proposal. The SOW describes and defines the work to be performed by the contractor, and is contractually binding. It follows the WBS structure and should contain, at a minimum, a statement of scope and intent, as well as a logical and clear definition of the tasks required. The SOW normally consists of three sections:

1. **Section 1: Scope**—Defines overall purpose of the program and to what the SOW applies.
2. **Section 2: Applicable Documents**—Lists the specifications and standards referenced in Section 3.
3. **Section 3: Requirements**—States the products to be delivered, and/or the services to be accomplished. Tasks need to be tracked with the WBS. The SOW describes tasks the contractor does; specifications describe the products and specific performance.

Thus, the flow is from requirements to WBS then to the SOW. A properly developed SOW is performance based; and describes the contractor requirements, without unnecessary detail on how the work will be accomplished. If the CLIN descriptions in conjunction with the IMP, adequately describe what is to be delivered, a SOW may not be required.

II.B.2. Discussion

The SOW is the document that defines efforts to be accomplished within the contract. It establishes non-specification tasks/requirements and identifies the work effort as minimal needs. The WBS serves as the link between the requirements and the SOW. It also provides the structure around which the SOW is to be written. All SOWs should be performance based, employing the principles of PBBE.

The contractor responds to the RFP with a SOW, which includes those tasks and activities the contractor plans on executing during the contract. A PBBE approach relies heavily on contractor's processes and practices. The SOW addresses the application of contractor processes during the design, development, test, manufacturing, delivery, and sustainment as applicable to the program. It is generally not the intent to put the specifics of the contractor's individual processes and practices on contract, however the SOW should recognize the application of key functional processes on the program. The SOW tasks must support the contractual IMP and demonstrate how the proposed work effort will satisfy the exit criteria.

Note:

N A well-written IMP will contain much the same information as that in a SOW, with the exception of the level of effort tasks (e.g., configuration management, etc.), which are not included in the IMP.

Using a standardized work breakdown structure as a template when constructing the SOW for a system acquisition will help streamline the process. Use of the work breakdown structure will also facilitate a

logical arrangement of the SOW elements, provide a convenient checklist to ensure all necessary elements of the program are addressed, and direct the contractor to meet specific contract reporting needs.

II.B.3. Principle Linkages within Integrated Project Management

Predecessors:

- Work Breakdown Structure (WBS) [Section II.A.] The SOW is derived from the WBS.

Interconnects:

- Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) [Section II.G.] The IMP contains much the same information as in a SOW, with the exception of the level of effort tasks (e.g., configuration management, etc.) included in the SOW, but not the IMP.

Successors:

- Cost Estimates [Section II.F.] Task statements within the SOW become the principle basis of estimate for program pricing.

II.C. ALLOCATED REQUIREMENTS AND THE SPECIFICATION TREE

II.C.1.Allocated Requirements and the Specification Tree Introduction

The purpose of allocating requirements is to implement the Systems Engineering Process, by flowing down the technical description of the product in further detail. Accomplished by the contractor, this will identify how the system requirements will be met and what elements of the overall performance are to be accomplished in the various lower levels. A disciplined approach is required to allocate these requirements, starting with all the programmatic and technical requirements, which are then decomposed to the lower level functions. This allocation will be structured by the WBS, and will allow progress tracking of the various elements of the design.

II.C.2.Allocated Requirements and the Specification Tree Discussion

The starting point for the contractor will be the system programmatic and technical requirements provided by the Government in the RFP, which are frequently documented as a SOO and SRD. As discussed in Section I.A., these "needs" should be stated in performance terms, and should provide any verification minimums or limitations. During this phase of proposal development, the contractor will typically submit a system level performance specification. To do so, the contractor must determine the appropriate product(s) that will satisfy the Government's requirements, while meeting their desired business objectives. This will ultimately be allocated to sub-systems, components, and parts required to meet the overall requirements, and must include a definition of all internal and external interfaces.

The organization of performance allocation is reflected in the Specification Tree, and the structure of the Specification Tree must follow the WBS structure. This permits traceability between cost tracking, schedule accomplishment and delivered performance. This is accomplished iteratively, as cost and schedule implications are considered for various solutions.

Caution:

C A key element of the System Engineering Process is to determine when each level of the design is contractually binding (baselined). If accomplished too early, an excessive amount of contract changes will be required. If delayed too long, there may be significant configuration control and support impacts.

The resulting requirements allocation and interfaces will be designed, qualified, produced and accepted as part of the Execution phase of the program. A key consideration in every level of the allocation is the process to prove key requirements are met. This is typically accomplished in a verification matrix.

Caution:

C Requirements, system level and allocated, are tightly coupled to the WBS, specifications, test planning, FCA, and PCA. The WBS reflects the requirements allocation. Section 4 of the specifications document how the requirements will be verified. Development and/or operational testing are accomplished to ultimately confirm all requirements. FCA and PCA establish the configuration baselines corresponding to these requirements. (MIL STD 1521B)

II.C.3.Principle Linkages within Integrated Project Management

Predecessors:

- Requirements [Section I.A.] The requirements process establishes the top level systems requirements which are reflected in the system level specification. These requirements are then allocated down to the subsystem specifications. This then defines what parts of the requirements are satisfied by the components of the systems through the allocation of functionality.
- RFP [Section I.E.] The system programmatic and technical requirements provided in the Government RFP are the starting point for the contractor to develop the system level performance specifications.

Interconnects:

- Work Breakdown Structure (WBS) [Section II.A.] As the design and requirements allocation matures, so will the associated WBS. The WBS provides an organized approach to the lower level subsystems, which will satisfy the allocated requirements.

Successors:

- Integrated Product Teams (IPTs) [Section II.D.] Often allocated requirements reflect WBS elements that are the responsibility of specific IPTs. These IPTs are then responsible to ensure that their subsystems achieve the allocated requirements as part of the overall system performance.
- IMP/IMS [Section II.G.] Many of the criteria for completion of accomplishments as documented in the IMP and IMS are demonstration that subsystems can achieve the requirements allocated to them.
- Source Selection [Section II.H.] Many times some of the factors that are part of a source selection are the offerors allocation of requirements to subsystems. This can be used to determine if the offeror understands the risks involved and whether they have correctly allocated overall requirements.
- Metrics/TPMs [Section III.C.] Achievement of allocated requirements by subsystems should be measured and tracked with metrics to ensure they are achieved and they can be combined to achieve the overall system requirements.

II.D. INTEGRATED PRODUCT TEAMS (IPT)

II.D.1.IPT Introduction

DoDD 5000.1 states *"[program] managers shall apply the concept of IPPD throughout the acquisition process to the maximum extent practicable… At the core of IPPD implementation are Integrated Product Teams (IPTs)…"*

IPTs are formed as soon as possible at the beginning of a project or task with the specific purpose of delivering a product. Critical criteria for successful IPT formation are:

1. All functional disciplines influencing the product throughout its lifetime are represented on the team;
2. A clear understanding of the team's goals, responsibilities, and authority that is agreed to by the Program Manager, functional area managers, and the IPT; and
3. Identified resource requirements such as staffing, funding, and facilities.

There can be, multiple IPTs on a program. There is no single "the IPT" to which you can reference. Rather, these IPTs exist in parallel and frequently overlap, each with different specific memberships and goals, with the common objective of program support. The term IPT is more a management philosophy than a reference to any specific team. IPTs exist in parallel at multiple levels within the organizations (Figure 28). It is a business management approach to conduct business within the framework of programs. There is both a breadth and depth to the IPT structure. There are usually parallel IPTs in equivalent level organizations (e.g., the Government IPT and industry IPT) and usually a hierarchical structure within organizations (e.g., subsystem level, system level, and DoD level).

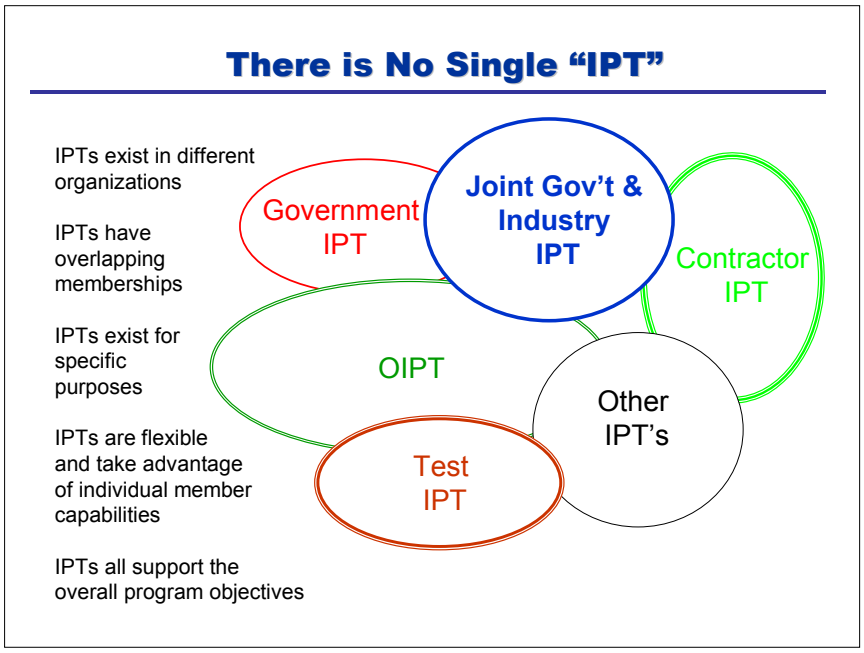


Figure 28 IPTs exist in parallel at multiple levels

IPTs are most effective when they have clearly written charters and are aligned with the WBS structure.

This conceptual discussion is applicable to all IPTs, but this handbook focuses on effective use of IPTs within the project. This includes Government IPTs, contractor IPTs, and combined IPTs. The purpose of the IPT is to facilitate an organizational structure to better manage the program; it needs to reflect both the Government role and the industry role during the Program Execution Phase.

II.D.2.Structuring the IPT

IPTs are the key principle of Integrated Product and Process Development (IPPD), facilitating the decision-making process. The Secretary of Defense has directed that the Department perform as many acquisition functions as possible, including oversight and review, using IPTs. Whether at the program level or HQ level, IPTs are composed of representatives from all appropriate functional disciplines working together to build successful programs and enabling decision-makers to make the right decisions at the right time. The IPT approach takes advantage of all members' expertise. IPTs operate under the following broad principles:

1. Customer focused.
2. A clearly defined product or process.
3. Continuous communications, in all directions.
4. Issues raised and resolved early.

Note:

N

IPT membership, objectives, specific responsibilities, and key interfaces (internal and external) should be clearly defined in a team charter. Like many similar documents, often the major benefit is in the creation of the charter. Building the charter, and getting all team members to understand the contents, fleshes out many issues. Operating procedures or team relationships may need adjusting to maximize individual member strengths.

5. Membership from all necessary functions, disciplines and skills to provide the required product. Open discussions with no secrets. Reasoned disagreement. Consistent, success-oriented, proactive participation. Multifunctional teamwork is essential to the integrated approach. IPT members have complementary skills and are committed to a common purpose, performance objectives, and approach for which they hold themselves mutually accountable. IPTs are responsible not only for delivering the product and its associated processes, but also for planning, tracking, and managing their own work and the processes by which they do their work.

Note:

N

Cooperation is essential. Teams must have full and open discussions with all the facts and no secrets. The team is not searching for "lowest common denominator" consensus, and disagreements are expected. However, the disagreements must be reasoned disagreements based on an alternative plan of action rather than unyielding opposition. Issues that cannot be resolved must be identified early to the appropriate level for resolution.

6. Qualified team members, empowered with the responsibility, authority and accountability to deliver products. Control and authority over its budget and the resources is essential. The WBS was constructed as an organized method to break down a project into its logical component parts, based on the system requirements and the specific program approach. The WBS should be structured first. IPTs should be formed to best manage the program defined by the WBS. Ultimately, the desired end state is to have an IPT structure within a company that mirrors, or can be easily mapped to, the WBS structure. The IPT lead knows exactly which WBS element(s) are his/her responsibility, in terms of cost, schedule, and performance. Since a WBS usually is closely aligned with the cost accounting system, aligning IPTs with the WBS often makes it easier for the IPTs to monitor and take responsibility for cost. By also making the IPT lead the cost account manager, internal reporting is greatly simplified because the WBS cost reporting can be directly tied to the EVMS.

Note:

N Empowerment is critical. Functional representatives must be empowered to give advice and counsel to the Program Manager. They must be able to speak for their superiors. Aligning IPTs with the WBS structure greatly facilitates empowering the "team" with cost, schedule, and performance responsibilities.

Caution:

C IPTs may go beyond their empowerment limits. It is important to ensure an experienced IPT lead is involved on both the Government and industry side, to avoid agreeing to approaches that create a constructive change to the contract or lose sight of the CAIV tradeoffs.

7. For most programs an integration team is required at each organizational level, ensuring that layer of IPT activities remain integrated. This is essential successful IPT implementation across a program.

Note:

N Particularly for larger programs with several sub-IPTs, an integration IPT is very beneficial. This enables the program to cover system wide issues and provides a safety net for the IPT-to-IPT invisible seams.

WARNING:

W The "I" in IPT stands for integrated, not independent! IPTs must recognize and manage the integration of their efforts with the other program related activities. They are only fully empowered when there is also an understanding of accountability. Boundary conditions must be defined to show cost, schedule and performance limits. Otherwise, the program will be sub optimized, or there will be serious interface problems between related IPTs.

IPT structures vary depending on the phase of the product life. As a program progresses from Determination of Mission Need, to Concept and Technology Development, to System Development and Demonstration, to Production and Deployment, and through Operations and Support, the needed skills and numbers of people will change. Therefore, a sub-IPT in development may become a primary IPT in the support phase.

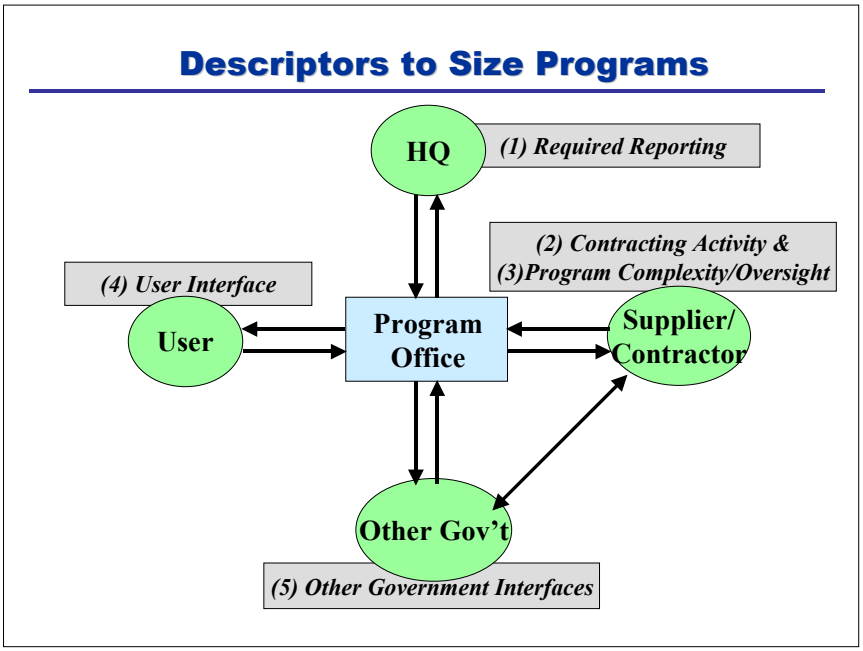


Figure 29 Workload influences Government Program Office size

IPT structures, and sizes, also vary depending on the program scope, complexity, amount of user interface, and political interest (Figure 29). Four underlying relationships drive Government program office workloads and define IPT sizing parameters. The extent to which any of these require additional oversight, manage-

ment, interface, or coordination increases program office workload. A similar and complementary relationship exists for industry program office workload determination. As part of the IPT structure, teams are formed to fit the task. This does not require all skills on the team full-time, however team personnel must be available as required to provide integrated life cycle and multi-functional team decisions.

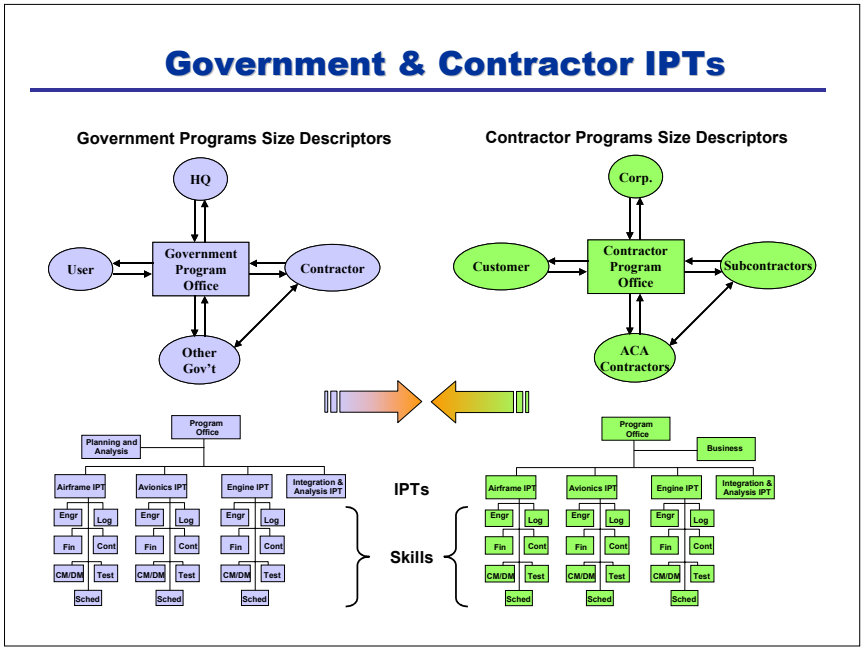


Figure 30 Government and contractor IPT's are similar

IPTs are personality dependent. Some people are less comfortable in the open IPT environment than others. IPTs tend to have more freedom and perhaps require a higher level of professional maturity than the case with traditional organizational structures and relationships. The changing environment should not be taken for granted and may generate training requirements.

Just as the program workload drivers influence Government program office workload and IPT structure, there is a corresponding influence on the contractor(s). For instance, where the Government has headquarters and contractor interfaces, the contractor has corporate and subcontractor interfaces (Figure 30). This usually results in similar organizational structures evolving.

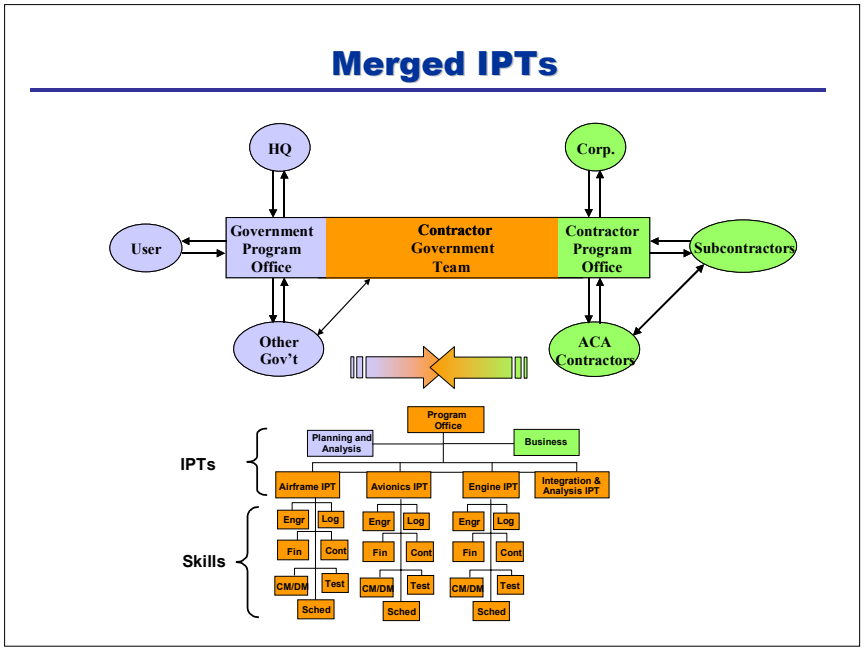


Figure 31 Government and contractor IPTs merged

Once the contract is awarded, the detailed work efforts begin. One of the most important agenda topics at any post award conference is usually a discussion of how the two teams are actually going to work together. There is high value in Government matching, within practical limits, the industry IPT. There will be specific IPTs unique to each organization, but the majority of efforts can easily be mapped and correlated (Figure 31). This has the advantage of providing specific counterparts for each IPT leader and many of the members. Each appropriate discipline should be represented on the IPT, ranging in size from a part-time to full-

time personnel on the team. The team may also include organic Government and support contractor personnel.

The depth to which the Government and industry IPTs correspond is based on program risks, the impact of program failure and the number of Government resources available. Industry takes the lead in structuring IPTs because the objective is for IPTs to be organized in a way that is most conducive to managing the total program—this is primarily an industry responsibility. During post-contract award, the Government reorganizes to work synergistically with the industry team(s).

The program execution structures, both on the contractor and Government side, are key determinants of program success.

II.D.3. Principle Linkages within Integrated Project Management

Predecessors:

- Work Breakdown Structure [Section II.A.] IPTs are formed to best manage the program defined by the WBS.

Interconnects:

- Risk Mitigation Planning [Section II.E.] IPT structure should also take into consideration the inherent program risks, and which management organization will most efficiently deal with them.
- Cost Estimates [Section II.F.] IPTs provide the insight and basis of estimates. WBS and IPT structure correlation will more effectively yield cost estimates and responsibility, which are directly traceable to a particular IPT.
- Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) [Section II.G.] The IMP/IMS *criterion* level (third level) should be correlated to single IPT responsibility.

Successors:

- Earned Value Management System (EVMS) [Section III.A.] Particularly if the IPT structure is aligned with the WBS structure and the cost account managers are the IPT leads, it becomes easier to align the execution organization (the IPT) with the performance tracking.
- Integrated Master Schedule (IMS) [Section III.B.] Ensuring a tight correlation between the IPT structure and the IMP/IMS *criterion* level (third level) will make it is easier to monitor cost and schedule performance.
- Metrics & TPMs [Section III.C.] Tight correlation between IPTs, the WBS structure, and the IMS better enable the responsibility for a particular metric to be placed with a single IPT.
- Risk Management and Updates [Section III.D.] Properly allocated, every risk and corresponding mitigation plan should be the primary responsibility of a single IPT. Inputs may be required from multiple sources and/or IPTs, but the responsibility should be vested in a single IPT. In this way IPTs are responsible and accountable for managing their risk areas.
- Management Reviews [Section III.E.] When the IPTs are “product” oriented, aligned with the program WBS structure, and responsible for specific segments of the IMS, management reviews are much easier to structure.

II.E. RISK MITIGATION PLANNING

II.E.1. Risk Mitigation Planning Introduction

Risk planning, in its simplest form is the development of specific ways to reduce the program risks inherent to the chosen technical or programmatic approach. The goal is to recognize early in the program planning process where risks occur and incorporate mitigation plans into the overall program approach. This enables proper program management focus—risk management.

Section I.C. (Risk Management Planning and Initial Assessment) examined the process for developing a "risk strategy"—one of the key components leading to the selection of an appropriate acquisition and support strategy. This process, when done correctly, involves significant interaction with industry such that the ultimate strategies leading to the DRFP are consistent with industry capabilities. Contractors should not be required, or coerced, into accepting financial risks inconsistent with their ability to control and absorb the risks. Financial risks are driven mainly by the underlying technical and schedule risks inherent in a program and defined, or possibly constrained, by the overall strategy.

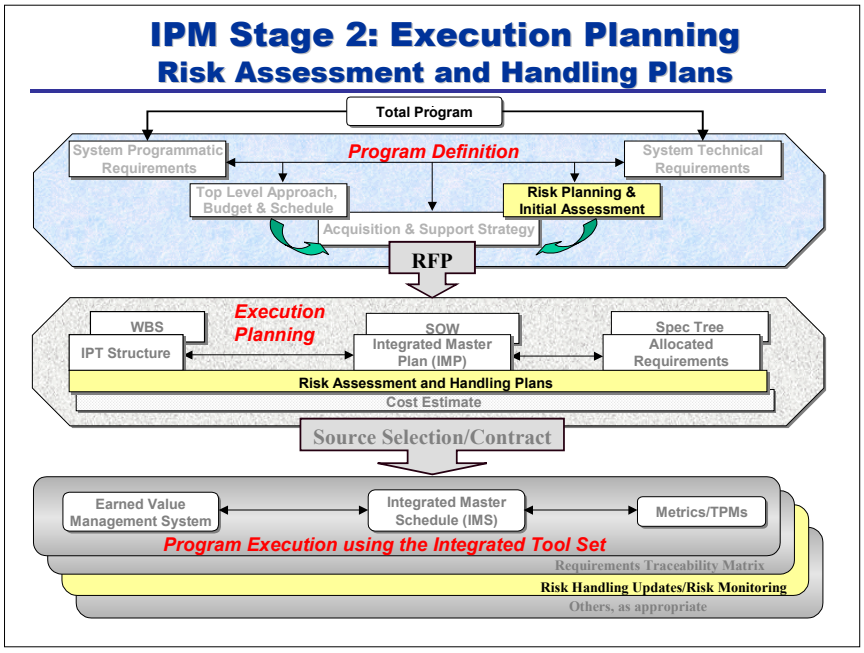


Figure 32 Risk mitigation planning is completed during Execution Planning

This Risk Planning activity in the Execution Planning Stage takes risk discussion to the next step, exploring the relationships between more detailed risk planning and proposal development (Figure 32). Risk planning is the key overarching activity essential to effective program planning. The key to successful risk management is early planning and aggressive execution. High-quality planning includes an organized, comprehensive, and iterative approach for identification and assessment of risk and risk-handling options necessary to refine a program acquisition strategy, and the program execution plan. To support these efforts, risk assessments should be performed as early as possible in the life cycle of a project or program to ensure that critical technical, schedule, and cost risks are addressed and incorporated into program planning and budget projections. Risk management is not a separate program function, but an integral part of the overall program planning and management process. Any program element associated with cost, schedule, and performance has a direct interface with the risk management process. Engineering, logistics, production and program control are some examples of program areas that present risk to a program's success.

Many would argue program management, if not synonymous with risk management, is at least largely composed of risk management, the management of cost, schedule and performance risks. Selected design and program approaches are dependent on program risks, and may drive additional risks. The risks and their specific mitigation plans need to be articulated within the IMS.

As discussed previously, the Government and industry processes are not sequential—the goal of reducing cycle time between requirements definition and system fielding, necessitates parallel strategy development and proposal development activities. Opportunities for miscommunication abound; but the opportunities for program synergism through open communication are equally prevalent.

Caution:

C Open communication during Industry Days improves the quality of decisions by both Government and industry. Superficial information and failure to identify approach or technology risks may result in inappropriate program constraints, which may lead to otherwise avoidable risks.

II.E.2. Risk Mitigation Planning Discussion

Risk management during the Program Definition Stage was principally a Government task, which recognized industry inputs, and focused on developing the risk strategy, resulting in generation of this key input to the Acquisition and Support Strategy. These Government identified risks should be expanded by the offeror into specific risk mitigaion plans, including plans for risks not identified by the Government

Risk management within the Execution Planning Phase is an industry task—it is risk management planning for program execution. Risk Planning is a central theme of Execution Planning, and is the underlying proposal theme. Specific risk mitigation plans are developed during the risk planning process (Figure 33). This planning must be developed and documented at a level adequate to identify risks in the offeror's approach and define corresponding risk mitigation plans. The planning should focus on higher risk areas. Specific information required and the level of detail provided will depend on the acquisition phase, the category and criticality of the program, as well as contract type and dollar value. However, in all cases, the proposal detail in the IMS must be at the level sufficient to identify possible schedule conflicts. Information required after contract award should be at the proper level to support the decision process during program execution. Risk management tasks (objectives) within this Execution Planning Stage are to:

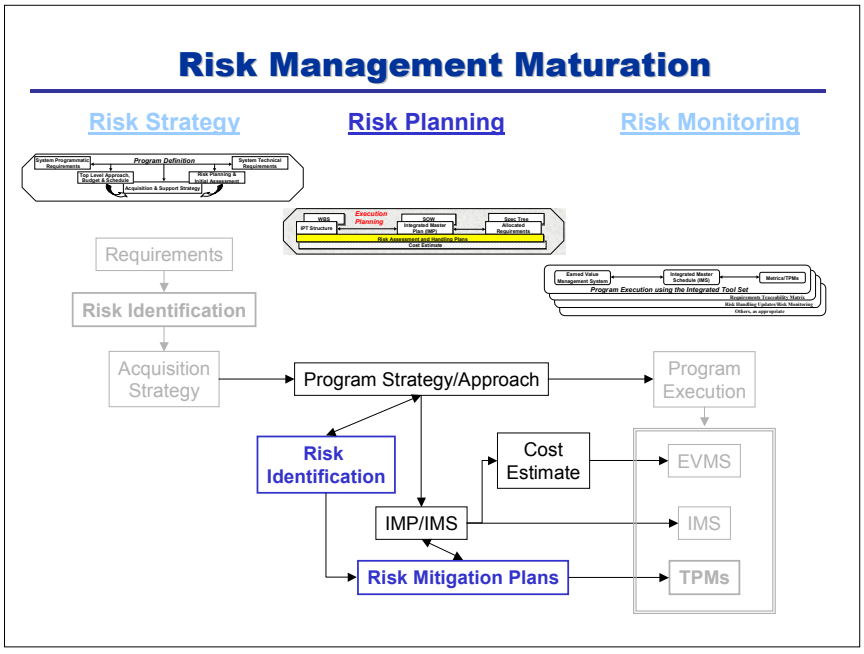


Figure 33 Risk planning develops specific mitigation plans

a) Develop and/or update the company **risk management plan**;

b) **Identify the risks** (an iterative effort with developing the proposed program approach);

c) Develop specific **risk mitigation plans**;

d) Incorporate this planning in the **IMS and IMP**;

e) **Develop the cost estimate** based on the IMS, modeling estimates, etc; and

f) **Explain the total risk management approach in the proposal**.

Risk Management Plan.

The risk management plan is typically a company-standard plan tailorable for a specific program. It describes the processes used to "manage" risk and provides the Program Manager an effective method to define a risk management program, fix responsibility for the implementation of its various aspects, and supports the acquisition strategy. The corporate risk management plan should be an inherent part of their systems engineering approach. Risk mitigation plans are intended to define specific steps planned to reduce the risk of an associated event or action. There is no specific format or required content for an effective risk mitigation plan. However, well-written plans have many areas in common. They are succinct and all typically contain generic descriptive information, a summary of the risk and mitigation plan, discussion of the consequences, metric(s) to be used in monitoring progress, and mapping of the associated mitigation tasks to the IMS. Figure 35 illustrates a sample risk mitigation plan.

Defining the program specific risks.

Program risks originate from two underlying sources, the Government overall acquisition strategy and the offerors program approach. Some risks (e.g., developing of a new technical capability) are the result of program requirements and the acquisition strategy while others (e.g., the decision to pursue a new development rather than existing off-the-shelf components) are a by product of the selected program approach. As discussed in the earlier Chapter, acquisition strategy should have been developed using early industry inputs, and the program approach frequently evolves based on identified risks (e.g., carrying two designs through CDR for instance).

A key part of risk identification is risk analysis—determining the relative risk levels of each identified risk. The objective of risk analysis is for the offerors to accomplish a detailed analysis of the identified risks and establish meaningful risk factors. These factors, based on the probability and consequences of occurrence of the risk item impact, determine where risk management attention needs to be focused. The program IPTs should objectively measure risk through the use of risk factors or levels. Risk levels are based on two factors, consequence of failure and, probability of failure. The overall risk factor is the product of the consequence and probability: Risk = Cf x Pf. The table below provides some sample definitions that might be used to help classify these risk factors.

Table II-1 Sample definitions which could be used to define various levels of risk consequences and probabilities

Cf—CONSEQUENCE OF FAILURE FACTOR		
Negligible	1	Minimal or no technical performance issues; budget costs will not be exceeded at program level; schedule impact negligible or compensated for by available slack
Minor	2	Small reduction in performance; budgeted costs increase less than 5%; 1 month or less schedule impact
Major	3	Some reduction in performance; budgeted costs increase by 5 to 20%; 1 to 3 months slip in schedule
Serious	4	Significant degradation in performance; budgeted costs increase 20 to 50%; schedule slip less than 6 months
Critical	5	Significant technical goal not achieved; budgeted overrun in excess of 50%; schedule slip of 6 months or more
Pf—PROBABILITY OF FAILURE FACTOR		

Low (Level 1) [0-10%]	1	Existing design; large lift of existing software; independent of other programs; all participants experienced; existing manufacturing capacity far exceeds job needs
Minor [11-40%]	2	Minor redesign of hardware/software; minor increase in completion schedule dependent on existing system; manufacturing capacity exceeds what is needed
Moderate [41-60%]	3	Major change of design is feasible in hardware and software; schedule dependent on other systems; manufacturing capacity matches need
Significant [61-90%]	4	Complex design includes all new software; schedule dependent on other programs' interim milestones; training must be acquired
High (Level 5) [91-100%]	5	Pushing state-of-the-art in hardware and software; schedule dependent on concurrent program or R&D results; new personnel must be hired; new manufacturing capacity must be designed and built

Using the risk factors discussed above, the identified risks are mapped into a risk matrix, and then grouped into "High", "Medium", and "Low" categories. Realistically, risks can never be eliminated. The goal is to reduce risks through various management actions. For moderate and high risks the offerors should prepare a detailed risk mitigation plan. Day-to-day program management activities should be designed to handle "low" risk areas.

Caution:

C

Not all items can be reduced to low risk through mitigation plans or management actions. Some areas, like large, new software development efforts, are just inherently higher risk. Expecting all items to be reduced to "low" is unrealistic and will lead to an overly optimistic proposal, program schedule and program cost.

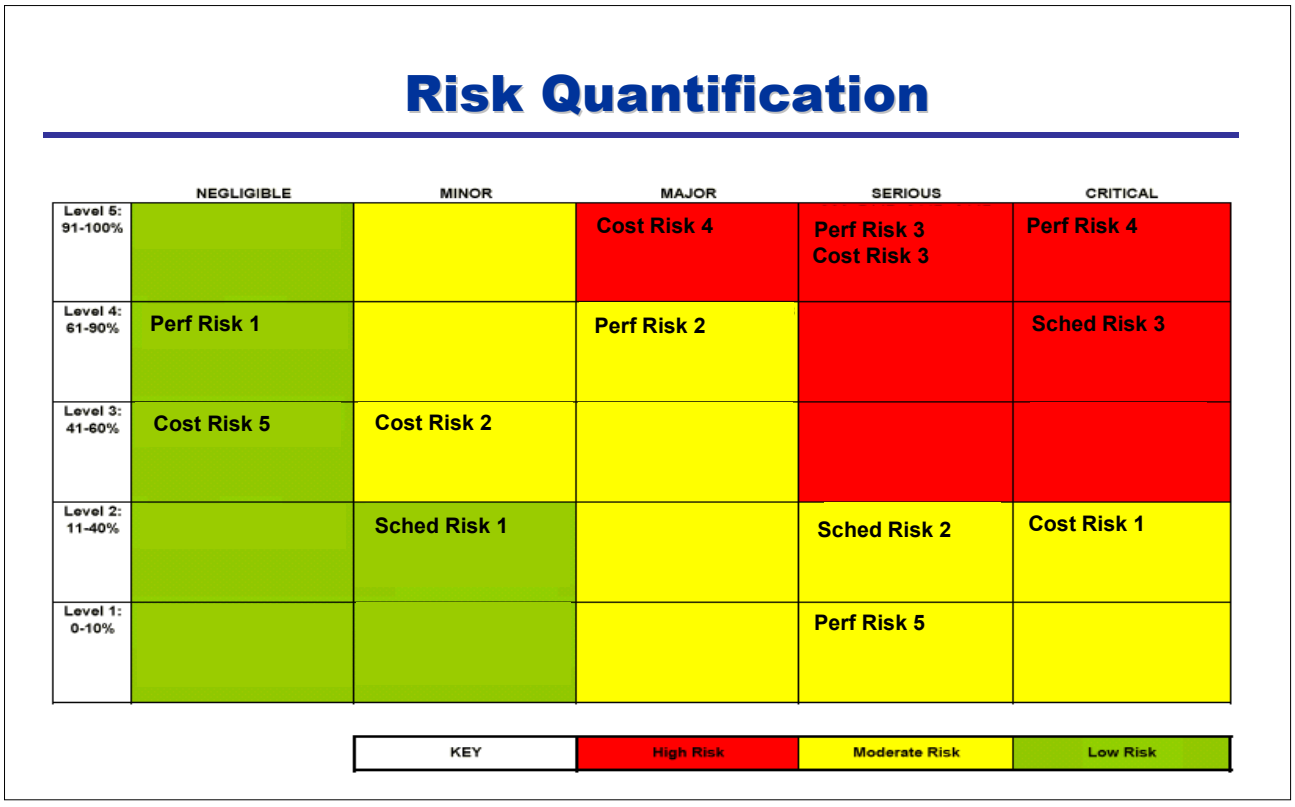


Figure 34 Risk quantification with a matrix

There are many ways to accomplish risk quantification. It is not as important precisely how risks are quantified; as it is that they quantified in a disciplined manner. Figure 34 illustrates one way to use the probability and consequence factors to correlate individual risk factors with management categories. Care must be taken to avoid the temptation to perform precise mathematical operations. Risk scales are, in most cases, just raw (uncalibrated) ordinal scales, reflecting a relative standing.

Risk mitigation plans

Risk mitigation plans are intended to define specific steps planned to reduce the risk of an associated event or action. There is no specific format or required content for an effective risk mitigation plan. However, well-written plans have many areas in common. They are succinct and all typically contain generic descriptive information, a summary of the risk and mitigation plan, discussion of the consequences, metric(s) to be used in monitoring progress, and mapping of the associated mitigation tasks to the IMS. Figure 35 illustrates a sample risk mitigation plan.

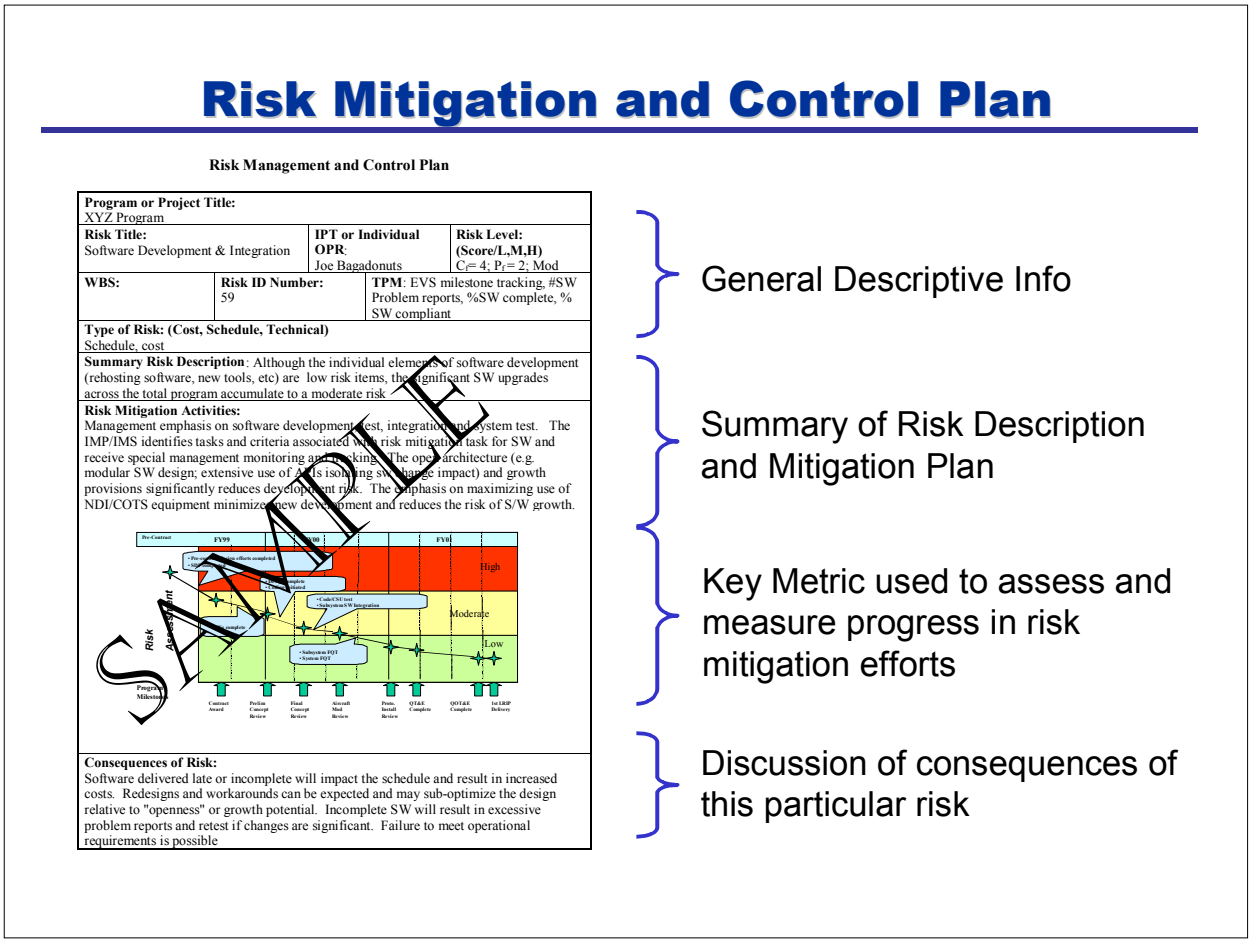


Figure 35 Sample risk mitigation plan showing four key elements

Incorporate risk planning into the IMS

Effective risk mitigation planning includes identification of specific actions, which reduce the likelihood of, and/or the consequences of occurrence. In aggregate, these actions comprise the specific risk mitigation plan. These actions should be included as tasks within the IMS. The proposal IMS will become a

primary tool in the source selection to determine if the contractor appropriately identified and has adequately developed mitigation plans to mitigate the risk.

Develop cost estimate based on the IMS

The IMS is the program schedule, reflecting both the content, interrelationship and phasing of all key program activities. As such, it is the cornerstone of the program cost estimate.

Explain the total "risk" plan in the proposal

The management part of the proposal, is where offerors explain "how" they intend to achieve program objectives. Risk Management is inextricably linked to the basic proposal constructs:

1. Risk Mitigation Plans: Describe detailed approach to reducing specific risks, identifying specific tasks contained in the IMS and metrics used to measure progress.
2. Integrated Master Schedule: Reflects the program content, task interrelationships, and phasing, including all tasks associated with "high" or "medium" risks mitigation actions.
3. Past Performance volume: Provides confidences the methods described in the risk mitigation plans and scheduled in the IMS are realistically achievable.
4. Cost volume: Prices the effort described in the IMS. The Basis of Estimate (BOE) in the pricing volume should be consistent with the content and phasing reflected in the IMS.

II.E.3. Principle Linkages within Integrated Project Management

Predecessors:

- Risk Management Planning and Initial Assessment [Section I.C.] The initial risk identification, done by the Government, is expanded by the offeror into specific risk mitigation plans, including plans for risks not identified by the Government
- The RFP [Section I.E.] The RFP specifies certain aspects about the program and strategy from which additional risk areas, and therefore risk mitigation plans, may emerge.

Interconnects:

- Integrated Product Teams [Section II.D.] Risk mitigation plans should be "owned" by a specific IPT. Actions with individual plans are frequently the responsibility of persons in other IPTs, but the oversight and ownership of individual risk mitigation plans should be vested in a single IPT.
- Cost Estimates [Section II.F.] Cost estimates must include all aspects of the risk mitigation plan.
- Integrated Master Plan (IMS) and Integrated Master Schedule (IMS) [Section II.G.] Risk mitigation planning can be effectively accomplished if done in concert with the overall program schedule. A specific mitigation action may have entirely different consequences when examined in the context of the other interrelated activities.

Successors:

- Integrated Master Plan (IMS) and Integrated Master Schedule (IMS) [Section II.G.] Risk mitigation activities should be reflected in the IMS. A risk, if it occurs, has a specific and quantifiable impact on cost, schedule, and performance. Therefore, it is probably on or near the critical path.

- Source Selection [Section II.H.] The source selection evaluates the proposed approach to achieving cost, schedule, and performance. The ability to achieve these parameters is tempered by the associated risks. Therefore, source selection evaluates risk mitigation activities—and analyzes the extent to which the Government believes these mitigation plans will be effective.

II.F. COST ESTIMATES

II.F.1. Cost Estimate Introduction

A cost estimate is an analysis and presentation of future costs of an object or service, based on prior cost history of the same or similar systems. Cost estimating is comprehensive in character, identifying all elements of cost that would be entailed by a decision to proceed with development, production, and operation of a system, regardless of funding source or management control[4].

The proposal cost estimates serve as a key element for industry development and submittal of a winning proposal (Figure 36). Proposal cost estimates reflect unique approaches to execution planning. As affordability has become more critical to the Government decision-making process, more emphasis has been placed upon realistic cost estimates as part of the source selection. Further, TOC appears to be increasing in importance in the Government decision-making process and source selection criteria. The cost estimate may now cover the entire spectrum of the acquisition program from the technical solution, to the schedule of planned work accomplishment, to the contract strategy, to the funding required over its full life cycle. No other program plan fully details the acquisition program like a documented cost estimate. Not only does it provide the estimated cost for the current contract, it provides a major element of data for updating the Government budget through the budget process.

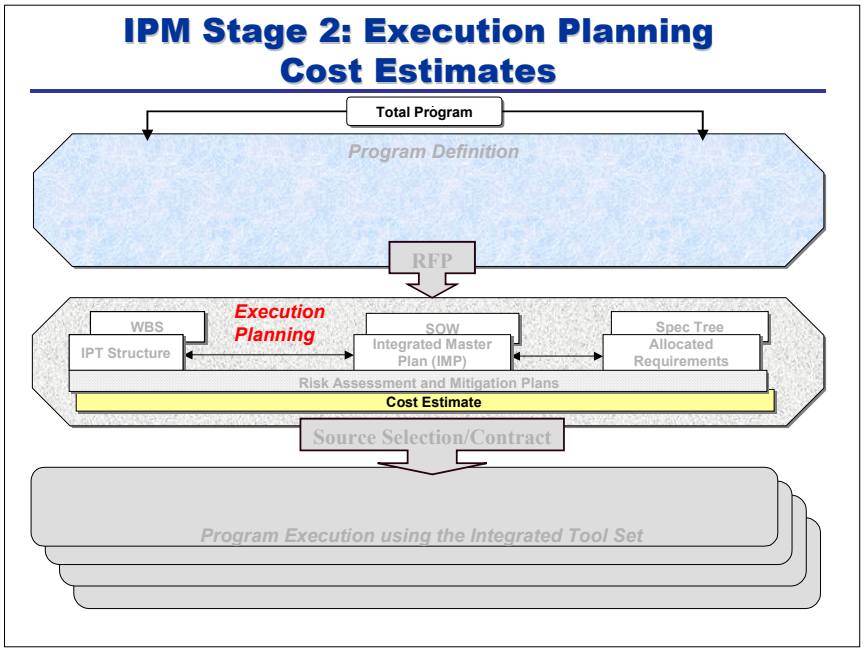


Figure 36 The cost estimate pulls together the approach, risks, and schedule

II.F.2. Constructing a Cost Estimate

If a cost type or fixed price incentive contract is being proposed, the Government will use a defined process for evaluating an offeror's cost estimate. Typically, the key elements of the cost evaluation centers on verifying the estimate is complete and realistic. Basically that means that all elements of cost are included, the costs in a proposal are realistic for the work to be performed, reflect a clear understanding of the requirements; and are consistent with the various elements of the technical proposal. Further the estimate must be reasonable in comparison with current or recent prices for the same or similar items, adjusted to reflect changes in market conditions, economic conditions, quantities, or terms and conditions

[4] DoD 5000.2R, Part 5.56, 11 May 1999

under contracts that resulted from adequate price competition. The Government will evaluate the cost estimate against this standard, and therefore must have adequate data for the evaluation.

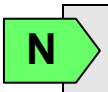
To provide this level of data, the cost estimate must be based upon a disciplined system engineering approach that begins with defining "what is to be estimated". The "what" reflects the planned approach to provide the contract deliverables and is organized around the Work Breakdown Structure. As noted in Section II.A., the Work Breakdown Structure provides a product-oriented family tree composed of hardware, software, services, data, and facilities. The family tree reflects from systems engineering efforts during the acquisition of a defense materiel item. This provides the architecture to identify all tasks required to execute an acquisition program. If TOC is a decision variable, the cost estimate will cover all efforts from development through production to sustainment and finally to disposal.

The next step in the process is to begin the actual estimating effort, identification and quantification of all tasks identified in the WBS. This is documented in the BOE, and reflects the cost estimates of activities presented elsewhere in the proposal. These include the technical and management approach and other activities included in documentation available. For example the SOW (see Section II.B.) provides a detailed description of planned work accomplishment with direct traceability to the WBS and the IMP/IMS. The Risk Mitigation Planning (see Section II.E.) identifies activities that will be accomplished to manage identified risks. Finally, the IMP/IMS (see Section II.G.) provides time phasing and schedule durations planned for the various activities required by the technical and management approach. With this information it is possible to start the estimating task.

Multiple tools exist for quantifying the program cost estimate. Tools most commonly used are Cost Estimating Relationship (CER) or parametrics, analogous or similar-to, engineering assessments, factors, subcontractor quotations, and actual costs incurred. The tool selection will track closely to the phases of development being proposed, due more to the availability of data than any other factor. Early on in development cycle, limited data is typically available for a specific technical solution so parametrics and analogies are routinely used. Example parametric models in use today include:

- The PRICE Estimating Suite (PRICE H/HL/M/S)
- System Evaluation and Estimation of Resources - Hardware Estimation (SEER-H); and
- Cost Analysis Strategy Assessment (CASA).

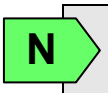
Note:



When a CER is used, it must be presented and its source cited. A cost estimator reviewing the cost documentation should be able to obtain enough information either from the document or from the sources cited therein to reconstruct the CER and evaluate its associated statistics.

For programs in the later part of the development cycle, actual cost performance data will normally be available and become some of the key estimating information since there is increased definition and understanding of the technical solutions. Logistics Support Analysis may provide information on spares budgeting, training requirements, etc.

Note:



Where subjective judgments were used to adjust estimates made by analogy with other systems or components of systems, the professions of those making the judgments should be identified (e.g., cost analysts, engineers, etc.) and full citations for the sources(s) of the costs of the analogous system(s) must be provided. Sources of the costs of each element in an engineering, or "grass roots," estimate must also be cited.

Crosschecks of estimates are typically conducted in order to increase the confidence level for the decision-makers. There is an emerging trend for the Government to provide the exact Life Cycle Cost (LCC) model(s) or specific analysis techniques they will use to evaluate offerors' proposals during the source selection. If this has occurred, the contractor will attempt to use this as either the BOE, or as a cross check to validate their estimate.

The next step is quantifying the risk around the cost estimate. Numerous tools are used for risk analysis but a key factor is the risk mitigation planning conducted by the Government/contractor team. Risk mitigation planning establishes the knowledge base of the program risk and identifies the windows of opportunity for reducing risk. The risks are quantified and then included in the cost estimate to establish a program with some level of execution confidence, e.g., 50%, 60%, etc.

Caution:

C Cost estimates must reflect the risk mitigation planning included in the proposal. If the cost estimate does not include these activities, either the efforts will not be accomplished, or the program will experience cost growth associated with the unbudgeted activities.

Note:

N Sensitivity analysis should be performed to include the cost of changing significant input parameters. Crosschecks should be included for all high cost/high risk portions of the estimate.

This entire cost estimating effort will be finished late in the proposal effort, as the early effort will be focused on defining the technical and management approaches to be implemented. As the program evolves during the proposal effort, the cost estimates will have to track to changes. Further, if the program team views the cost estimate as non-competitive (see below), the program strategy may change, resulting in restructuring of the approach and proposal.

Caution:

C Documentation is often viewed as one of the final tasks or activities. With that perspective, it becomes the most difficult task. If documentation is left untouched until the end of the estimate it becomes extremely difficult to recapture the rationale and judgments that formed the estimate.

The final step in developing the cost estimate is gaining the collective agreement of the program leadership such that the estimate becomes the program input into the proposal. Depending on the dollar value, this may take a significant amount of time to obtain high-level corporate approval.

II.F.3. Competitive implications on Cost Estimating

Prior to the release of a formal RFP, industry frequently approaches program structure and technical/management approaches based on a "cost to win" position versus a bottoms up cost estimate. "Cost to win" is the price an offeror believes is a winning proposal. Routinely, the "cost to win" numbers are established by the marketing team based on the intelligence they have garnered through contacts within the Government and through competitive industry sources interested in the program. The "cost to win" numbers then become an element of the offeror's basis for Bid/No Bid decision and even the program approach they implement.

A key difference between the Government estimate and an offeror's cost proposal is the "cost to win" effect. The offeror continues to assess their cost proposal against a "cost to win" position such that they remain competitive in the eyes of the source selection evaluation team. The greatest impact of "cost to

win" is the risk surrounding a cost proposal. Typically, the cost proposal reflects a greater degree of optimism, especially if the Government bears the cost risk for overruns. It does not necessarily make the proposal unrealistic but it may increase the risk level of executing within established cost constraints.

As a result, the Government is motivated to carefully look at the estimate to ensure it is complete and realistic. Particular areas of focus include 1) The Government assessment of the risk areas to ensure they are all included in the estimate; 2) the proposed schedule durations for credibility; and 3) cost estimating relationships and analogies will be reviewed for relevance. This will culminate in some form of "Most Probable Cost" assessment during the source selection to ensure the estimate reflects the effort proposed as part of the overall assessment.

Caution:

C

It is important for the contractor to provide necessary information to show the estimate is complete, reasonable and realistic. Cost estimates that the Government's initial assessment judges to be inaccurate or artificially low may generate a number of Evaluation Notices (ENs), requiring extensive effort to respond. If the concerns are not alleviated, the Government will use their own estimate as part of the evaluation for final award.

II.F.4. Principle Linkages within Integrated Project Management

Predecessors:

- Work Breakdown Structure [Section II.A.] Technical and programmatic requirements of the acquisition program form the basis for establishing the work breakdown structure. Cost estimates are developed using the work breakdown structure ensuring all costs are accounted for in the budget.
- Statement of Work [Section II.B.] The detailed description of planned work accomplishment is reflected in the SOW with direct traceability to the WBS and the cost estimate of the program.

Interconnects:

- Integrated Product Teams [Section II.D.] IPTs, both Government and industry, mirror the WBS. The IPTs are established at the lowest level of the Contractor WBS where responsibility and accountability for work accomplishment is established. Cost estimates quantify the level of accountability for which the IPT is held responsible.
- Risk Mitigation Planning [Section II.E.] Cost estimates reflect the degree of risk mitigation planning conducted for the acquisition planning. Insufficient risk planning results in overly conservative and/or overly optimistic budgets depending upon the level of risk analysis conducted on the program.
- IMP/IMS [Section II.G.] Cost estimates are a direct reflection of the work content of the IMP and the scheduled effort reflected in the IMS. Disconnects between either products is readily visible in source selection activities.

Successors:

- Proposals Contractor proposals are evaluated for technical content, schedule accomplishment, and estimates of cost to execute the proposed contractual effort. Cost estimates reflect the proposed technical solution in concert with the planned schedule of accomplishment.

- Source Selection, Contract Award [Section II.H.] A key element of a source selection and/or award of a sole source contract is the cost proposal. Evaluation of the cost proposal is based on the criteria of reasonableness, realism, and completeness.
- EVMS [Section III.A.] The cost estimates provide budget available to distribute to either cost accounts or management reserve used as the foundation for the EVMS.

II.G. INTEGRATED MASTER PLAN (IMP) AND INTEGRATED MASTER SCHEDULE (IMS)

II.G.1. IMP and IMS Introduction

During the 1980's acquisition leaders became increasingly aware that detailed program planning was not accomplished until after contract award. The results were predictable cost and schedule overruns. An approach was needed which better incentivized industry to develop a detailed and fully integrated program plan as part of their contract proposal. The IMP and IMS provide very effective vehicles for understanding the complete program approach. They illustrate the event driven program plan including entry and exit criteria for each event, how the various integrated processes are tailored for the particular program, and the details of program execution yielding a higher confidence cost estimate.

The RFP should require an IMP and IMS; which obligates offerors to do significantly more planning prior to contract award. The IMP is normally placed on contract, becoming the mutually agreed "event driven" approach for program execution. The IMS is the detailed schedule, showing the time spans required for each task and the interrelationship between tasks. These events are closely related, frequently from the same database (Figure 37). The IMS should not be placed on contract, because this could trigger a contract change every time a lower level task completion date changed.

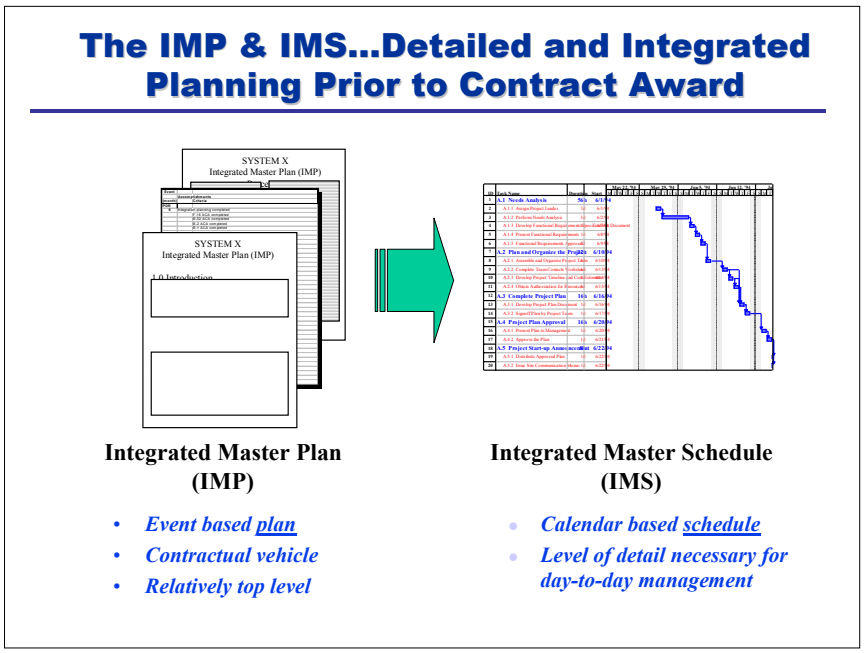


Figure 37 The IMP and IMS are closely related

The IMP and IMS are developed in parallel. The IMS supplements the IMP with additional levels of detail and adds scheduling durations and task linkages. Another way to view it is that the IMP task listing is a compressed IMS without scheduling information. The IMP and the IMS contain similar information viewed from separate perspectives and different levels of detail. The IMP defines the event driven plan and the IMS reflects the task level details and scheduling information essential for day-to-day program execution. The IMP and IMS should clearly demonstrate the program is structured to be executable within schedule and cost constraints, and with acceptable risk. Thus, both the IMP and IMS are key ingredients to proposal preparation, source selection, and program execution.

Prepared correctly, the IMP and IMS are totally interrelated and completely integrated. Together, they become the key vehicle for additional insight into virtually all areas of the proposal including cost realism, program risk handling, and processes maturity. They track to the IPTs, the WBS, and the SOW. Because the IMS is so fundamental to effective program structuring and therefore the source selection

process, its creation is discussed as a part of the IMP. IMS used as part of the Program Execution Stage is discussed in Chapter III.

Building the IMP/IMS is straightforward—not simple, but straightforward:

1. Construct a top level notional plan showing major program phases, events, tasks and approximate dates that define the maturation process. The real dates will be event driven and available only after the IMS is completed.
2. Translate the top level plan into an IMP by completing the second and third level indentures needed to fully define an "event driven" program. Add narrative process descriptions.
3. Expand the IMP into an IMS by adding subordinate tasks, their durations, and linkages showing interrelationships to other tasks. This produces a Gantt chart format.
4. Refine the IMS using schedule risk analysis. Using schedule risk analysis, critical path analysis, etc., isolate the need for additional risk mitigation activities to yield a higher confidence schedule.
5. Translate the top level plan into a top level schedule reflecting the real dates from the IMS.

Of course, reality seldom works in such an orderly and serial fashion. Typically, the IMP and IMS are built in an iterative manner, with top level approach changing as the proposal is finalized. Because this frequently occurs before the RFP is final, it helps industry if they provide insights during early industry feedback, as described in Chapter 1, The Program Definition Stage.

II.G.2. Construct a top level notional plan

Spending time constructing a well-defined plan is an investment that pays large dividends, reducing scrap and rework during the remainder of the Execution Planning Stage. The top level plan is a one-page summary covering the entire program and reflecting the best judgment of how program objectives will be accomplished (Figure 38).

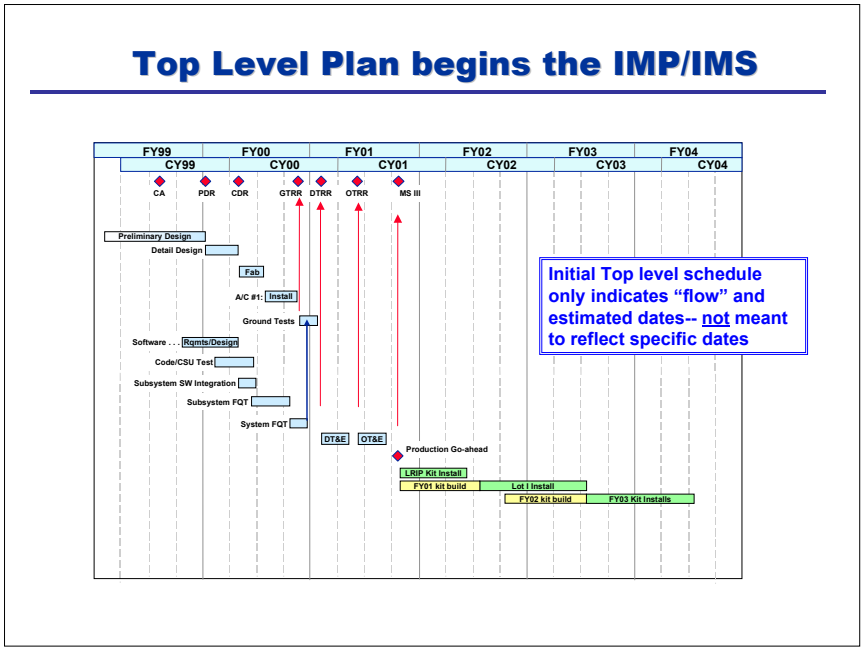


Figure 38 IMP/IMS begins with a top level plan

Properly accomplished, using a phased building block approach, the top two or three levels of the IMS can be defined as an adjunct to building the top level plan. However, this requires adequate program definition including the execution approach, early in the program planning process. This results in definition of the insight to: Who writes which modules of software? When do we integrate software and hardware? What are the prerequisites for each major event? How is testing actually going to be accomplished?

The top level plan covers the entire program, reflecting how the program will be accomplished (Figure 38). Success-

ful program planning typically follows a sequential process by answering two fundamental questions: What are the program requirements, and how will they be implemented? The "how" is described in macro terms (e.g., development phase followed by a production or mod phase), which are further broken down into the contractor's proposed program structure (e.g., PDR, CDR, etc.). Following these decisions an iterative approach defines the multi-disciplined requirements for each step along the way. Program interrelationships also emerge at this point; e.g., multiple subcontractors producing software modules, which must be individually tested prior to delivery to the prime for hardware-software integration testing.

WARNING:

W The contractor normally spends too little time in developing their top level plan. There is a rush to work the details. Significant scrap and rework can be avoided if the full team irons out the top level interrelationships and dependencies early.

This plan is the beginning of IMP/IMS construction, portraying the overall program approach, reflecting major programmatic steps, and includes the key risk mitigation approaches. *Events* are major program activities (e.g., CDR) and *significant accomplishments* are the event closure criteria (e.g., CDR requires detailed design completion).

Note:

N If the top level schedule can be constructed from a fully integrated and multi-functional approach, keeping in mind the ultimate objectives of the IMP and IMS, then it is relatively easy to convert the contents into a first draft of the IMS.

II.G.3. Translate the top level plan into an IMP

The IMP is the program plan, not a schedule. It contains event-based descriptions and the key processes employed to achieve those events. In conjunction with the IMS, the IMP facilitates the ability to better evaluate cost and schedule realism and helps focus on program risk mitigation planning. It provides insights into how processes will be tailored for the particular program peculiarities. The Government does not usually specify a particular IMP format. It normally contains three sections: Descriptive Section, Product IMP, and Process IMP (Figure 39).

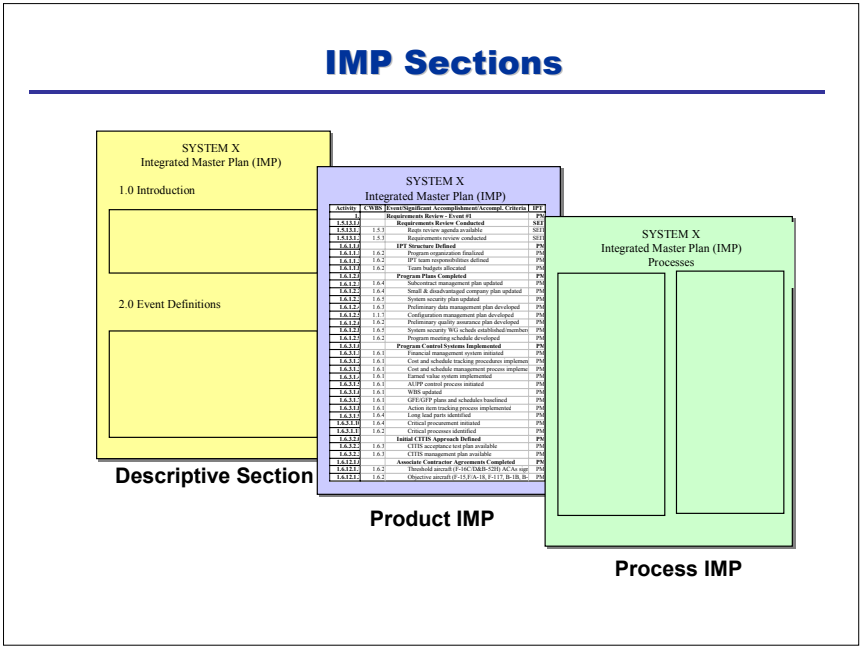


Figure 39 The three IMP sections typically go on contract

The **Descriptive Section** focuses on how to use the IMP and summarizes key programmatic ground rules. It typically contains topics such as: assumptions/guidelines, dictionary of definitions for selected events and action verbs, and description of the purpose, expected results and proposed

event closure criteria.

The **Product IMP** is an event-oriented representation of integrated product development. It is a list of "events," (initiation or conclusion of major intervals of program activity), "significant accomplishments" (the event closure criteria), and associated completion "criteria" (definitive measures of accomplishment) describing the necessary work effort. The IMP is a description of how the program will be accomplished.

Events or Milestones: Major program events are opportunities to gauge program status and typically are spaced no more than four to six months apart. There is no set requirement for what will be defined as a milestone or event, but MIL Standard 1521B contains the traditional major program events and serves as a good starting point. An "event" is a key point in the program where you would measure progress to determine whether it is appropriate to proceed to the next series of activities. Interim status reviews may need to be inserted to prelude excessive time between events.

Significant Accomplishments: Groups of criteria that logically fit together and become the entry criteria for Events. Within an event driven schedule, the program would proceed only when all significant accomplishments have been accomplished (e.g., detailed design prior to CDR). Significant accomplishments should always be stated in finished terms, such as "completed", verified", etc.

Caution:

C Significant accomplishments must be selected at the appropriate level—not too high, not too detailed. If they are at too high, the criteria list will be long and difficult to associate with a single milestone. If too low, there tends to be a one to one ratio of accomplishments and criteria, which confuses the distinction.

Note:

N An easy crosscheck to ensure a multi-disciplined approach is being followed is to ensure every functional discipline is significantly involved in at least one significant accomplishment for each event.

Criteria: Objective evidence significant accomplishments have been satisfactorily completed. They document the claimed progress and can be seen, touched or demonstrated using well-defined terms (e.g., 90% drawing review as evidence the detailed design was complete). Meeting all the criteria indicates completion of the significant accomplishment. The IMS will take these criteria and further break them into tasks representing the work necessary to meet the criteria.

Note:

N Events occur at the system level and cross multiple IPTs. Significant accomplishments may also cross multiple IPTs. Each "criterion" needs to directly relate to a particular IPT, which aids future accountability and reporting. Each IPT can then flesh out subordinate task definitions, durations and linkages (i.e., below the criterion level).

The **Process IMP** describes critical program processes. This part of the IMP may also fulfill the role of the functional plans (QA, Configuration Management, Manufacturing, etc.). It is not intended to restate existing company processes but to explain how these processes will be used, and possibly tailored, to execute this particular program. Each process description is typically three to ten pages.

II.G.4. Expanding the IMP into an IMS

The IMS is a detailed extension of the information contained within the IMP, reflecting tasks subordinate to the criteria. This additional detail enhances rigorous schedule management, facilitates identification of task interdependencies, and provides additional insight through the use of critical path analysis. The IMS

is a key tool for ensuring consistency of actions and unity of purpose among program IPTs. It is not an attempt to cover every possible program task, but to describe a realistic and supportable schedule, determined by the starting date of the network, activity duration, and the connecting activity logic. It will be the key determinant of the offeror's ability to successfully execute the proposed program.

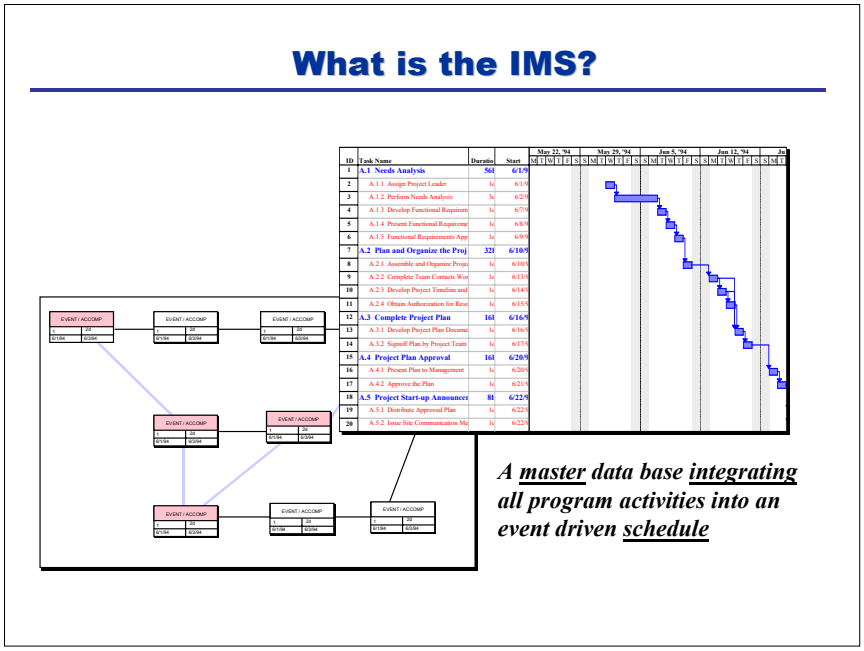


Figure 40 IMS expands the IMP and adds scheduling data

The IMP addresses planning to the third level, i.e., criteria. The IMS expands these criteria, describing the "tasks" needed to complete the efforts and allocating specific span times to each task. This description can be taken to any level of detail desired—whether only to the fourth or fifth indenture, or all the way down to individual work packages measurable in the EVMS (Figure 40).

Expanding the IMP into a fully developed IMS is a multi-step, iterative, process focused at the IPT level. As discussed above, criterion may usually be isolated to a single IPT. This has numerous advantages: "ownership", the ability to correlate one-to-one with specific WBS elements, and isolating the cost and schedule tracking responsibility to name a few. Tasks are work efforts stated in work package terminology, such as "Review the drawing package."

Building the IMS is a four-step process:

1. **Add subordinate tasks to each Criterion**. These are the work efforts necessary to complete the criterion, expanding the database to a lower level of detail. Normally there will be several tasks required for each criterion, crossing multiple disciplines.

Note:

N

Program management is most effectively accomplished when there is a one-to-one correlation between specific IPTs and summary levels in the IMS. Typically, this is done at the third level of the IMS, the Criterion level. Constructing the IMS so that each third level Criterion can be directly correlated to a specific IPT greatly simplifies management—consolidating cost, schedule, and performance responsibility within a single IPT. Each functional discipline within the IPT should have a subordinate task.

2. **Specify durations for each task**. Determine the appropriate duration. Task durations in the IMS should be directly traceable to the cost volume BOE and supported by relevant past experience.

Note:

N

Whenever possible analytical tools, calibrated with actual company experience, should be used to assess tasks and determine estimated task durations. Some frequently used software models are Kokomo, Price-S, etc.

3. **Add dependencies for each task**. Add both internal and external dependencies by linking tasks to their preceding and succeeding tasks.

Caution:

C It's important the IMS developer monitor the critical path during insertion of dependencies to ensure it remains valid. Failing to notice a "lost" critical path until after many additional dependencies have been inserted will greatly increase the troubleshooting workload.

Note:

N Do not use date constraints because doing so overrides the critical path analysis. Minimize the number of relationships that are not finish to start because it overly complicates the schedule, making it significantly more difficult to evaluate and troubleshoot.

4. **Adjust to reflect any real world constraints**. There will frequently be external program constraints, driven by operational considerations and/or funding availability, which need to be adjusted to IMS.

II.G.5. Refine the IMS using Schedule Risk Analysis

Schedule Risk Analysis is an analytical technique allowing qualitative schedule risk assessments. Several commercial programs are available. It is accomplished by modeling the entire program network as constructed in the IMS, uses a Monte Carlo simulation to recreate the network flow hundreds of times, taking into account all the possible variations with each task.

In order to run a schedule risk assessment, the IMS must conform to certain ground rules.

1. Valid critical path. The critical path evolved during the third step (add dependencies for each task) of building the IMS. Provided links were inserted properly there should be a critical path.
2. "Most Likely" durations for every task. This was accomplished during the second step (specify durations for each task).

Caution:

C Schedule risk analysis programs are only as good as the underlying assumptions and the input data. The sophisticated user can "game" the results. It is important the proposal instruction clearly articulate the importance the Government places on an honest risk assessment. Risk identification, with realistic mitigation planning, must be viewed as a positive attribute, and used as a selection criteria in Section M. "*Garbage in, garbage out*."

II.G.6. Characteristics of an Excellent IMP/IMS

There are selected IMP/IMS characteristics, proven to be very valuable in constructing the proposed schedule/plan, evaluating it during source selection (Section II.H.) and using it (Section III.B.) in program execution. The characteristics of an excellent IMP/IMS are:

1. The IMS is event driven and highlights the critical path.
2. The numbering scheme is logical and consistently applied with traceability between the IMS, IMP, SOW, WBS, etc. This is most easily accomplished by using a correlation matrix.

Caution:

C

Forcing the WBS structure and numbering system on the IMS, imposes an artificial structure on the event-based approach, making it very cumbersome to use during program execution. The IMS and WBS are both product oriented; however, the IMS is typically constructed to reflect task accomplishment according to the normal program flow (i.e., chronological sequence such as design leading to testing to production, etc.) for the total program, rather than at a lower level, permitting system level integration.

3. Provides adequate breakdown of IMP accomplishments into key work packages. The IMP/IMS is not unnecessarily complex, but of sufficient length and complexity to thoroughly demonstrate the offerors understanding of the complete program requirements, risks and complexities.

WARNING:

W

IMS line constraints should be avoided. Offerors are limited in their most valuable tool for communicating how they will manage program risk and the Government foregoes the key opportunity to get valuable source selection information essential to picking the "best value".

4. Logically organizes all activities. Ownership of each activity is identified with the appropriate organizational (IPT) and/or functional code (i.e., test, manufacturing, software design, etc.).

Caution:

C

The IMS is the responsibility of the IPT leader—not the schedule manager. The schedule manager can be responsible for the process and facilitate IMS updates, but it is important to maintain responsibility with the IPT. Otherwise, it is easy to migrate to an official IMS and the IPT's "real" schedule. This frequently causes problems in progress analysis.

5. Integrates all functional work packages needed to pass a milestone.
6. Reflects realistic time spans (durations).
7. Contains relatively few date constraints (e.g., Start No Earlier Than) – if any.
8. Ground rules and assumptions, for duration estimates, are explained. Relationships with long lead or lag times are fully explained. Constraints other than "as soon as possible" are avoided.
9. Influences/drives scheduling of milestones/events.
10. Traceable numbering system to other proposal elements.
11. Risk mitigation plans are consistent with, and linked to, the IMP/IMS. Tasks are selected to ensure visibility into key program activities. Appropriate metrics have been developed.
12. A thorough schedule risk analysis is presented.

II.G.7. Principle Linkages within Integrated Project Management

Predecessors:

- Developing a Top Level Approach [Section I.B.] The top level approach, developed by the Government, will form the starting point for the IMS structure.
- Work Breakdown Structure [Section II.A.] The WBS defines the program "products"; therefore it also provides a starting point for the subsections within the IMS. The "products" are frequently

directly associated with the IMS second level Significant Accomplishments; i.e., subsystem CDRs in preparation for the system level CDR.

- Allocated Requirements and the Specification Tree [Section II.C.] Each of the allocated requirements should somehow be represented within the IMS, either as part of a larger unit or as a separately identified piece.
- Risk Mitigation Planning [Section II.E.] Risk mitigation planning leads to specific IMS activities associated with higher categorized risks and should certainly be included in the IMS.

Interconnects:

- Integrated Product Teams [Section II.D.] The WBS defines the products and key processes associated with program accomplishment. IPTs are constructed to best manage these products.
- Risk Mitigation Planning [Section II.E.] Risk mitigation plans need to be reflected within the IMS, to increasing levels of details commensurate with the risk severity categorization.
- Cost Estimates [Section II.F.] IPTs provide the insight and basis of estimates for the work content of the IMP and the schedule efforts defined in the IMS.

Successors:

- Source Selection [Section II.H.] This IMS provides the most significant insight into how the program will actually be accomplished.
- Integrated Master Schedule (IMS) [Section III.B.] The most important part about constructing an IMS is to build it to represent how the program will actually be managed. Building a separate "proposal IMS" leads to significant complications during program execution.
- Risk Management and Updates [Section III.D.] Tracking progress against identified risks should be accomplished, using the information embedded in the IMS.
- EVMS [Section III.A.] EVMS is a management tool to track program schedule execution by the IPTs. There must be traceability between the data being collected and the schedule being used by the IPTs, or analysis of reporting variances will suffer.

II.H. SOURCE SELECTION/CONTRACT AWARD

II.H.1. Source Selection /Contract Award Introduction

Source Selection and contract award culminate the Execution Planning Stage of the Integrated Project Management framework. The source selection objective is to evaluate and select the contractor whose proposal articulates a program matching the Government's relative priorities while providing confidence in the contractors' ability to satisfactorily fulfill the performance criteria outlined in the RFP. The acquisition and support strategies (Section I.D.) defined Government priorities, which were articulated to the offerors in the RFP (Section I.E.), and became the basis for the proposals.

Upon the receipt of the contractor's proposal, the Government enters into a formal proposal evaluation process—source selection. Although there are a variety ways to accomplish source selections and each service has some unique procedures, they all conform to FAR source selection guidelines. This process begins with proposal receipt, through several well-defined steps, and culminates with the contract award and debriefings to losing offerors (Figure 41).

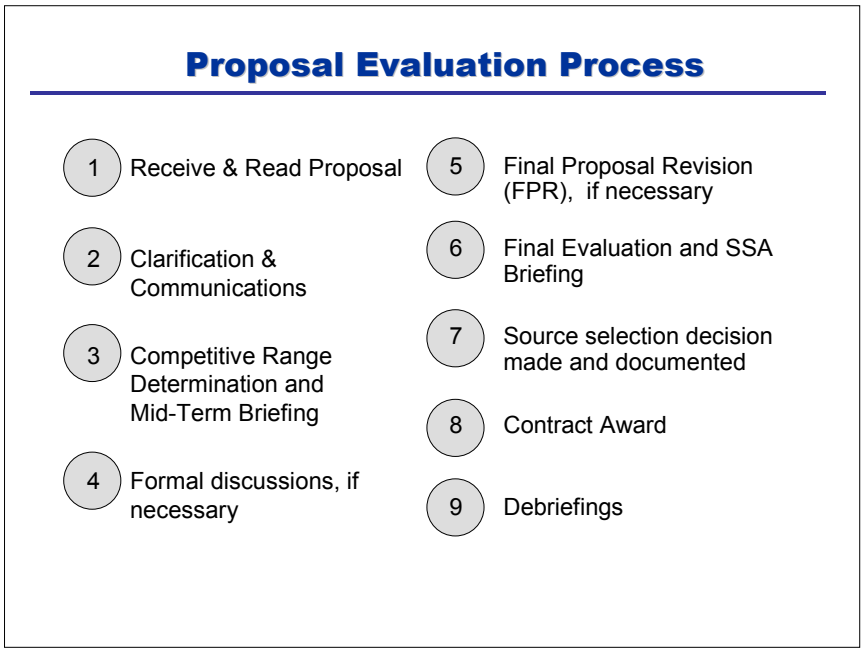


Figure 41 Proposal evaluation process

Oral presentations and oral discussions have become an increasingly prevalent part of the proposal and source selection processes. They offer both parties an effective vehicle for significantly improved communications.

Past performance has taken on increased significance over the past few years. In addition to offerors demonstrating a well thought out program approach, with the appropriate risk mitigation plans in place, it is important to demonstrate relevant experience. The exact role past performance plays varies between source selections, but can be a very meaningful discriminator.

II.H.2. Source Selection Discussion

The Source Selection Plan (SSP) documents source selection procedures and organization. Although services have unique source selection procedures, each focuses on reviewing the proposals and selecting a best value solution. The general process involves receipt and evaluation of the proposals, performance of initial review against evaluation criteria, obtaining the necessary clarifications, and possibly conducting a mid-term briefing to the SSA. In the mid term briefing, the team evaluates each proposal against standards, rather than against each other. As part of the mid-term review, the SSA makes a competitive range

determination for each proposal. If the determination is made that more information is required prior to selecting a source, formal discussions with industry begin. After completing these discussions, industry provides a final proposal revision in which the Government team performs the final evaluation and prepares a briefing to present to the SSA. The SSA makes a decision, appropriately documented, and the contract is awarded. Debriefings are offered to the non-winning offerors.

Note:

N

Historically there has been a great deal of focus on ensuring source selections are protest-proof, and there is "a level playing field" provided to all contractors. An emerging trend is to focus on ensuring the winning contractor provides the best value, and the Government can benefit from their inherent strengths and experiences. This is the appropriate objective of a source selection.

A modified approach to the more "classic" proposals is for various elements to be presented orally; i.e., an oral proposal. This is frequently used to address more than the technical approach, concentrating on those areas particularly challenging to present in textual form, such as explanations of the management approach, risk mitigation planning, and decision rationale. Oral proposals frequently yield some combination of briefing charts and words to supplement or replace part of or the entire proposal. It will be subject to the same restrictions as the written proposal. A record must be kept and provided to the applicable offeror. The contracting officer chairs the session and all evaluators must be present to hear the entire presentation. There are certain documents that may not be provided through an oral proposal. At a minimum, contract inserts or attachments, representations and certifications, a signed offeror sheet and any exceptions to Government Terms and Conditions must be written.

Note:

N

A best practice, which many programs find beneficial, is to use oral dialogue as an integral part of the discussions process. When used as a part of the issuance of an EN, this assures clear communication of the Government's real question. When combined with oral presentation of the response, it further facilitates clear communication.

It is generally required that the detailed selection process be formally documented in the SSP. This plan must be prepared prior to receipt of proposals, and prior to release of the RFP. It must be approved by the SSA, and describe the organization, membership and responsibilities of the source selection team. A basic source selection can be as simple as a very small group consisting of a contracting officer and a technical person. It may be a medium sized source selection where there is a SSA, a Source Selection Evaluation Team (SSET) and a Performance Review Assessment Group (PRAG). Or it could be a very large source selection with a SSA, the SSET, the PRAG, and SSAC. The SSP must also clearly state the relative importance of factors and sub-factors. Generally, these factors include some form of technical performance or mission capability, as well as an assessment of the proposal risk associated with a particular approach. Further, there is a requirement that past performance be graded, in order to determine past performance risk. Finally some measure of cost or price will be evaluated. The SSP identifies the relationship between cost and other factors and delineates the relative weights of all these considerations as described in Section M of the RFP (Section I.E.). Key definitions and evaluation approaches are defined, including the standards to be considered to assess the strengths and weaknesses for each element of the proposal. It also provides a description of the evaluation process to be followed, including how to score programs that exceed threshold requirements, and what, if any, value is to be placed on exceeding objectives. It defines the structure being used for performing a technical evaluation. Although each service has unique terms, all fundamentally show a range going from low risk, with little impact potential to the program, to high risk, which is likely to have a poorly executed program for the element being rated. The SSP shall include a description of how evaluation results will be presented.

The cost or price portion of the proposed information is normally viewed as "reasonable" if competition exists, and the proposal is for a fixed price effort. Any further cost/price analysis is done only upon approval of the contracting officer, if there is a reason to believe the price is unreasonable, incomplete or unrealistic. If a cost or fixed price incentive type contract award is planned, then cost reasonableness, realism and completeness will be assessed. If TOCs are part of the evaluation criteria, there must be information to support the out-year analysis.

Proposals must provide an integrated and consistent story to describe how the offeror intends to provide the proposed solution. It normally includes a technical description of the solution, an approach and management structure of how it will be provided, a schedule to be met, and a discussion of the various risks and how they will be mitigated. It also provides cost or price information. As part of the evaluation, the source selection team needs to ensure there is consistency between various elements of the proposal. For example, risk mitigation plans may be provided, but the various elements are not budgeted for in the cost proposal. Another example is a technical approach such as spiral development for software is planned, which is not reflected in the IMP/IMS. Such inconsistencies significantly increase the risk that what is proposed is not what will be delivered.

Caution:

C The SSET needs to cross check proposed approaches and costs in the different proposal volumes to ensure a consistent approach. Inconsistencies will generally result in cost and/or problems during program execution.

Beyond performing the technical evaluation and the cost/price evaluation, source selections are required to conduct a past performance evaluation, generally performed by the PRAG. Each offeror is required, as part of the RFP, to identify their applicable relevant past performance. The Government will evaluate the data, determine its relevancy and make a preliminary assessment of the past performance risk and the potential impact to the impending contract. Concerns will be identified to the offerors who are allowed to provide feedback and the final past performance risk will be identified.

There may be verbal or written interactions with the various offerors that are not deemed discussions for purposes of contract award. Clarifications are allowed which make certain aspects of the proposal more clear, resolve minor clerical errors, or discuss the past performance information. There may also be exchanges to establish a competitive range. An example may be where an offeror addresses adverse past performance information to enhance the Government's understanding of the proposal. This allows for a reasonable interpretation to facilitate the Government's evaluation process. These clarifications cannot be used to correct defi-

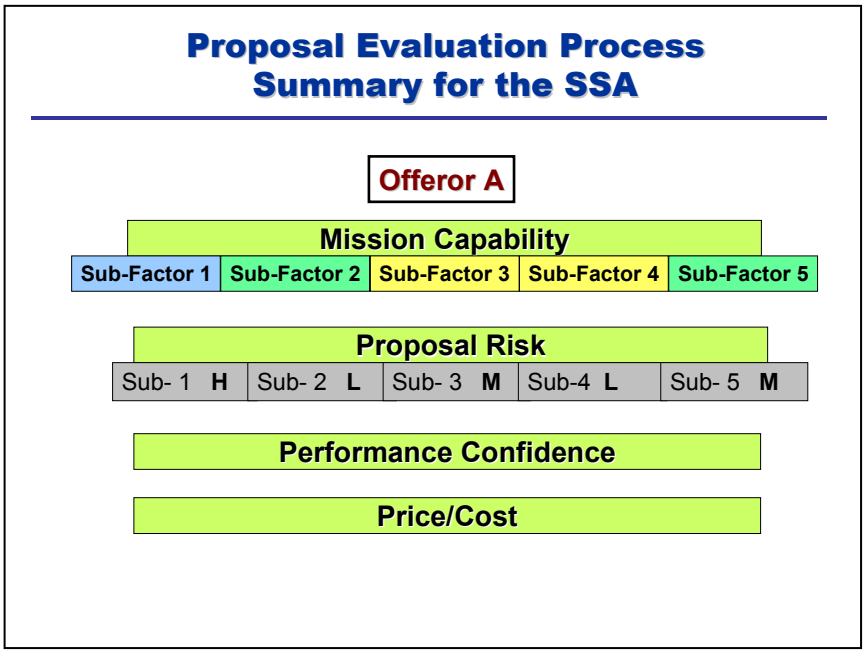


Figure 42 Sample proposal evaluation summary for the SSA

ciencies or revise the proposal but may be considered in rating the proposal.

After this initial evaluation is accomplished, a full presentation is developed for the SSA. It describes, in detail, the results of the evaluation against each factor and sub-factor, and includes a recommendation to either award without discussions or enter into discussions with the contractors. A sample of how the evaluation might be presented is shown in Figure 42. The evaluation is formally documented and presented to the SSA for a decision regarding whether there is adequate information to award the contract. If additional information is needed to make such a decision, discussions will be entered into. This determination will be documented as part of the file. At the same time, the SSA must make a competitive range determination.

If an offeror is removed from the competitive range, they will receive written notification that will identify deficiencies or significant weaknesses that were determined by the SSET. A debriefing will be offered to that vendor, but will only discuss their proposal evaluation. There will be no opportunity to correct it and they are entitled to only one debriefing.

Frequently *discussions* are required to determine a winning contractor. They are structured to maximize the Government's ability to select the best value given the requirements and evaluation factors, but focused on information, which will help discriminate between the various choices. Typically the discussions would be focused on resolving deficiencies and significant weaknesses, or understanding the operational value of areas that exceed thresholds. Since entering into discussions may significantly extend contract award date, and expenditures of personnel resources are costly, they should be as focused as possible. Further, it may require delicate handling to ensure that the Government team avoids any possibility of technical leveling between contractors. The contractor will be allowed to revise their entire proposal after the discussions are complete, in the Final Proposal Revision (FPR).

Caution:

C Evaluation notices need to be scrubbed by the Government team to ensure they focus on information that will make a difference in which offeror is selected. It can be very expensive for industry to reply to each request for information.

Finally, given all the above information and the FPR, an updated proposal evaluation is provided to the SSA. A decision will be made, and documented with the rationale and the benefits. It will include the strengths, deficiencies, significant weaknesses and risks assessed against each proposal along with the supporting rationale for why a contractor was selected. This document reflects the complexity and the value of the environment and the rationale used to determine the winning contractor. It describes what tradeoffs were considered and how the proposal compared to the highest rated proposal. This will be fully releasable to the General Accounting Office (GAO) and provided to all offerors in redacted form. For example, Offeror A would get the source selection decision document, but it would not include the information in Offeror B's proposal.

WARNING:

W The source selection must be accomplished consistent with the Selection Criteria described in the RFP. The evaluation must be performed using any described tools and standards. The source selection decision must use relative importance and weighting for each factor described in the Selection Criteria of in the RFP. Otherwise, a protest is possible.

Throughout the source selection process a number of key documents will be required. Documentation will be required on the findings and results of the source selection, which may include items such as a copy of the briefing provided to the SSA as well as a written report to the SSA on how successful each vendor was in meeting the requirements of the RFP. A best practice consideration is to integrate the two into a single document with an annotated briefing or a scripted briefing.

II.H.3. Principle Linkages within Integrated Project Management

Predecessors:

- Allocated Requirements and the Specification Tree [Section II.C.] Provides the technical solution to be evaluated in the source selection.
- Risk Mitigation Planning [Section II.E.] Provides the assessment as approach to manage risks in delivering the solution described in Section II.C. (Allocated Requirements). This helps define the program risk to be evaluated.
- Cost Estimate [Section II.F.] Provides the rationale and cost assessment required for the overall best value assessment by the SSA.
- IMP/IMS [Section II.G.] Provides the approach and event based structure and risk mitigation plans to deliver the solution described in Section II.C. (Allocated Requirements). This helps define the program risk to be evaluated.
- Acquisition and Support Strategy [Section I.D.] The acquisition and support strategies define the Government priorities which will be addressed in the source selection.
- RFP [Section I.E.] The RFP translates the requirements, constraints and program strategies into guidance for the offerors and forms the basis for the proposals. The RFP clearly articulates the criteria for evaluation during the source selection process.

Interconnects:

- None

Successors:

- Program Execution Using the Integrated Tool Set [Section III] The contract resulting from the source selection will define the requirements and approaches being pursued in contract execution.

II.I. CHAPTER 2 SUMMARY

During the Program Definition Phase (Chapter 1) the Government, with industry participation, defined the program and issued the RFP. Chapter 2 focused on the **Execution Planning** Stage, (Figure 43) beginning with the contractor(s) proposal preparation activities and culminating with the Government's source selection and contract award.

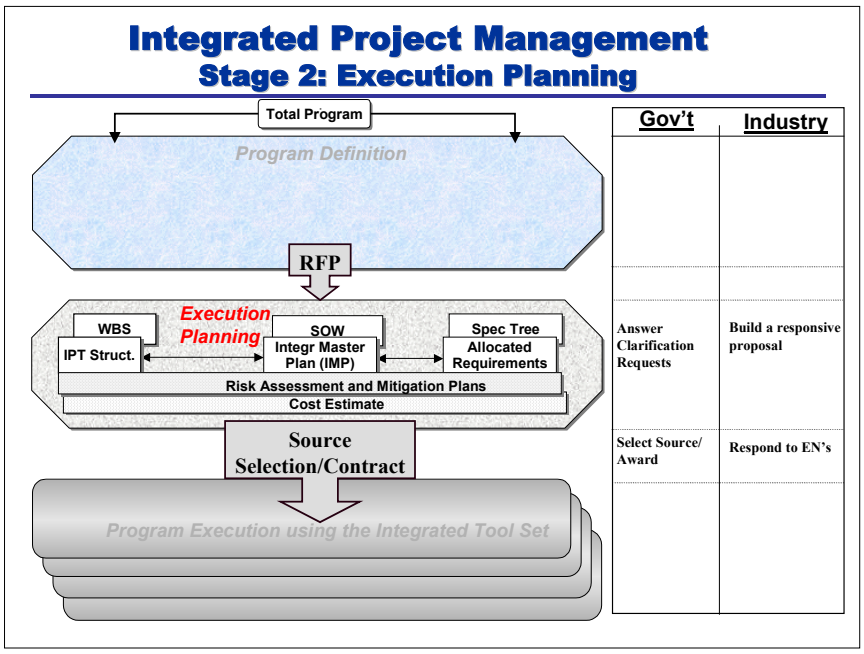


Figure 43 Execution planning culminates with contract award

Typically the RFP contains the model contract, SOO, SRD, top level program plan, CDRL requirements, general proposal instructions and selection criteria. Then it is the offerors responsibility to produce a WBS, SOW, IMP/IMS, System Specification, financial data, past performance data, etc., consistent with the instructions to the offeror.

The contractor creates and presents their best business approach to meet the contract requirements. Expanding and customizing their unique top level approach, and incorporating any risks peculiar to their planning accomplish this. Using the top level approach as the basis, they construct the **WBS**—the structure around which the program will be executed and costs captured. After determining how to best structure the program, the management approach is developed and the **IPT** structure is established. The idea is to decide how best to manage the program, build a WBS structure to accomplish this, and then structure the program team to compliment the WBS. The **SOW** and the **IMP** can be thought of as synonymous in many ways, except for the level of effort tasks, virtually all SOW contents will be contained in a well-structured IMP. Top level technical requirements flow directly down to the contractor developed specification, **specification tree** and **allocated requirements**. Throughout these efforts, **risk assessments and mitigation plans** are created and updated, and **cost estimates** are developed and refined. The objective of this Execution Planning Stage is for industry to provide a good quality proposal to the Government so that a source selection can be made and a contract awarded.

III. CHAPTER 3 – PROGRAM EXECUTION

The objective of this stage is to successfully execute the program. The foundation for Program Managers' success in program execution is to maintain insight into program progress, and manage the impact of changes, whether these changes are due to contract execution or to external influences. As the program progresses, the manager must make decisions and provide direction to accommodate changing circumstances. These changes may or may not be within scope of the current contractual effort. Appropriate contractual changes must be made to accommodate all "out of scope" change actions. Given the huge amounts of information available, it is important to prioritize and keep a focus on the elements most likely to impact the program—the risk areas. Key information sources to accomplish this task are the management indicators developed during the Program Definition and Execution Planning Stages. These include the EVMS, IMS and appropriate metrics. This becomes the integrated tool set used for primary program insight (Figure 44).

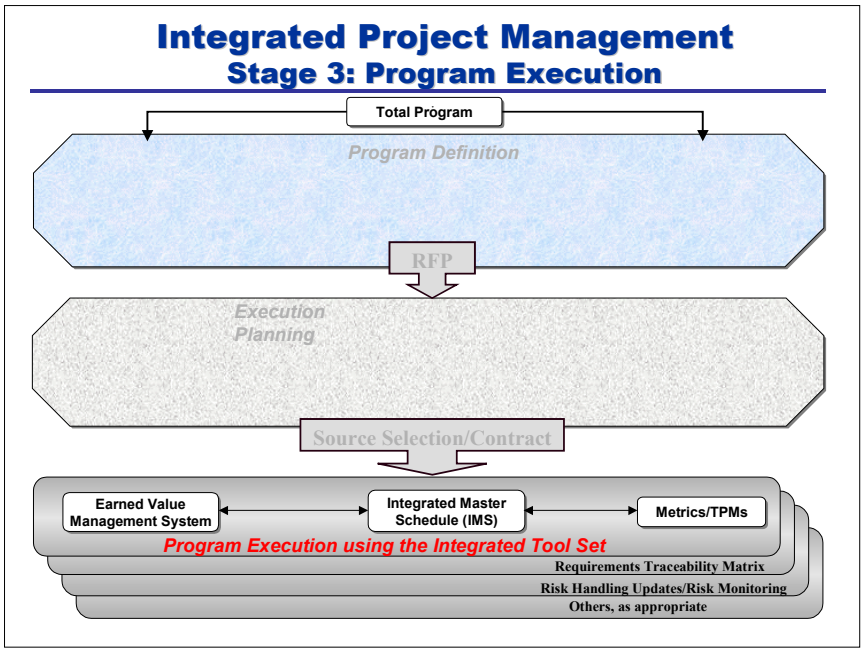


Figure 44 Program Execution using the Integrated Tool Set

The EVMS, IMS and metrics are used in conjunction with the risk mitigation plans, and other plans for day-to-day program management.

As progress is tracked, and decisions made, integrating and balancing the cost, schedule and performance aspects of the program is critical. Recurring management reviews, structured around program risks and key performance indicators, ensure all stakeholders are aware of status information and facilitate cross team communications and integration. Following contract award both the Government and industry roles shift to a joint responsibility for overall program success, with the contractor's primary focus on program execution and status reporting, while the Government is providing progress insight and reporting, clarifying requirements and managing other Government interfaces to enable industry to succeed.

Program success or failure is dependent on the skills of both the Government and industry Program Managers working together to meet program objectives. Essentially, this success is a reflection of their abilities to gather and analyze program information in a timely manner. Performance, cost and schedule risk are present in all phases of an acquisition program. Further, these risks change as the program evolves. Since most programs cover several years, even decades, there will be times when the program will have to alter the course. The Government Program Manager must ensure when conditions change that drive programmatic changes, the new requirements are clearly scoped for inclusion into the contract.

Managing the risks and enhancing the probability of successful execution drive the program structure from the Government requirements and strategy point of view, as well as the contractor's approach to

meet the requirements. Tracking the progress of the remaining risks and integrating the information from disparate sources is the key to successfully executing the program.

During the life cycle of the program, changes may originate from internal or external sources. The most obvious is the virtual certainty of execution variances from the contracted plan. This will result in tracking the progress, analyzing those variances, and determining any follow-on actions. The EVMS, IMS and metrics are the key data sources for this analysis. But how much data is needed? Determining the right balance between oversight and insight is fundamental to the type and frequency of information collected. Regardless, the information within the integrated tool set provides the data (Figure 45). The particular content of the integrated tool set will be program peculiar, consisting of many common tools but also unique to the program phase and individual characteristics. A good rule of thumb is to only measure what needs to be measured to successfully manage the program.

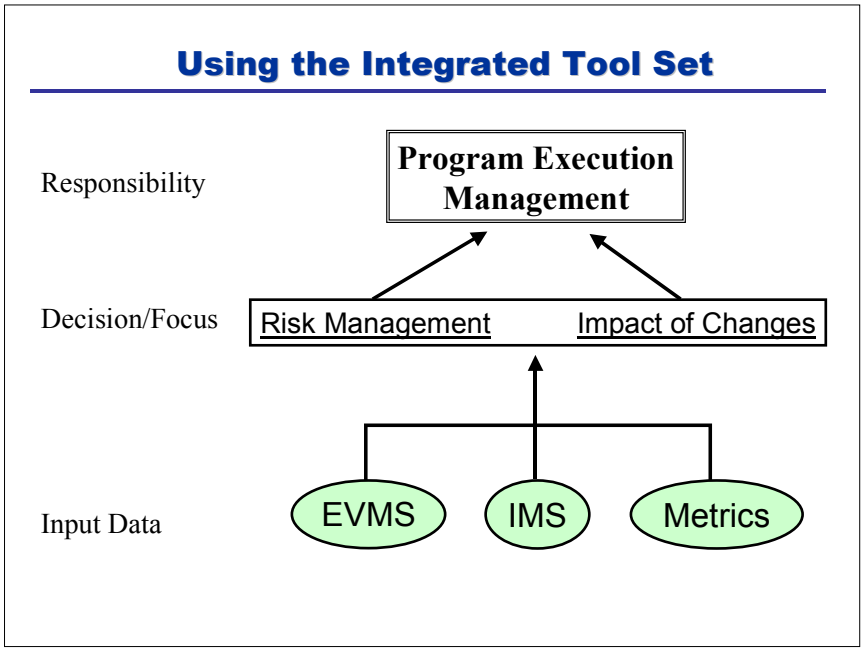


Figure 45 Using the integrated tool set

There are also external sources of program change. The user's requirements may evolve due to a new or evolving threat, or technology changes which may result in a changed decision on what solutions are most cost effective. The Congressional appropriation process also creates its own challenges for the Program Manager. Not only are there typically more requirements than funding, but also funding instability over the program life can play havoc with even the best thought out plans. This is obviously important for an incrementally funded contract, but is also relevant for fully funded efforts if there is a change to out-year plans. Programs not meeting user expectations or that have schedule delays due to technical challenges may find their appropriated funds cut back or totally withdrawn. The best defensive weapon is early and accurate information.

Program information must support necessary decision-making, as complete and accurate as possible. This requires the team to cross check the information for internal consistency – integrate the information. For example, if the schedule in the IMS were slipping, one would expect to see a cost impact for the elements of the IMS. Similarly, if the design is not supporting the planned progress, schedule slips and cost impacts are to be expected. The information needs to be rolled up to the appropriate level of detail for its use.

The Program Manager's prime responsibility is to accurately and forthrightly convey consequences of program funding actions or changes in requirements, both in terms of schedule slip and/or cost growth.

III.A. EARNED VALUE MANAGEMENT SYSTEM (EVMS)

III.A.1. EVMS Introduction

The purpose of the EVMS is to provide Government and contractor with accurate data to monitor program execution. It allows a comparison of the amount of money *actually* spent with the amount of money *planned* to achieve the actual progress accomplished, and is dependent on two key elements: 1) the contractor must have a fully integrated management system and robust work planning; and 2) the EVMS information must enable the comparison of resource plans to schedule and technical performance requirements. The resources include manpower, as translated into funding, and direct funds expenditure. DoD guidance is based on providing uniform evaluation criteria to ensure contractor management control systems are adequate (DoD 5000.2R, 3.3.5.3). The EVMS system must produce data that:

- Indicate work progress;
- Properly relate cost, schedule, and technical accomplishment;
- Are valid, timely, and able to be audited; and
- Provide managers with information at a practical level of summarization.

EVMS principles should be applied to all efforts, whether required or not, tailored to balance the costs of data gathering with the value of the management information being gathered. Government and industry Program Managers and IPTs review planning baselines during the Integrated Baseline Review (IBR), held promptly after contract award and frequently in conjunction with the Post Award Conference. The IBR objectives are to ensure plans and performance measurement baselines are established to capture the entire contract requirements and have adequate resources assigned to complete the tasks. Particular attention should be paid to the risk areas identified during the proposal preparation and evaluation.

The key for an effective EVMS is to make it a tool for the entire program management team, not just the "cost person." The purpose of the EVMS system is to aggregate and present data to support management decisions, so it is incumbent upon the Program Manager to understand the basic principles and structures. With this foundation, the Program Manager can understand the limitations of the system, as well as identify the right questions to ask, based upon the information being presented. The IBR can be an extremely valuable tool for early evaluation of the plan and associated risk identification and management, but the Program Manager must be aware of the continuing reality that accurate data for evaluation is parmount to valid EVMS reporting. Progress tracking is only valid if the underlying plan is a realistic representation of the planned and required efforts to meet program needs. From a Program Manager's point of view, the key elements of all EVMS applications are to:

- Define the products and organizing principles for the program;
- Accomplish the appropriate planning and budgeting to describe how the project will be accomplished with a defined planning budget for each element;
- Track, allocate, and record actual performance and costs against each element of the plan;
- Analyze variances from the plan and provide reports on these variances, including any appropriate predictions of revised predictions of project cost and schedules; and
- Make decisions on future efforts to reflect the program execution realities.

An early step in the EVMS process is to define authorized program work elements. A WBS structure (Section II. A.) is commonly used in this process to relate resource plans to schedules and technical performance requirements. This step also identifies the organizational structure, including the major subcontractors, responsible for accomplishing the authorized work, and defines the organizational elements in which work will be planned and controlled. This should track to the IPTs (Section II.D).

Caution:

C The Program Manager must be the person in the company who distributes the budget. If the budget is distributed to organizations other than those responsible for executing the program, significant execution problems will likely arise.

Caution:

C EVMS reporting will follow the WBS (Section II.A.) and if the IPTs (Section II.D.) are not aligned with the WBS, accountability and tracking will suffer.

III.A.2. Accomplish planning and budgeting

In this step, the authorized work is scheduled in a manner describing the sequence of work and identifies significant task interdependencies required to meet program requirements. It identifies physical products, milestones, technical performance goals, or other indicators that will be used to measure progress (Section III.C.), and establish and maintain a time-phased budget **baseline**. These are built around work packages, which are detailed, discrete efforts with defined cost, schedule and performance that build up to control accounts consistent with the WBS. A simple example is shown in Figures 46 and 47 below.

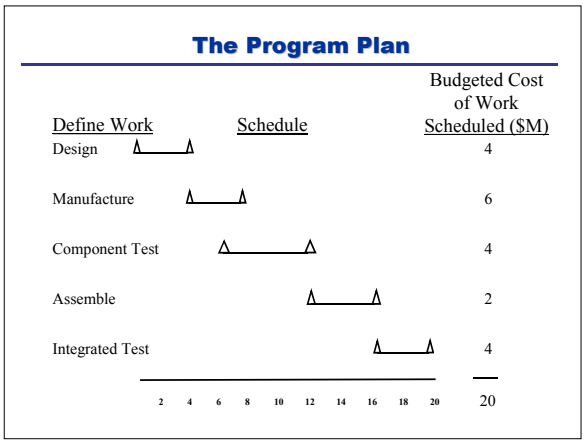


Figure 46 Program Plan

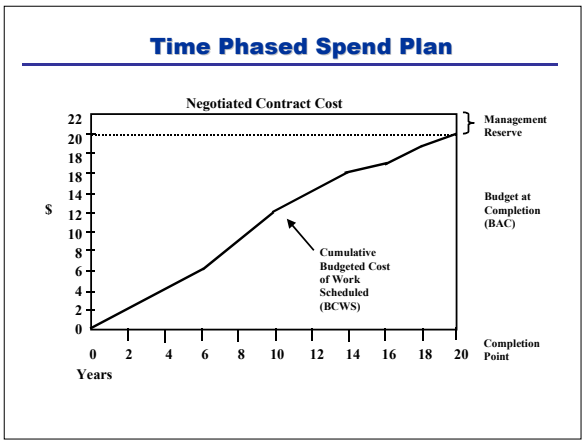


Figure 47 Time Phased Spend Plan

Caution:

C EVMS analysis will suffer if the IMS (Section III.B.) and the Metrics/TPMs (Section III.C.) used for overall program tracking in Management Reviews (Section III.F.) are not directly traceable to each other, and the EVMS structure.

WARNING:

W Changes to the baseline must be carefully controlled, in accordance with the EVMS criteria, or the analysis of variances will be meaningless.

For contracts requiring compliance with DoD EVMS criteria or Cost/Schedule Status Report (C/SSR) requirements, IPTs reviews contractor planning baselines shortly after contract award at the IBR. During this review the team ensures reliable plans, such as the IMS and performance measurement baselines are available which: capture the entire scope of work; are consistent with contract schedule requirements; and have adequate resources assigned to complete program tasks. The team should also review contract performance risks, such as the schedule realism and management system risks, experience of the people performing the work, the existence of new management systems that may make it more challenging to capture the data, etc. The underlying purpose of an IBR is to achieve a mutual understanding of the plan and its relationship to the underlying management control systems and processes that will operate during contract execution.

Note:

N An IBR needs to be accomplished as early as possible. This provides a means to ensure all efforts are adequately addressed. It is important to focus on ensuring risk identification and mitigation plans are incorporated into the planning baseline.

Risks items identified during the IBR must be documented in the contractor risk handling system (Section III.E.). This information, in concert with the results of the source selection where other program risks might have been identified, should be used to update risk mitigation plans and the IMS.

There may be a requirement to do another IBR later in the program, if the Program Manager is concerned that the risks inherent in the baseline are not well understood. For example, a significant contract restructure or contract award agreement may require an additional IBR.

III.A.3. Track, allocate and record actual performance and costs

The contractor will record costs in a manner consistent with the budgets in a formal system controlled by the general books of account. They are allocated to the control accounts defined by the WBS. Typical results of these efforts are shown in Figures 48 and 49.

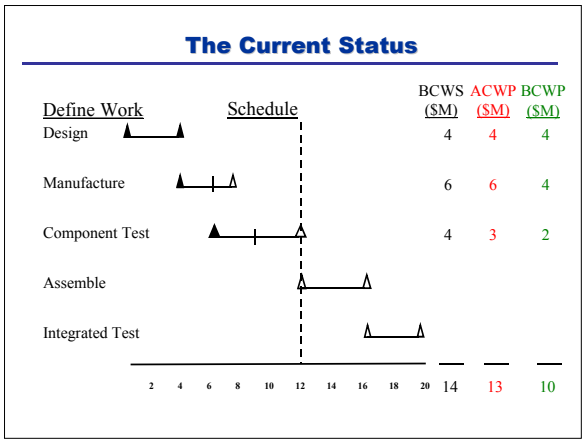


Figure 48 Current Program Status

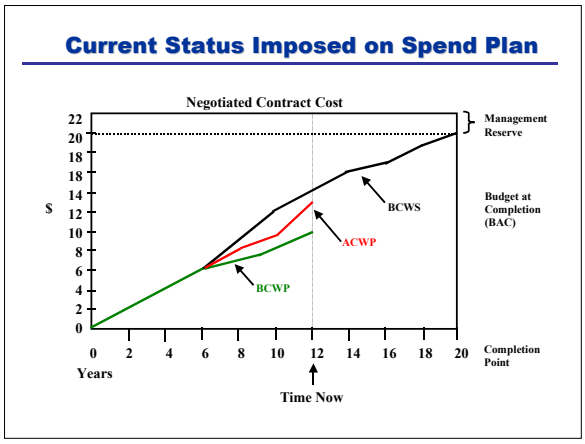


Figure 49 Time Phased Spend Plan and Status

W Contract funding requirements must be always remain compatible with the available funding, both in the aggregate, and in the annual increments. Failure to do so could result in contract termination and/or an Anti-Deficiency Statute violation.

III.A.4. Analyzing variances from the plan and making decisions

Depending on the type of contract the Government Program Manager will have different types and levels of information to review. On a Firm Fixed Price effort there is very little information provided to the Government and the contractor retains all of the risk. However, on most other contracts there is cost and schedule data provided to the Program Manager who must be able to analyze the information and determine what program actions are necessary. Analysis is a two-step process. First, a comparison of the amount of planned budget and the amount of budget earned for work is accomplished. This provides the schedule variance. Second, a comparison of the amount of the budget earned with the actual costs incurred is accomplished, for the same work. This provides the cost variance.

Trend analysis can be accomplished, and there are several ways to predict future contract performance. Identify, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management. The information should be sorted and assessed both against specific products and by the organizations responsible for the efforts. The analysis needs to analyze the data in depth to allow an understanding of the root causes of variances and possible mitigation actions. There are five types of variances/indexes commonly used:

SV	**Schedule Variance** Cost comparison of what has been earned to what was budgeted. SV = BCWP – BCWS, SV (%) = (SV/BCWS) x 100%
CV	**Cost Variance** Cost comparison of what has been earned to what has been spent. CV = BCWP – ACWP, CV (%) = (CV/BCWP) x 100%
VAC	**Variance at Completion** Cost comparison of the budget at completion to the current estimate at completion. VAC = BAC – EAC, VAC (%) = (VAC/BAC) x 100
SPI	**Schedule Performance Index** Indicates how far behind or ahead of schedule the project is and tends towards 1.0 as the project progresses. It is of minimal value as the project nears completion. SPI = BCWP / BCWS
CPI	**Cost Performance Index** Index of Earned Value to actual costs. Below 1.0 is bad, above is good. CPI = BCWP / ACWP

The information described above is reported as part of the overall reporting structure described in Management Reviews, Section III.F. of this handbook. Program Managers use the information described above to make appropriate changes in program execution plans.

As part of the variance analysis, management decisions need to be made within the CAIV construct. If there are cost and schedule problems with the program, a consideration should be given to tradeoff performance for affordability.

Note:

N

The user becomes a key IPT member whenever there is consideration of readdressing the balance between cost, schedule, and performance. They must fully participate, in order to fully understand the causes and effects of the potential tradeoffs, so they can provide their input to the acceptable balance.

III.A.5. Principle Linkages within Integrated Project Management

Predecessors:

- Work Breakdown Structure [Section II.A.] This provides the structure for capturing and reporting costs.
- Integrated Product Teams (IPTs) [Section II.D.] This identifies who will be accomplishing the work. If there is no traceability between the data being collected and the team performing the work, allocation of responsibility will suffer.
- Cost Estimate [Section II.F.] As reflected in the signed contract, the cost estimate provides the budget available to distribute to either cost accounts or management reserve.
- Requirements CAIV [Section I.A.] The CAIV strategy between the technical performance (including supportability) objectives, the cost objectives, and the schedule objectives must be incorporated in the EVMS for performance tradeoffs variance analysis.

Interconnects:

- IMS [Section III.B.] A management tool used to track program schedule execution by the IPTs. If there is no traceability between the data being collected and the schedule being used by the IPT, analysis of reported variances will suffer. The IMS may provide a leading indicator of problems which are masked in lower level cost accounts and vice versa
- Metrics/TPMs [Section III.C.] A management tool used to track program performance execution by the IPTs. If there is no traceability between the data being collected and the tool being used by the IPT, analysis of reported variances will suffer. The Metrics and TPMs may provide a leading indicator of problems which are masked in lower level cost accounts and vice versa
- Risk Monitoring [Section III.D.] A management tool used to track program risks by the IPTs. If there are no cost accounts to accomplish the risk mitigation activities, either they will not be accomplished, or there will be costs incurred outside of the planning baseline, with resultant schedule and cost impacts

Successors:

- Management Reviews [Section III.E.] The means by which program management structures the review of the data captured and analyzed through the EVMS system.

III.B. INTEGRATED MASTER SCHEDULE (IMS)

III.B.1. IMS Introduction

Section II.G. discussed development of the IMP and IMS during the Execution Planning Stage.

- **IMP**—defines the agreed upon event driven program plan. *Events* are the initiation or conclusion of major intervals of program activity. Significant *accomplishments* are the event closure criteria. Associated completion *criteria* are definitive measures of accomplishment describing the necessary work effort required for each significant accomplishment. The IMP contains no dates.
- **IMS**—an extension of the information contained within the IMP, reflecting not only the events, accomplishments, and criteria identified in the IMP but also tasks subordinate to the criteria plus the associated durations and linkages between tasks. The resulting schedule shows planned dates.

These documents are used during both the Execution Planning and Program Execution Stages. During Execution Planning they facilitate better understanding of the offeror's proposed planning (the source selection in competitive solicitations). During Program Execution they are used in day-to-day program management.

Normally, the IMS submitted with the proposal is an abbreviated version. Following contract award, particularly in a line count constrained competitive solicitation, the IMS is expanded, sometimes down to the work task level corresponding to the level used in the EVMS.

Note:

N

The IMS and EVMS must be based on the same schedule plans. If there is a difference, it must be rectified. Ideally they use the same database and the software packages are linked. In reality, few corporate EVMS systems can automatically link to a project management scheduling system, which is easily used by the IPTs in day-to-day efforts.

At this point, after contract award, we transition from developing the IMS to performance tracking against the plan. The IMS must maintain clear traceability to the WBS and EVMS; as variances occur it enables the program team to analyze variances for impact on future scheduled program activity

Understanding how much available schedule slack in a task or series of tasks is useful in this analysis. Further, the schedule will need to be updated over time for additional information, emerging risks and other program changes. But don't lose track of the baseline. The key is to rigorously track and report the status after key events for accomplishment of the criteria and key accomplishments.

III.B.2. Using the IMP

Recall from the IMP discussion (Section II.G.3.) that it serves as the mutually agreed to event-driven program execution description. It details an event-oriented approach to executing the program and identifies key program events, significant accomplishments, and associated completion criteria. The IMP is placed on contract and serves as a checklist for major event entry criteria. Only when all significant accomplishments are satisfactorily accomplished will the event proceed.

III.B.3. Using the IMS

The IMS was developed during the Execution Planning Phase (Section II.G.4.) to provide the Government insight and confidence into the realism, reasonableness, and completeness of program planning. However, it is used during program execution as the principal day-to-day tool for gaining overall program insight. The IMS is normally a CDRL submittal, which allows for many detailed planning adjustments to be made without requiring a formal contract change. The IMS is a time-based schedule that shows tasks to be accomplished, duration, resources, the inter-relationship of tasks, and the deliverables.

Prior to every program review the IPTs should formally update the IMS status. This status should be reviewed, analyzed, presented and discussed at each program review.

Key aspects of this IMS review are:

- **Critical Path Analysis**. Identification and management of the critical path tasks are an important management tool. Critical path tasks do not have slack; any delay in these tasks will delay the overall project. Therefore, managing the critical path tasks provides the opportunity to take early management actions necessary to preclude a schedule slip. For instance, if highlighted early enough, resources can be shifted from a non-critical path task to a critical path task, thereby potentially avoiding a program slip.

Caution:

C

Using the critical path analysis is important to understanding the real impacts of subsystem variances. Schedule variance in a subsystem with significant *total slack* requires significantly less management attention than one on or near the critical path. Without adequate attention to the critical path analysis, resources are frequently misapplied.

- **Schedule Risk Assessment**. Uncertainty is an important ingredient in all program schedules, and it plays a particularly significant part in complex programs. Further, each activity has its own uncertainty risk. For example, an item which is on or near the critical path may have relatively little schedule risk (e.g., receipt of COTS hardware) while other items may have substantial schedule risk (e.g., software development) even if they are not on or near the critical path. By statistically analyzing the schedule, it is possible to look at the impacts of predictable variations in task completion dates. This provides significant additional insight into the "risk critical" path—identifying those tasks, which are likely to become critical path if durations of other activities change. This analysis allows the Program Manager to expand the discussion of those items needing the most attention at each program review.

- **Personnel Resource Management**. Based on the results of the critical path analysis and schedule risk assessment, the program review attendees can make decisions on needed risk mitigation actions. These actions may include shifting resources from other areas.

- **Planned vs. Actual Task Starts/Finishes**. One of the most important IMS metrics is whether tasks were started and finished on time. This review enables a predictive look ahead to see if a future schedule problem is likely. Frequently, when increasing numbers of many non-critical path tasks are starting late it is an indication of future impact to the critical path.

- **Risk Management Activities**. The IMS is the principal mechanism used to achieve an integrated perspective of risk management perspective. The IMS does not contain every detail of every task, however it does contain those tasks determined to be most valuable to program success. Risk mitigation tasks associated with each of the identified risks are also included in the IMS. The statuses of

these tasks are reviewed as a part of the IMS review and the risk analysis during each program review.

- **Major Dependencies**. Program work effort is normally allocated between various IPTs. However, because many of these tasks cannot be accomplished independently within any one IPT there is a reliance on obtaining information from or providing information to other sources. These major dependencies are critical to overall schedule success. Missing required dates on these dependencies serves as leading indicators of future schedule problems. The statuses of these major dependencies are reviewed during the IMS review and during each program review.

- **GFE and GFI Status**. In conjunction with the Major Dependencies review, the IMS review also analyzes the status of required Government Furnished Equipment (GFE) and Government Furnished Information (GFI) availability. Late or deficient GFI/GFE can cause significant schedule impact. GFE and GFI dependencies are analyzed during the IMS review and during each program review.

- **Emerging Risks**. The IMS review integrates all schedule information to identify potential emerging risk areas. These areas are evaluated and the recommended way forward is presented at each program review. Once a decision is made on the approach these new plans must be integrated in an updated IMS.

III.B.4. Principle Linkages within Integrated Project Management

Predecessors:

- Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) [Section II.G.] Done properly, the IMS submitted with the proposal exactly represents how the program will be managed.

Interconnects:

- Earned Value Management System (EVMS) [Section III.A.] The EVMS is tied directly to the WBS, which is directly correlated to IPTs and the IMS. Since IPTs are responsible for specific parts of the IMS there is a natural correlation between the IMS and EVMS.
- Metrics and TPMs [Section III.C.] IMS sub-levels are correlated to IPTs, which are also responsible for the metrics associated with the particular products.
- Risk Management and Updates [Section III.D.] Any decision on risk handling must be made in concert with their corresponding impact on the overall program.

Successors:

- Management Reviews [Section III.E.] This IMS can easily become the basis for all management reviews. It contains program schedule information and can easily be segmented into areas of product (and IPT) responsibility.

III.C. METRICS

III.C.1. Metrics Introduction

Metrics are management indicators used to identify how well a program is performing against cost, schedule and performance requirements, and are a key tool used to support **Program Execution** (Figure 50). They provide the insights necessary for management oversight of the program. There are three metrics classes that may be used: progress, product, and process metrics. Each may assist in assessing different aspects of the program. They support the analysis of how well the goals or objectives are being met. They provide quantitative information needed to identify and manage the known issues as well as identify emerging issues. When used in concert with the EVMS system and the IMS, they support an assessment of cost, schedule and performance health. This is important to enable management in developing alternative solutions or making timely adjustments to program execution targets, if progress is not under control. Metrics need to be simple, understandable, logical and repeatable for successful use during the Program Execution Phase. Unlike statistics, metrics are intended to be the leading indicators and useful for driving appropriate action.

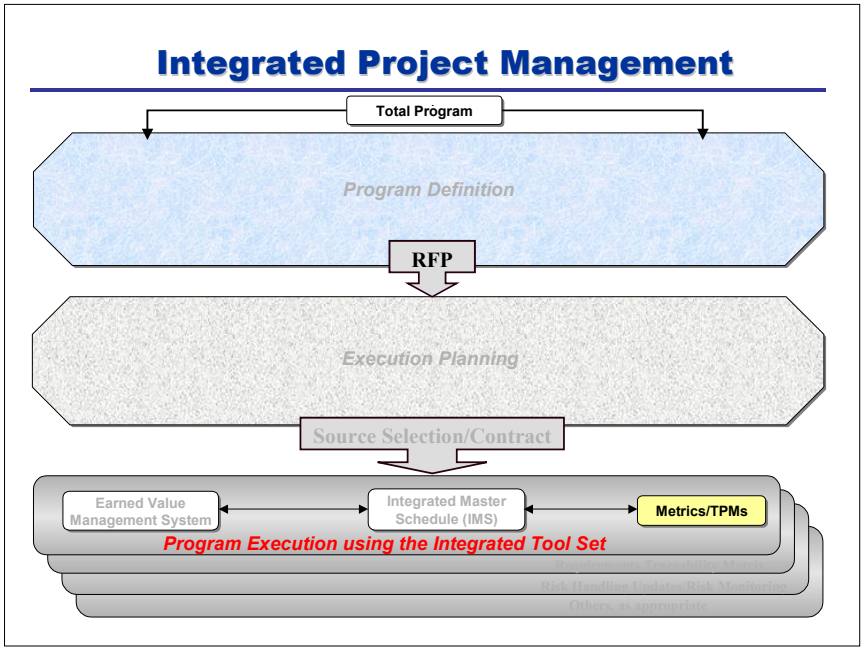


Figure 50 Metrics are a key element of the integrated tool set

III.C.2. Metrics Discussion

The first step in defining and using metrics is to review the key goals or requirements to be met and need tracking. This effort does not begin after contract award, rather is a review and compilation of the efforts accomplished in Stage I **Program Definition** and Stage II **Execution Planning**. Each contract effort will have numerous requirements, but all are not equally risky or important to the overall success of the project. Early identification of potential risks and critical objectives will permit approaches and mitigation plans to be defined, and tracking to be established. No one metric can cover every issue of concern; it is prudent to use a family of metrics to ensure the most important program elements are accomplishing their purpose. However, it is possible to become inundated with information if too many metrics are collected. Further, metrics take time and effort to collect, the return on that investment must be clear. Therefore, measuring a few vital things is more valuable than measuring many trivial things.

An effective team (Section II.D., Integrated Product Teams) will review program KPPs (Section I.A., Requirements), the final contract, etc., and discuss the most important project elements from both the Gov-

ernment and industry points of view. As part of this discussion, it is important to define the purpose by capturing the data. This must take into account the expected risks associated with various parameters (Section II.E., Risk Management and Updates). For low risk elements of the project, the effort to collect and analyze the data will not be offset by the benefits in information gained. For higher risk items, the risk mitigation plans are a valuable source of information. In general, the contractor develops metrics to measure actual performance against contractually required performance and the joint industry/Government IPTs have cognizance of these metrics. The three classes of metrics most commonly used are progress, product, and process.

Progress metrics serve as alarms for adverse trends. These metrics must allow for the detection of adverse trends in sufficient time to permit corrective actions. Examples that fall into the progress category include Earned Value (Section III.A.), schedule task completions (planned versus actual) (Section III.B.), Risk Assessment tracking (Section III.D.), Manpower (planned versus actual), Deliveries, etc.

Product metrics are measures of a program's technical maturity and are tied to the key performance parameters of a product. For developmental programs, these measures are found in the ORD as objectives and thresholds, and in the TEMP as critical technical parameters. Metrics of this type indicate if the desired technical performance is achievable given the constraints of the program. Calculations of some TPM parameters require rolling up all constituent parameters from the lower levels. The hierarchies are strongly bound to the contract WBS (Section II.A.) to ensure progress on technical performance is traceable to cost and schedule performance. Examples of product metrics include operational availability, weight budget, Mean Time Between Failure (MTBF), etc. Formal verification of this class of metrics is generally accomplished in formal Development or Operational Test and Evaluation.

Process metrics assess the quality and productivity of a program's processes. Data is collected at specific checkpoints in the process flow and then analyzed. Process metrics are concerns not only of the product IPTs measuring them, but also of the functional organizations, such as budgeting, contracting, or testing that own the processes being measured. Process metrics usually compare current/predicted performance versus performance objectives. A standard of performance is set using historical data or expected levels of performance. Examples of process metrics are scrap and rework, number and cost of engineering change proposals, number and cost of test failures, etc.

After decisions are made on what the desired requirements are and goals to be tracked, the IPT must determine which information is available, or needs to be created to perform the status tracking. It should also identify which specific organization has responsibility for its collection, tracking and variance analysis. This will be accomplished iteratively with decisions on how to accomplish the measurements and presentation results. For a metric to be meaningful, it must represent one or more cause-and-effect relationships that control the effort being measured. In many areas, history has caused the creation of suitable metrics for progress tracking. To the degree that those existing metrics are either not suitable or do not exist, new metrics may be developed. Key considerations in new metrics include:

- Measure near the point of execution – probability of accuracy improves.
- The items must be unambiguously defined and measurable.
- The items should be traceable to the WBS.
- Timeliness of the information—both for calculating the metric and in the information the metric provides—is important if it is to be used in decision-making.
- Metric data needs to be economical to gather. This includes the hours spent gathering the data, processing it, and the time required to display it. Automated data gathering is preferred, but many collection processes do not lend themselves to automation.
- The people performing the activities and collecting the data need to be kept informed of the metric and its purpose. If it is not clear why the data is being gathered, the risk of careless or inaccurate data collection increases.

Caution

C It is possible to measure virtually any activity in the program, but if the measurement does not support a key objective, it is not worth the cost of data collection and analysis.

There is an opportunity to use an integrated digital environment where each level of the organization places metrics in a database, providing real time access to authorized information. This can be done so that organizationally private information is only available within the organization, and outside management levels are restricted to predefined levels of information. Commercially available software enables this to be implemented in a risk free way. Using such an approach could significantly reduce future manpower requirements because it avoids the necessity of having multiple people handling the data. The need to produce special charts would be greatly reduced, and consistency and currency of data can be greatly improved.

Finally metrics must be tracked and reviewed over time. The information will help enable a predictive estimate of what the results will be at completion of the program. This can be compared to the appropriate goals and thresholds identified in the project requirements. "Tripwire" values or tolerance bands should be identified, and used to signal management attention. The CAIV process helps to decide if improvement adjustments should be made for items falling between goals and thresholds. This review must be consistent with the Management Review Process discussed in Section III.E. This will ensure the information is used; otherwise, there will be no impact to the program, besides the additional costs associated with collecting the data. It helps if the expected metrics are included in the IPT charter, and that they are recognized as information to improve performance rather than to punish people.

III.C.3. Principle Linkages within Integrated Project Management

Predecessors:

- Requirements [Section I.A.] Key program requirements, as defined in the SOO and SRD provide a list of potential areas to be measured and tracked.
- Work Breakdown Structure (WBS) [Section II.A.] Provides a structure to correlate product metrics with EVMS and IMS progress information.
- Allocated Requirements and the Specification Tree [Section II.C.] Metrics should be measured to track achievement of allocated requirements by subsystem.
- IPT [Section II.D.] Tight correlation between the IPT, WBS structure, and the IMS structure enables a single IPT take to take the responsibility for a particular metric.
- Risk Mitigation Planning [Section II.E.] Early identification of potential risks permit approaches and mitigation plans to be established, along with metrics tracking.

Interconnects:

- Earned Value Management System (EVMS) [Section III.A.] The EVMS is tied directly to the WBS, which is directly correlated to IPTs, the IMS and Metrics. Since IPTs are responsible for specific parts of the metrics, there is a natural correlation between the metrics and EVMS.
- Integrated Master Schedule (IMS) [Section III.B.] IMS sub-levels are correlated to IPTs, which are also responsible for the metrics associated with the particular products.

- Risk Management and Updates [Section III.D.] Any decision on risk handling must be made in concert with their corresponding impact on the overall program.

Successors:

- Management Reviews [Section III.E.] Metrics should be a part of all management reviews. They contain program progress information and can easily be segmented into areas of product, and IPT, responsibility.

III.D. Risk Management and Updates

III.D.1. Risk Introduction

Risk planning is discussed extensively in the Program Definition Stage (Section I.C.) and the contractor developed detailed risk mitigation plans in the Execution Planning Stage (Section II.E.). During Program Execution this information is tracked, including progress against risk mitigation plans to ensure the appropriate tasks are being accomplished (see Section II.E., Figure 35, Sample Risk Mitigation Plan Showing Four Elements). Using the integrated management tools to control both business and technical risks during program execution is important. Risk assessments must be ongoing analyses, using predetermined metrics in addition to the IMS (Figure 51). These analyses, which are the key to risk control, should be accomplished over the entire life cycle of the program and should include inputs from all functional disciplines. There are numerous commercially available automated risk analysis and risk management tools, which simplify the recurring risk analysis task, however the key is management focus and vigilance.

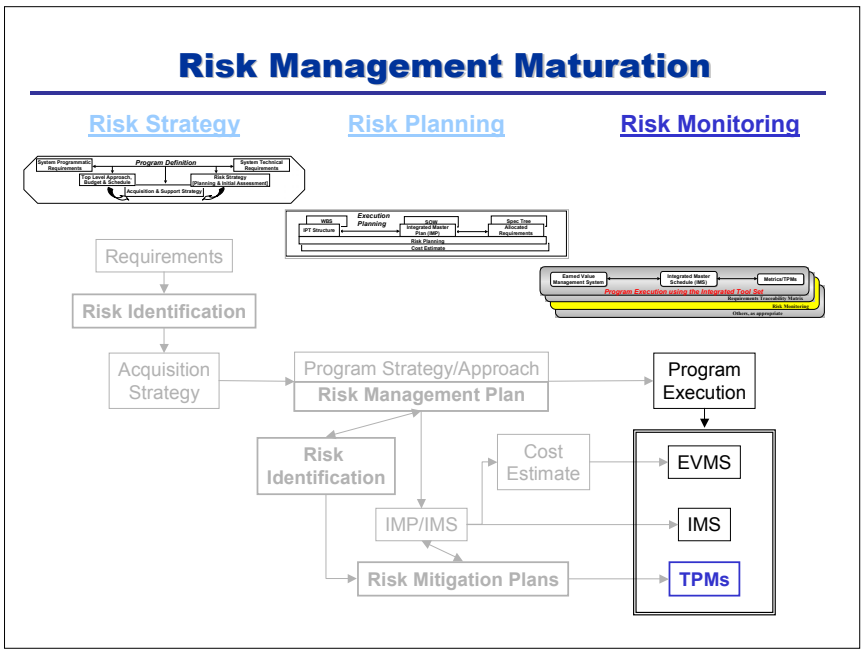


Figure 51 Risk monitoring is done during Program Execution

III.D.2. Risk Monitoring Discussion

Risk management must be an inherent part of overall program management and an integral part of all program reviews. Risks should be assigned a project risk index based on probability of occurrence and severity of consequence. Every large-scale product development and manufacturing program contains inherent risks that can prevent successful accomplishment of program requirements. The cornerstone of the risk management process is the Risk Management Plan, which should require IPTs to perform risk assessment and reduction/mitigation planning and execution as an on-going activity.

The Program Manager monitors and controls the risk process implementation through periodic program reviews to ensure risk management is an on-going process of assessment, update of risk status, tracking of risk indicators, and controlling risk issues. The IPT will be tracking the program on a daily basis, monitoring risk areas and the associated metrics. Weekly risk management reviews with program leadership provide necessary visibility into key program risks.

WARNING:

W Bad news never gets better with age. Indicators that the program is approaching difficulties need to be elevated immediately. One of the program management teams primary responsibilities is to provide timely and accurate information, along with consequences and available workarounds. The bureaucracy can take bad news, but it cannot stand surprises. If difficulties cannot be solved at the lower levels and not elevated quickly, they may result in major program impacts that could have been avoided.

III.D.3. Principle Linkages within Integrated Project Management

Predecessors:

- Risk Planning [Section II.E.] Risk mitigation planning describes how the risks are to be handled during the Program Execution Phase.
- Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) [Section II.G.] Risk mitigation plans are described in the IMS.
- Risk Management Planning and Initial Assessment [Section I.C.] The risk management efforts during the Program Definition Stage lay the foundation for the risks handled during this stage.
- IPT [Section I.D.] Every risk and associated mitigation plan should be a primary responsibility of a single IPT, that is held accountable for managing their risk areas.

Interconnects:

- Earned Value Management System (EVMS) [Section III.A.] All risk handling actions have impacts on cost and schedule, which is reflected in the EVMS.
- Integrated Master Schedule (IMS) [Section III.B.] The IMS reflects the attainment of risk handling actions.
- Metrics and TPMs [Section III.C.] Metrics reflect the degree to which risk handling actions were effective.

Successors:

- Management Reviews [Section III.E.] Periodic risk management reviews with program leadership provide necessary discipline and visibility into key program risks.
- Successful Program Execution

III.E. MANAGEMENT REVIEWS—CONTENT AND CADENCE

III.E.1. Management Reviews Introduction

The need for Program Management Reviews (PMRs) will be based on several factors. After the contract has been signed, program management duties for both Government and industry will broaden to cover a large range of issues. The success or failure of a program may rest on the skills of both the Government and industry Program Managers working together, using common information to meet program objectives and on their abilities to gather and analyze timely program information. As a natural part of the job, the Government Program Manager will spend a considerable amount of time interfacing with the using command where the requirements are generated and with higher headquarters where the funds originate. The Government will require recurring information on the program to ensure satisfactory progress is being made, with frequent recurring requirements for program status information. As a result, a decision will be made regarding whether the Government program office's role will be more oriented toward oversight or insight of the contractor's activities. A key determinant of this decision will be the impact of failure, which will further influence the type and frequency of management reviews.

Even with all the modern information systems to provide near real-time data, the Government Program Manager will still have a need to conduct periodic reviews to stay abreast of various program activities and to place information being generated in proper perspective. Although there is no single best approach to collecting/analyzing all the data, there are several key activities that are taken into consideration to ensure the program remains on track towards successful completion. In many cases the program's activities are disparate and conducted simultaneously at several locations, which makes the Program Manager's job tough for both Government and industry. To ensure that problem areas are provided the visibility early enough to develop viable mitigation plans, both the Government and industry Program Managers need to use all the tools provided in this handbook. The nature of the program will dictate how and when these tools are utilized. PMRs can be an effective avenue for both Government and industry to monitor the health of the program and to provide a timely forum for problem resolution.

III.E.2. Objectives and Focus

A PMR is a specific meeting with an agenda that provides a forum to share information needed by both Government and industry. Scheduling these reviews on a recurring basis provides a degree of discipline that accompanies gathering the needed cost, schedule, and performance information. It is very easy to be consumed with "urgent" issues and not take the time to sit back and review how the overall program is progressing. Often critical program issues can be identified early, if attention is focused on them. However, it is not unusual to overlook them, with no disciplined, recurring check. The PMRs also provide an orderly method for presenting the data in a format that is understandable by a wide audience. A PMR can be either a formal or informal meeting conducted for a specific purpose, such as to evaluate the status of the program, identify problem areas needing further management attention, or discuss relevant issues related to data from the EVMS, IMS status, metrics, etc., all traceable to the WBS. This provides the basic architecture for analyzing the data from the individual tools. This basic architecture can be used to ensure the reporting is consistent and rational. For example, if the schedule were slipping, increases in specific cost elements would also be anticipated. Similarly, design difficulties typically result in schedule slips and corresponding cost increases.

Typically, there will be several formal management reviews during the life cycle of a program along with more frequent informal reviews. For programs that require APBs, PMRs provide an outstanding forum for reviewing the status of the program regarding the thresholds and objectives.

III.E.3. Formal Reviews

During formal reviews, senior management, both Government and industry, will attend the meetings to gather information and provide program direction based on the technical, financial, and political aspects. Formal PMRs may be combined with technical meetings such as PDR, CDR and formal Test Readiness Reviews or they may be stand-alone meetings held on a periodic basis (quarterly, semi-annually, etc.). The reviews can be held at contractor, Government, or neutral locations, whichever is most beneficial and cost effective at the time. In most cases, there will be a requirement for considerable support from the contractor personnel to satisfy the meeting agenda. If the program is structured around an IPT concept, both the Government and industry personnel usually present information to senior management.

The frequency of formal reviews is based on the nature of the program. For example, early in a typical Program's Development Phase, it is not unusual for user requirements to need clarification and for technical alternatives to be addressed. As a result, there may be a need for more frequent formal reviews with representatives from the using commands, the acquisition community, and industry (including both prime contractors and their subcontractor team mates). As the program matures and/or becomes more stable, the frequency for formal reviews may be adjusted accordingly, with informal management reviews held in between. As a general rule, formal PMRs should be considered at least quarterly during the initial stages of the program. The reviews will normally be conducted over a full day or two, depending upon the scope of the agenda. When critical issues arise that have significant impact on program success, more frequent formal reviews should be considered until risk mitigation plans demonstrate an ability to resolve the issue. The nature of the program risks will determine the timing of formal PMRs. The Government Program Manager will have to determine the overall benefits of conducting the formal reviews against the cost to conduct them. PMRs should not be held just for the sake of having a meeting. If the nature of the program is so dynamic and time consuming that holding a formal review will adversely impact program execution, then a series of informal reviews may be more prudent to ensure action items are being worked and the various management tools discussed are being properly utilized.

Caution:

C Failure to conduct periodic formal reviews may result in the Program Manager missing important information on other areas that may result in unexpected problems. The trap to avoid is getting focused on short-term problems and losing track of total program direction. Formal PMRs allow both Government and industry an opportunity to get a snapshot of the program at a macro level.

Caution:

C Formal PMRs take time and energy to be properly completed. Be aware that team members on both sides will have to expend considerable time and resources to prepare for the review. If not handled correctly, these reviews can drive up costs. Informal reviews should be considered when feasible.

III.E.4. Informal Reviews

When circumstances do not warrant the need for formal PMRs, informal reviews should be considered. An informal review can be held in a wide variety of ways, including a teleconference between Government and contractor. Video teleconferencing is also a cost effective method to conduct informal reviews

For all reviews, the same core data generated in the integrated management toolset described (EVMS, Metrics, IMS, etc.) may be used. Depending on the review, core data must be analyzed at the appropriate level to provide an understanding of the root cause and the impact of variances. The level of data then needs to be rolled up as appropriate for the audience. For example, if the management review includes

corporate vice president or general officer members, the information being presented would be at a different level of detail than being reviewed by functional specialists. Relevant management information is required to be supplemented with the detailed knowledge and judgment of the IPT.

Note:

N

A typical management review cadence for a large program may include the following.

- Daily informal IPT meetings to accomplish required execution and integration tasks.
- Weekly staff meetings to check status and track performance on issues.
- Monthly informal reviews between the Government and industry Program Managers, possibly via video teleconference.
- Quarterly formal reviews including attendance by senior level management from both the Government and industry

The information from monthly informal reviews easily provides the basis for the formal reviews. If there are indicators of developing problem areas, the formal review provides the forum for them to be elevated. Indications of program degradation require immediate elevation to senior management for assessment. In essence, the appropriate frequency and content of management reviews correlates to expected performance objectives being met by the program.

III.E.5. Principle Linkages within Integrated Project Management

Predecessors:

- Source Selection [Section II.H.] The number and type of PMRs will be partially determined by the approach proposed and cannot exceed the contract requirements. If there is a conflict, a contract modification may be required.
- IPT [Section II.D.] IPT management reviews are much easier to structure when the IPTs are responsible for specific segments of the WBS and IMS.

Interconnects:

- Earned Value Management System [Section III.A.] A key source of information on cost status.
- Integrated Master Schedule (IMS) [Section III.B.] A key source of information on schedule status.
- Metrics/TPMs [Section III.C.] A key source of information on performance status.
- Risk Management and Updates/Risk Monitoring [Section III.D.] Tools to ensure risk mitigation plans are effective, and emerging risks are identified and managed.

Successors:

- Successful Program Execution

IV. Attachment 1 Early Dispute Resolution

IV.A. Early Dispute Resolution Introduction

The Air Force Alternate Dispute Resolution (ADR) Reference book provides a wealth of information on the origins and uses of ADR. This section draws heavily from the reference book.

ADR refers to a variety of streamlined resolution techniques designed to resolve issues in controversy more efficiently when the normal negotiation process fails. FAR 33.201 defines ADR as "…any type of procedure or combination of procedures voluntarily used to resolve issues in controversy. These procedures (Figure 52) may include, but are not limited to, conciliation, facilitation, mediation, fact-finding, mini-trials, arbitration and the use of ombudsmen." FAR 33.201 defines an "issue in controversy" as a material disagreement between the Government and the contractor which: (1) may result in a claim; or (2) is all or part of an existing claim. It is not "giving away the farm," "paying a premium", or an "easy way out." It is a disciplined approach to resolving contract issues. It is important to note that ADR is not the first step to litigation, rather it is an extremely effective business tool available to the Contracting Officer and Program Manager to resolve contract issues in controversy long before litigation is contemplated.

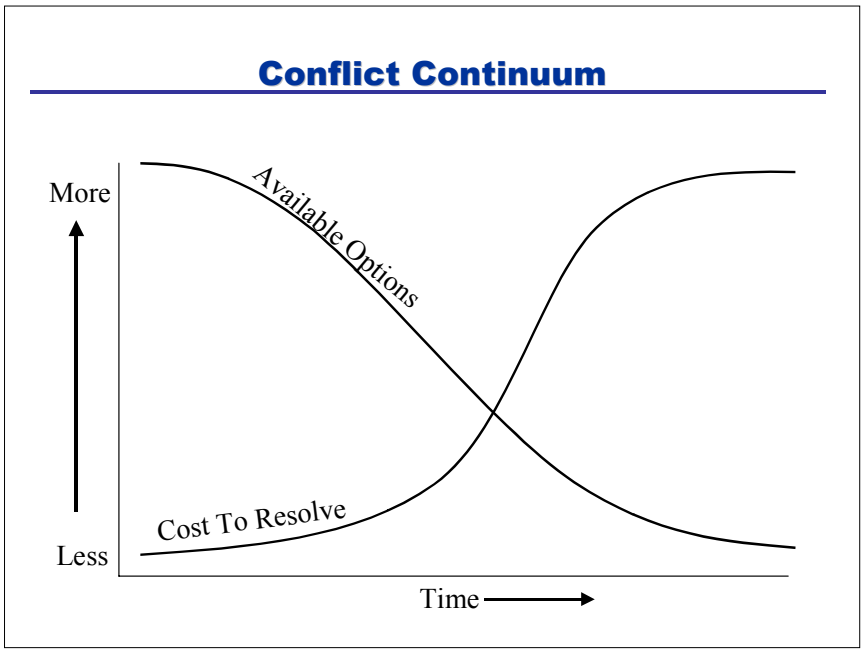


Figure 52 Conflict resolution is best accomplished early

Effective use of ADR makes good business sense. It is national policy and the policy of the Department of the Air Force to use ADR to the maximum extent reasonable and appropriate to resolve issues in controversy at the earliest stage feasible, by the most efficient and least expensive means possible, and at the lowest achievable organizational level.

The Air Force ADR Reference Book lists a number of common-sense business reasons to consider using ADR.

- *Fitting the Form to the Fuss:* ADR permits the parties to fashion a process that is custom-tailored to resolving their issue.
- *Keeping Control*: ADR permits the parties to fashion agreements that address time and effort needed to resolve issues. It also ensures the parties mutually resolve the issue rather than relinquish control to a disinterested, and probably less knowledgeable, third party.

- *Flexibility*: ADR processes permit business and requirements personnel to help design a resolution process that can adapt, to changing circumstances in order to remain effective.
- *Facilitating Open Communication and Information Exchange*: ADR processes can significantly reduce the adversarial nature of resolving an issue, improve the productivity of face-to-face discussions between stakeholders, and typically permit expedited information exchanges.
- *Tangible Benefits*: ADR processes significantly reduce resolution cycle times and transaction costs associated with protracted litigation.
- *Intangible Benefits*: The impact of protracted litigation can lead to inefficiencies and distractions that can materially impact the quality of performance on existing and future contracts. In addition, many ADR processes directly involve stakeholders. This direct involvement can increase buy-in for the results, and enhance the long-term relationships of the parties.
- *ADR Works*: Armed Services Board of Contract Appeals (ASBCA) judges serving as third-party neutrals in hundreds of ADR proceedings confirm that ADR works. Over the last five years, the ASBCA has been asked to resolve more than 400 DoD appeals using ADR. They have successfully resolved over 95% of these appeals.

Successful ADR requires all parties to make a good faith effort to help the process work. As a result the contractor is a key player. Most of the major DoD contractors have adopted ADR as a preferred method of resolving issues in controversy. Many of these DoD contractors have committed to use ADR and have ADR agreements with the services. The Air Force has led the way in establishing corporate level ADR agreements that establish an overarching ADR process that generally requires the parties to:

1. Use a cooperative philosophy throughout the acquisition life cycle. In furtherance of this principle, all Air Force/corporate teams are encouraged to conduct joint reviews of the contract's goals and objectives identify potential obstacles to timely and effective completion, and to periodically assess progress toward overcoming these obstacles.
2. Resolve all contract issues at the lowest possible level. This principle recognizes that detailed knowledge of the issues is generally at the program level and the resolution of problems at that level fosters teamwork in pursuing mutually satisfactory solutions.
3. In the event an issue cannot be resolved through negotiation, the parties shall, in lieu of litigation, endeavor to use ADR to facilitate resolution. The parties' management will be kept advised of the progress in resolving the issues whether through negotiation or through ADR techniques.
4. Consistent with FAR 33.214, the parties will, before initiation of the use of ADR for a particular matter, agree in writing to specific ADR collaborative techniques, timelines and identification of neutrals appropriate for the issues in controversy.
5. In the event either party believes a particular issue is not well-suited to ADR, or is dissatisfied with progress being made in a particular ADR proceeding, that party may, after good faith efforts to resolve the issue, elect to opt out of the ADR processes and proceed as otherwise provided under contract, regulation or statute. Nothing in the agreements is deemed to prevent either party from exercising their legal rights and remedies during the ADR process.

IV.B. FACTORS TO CONSIDER IN ASSESSING IF ADR IS APPROPRIATE

Issues in controversy become disputes if not addressed properly. ADR should be used as early in the life cycle of an issue in controversy as possible. The following three-part test can help determine whether ADR is suitable for issues:

- What are the business objectives with regard to this issue? ADR is applicable when there is a strong desire to maintain good working relationships, early problem resolution is mutually beneficial, and flexibility in shaping the outcome is possible.
- Why did negotiations reach impasse? ADR should not be used if face-to-face negotiations are producing results. However, if negotiations have reached an impasse, ADR may be appropriate.
- Are there pragmatic concerns about whether ADR will work? Programmatic circumstances where a third-party neutral would speed up resolution are appropriate for ADR. However, circumstances such as major Government policy issues are less appropriate for ADR.

IV.C. ENGAGING IN ADR

An issue will not be ready for ADR unless decision-quality information is accessible using available resources within the time frame contemplated. This is because the parties must have sufficient knowledge of the facts to determine their business interests and make a credible ADR presentation. Accordingly, each party must be conscious of the other party's need for reliable information sufficient to support a rational decision, to conclude the matter and should cooperate in furnishing this information.

Audit input on financial matters is often critical in establishing facts needed to justify a settlement. Many contract controversies stem from audit exceptions. These issues are complex and require in-depth knowledge of accounting and related regulations. To fully understand the financial consequences of decisions, Government procurement professionals should include auditors as part of the ADR team in appropriate cases. Seek audit assistance whenever equitable adjustment proposals or claims are included in the ADR. The ADR agreement should address the type of information and documents to be provided to the auditor and whether there are any restrictions on the use of the information or documents provided.

The GAO will make its attorneys available to serve as third-party neutrals before and after a bid protest is filed with the GAO. The procedural steps used on a particular ADR may depend on when you use ADR. The FAR provides that the parties may agree to use ADR when an issue first arises or a claim is submitted.

V. Attachment 2 Acronyms

AoA	Analysis of Alternatives
ACAT	Acquisition Category
ADM	Acquisition Decision Memorandum
ADR	Alternate Dispute Resolution
APB	Acquisition Program Baseline
ASBCA	Armed Services Board of Contract Appeals
ASP	Acquisition Strategy Panel
B&P	Bid and Proposal
BES	Budget Estimate Submittal
BOE	Basis of Estimate
C&TD	Concept & Technology Demonstration
C4I	Command, Control, Computers, Communication and Intelligence
CAIG	Cost Analysis Improvement Group
CAIV	Cost as an Independent Variable
CASA	Cost Analysis Strategy Assessment
CCA	Component Cost Analysis
CCDR	Contractor Cost Data Reporting
CDR	Critical Design Review
CDRL	Contractor Data Requirements List
CER	Cost Estimating Relationship
CFSR	Contractor Funds Status Report
CJCSI	Chairman of the Joint Chiefs of Staff
CLIN	Contract Line Item Number
CLS	Contractor Logistics Support
COTS	Commercial Off-the-Shelf
CPR	Cost Performance Reports
CRD	Capstone Requirements Documents
C/SSR	Cost/Schedule Status Report
CWBS	Contractor Work Breakdown Structure
DAU	Defense Acquisition University
DMS	Diminishing Manufacturing Sources
DoD	Department of Defense
DoDI	Department of Defense Instruction
DRFP	Draft Request for Proposal
DSMC	Defense Systems Management College
DT&E	Development, Test and Evaluation
DTRR	Developmental Test Readiness Review
EDA	Evolutionary Defense Acquisition
EN	Evaluation Notice
EVMS	Earned Value Management System
FAR	Federal Acquisition Regulation
FCA	Functional Configuration Audit
FOC	Full Operating Capability
FoS	Family of Systems
FPR	Final Proposal Revision
FPRA	Forward Pricing Rate Agreement
GAO	General Accounting Office
GFE	Government Furnished Equipment
GFI	Government Furnished Information
HQ	Headquarters
IBR	Integrated Baseline Review
ICS	Interim Contractor Support
IDE	Integrated Digital Environment
IMP	Integrated Management Plan
IMS	Integrated Master Schedule
IOC	Initial Operating Capability

IPM	Integrated Project Management
IPPD	Integrated Product and Process Development
IPT	Integrated Product Team
ISR	Intelligence, Surveillance and Reconnaissance
JCS	Joint Chiefs of Staff
JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameter
LCC	Life Cycle Cost
LRIP	Low Rate Initial Production
MAA	Mission Area Assessment
MAPP	Master Acquisition Program Plan (used by Navy)
MDA	Milestone Decision Authority
MNS	Mission Needs Statement
MTBF	Mean time between failures
O&M	Operations and Maintenance
O&S	Operations and Support
OIPT	Overarching IPT
ORD	Operational Requirements Document
OSS&E	Operational Safety, Suitability and Effectiveness
OT&E	Operational Test and Evaluation
OTRR	Operational Test Readiness Review
PBBE	Performance Based Business Environment
PCA	Physical Configuration Audit
PDR	Preliminary Design Review
PM	Program Manager
PMR	Program Management Reviews
POM	Program Objective Memorandum
PPBS	Planning, Programming, and Budgeting System
PRAG	Performance Review Assessment Group
RDT&E	Research, Development, Test and Evaluation
RFP	Request for Proposal
RTOC	Reduced Total Ownership Costs
SAMP	Single Acquisition Management Plan (used by Air Force)
SEER-H	System Evaluation and Estimation of Resources - Hardware Estimation
SSAC	Source Selection Advisory Committee
SSET	Source Selection Evaluation Team
SOO	Statement of Objectives
SoS	System of Systems
SSA	Source Selection Authority
SSP	Source Selection Plan
SOW	Statement of Work
SRD	System Requirements Document
SRR	System Requirements Review
TEMP	Test and Evaluation Master Plan
TO	Technical Order
TOC	Total Ownership Costs
TPM	Technical Performance Measure
WBS	Work Breakdown Structure