DEPARTMENT OF ENERGY
INFORMATION MANAGEMENT

PROJECT MANAGEMENT GUIDE

September 1998

Change Control Page

The change control page will be used to record information for controlling and tacking modifications made the Project Management Guide.

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PREFACE

This document was developed by the Chief Information Officer (CIO) Partnering Team's Goal 6 Project Management Team to define the Department of Energy's (DOE) information management (IM) project management process. It establishes processes for managing DOE IM projects. By documenting the DOE process, the Partnering Team will become a cohesive unit in management systems (IMS) development and deployment. The following members constituted the Project Management Process Development Team:

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PURPOSE

The purpose of this document is to present an overview of project management processes that can be consistently and repeatably used in the planning, management, budgeting, execution and review of IM Product and Services Management Structure projects. The document defines activities required for project authorization and justification, and outlines project roles and responsibilities, and other processes involved in conducting a project. These activities and requirements occur whether the project tasks are preformed by a federal staff or a contractor. The document is compliant with DOE Order 4700.1, *Project Management System* and was written so it could be used for IM-focused project management training.

OBJECTIVE

The objective of this document is to assure the application of sound IM project management practices by defining consistent and repeatable processes that can be used in the planning, management, budgeting, execution and review of IM projects to meet mission needs. The document's four Parts discuss project management activities and requirements, which occur regardless of whether the project tasks are preformed by a federal staff or a contractor.

AUDIENCE

The Guide was developed to assist IM Project Managers in complying with private industry and DOE project management requirements to manage projects more effectively. This Guide may also be used by all DOE organization Federal Project Managers who prepare and update project plans, and monitor adherence to those plans.

BACKGROUND

DOE Order 4700.1, *Project Management System* provides guidance to DOE Project Managers for "Major" projects; however, the guidance provided in the Order is primarily directed toward construction projects. Additionally, the DOE entered into a partnering agreement with the Project Management Institute (PMI). Therefore PMI's publication, *A Guide to the Project Management Body of Knowledge* (PMBOK), is the primary source for guidance for Information Management projects within the DOE. This document adheres to the guidance of DOE Order 4700.1 and the PMBOK, and provides additional guidance to DOE information systems Project Managers.

The guidance for the information management system project management processes is presented in four (4) parts and is based on the material which is discussed in the listed references.

- PART I - ABSTRACT: Contains a high level look at project management processes.

- PART II - PROJECT MANAGEMENT PROCESS OVERVIEW: Contains a lower level overview of the processes and delineates the steps of project planning and execution performed by Project Managers. Guidance areas include project initiation, planning, tracking, reporting, and execution, including acquisitions related to the project.

- PART III - PROJECT MANAGEMENT PLAN GUIDE: Contains the format, attributes and suggested minimal set of elements that should appear in a Project Management Plan and/or Project Plan..

- PART IV - PROJECT MANAGEMENT TRAINING: Contains a listing of relative training courses available from the Government, the Washington D.C. area, and the region.

Development of Information Management Systems components (infrastructure, hardware, software, and applications), regardless of their nature, is accomplished as a project, which can be defined as a collection of discreet work packages or tasks that, when accomplished, will result in a unique service or product. There are specific steps such as project identification and project funding source identification that are required prior to assigning a Project Manager or commencing work on a project. Therefore, those activities are not discussed in this document.

SPECIAL RECOGNITION

The CIO Partnering Team expresses special appreciation to the many Headquarters representatives who contributed their valuable insights and shared lessons-learned relative to their organizations project management processes.

REFERENCES

The following reference materials were used in the writing of this document.

- DOE 1332.1A, *Uniform Reporting System*, Change 1: June 1992.

- DOE 4700.1, *Project Management System*, Change 1: June 1992.

- DOE 5700.6C, *Quality Assurance,* August 1991.

- DOE G200.1-1, *Software Engineering Methodology*, March 1996.

- Institute of Electrical and Electronic Engineers, *Standard for Software Project Management Plans,* (IEEE Standard 1058.1-1987)

- J. Davidson Frame, *Managing Projects in Organizations*, Jossey-Bass Inc., Publishers, San Francisco, CA, (HD69.P75F72) 1987.

- J. Davidson Frame, *The New Project Management*, Jossey-Bass Inc., Publishers, San Francisco, CA, (HD69.P75F73) 1994.

- *A Guide to the Project Management Body of Knowledge (PMBOK) Guide*, Project Management Institute, Upper Darby, PA, 1996 (HD69.P75G845).

- *Project Management for Mission Critical Systems, A Handbook for Government Executives*, The Information Technology Resources Board.

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PART I

ABSTRACT

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PART I - ABSTRACT

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All figures in this Summary are reprinted by permission of the Project Management Institute (PMI).

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PART I - ABSTRACT

1.   INTRODUCTION

The Department of Energy (DOE) Information Management professionals design, implement, and manage the Department's information management (IM) systems, infrastructure, architecture, and applications. This is accomplished through IM related projects. On October 18, 1995, the DOE and the Project Management Institute (PMI) entered into a partnering agreement to advance project management. That partnering agreement recognized two primary project management guidance documents for DOE; DOE Order 4700.1, *Project Management System,* and PMI's *A Guide to the Project Management Body of Knowledge* (PMBOK).

Although DOE Order 4700.1, *Project Management System,* provides excellent project management guidance, it does not fully address the project management challenges relative to IM projects. DOE organizations need IM centric project management guidance that is in line with DOE Order 4700.1, but is attuned to the unique challenges offered by IM projects. The PMBOK provides detailed guidance, and is the primary source of guidance for DOE IM Project Managers. This document uses information from the documents cited in the references section, particularly the PMBOK and IEEE, to provide IM focused guidance to benefit the DOE community.

Project management is the application of knowledge, skills, tools techniques and resources to project activities to meet or exceed stakeholder needs and expectations. It is the discipline of planning, managing and executing a project to ensure that the products or services are produced according to specifications, on time, and within budget. Project management entails carrying out a project as effectively as possible with respect to these dimensions. All successfully completed projects, regardless of size and complexity, share the following attributes:

- A Project Manager is assigned, in charge, accountable and controls the project budget
- The Project Manager, the project team and the project customers share a common understanding of that person's responsibility and authority
- There is a clear definition of the work scope
- There is an integrated schedule, including milestones
- Supportive budget planning and execution that ensure funding availability within the DOE
- An overall plan (management or project) for performance
- Project execution must be measured against the plan
- Sufficient reporting to keep stakeholders aware of progress
- Periodic management review to ascertain project statusOrganizational commitment to successful project completion

2.   PROJECT DEFINITION

A project is a series of goal-oriented processes to produce specific unique product or service. Projects include the coordinated undertaking of interrelated activities. It is a *temporary* endeavor. *Temporary* means every project has a definite beginning and definite end - the end being when the project's objectives have been achieved. The result or product may be ongoing,

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but the project has ended. *Unique* means that the product or service is different in some distinguishable way from all similar products or services - a product or service that has not been available before.

Projects have a scheduled beginning, intermediate, and ending date milestones; prescribed performance requirements and costs. A project is subjected to close management, planning and control. It may stand alone, or be a basic building block in a program. It can be individually planned, approved and managed, or share activities and goals with related projects within a program.

A project is conducted in phases or stages. There are an initiation phase, one or more intermediate phases, and a closeout phase. Figure 1 provides a representation of phases possible in an IM project. Project processes that occur are initiation, project planning, project execution, and project closeout aand transition. In addition, there are specific management functions that occur within each phase. They are project integration management, communications management, scope management, time management, cost management, quality management, resource management, risk management, and procurement management.

Figure 1. Representative Project Phases
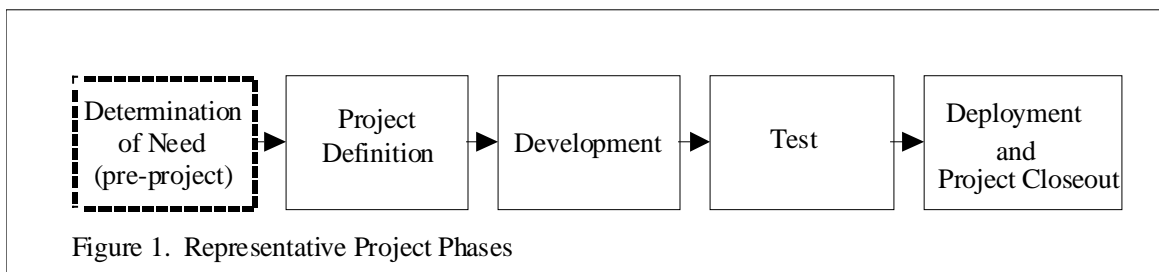
3.   PROJECT PROCESSES
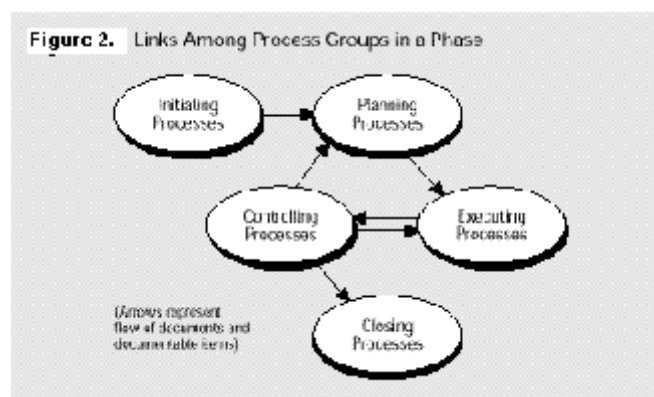
Projects are composed of a series of actions (processes) bringing about a result. The processes are organized into five groups: initiating, planning, executing, controlling, and closing processes. Some or all of these processes occur in every project phase. Figure 2 demonstrates the relationship between the project processes within a project phase. Figure 3 demonstrates the interaction of project processes within the project phases.

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Figure 3. Overlap of Process Groups in a Phase
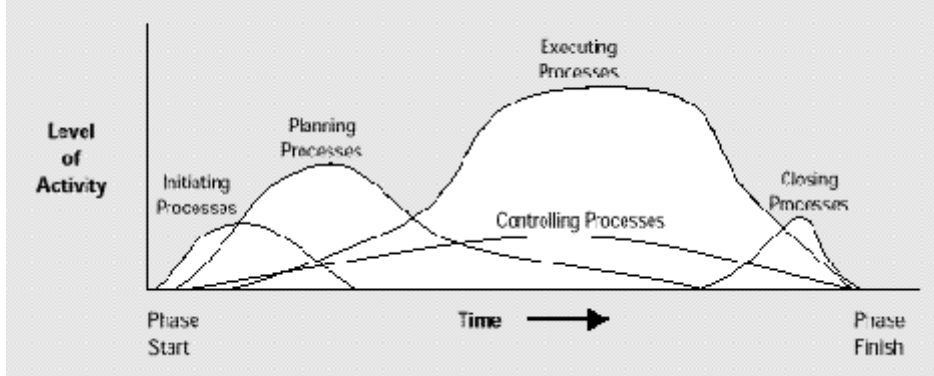
3.1 Initiation Process

The initiation process is defined by PMI as recognizing when a project should begin, and fully committing the organization to the project. Tasks in the initiation process include the following.

- Assignment of a DOE Project Manager. The Project Manager is responsible for all aspects of project performance including: planning, budget execution, project execution, and close-out
- Funding. To increase the probability of a project's success it should be authorized, justified (analysis of benefits and cost; business case), and funded before it is implemented. These activities occur in the pre-project period.
- Validation. Validating the need(s)/requirements that lead to project initiation.

3.2 Planning Process

The planning process is devising and maintaining a workable scheme to accomplish the mission needs that the project was undertaken to address.

- Prepare the Management Plan in-accordance-with the IEEE standards contained in Part III
- Define the project scope
- Prepare project work breakdown structure (WBS) based on the DOE Products and Services Management Infrastructure Guide
- Prepare a project schedule to meet required dates in the validation portion of the initiation process
- Establish configuration control on the Project Management Plan
- Establish performance standards

3.3 Execution Processes

The execution process is the coordination of people and other resources to carry out the Project Management Plan. Project execution may be accomplished by the Program Manager's federal staff, or be assigned to a contractor service provider. Regardless, the responsibility for the successful completion of the project typically rests with the DOE Project Manager.

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- Execute the project plan
- Verify scope
- Evaluate project performance
- Establish a project team

3.4   Controlling Processes

The controlling process ensures project objectives are met by monitoring and measuring progress and taking corrective action when necessary.

- Exercise change control
- Scope change control
- Schedule change control
- Cost control

3.5   Closure Process

The closure process is formalizing acceptance of the project and bringing it to an orderly end. The process groups are linked by the results they produce - the outcome of one becomes an input to another. Repeating the initiation processes at the start of each stage of the project helps to keep the project focused on the business need it was undertaken to address. It will also ensure that the project is halted if the business need no longer exists, or if the project is unlikely to satisfy that need.

3.6   Reporting

DOE organizations adopting these Project Management Processes may wish to enter their organizational-specific reporting requirements into this section.

Reporting requirements will be identified to the Project Manager by Group Leaders, Office Directors and/or Program Managers. Reports will reflect project status in relation to its performance measures, including scope, schedule and cost performance.

Should the Program Manager use a support contractor service provider to accomplish the project, it is essential to monitor the contractor, and, if appropriate, the subcontractor performance. This is accomplished through contract reporting. The contractor must provide sufficient reporting for the Project Manager to see the true status of the project, and meet his or her reporting requirements to the other project stakeholders. Specific reports and reporting requirements will be in-accordance-with the contract, and contained in the statement of work (SOW) for the project.

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3.7 Project Decision Points

There are key decisions made throughout a project's life cycle. Several of those decisions are made prior to project initiation, and others at logical points during project execution.

3.7.1 Approval of Mission Need

The Program Manager must approve the identified mission need. It is the prerequisite for requesting conceptual design funding in the internal review budget cycle. Approval must occur prior to the planning stages of the annual internal review budget cycle and be accompanied by justifying documentation.

3.7.2 Approval of Project Startup

The approval for project startup is the prerequisite for requesting project line item funding in the internal review budget cycle. There will be an approved project description with initial project baselines and authorizing signatures that validates the commitment of how the project will be conducted. A configuration management system delineating specific responsibilities, authority and accountability will be implemented to manage changes affecting the project baselines. These activities must occur prior to the release of funding.

3.7.3 Logical Checkpoints

Projects have logical checkpoints (stages or phases). These checkpoints are delineated in the project management plan. Project evaluations are conducted at these checkpoints. Stakeholders will take these opportunities to validate that the project is meeting requirements; that requirements are still worthwhile; if requirements have changed; and whether to continue with or terminate the project.

3.7.4 Approval to Commence Operation/Production/Delivery

The prerequisite for these activities is the demonstrated capability of the desired product to meet technical performance goals, customer requirements and specifications, and goals specified in the baselines. The demonstrated capability usually involves an acceptance process through which official acceptance is received from the customer.

3.8 Performance Measures

Measuring the performance of a project is accomplished by comparing how effectively work products are delivered to the scheduled delivery dates, and how efficiently products are produced to cost estimates. Conducting a project on schedule and within cost is usually considered good performance, and an indicator of a healthy project, if the project is meeting or exceeding its quality goal. An effective control in ensuring favorable performance is close project tracking and control by the Project Manager.

Project performance can be enhanced by adequate status reporting, which affords stakeholders timely information for the review of successes, problems and issues that need resolution. Performance can be validated through a Stage Exit process, wherein stakeholders meet with the Project Manager and collectively agree to the recent project performance, and authorize continuation of the project.

The quality of products can be assured and measured through the techniques addressed in the Project Management Process Overview, section 4.6, Quality Management. Mechanisms for technical performance will be identified in the Project Management Plan.

3.9   Project Completion

The project is completed when the product desired by the customer has been developed, tested and validated and verified to be operationally ready and functionally certified to the customers requirements and specifications during a customer and/or user participant acceptance testing process.
The acceptance, a written statement, is a signed acknowledgment by the customer and stakeholders that the work performed has been accepted for being in accordance with approved plans, requirements and specifications.

4.   ELEMENTS OF PROJECT MANAGEMENT

These project management elements are generally accepted by and practiced in private industry. Complete definitions are contained in the PMBOK. Additional information about specific elements was added in this document. The extent to which they are incorporated into Management or Project Plans will be dictated by the size, complexity and environmental considerations of each project.   The project management team has the overall responsibility for determining what is ultimately appropriate for any given project, which would be agreed to by the customer and stakeholders. Project elements include the following.

- Project Integration Management

- Project Management Plan (PMP) - the PMP is developed in-accordance-with Part III
- Management Plan Execution
- Project Change Control

- Communications Management
- Project Scope Management - Developing the work breakdown structure (WBS) subdivides major project deliverables into smaller, more manageable components.

> An example of a software development WBS may be found online at http*://cio.doe.gov/smp.* A generic example may be found in the draft DOE *IM Products and Services Management Structure,* Project Functional Breakdown Structure and Definitions.

- Project Time Management

- Project Cost Management

- Project Quality Management

- Project Human Resource Management
- Project Risk Management/assessments

- Project Procurement Management

- Contractor/subcontractor Management - A project requires a wide range of skills and experience, it may require teaming agreements with DOE organizations, contractors, or subcontracts with other companies. It is the Project Manager's responsibility to ensure that the teaming partners and contractor/subcontractors are held to uniform quality assurance standards especially in view of existing DOE guidance such as the DOE materials listed in the References section.

  Statements of work for the contractor/subcontractors must clearly state what quality assurance reviews are expected in their performance. The primary quality activities which the project management team will address with contractor/subcontractors are:

  - Provide the DOE quality requirements to the subcontractor
  - Establish acceptance criteria
  - Review and approve the contractor/subcontractor quality plan
  - Perform quality assessments of contractor/subcontractor performance
  - Monitor contractor/subcontractor assessments, preventive and corrective action plans

5.   CONCLUSION

The previous paragraphs discuss the attributes of project management practices that will assist DOE Project Mangers in the effective management of their projects. Part III contains a Project Management Plan Guide to assist Project Managers in developing Project Management and Project Plans. Part IV contains a listing of Project Management Training available in the Washington, D.C. area and the region.

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PART II

PROJECT MANAGEMENT PROCESS OVERVIEW

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PART II - PROJECT MANAGEMENT PROCESS OVERVIEW

1. INTRODUCTION

Department of Energy (DOE) organizations initiate and/or collaborate on special information management (IM) projects to meet organizational IM needs. DOE Order 4700.1, *Project Management System,* provides project management guidance to mangers and to meet the unique challenges of managing major construction and facility-related projects, but there is no specific IM-focused project management guidance. This Guide consolidates information extracted from the documents noted in the References section to provide the needed IM-focused project management guidance.

Project management is the application of knowledge, skills, tools and techniques to project activities to meet or exceed customer and stakeholder needs and expectations. It is the process discipline of planning and managing a project to ensure that products are produced according to specifications and are completed on time and within budget. These goals constitute the focal point of a Project Manager's attention and energy.

Project management entails conducting a project as effectively as possible with respect to these goals. Commensurate with these goals, every project effort, regardless of size and complexity, has the following inherent characteristics to assure a successful project.

- Someone in charge and accountable.
- Clear lines of responsibility and authority.
- A clear definition of the work scope.
- An integrated schedule, including milestones.
- Supportive budget planning and execution that considers overall funding availability within the DOE organization and the Department.
- An overall management plan to ensure performance.
- Project execution against the plan.
- Sufficient reporting to keep stakeholders aware of progress.
- Periodic management review to ascertain project status.
- Organizational commitment to successful project completion.

In the following sections, this document focuses on these characteristics in summary level detail.

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2. PROJECT DEFINITION

A project is a series of goal-oriented processes conducted to achieve a specific product or service result(s). It is a *temporary* endeavor undertaken to create a *unique* product or service. *Temporary* means every project has a definite beginning and definite end - the end being when the project's objectives have been achieved. The product or result may be ongoing, but the project has ended. *Unique* means that the product or service is different in some distinguishing way from all similar products or services - a product or service that has not been available before.

Projects have scheduled beginning, intermediate, and ending date milestones; prescribed performance requirements and costs; and close management, planning and control. A project is a basic building block in relation to a program and is individually planned, approved and managed. A project should be identified, justified, authorized and funded before it is established and a project team is assigned.

2.1 Identifying a Project

Federal laws and regulations may mandate that a project be initiated to comply with their direction. A project may be identified by DOE or IM Strategic Plans, and site working groups, such as the Headquarters Collaboration Group or the DOE IM Council. Projects may also be initiated by Federal Program Managers through mission analysis and internal assessments of their programs, where they identify need for improvement to existing capabilities or opportunities that will enhance the accomplishment of missions. Program Managers are typically organizational heads, Directors or Group Leaders. Program Managers will have the knowledge of organizational requirements and identify projects necessary to ensure organizational missions are accomplished.

2.2 Authorizing a Project

Projects can be mandated by executive or legislative authority. Projects may also be identified through a mission analysis or internal assessments, which may result in the Federal Program Manager authorizing a project. In addition, a Program Manager undertaking new or additional program areas may authorize a project so new capabilities may be established. Some organizations authorize projects through an IM Steering Committee. Decisions may justify system acquisition approvals, projects, planning and budget formulation.

2.3 Justifying a Project

Justifying and obtaining approval for a project is a prerequisite for requesting funds in the internal review budget cycle. Projects should have an Analysis of Benefits and Cost (ABC). Specifically, the business-need project should always have an ABC, which is generally contained

in the business case for the project. The ABC justification will contain an analysis of the costs versus the benefits, and show a quantifiable return on investment. When the justification is realistic, accurate and kept current, it will be easy to defend. An ABC is also effective as the basis for justifying prototyping or experimental projects for proof-of-concept (or choice of approach), i.e., "If this is feasible, the cost/benefit is . . ."   Program Managers should approve projects prior to the planning stages of the annual internal review budget cycle.

Volumes 1, *A Manager's Guide to Analysis of Benefits and Costs;* and 2, *An Analyst's Guide to Analysis of Benefits and Costs*, may be found at *http://cio.doe.gov/smp.*   Section 3.6.5 of the *Software Engineering Methodology* (SEM), also provides more detail on conducting an ABC.

Risk justification (management) is as important as an ABC. All projects should undergo risk analysis, which should be conducted based on size, complexity and environmental considerations. Major projects and those with the potential for failure or for rapid cost escalation, should have a detailed risk analysis performed. It may be appropriate to conduct requirements analysis through the Strategic Information Management (SIM) process, and have a risk response plan in place before project approval. Showing that risks have been assessed and addressed will help justify a project.

2.4   Funding a Project

Program Managers are responsible for budget formulation and execution of an approved budget for projects they have authorized. In almost all cases, legislative mandated projects will receive priority funding. Other projects may be funded by a Federal Program Manager to improve the efficiency and effectiveness in the accomplishment of program missions.

Funding decision guidance is provided in DOE 4700.1, Part D, beginning with page I-26; and section 3.7 of this Project Management Process Guide.

Planning estimates must be developed for a project at the time of project identification to support project justification. These estimates are developed early in the project life cycle and are order of magnitude only. Cost estimates from the ABC must be documented in a statement of costs to be incurred to complete the project. This is the baseline against which cost comparisons are made during the life of a project.

2.5   Establishing a Project

A project should be authorized, justified and funded before it is established. Projects may be conducted solely by Federal employees. If the project is to be conducted by a contractor service provider, a Federal Project Manager or Technical Monitor (TM) will be placed in charge. The TM will submit a task assignment through a Contracting Officer Representative, or establish a project via an existing task assignment. The contractor must respond to the task assignment with a Management Plan based upon contractual requirements.   The Management Plan may summarily define the management approach for performing the effort, the scope of activities, and provide information as to how the task will be managed to demonstrate to the customer that the contractor understands the request and objectives of the task.

This Management Plan may be all that is required for recurring (administrative) tasks. A more detailed Project Management Plan may be developed during the planning stage for new IM Products and Services Management Structure projects. The size and complexity of the project are usually the determining factor in the level of detail. Figure 1 depicts the project management processes.
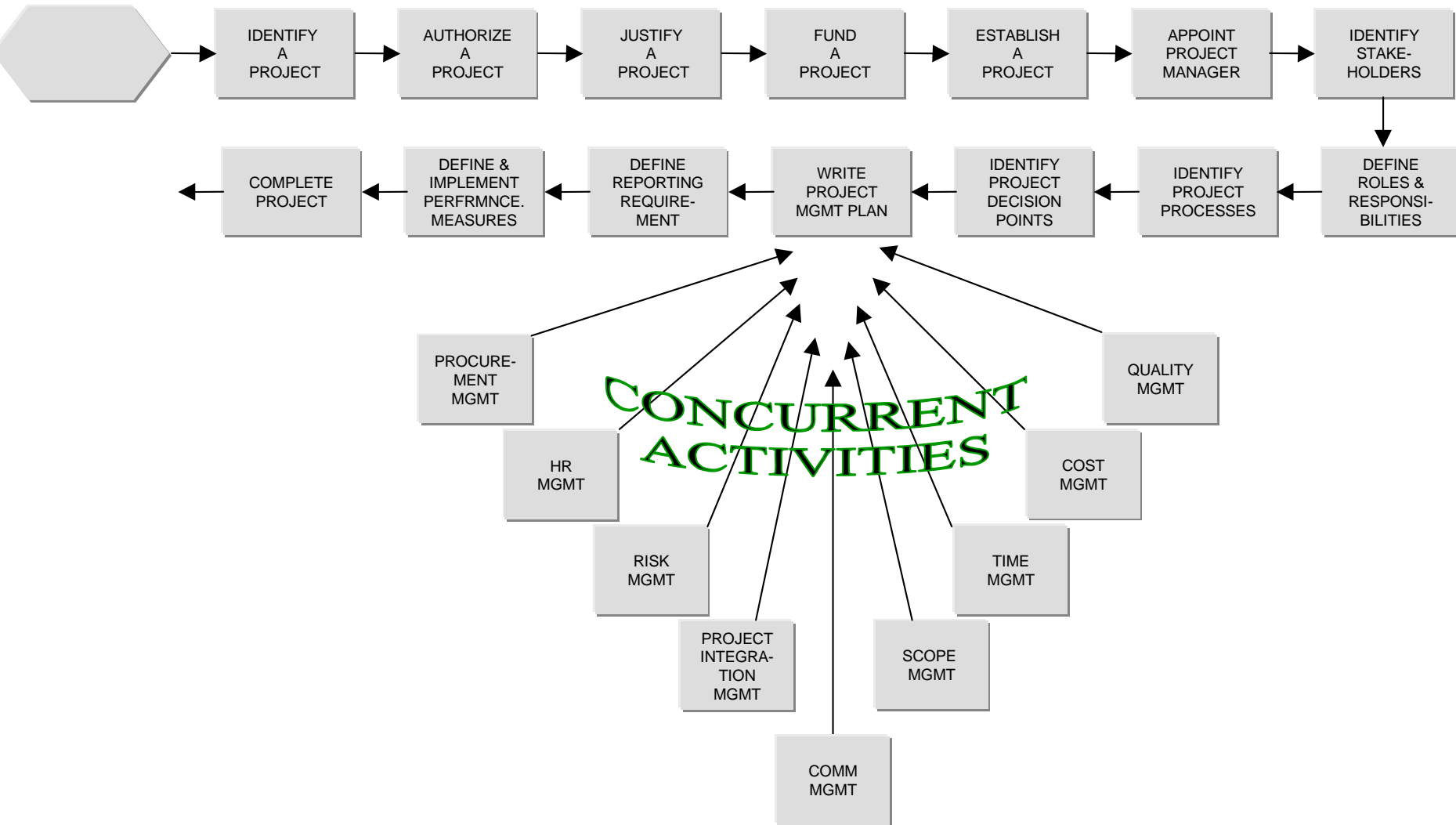
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Figure 1 - Flowchart of the Project Management Process

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Projects are composed of a series of actions (processes) that bring about a result. The processes are organized into five groups:

- Project Initiation Process - recognizing when a project will begin, and fully committing to the project.

- Project Planning Process - devising and maintaining a workable scheme to accomplish the missions need the project was undertaken to address.

- Project Execution Process - coordinating people and other resources to carry out the Project Management or Project Plan.

- Project Controlling Processes - ensuring those project objectives are met by monitoring and measuring progress and taking corrective action when necessary.

- Project Closure Process - formalizing acceptance of projects and bringing it to an orderly end.

The process groups are linked through the results they produce - the result of one becomes an input to another. Repeating the controlling processes at the start of each stage of the project helps to keep the project focused on the business need being addressed. It will also ensure that the project is halted if the business need no longer exists, or if the project is unlikely to satisfy that need.

3.1   Appointing a Project Manager

Project Managers are appointed based on their overall skills and experience in project management relevant to a project. Federal Program Managers may assign overall project management duties to a Federal employee in cases where the project has DOE-wide impact, or there is a large mix of DOE and contractor project participants. In less complex projects, these duties may be delegated to a contractor Project Manager.

When Project Manager duties have been delegated to a contractor, the project may fall under the general direction of a Federal Technical Monitor (TM) who works within the Program Manager's organization. Although the contractor Project Manager generally has the authority and responsibility for executing, planning, organizing, directing and controlling of all activities within the project, the carrying out of these duties should be done at the full knowledge of the Technical Monitor.

The Project Manager, whether Federal or contractor, is responsible for all aspects of the project including quality assurance, configuration management, security plan; i.e., all items listed in the sections on Project Management Plans and Part III. The Project Manager will be the point-of-contact for the information flow to customers and stakeholders on the day-to-day project activities.

Project stakeholders are individuals who will be actively involved in or affected by the project. The project management team must identify the stakeholders, determine what their needs and expectations are, and then manage and influence those expectations to ensure a successful project. The Project Manager is responsible for identifying the key stakeholders during the planning process.

Typical stakeholders on a project will include:

- Federal Program Manager - the person who identifies, authorizes, justifies and provides funding for a project.

- Customer - the organization or individual(s) who will use the project product. Customers may be a Program Manager, system owner, IM or user point-of-contact, or Technical Monitor.

> Identifying customers can be complicated because a project can encompass a variety of internal and external customers. For example, an organization may be developing a DOE-wide financial system where the primary customer is the Office of Accounting. Primarily, the internal group of customers must be satisfied. When collecting requirements at field sites, the project team also may learn that external customers have different or additional requirements. Therefore, all customers must be identified to ensure all requirements are collected related to the project.

- System Owner - a person within the organization representing the Program Manager on the project, who may also have oversight responsibility. The Program Manager can also be the system owner.

- Project Manager - Federal or contractor employee responsible for managing the project. Project Managers may also be referred to as Technical Monitors.

- Project Team - the group of Federal and/or contractor employees responsible for developing the product.

- Quality Assurance - the person or group responsible for assuring the project meets customer specifications and expectations of the project, quality standards, and identifying risks that could cause impact and delays to the project.

- Functional Area Staff - all functional areas that at some point will be involved in completing the project.

Roles and responsibilities of project stakeholders are identified in project management plans. Following are outlines of project stakeholder responsibilities.

3.3.1 Federal Program Manager

Federal Program Managers are typically at the Team Leader, Group Leader or Office Director level. Program Managers have the responsibility for identifying, authorizing, justifying and funding all projects within their functional area. They are also responsible for the following items.

- Provide guidance for determining priorities among programs and projects within the group, and relate these to various levels of resource availability.

- Provide clearly defined missions with clear time-phased goals and objectives.

- Ensure project operational and technical risks are assessed.

- Ensure that the commitment of major resources is avoided until adequate project definition is developed.

- Provide visibility on all key decisions, timely feedback for all levels of management, and accountability and traceability of management decisions across all levels of the organization.

- Approve the Project Management Plan.

- Inform the Contract Officer Representative of all changes in Technical Monitors.

3.3.2 Federal Technical Monitor

A Federal Technical Monitor (TM) is typically the Federal Project Manager who administers funded contractor task assignments. A TM must be involved in all DOE funded contractor projects. Following is a list of TM project-related responsibilities.

- Serve as the Project Manager for special, integrated, organizational and DOE-wide projects as assigned by a Program Manager.

- Develop a clear and definitive statement of work (SOW) for contractor task assignments and provide independent government estimates for manpower and funding resources.

- Ensure plans and reports essential to managing and monitoring the task or project are required, and that they support effective management and satisfy technical and financial reporting requirements. Review, analyze, evaluate and act on information provided through the plans and reports.
- Ensure coordination with all Federal and contractor project participants at project inception.

- Provide technical direction, planning, funding and monitoring of contractor resources, including the approval of related travel and training.

- Promote project execution which achieves technical, schedule and cost objectives.

- Provide written evaluation of resource work plans, technical schedules, cost and project management performance.

- Promptly review and approve management and project plans, and draft deliverables.

- Initiate written modifications to tasks upon change in scope or the period of performance.

- Analyze problems, formulate solutions, and resolve project-related problems and conflicts at the Technical Monitor peer level.

- Recommend new or modified program management procedures and guidelines to be followed by support contractors when improved efficiencies are identified.

- Advise customers on the appropriate telecommunications and computer technology and their capabilities and limitations; hardware, software and related service industries; procedures and standards, and budget processes.

- Evaluate contractor performance every 4 months and provide comments with grades.

3.3.3 Contractor Project Manager

When tasks are assigned to a contractor service provider, the responsibilities of the Project Manager are sometimes delegated to the contractor. In this role, the contractor Project Manager is the primary motivator of customer focus on the project and the point-of-contact for day-to-day information flow to the Federal Project Manager and/or Technical Monitor. Within contractual constraints and limitations, the contractor Project Manager has authority, responsibility, and accountability for the success of a project. The contractor Project Manager will provide detailed planning, organization, direction and control for all activities leading to the successful execution of a project. The Project Manager has the following additional responsibilities.

- Respond to the task assignment with a Management Plan (initial project description with initial baselines) based upon contractual requirements.

- Ensure project planning efforts support those of the sponsor organization.
- Provide a detailed Management Plan for the management, execution and control of projects, including evaluation of project progress in relation to specific milestones. Include in the Plan how project performance will be measured. Use the Plan to manage and control the project.

- Accept responsibility and accountability for the proactive execution of the project in accordance with the mutually approved Management Plan.

- Ensure the project is staffed with capable personnel at the right times and with adequate skill levels to attain successful completion of the project within schedule. Be capable of understanding staff needs.

- Identify the responsibilities and authorities of project and matrixed staff.

- Have a strong commitment to the project and a thorough understanding of project goals.

- Be results oriented, practical and cost conscious.

- Follow reporting requirements of the DOE 4700.1, DOE 1332.1A, and those identified in the Project Management Plan to measure baseline performance.

- Conduct software development projects in accordance with DOE G200.1-1, *Software Engineering Methodology (SEM)*.

- Conduct other IM Product and Services Management Structure projects by adapting portions of the SEM, and guidelines and references listed in this Guide.

- Adhere to DOE quality assurance procedures contained in the SEM and DOE 5700.6C, *Quality Assurance*, in the management of the project.

- Establish configuration management to establish and document the baselines, control changes, and to ensure the review, approval and documentation of baselines when they change.

> The *DOE Headquarters Software Configuration Management Guide* contains the details for establishing configuration management. Copies are available in the HR Technical Library.

- Conduct risk assessments on all new technology that may directly or indirectly impact a project. Update the Project Management Plan with a status of the technology assessment and it's impact to the project.

- Ensure the preparation and execution of a complete test plan to assure full operational and functional performance of capabilities defined in the specifications and requirements.

3.4   Office of Chief Information Officer Status Reporting

The Office of Chief Information Officer (CIO) status reporting is accomplished according to the Office of Assistant Secretary for Human Resources and Administration (HR-1) guidelines, which are aligned with the reporting requirements of the Secretary of the Department of Energy. Federal Technical Monitors (TM) report to the Group Leaders weekly, and Group Leaders roll-up the reporting to the CIO weekly. Reporting focus is on major events, emerging issues, Secretarial commitments, the future, employment levels, Congressional hearings, awards (grant, contract, CRADAs), honors, and employee awards (monetary) and recognition.

Federal TMs reporting the status of projects may be required to report in more detail than is required for the weekly CIO report. These reporting requirements will be identified to TMs by their Program Managers.

3.5   Contractor Reporting

There are many categories of contractor reporting: status, executive, schedule, cost, labor, exception, technical, and performance. The requirements for reporting will be based on the size and complexity of a task or project, as defined by the Program Manager in the task SOW, and will be identified in the Project Management Plan.

Project management reporting requirements are outlined in DOE 4700.1, *Project Management System,* Chapter IV, Part B; and DOE 1332.1A, *Uniform Reporting System.*

At a minimum, a report on project status will be provided to Federal Project Managers and/or Technical Monitor through a monthly Technical Status Report (TSR). The TSR will include the Project Manager's concise narrative assessment of the status of the work being performed under a task assignment. Federal Technical Monitors will use the TSR to monitor project status, costs, identify potential problems, and to report to their Program Manager.

The TSR will contain, but is not limited to, the following outline compliant with DOE 1332.1A. The required headings are variances from baselines, causative factors and actions taken (Project Staff Hours and Costs); changes in objectives and technical approach, task progress, summary of the current situation, and forecast of the near future and expected impact on the project (Status Assessment and Forecast).

Following is a list of key headings that will be used in TSR reporting. Headings will be used only when there is supporting narrative.

Provide a breakdown of direct and indirect charges for the month in both cost and person hours. When variances between the actual and planned costs and/or resources occur (overruns and underruns), provide an analysis and explanation of those variances along with causative factors and planned actions to remedy them.

B.   **STATUS ASSESSMENT AND FORECAST**

Provide an overall status of the task or project. The narrative presents the current status, the past month's activities and planned activities for the following month. Significant accomplishments or feedback from the Technical Monitor are included in this section. It is used to highlight task progress and/or addressing delays in deliverables due to unanticipated problems. Following is a list of key elements for this part of the TSR.

Assessment of Current Period

Provide a summary assessment of the status of the task or project for the current period. Details will be given to clearly explain services provided for each individual subtask, where appropriate, and functional area or specific activity.

Significant Accomplishments

Report items that are particularly noteworthy, required special effort or attention, required additional usage of resources and expenditures of time. Significant accomplishments, tasks completed, products delivered or a service/product provided that was very beneficial to the client will be highlighted (i.e., either redline or bold), so they can be easily identified and included in the contractor internal reports to executive management.

Problems

Identify project problems. It is important that contractor and DOE management be made aware of project problems so timely solutions can be identified. Project Managers will freely report any problems related to the project, regardless of character. This will bring problems and situations that may have impact on the project to the attention of the Technical Monitors, and keep them reminded when problems go unresolved.

Issues Needing Resolution

Document any issues that need resolution. Reiterate issues that have been previously reported and have not been responded too by the TM and remain unresolved.

Provide a summary of all activities in progress that are not completed.

Future Activities

Provide a summary of tasks or projects that will be completed in the next or future reporting periods. Also include projected or expected leave, training and travel during the next month.

Forecast

Provide a forecast of the near future and expected impact on project accomplishment. Predict hours and cost under and overruns.

Optional Headings

The following list of optional headings can be used under Status Assessment and Forecast section, when appropriated. Headings will be displayed only with a supporting narrative.

- Project Objectives

  Report project requirement and scope changes under Status Assessment and Forecast section when these situations occur.

- Optimization of Resources

  Report measurable, significant and quantitative optimizations in the project resulting from significant cost savings, optimization of manpower, or reallocation of available resources to meet client needs (matrixing from other projects), when the opportunities occur. When used, report this option under Status Assessment and Forecast section.

- Meetings Attended

  Provide a summary of meetings attended that resulted in significant accomplishments or key decisions being made.

- Conferences Attended

  List conferences, symposiums and trade shows attended. Indicate if they were attended on personal time. List dates and location.

- Expected Activities to Begin During the Next Reporting Period

C. DELIVERABLES LOG

Provide a list of deliverables specific to the task as specified by the Technical Monitor. Update monthly or more frequently, if applicable. Add non-scheduled deliverables as they occur. Include the DOE comments due date.

D. MILESTONE SCHEDULE/STATUS REPORT

Provide a graph depicting an agreed upon baseline plan for projects, and a project status. The graph includes time lines and symbols used to convey to DOE and contractor management whether or not the project is ahead or behind schedule; if the project has been delivered; or if there have been any changes to the original due date. Project milestone dates will be established, maintained and tracked in a structured, graphic method for easy management review for status of project events and activities, either by project milestone Gantt Charts, work breakdown structures or other milestone distinguishable schedule.

3.6 Project Decision Points

There are several key decisions that need to be made regarding a project. They are listed below.

3.6.1 Approval of Mission Need

The Program Manager must approve the identified mission need. It is the prerequisite for requesting conceptual design funding in the internal review budget cycle. Approval must occur prior to the planning stages of the annual budget cycle and be accompanied by justifying documentation.

3.6.2 Approval of Project Startup

The approval for project startup is the prerequisite for requesting project line item funding in the internal review budget cycle. There will be an approved Management Plan (project description) with initial project baselines, and customer signatures which validates the commitment to how the project will be conducted. A configuration management system will be implemented to manage changes affecting the project baselines, and define specific responsibilities, authority and accountability. These activities should occur prior to the release of funding.

3.6.3 Logical Checkpoints

Projects will have logical checkpoints (stages or phases), at which point an evaluation of project progress to date can be made. Stakeholders will take these opportunities to validate that the

Figure 2 contains a graphic of this process.

Figure 2 - Logical Checkpoints

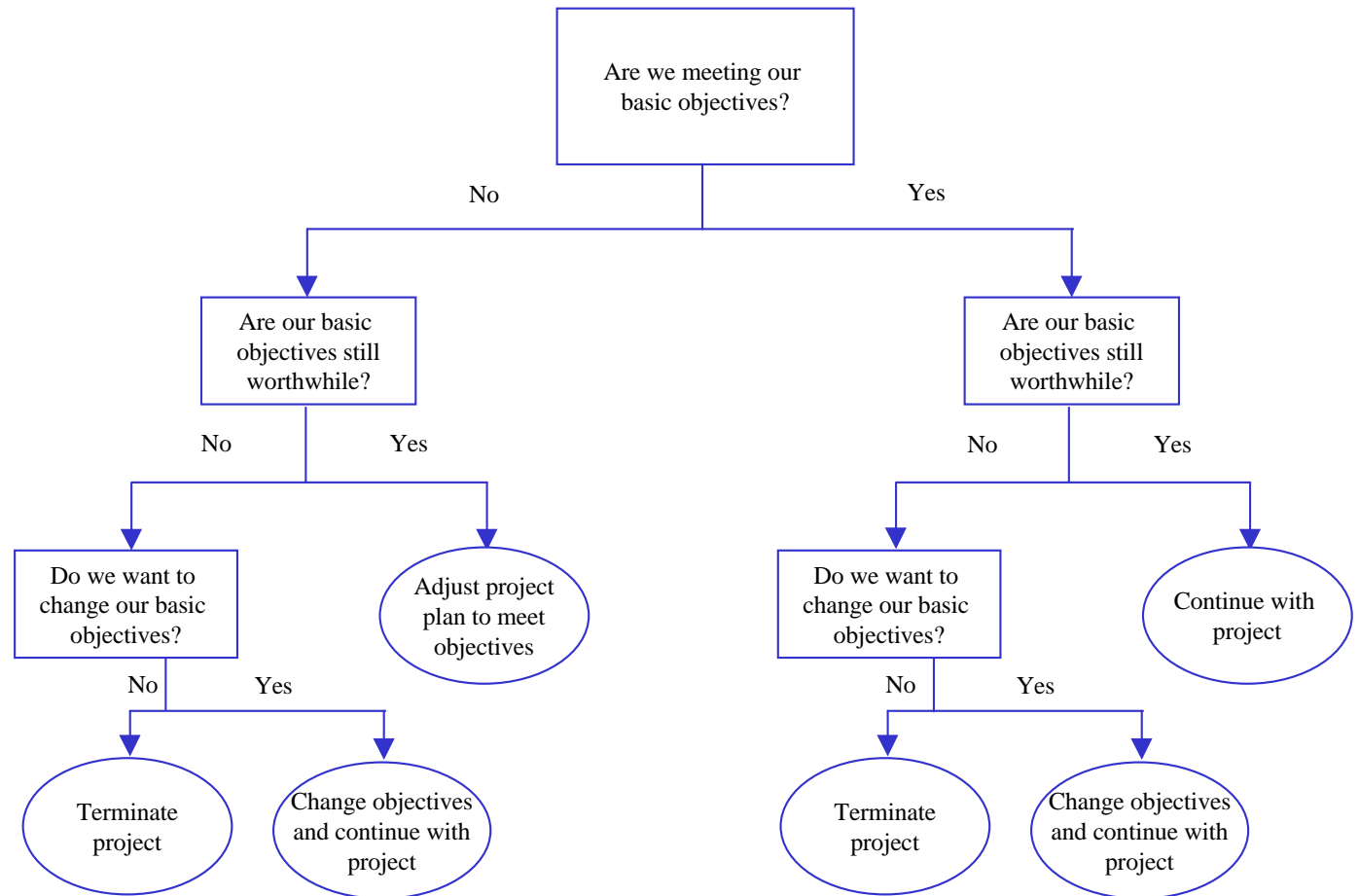### 3.6.4 Approval to Commence Operation/Production/Delivery

The prerequisite for these activities is the demonstrated capability of the desired product to meet technical performance goals, customer requirements and specifications, and goals specified in the baselines. The demonstrated capability usually involves an acceptance process through which official acceptance is received from the customer.

Measuring the performance of a project can be accomplished by comparing how effectively work products are delivered compared to the scheduled delivery dates, and how efficiently products are produced compared to cost estimates. Conducting a project on schedule and within cost is usually considered good performance, and an indicator of a healthy project. An effective control in ensuring favorable performance is close project tracking and control by the Project Manager.

Project performance can be enhanced by frequent status reporting, which affords stakeholders timely
information for the review of successes, problems and issues that need resolution. Performance can be validated through a Stage Exit process, wherein stakeholders meet with the Project Manager and collectively agree to the recent project performance, and authorize continuation of the project.

The quality of products can be assured and measured through the techniques addressed in the Project Management Process Overview, section 4.6, Quality Management. Mechanisms for technical
performance will be identified in the Project Management Plan.

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┌──────────────┐      measurement       ┌──────────────────┐
│   Process    │ ─────────────────────▶ │   Performance    │
│              │                        │  Measurements    │
└──────────────┘                        └──────────────────┘
       ▲                                          │
improvement│                                      │ comparison
       │                                          ▼
┌──────────────┐       analysis         ┌──────────────────┐
│ Improvement  │ ◀───────────────────── │   Performance    │
│    Plan      │                        │     Goals        │
└──────────────┘                        └──────────────────┘
```

what should change?
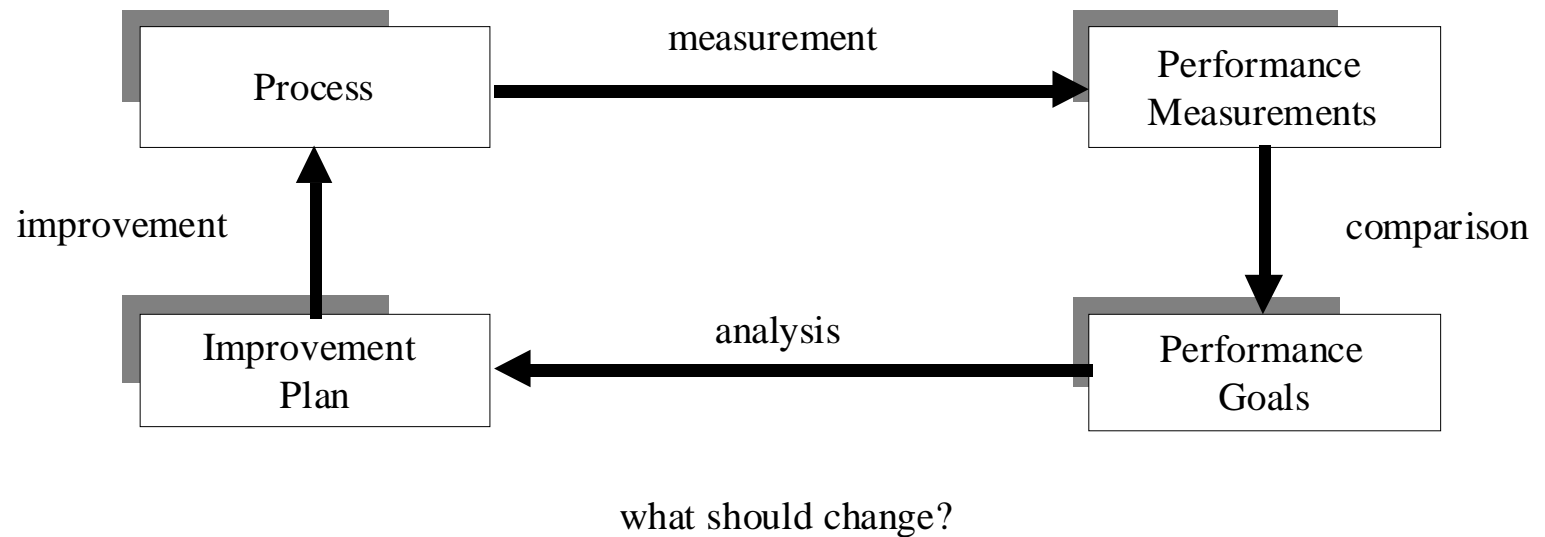
Figure 3 - Performance Measurement

3.8   Project Completion

verified to be operationally ready; and functionally certified to meet the customers requirements and specifications during a customer and/or user participant acceptance testing process. The acceptance is a written statement signed by the customer and stakeholders acknowledging that the work performed by the contractor has been accepted as being in accordance with approved requirements and specifications.

This section contains summaries of project management elements accepted and practiced by private industry and the Federal Government. The extent to which these elements are incorporated in Project Management Plans will be dictated by the size, complexity and environmental considerations of each project.   The project team has the overall responsibility for determining what is ultimately appropriate for any given project, which is subject to the concurrence by the Federal Program Manager.

4.1   Integration Management

Project integration management involves the processes required to ensure that the diverse elements of project management are properly coordinated. This includes making tradeoffs among competing objectives and alternatives in order to meet or exceed customer needs and expectations. The work of the project must also be integrated with the ongoing operations of the organization conducting the project.   Additionally, product and project scope must be integrated; i.e., the features and functions that are to be included in a product must flow with the work that must be done to deliver a product. This includes deliverables from, and required by different functional specialties. The elements of project integration are Management Plan Development, Management Plan Execution and Change Control.

4.1.1   Management Plan Development

An initial Management Plan is developed for a new task/project. It can be followed-up with a more detailed Management Plan for specific projects. The detailed Plan is the result of the Project Manager going through the process of planning the scope of a project, specific project deliverable activities, staffing, activity sequencing, activity duration estimating, schedule development, resource planning, cost estimating, and cost budgeting. The detailed Plan may be a Project Management Plan or Project Plan. They both serve the same purpose: they are the consistent, coherent, dynamic document that is used to guide both project execution and project control.

The Plan contains the project goals, objectives, scope and product overview. The Plan is used to guide project execution; document project planning assumptions and decisions regarding alternatives chosen; facilitate communications among stakeholders; define key management reviews as to content, extent, and timing; and provide a baseline for progress measurement and project control. The Plan is reviewed and revised as needed, typically at the end of stages, phases or any logical checkpoint within a project. Critical project decisions made can also result in the Plan being revised. An outline of an industry standard Project Management Plan may be found in Part III.

A Project Plan example is available online on the Software Management Program web site at *http://cio.doe.gov/smp*. Although the Project Plan example was developed with software projects in mind, it contains the key elements of a Plan for any type of IM project.

Execution of the Plan is where the project budget will be spent. In this process, the Project Manager and the project management team must coordinate and direct the various technical and organizational interfaces that exist in the project.

4.1.3 Change Control

Once written, the Management Plan is placed under configuration management. Changes are managed in a manner that assures the integrity of the project baselines is maintained. All approved changes are reflected in a revised Plan. Changes to the products will be reflected in the revised definition of the project scope, and be approved by all project stakeholders.

4.2 Communications Management

Communications management involves methods for communicating and receiving information about the project to and from the project customer, stakeholders and all participants. The methods of dissemination can vary widely. The manner in which these needs are met can also vary widely.

One element of communications management required by DOE 1332.1A for all projects is the monthly Technical Status Report (TSR). Additional performance reporting requirements may include, but are not limited to, special Project Manager's Progress Reports; Quarterly Project Reports; weekly/monthly status briefings to the stakeholders and management; and Project Status Review presentations.

More formal and frequent communications management may be required for projects with critical importance to program objectives that are large in size or complex, require a high degree of Federal oversight and are highly visible. All project communications requirements will be identified in the detailed Management Plan.

4.3 Scope Management

Project scope management includes the development of a written statement about the parameters of the project, and the process required to ensure that the project includes all the work required for successful completion. Developing a written scope statement establishes the basis for future project decisions, and forms the basis for an agreement between the project team and the customer. It identifies the project objectives, project justification, a product description and a summary list of major project deliverables.

The major project deliverables are subdivided into smaller, more manageable components in a work breakdown structure (WBS) to improve accuracy of cost, time and resource estimates. The WBS also defines a baseline for performance measurement and control, and provides a graphic representation that completely defines the project by relating elements of work to each other and to the end product. The WBS shows the relationship of all elements (hardware, software,

An example of a software development WBS may be found at *http://cio.doe.gov/smp*, under Project Planning. A more generic WBS can be found in the draft DOE *IM Products and Services Guide* at *http:/cio.doe.gov*, under Councils/Committees/Groups, and Collaboration Group. Hard copy examples are included as attachments to Part III.

Scope verification is the process of formalizing acceptance of the project scope by stakeholders. It requires reviewing of work products and results to ensure that all were completed correctly and satisfactorily. If the project is terminated, scope verification will establish and document the level and extent of completion.

Change control is critical. When the scope of the project changes (typically as a result of requirements changing), the costs go up, benefits go down, and payback periods increase. Project Managers will use an integrated change control process (configuration, quality, time and cost control), to manage changes when they occur, and to ensure changes are beneficial.

4.4   Time Management

Project time management includes the processes required to ensure timely completion of the project. The processes include activity definition, sequencing, duration estimating, schedule development and schedule control. It also includes identifying the resources, constraints, and assumptions that can impact scheduling.

4.4.1   Activity Definition

Activity definition involves identifying and documenting the specific activities (at the lowest level) that must be performed to produce the deliverables and subdeliverables identified. These activities are sequenced and linked, if necessary, in a WBS. Implicit in this process is the need to define the activities so project objectives will be met. The primary input to this process is the high-level WBS provided in the Management Plan. The WBS also provides a framework for assigning responsibilities. The scope statement is a major source for activity definition since it contains the project justification and objectives.

4.4.2   Activity Duration Estimating

Activity duration estimating involves assessing the number of work periods (e.g., hours, days, weeks) likely to be needed to complete each identified activity. Estimating the number of work periods required to complete an activity will also require consideration of elapsed time. It also involves a list of all activities that will be performed on the project that maps to the WBS (at the lowest level) to ensure traceability. The accuracy of duration estimation is enhanced by the availability of previous projects files, commercial duration estimating databases, and project team knowledge resulting from working on similar projects.

After the activities have been defined and sequenced and their duration estimated, a schedule can be developed. Schedule development involves determining start and finish dates for project activities. If the start and finish dates are not realistic, it is doubtful the project will be finished on schedule. The process should be iterated, along with the processes that provided the inputs for the schedule, (especially duration and cost estimating) prior to redetermination of the project schedule. The schedule development also involves knowledge of the following.

- What human and material resources will be needed.

- What human and material resources are available at what times.

- Project and resource calendars identifying periods when work is allowed.

- Imposed dates for completion of certain deliverables required by the customer, project owner, Program Manager.

- Regulations or new legislation.

- Non-negotiable completion dates for major deliverables.

- Lead/lag times for projects involving acquisitions for equipment and subsequent installation.

4.4.4   Schedule Control

Schedule control involves the factors which create schedule changes to ensure that changes are beneficial. It involves determining that the schedule has changed and managing the actual changes when they occur. Schedule control will be integrated with configuration management (change control). Regardless of the source of change requests (oral, written, legally mandated, etc.), the schedule must reflect the change and time extensions. Funding may also need adjusting to accommodate changes. The schedule plan (which can be part of the Management Plan) defines how changes to the schedule will be managed.

The project schedule provides the basis for measuring and reporting schedule performance. Performance reports provide information on schedule performance (which planned dates have been met and which have not), and can alert the project team to issues which may cause future problems.

4.5   Cost Management

Project cost management is a process that ensures the project is completed within the approved funding. A methodology for cost estimating is outlined in section 4.5.2. The cost management methodology must also consider the information needs of the stakeholders, because different

4.5.1 Resource Planning

Determine the resources (people, equipment, materials) required to perform project activities. This can be accomplished by analyzing the WBS to identify project elements that will require resources; reviewing historical information for the types of resources that were required for a similar project; analyzing the scope statement containing the project justification and objectives; and analyzing the resource pool for people, equipment and materials that are relevant and potentially available to the project. Any sponsoring organization policies regarding staffing and the rental or purchase of supplies and equipment, must also be considered during resource planning.

4.5.2 Cost Estimating

Cost estimating is the process of developing an approximation or estimate (quantitative assessment of the likely costs) of the resources needed to complete the project. The estimates will be supported by documentation describing the basis of the estimate, documentation of any assumptions made, and an indication of the range of possible results to indicate that the item is expected to cost between, e.g., $n,nnn and $nn,nnn. Cost estimates should include all resources needed for a project such as labor, materials, supplies and quality assurance. Projects should be estimated using a combination of the following methods so one method can be used to validate the results of another.

- Use the WBS to develop a *bottom-up* estimate of each task separately, then combining the results to produce an estimate for the entire project. Organizing the cost estimates in this manner help to ensure that all identified work has been estimated.

- Analyze the resource requirements required for the project and resource rates for each resource unit (staff, bulk material, etc.) to calculate project costs. If actual rates are unknown, the rates may have to be estimated.

- Analyze how activity duration estimates will affect overall cost estimates for projects that have an allowance for the cost of financing (i.e., interest charges).

- Use the *analogy method* by reviewing historical information from previous projects for similar categories of resources and extrapolating data to assist in estimating the cost of the proposed project. When the Project Manager and/or project management team from the previous project are available, their experience and understanding (*expert judgement)* of the proposed project can be used for formulating or validating estimates.

- Use computerized tools such as cost-estimating software, project management software, and spreadsheets.

- Analyze the organization's chart of accounts (DOE analogy is the B & R Code), to ensure project cost estimates are assigned to the correct accounting category.

Cost budgeting is the allocation of the overall cost estimate to individual work items to establish a cost baseline for measuring project performance. The sources of cost budgeting include the cost estimates, the WBS and the project schedule which contains the planned start and expected end dates for the project elements to which costs will be allocated. This information is needed to assign costs to the time period when the cost will be incurred.

4.5.4   Cost Control

Cost control is the control of the factors which change the cost baseline to ensure that changes are beneficial. Cost control for the project funding includes the following.

- Monitoring cost performance to detect variances from the plan.

- Ensuring that all appropriate changes are recorded accurately in the cost baseline.

- Preventing incorrect, inappropriate or unauthorized changes from being included in the cost baseline.

- Informing and/or obtaining mutual consensus from stakeholders on authorized changes and revising the cost baseline (estimates).

4.6   Quality Management

Project quality management involves the processes required to ensure that the project will meet or exceed customer requirements and expectations. It includes the process activities recommended by the Quality Program or function that determines the quality policy, objectives and responsibilities. The major processes are quality planning, quality assurance, quality control and quality improvement. Each of the quality processes or activities may involve one or more individuals or groups of individuals based on the needs of the project.

4.6.1   Quality Planning

Quality planning involves identifying the standards and quality activities which will apply to the project, and determining how to incorporate and satisfy them. Quality planning is performed regularly and in parallel with the other project planning processes. The performing organization's quality policy states the overall quality direction, and should be included in the Quality Plan. If the organization conducting the project does not have a formal quality policy, then a decision should be made to have the project management team develop a quality policy based on the requirements of DOE Order 5700.6C, *Quality Assurance.* The customer will concur in the Quality Plan and provide approval. The project management team is responsible for ensuring that stakeholders are aware of the quality policy.

project description, and major deliverables which serve to define important project requirements. The product description will often contain details of technical issues and other concerns that may affect quality planning. Other considerations that affect quality planning are standards, regulations, and DOE policies.

A Quality Assurance Plan (QAP) will describe how the project management team will implement the quality policy processes and activities. The QAP will describe the organizational structure, responsibilities, procedures, processes and resources needed to implement quality management. The QAP provides input to the overall Management Plan and will address quality assurance, quality control and quality improvement for the project. The QAP may be formal or contained within the Management Plan. It can contain a high or low level of detail based on the size and complexity of the project.

Elements of quality assurance may be found in DOE 4700.1, *Project Management System,* Chapter III, Part D; and DOE 5700.6C, *Quality Assurance*. An outline for a (software) Quality Assurance Plan may be found in section 3.8 of the *DOE Software Engineering Methodology*, and online at *http://cio.doe.gov/smp.*

4.6.2   Quality Assurance

Quality assurance is the implementation of the planned and systematic activities contained in the QAP, and indicated in the WBS, that will satisfy customer requirements and provide confidence that the project will satisfy the relevant quality standards. Some of the activities included in quality assurance are structured walkthroughs (peer reviews), in-stage assessment (in-process independent reviews), testing, configuration management and risk assessments.

4.6.3   Quality Control

Quality control involves measuring and monitoring specific project results to determine if they comply with project specifications and quality standards, and identify ways to eliminate causes of defects. Quality measurements and associated metrics should be specified in the QAP and/or Management Plan. The results of the quality measurements will be reviewed to gauge the quality of the project. Metrics may be identified through operational definitions, which will describe what something is and how it is measured. For example, meeting the planned schedule date in itself is not a measure of management quality. The project management team must also indicate whether every activity must start on time, or only finish on time; and whether individual activities will be measured or only certain deliverables, and if so, which ones. Checklists may be simple or complex (depending on the project) structured tools that can be used to verify that a set of required steps have been performed.

Project results include both *product* results (deliverables), and *management* results (cost and schedule performance). The project management team should have a working knowledge of

Comparisons of managem
results identified in the QAP or Management Plan. Assessment techniques can range from peer
reviews to independent audits as a means to determine if the results conform to requirements.
Variances will be analyzed for determination of causes and unidentified risks to the project.
When variances exist, action must be taken to bring the project into compliance to requirements.
In addition, trend analysis will be conducted to monitor technical performance (mean to defect
ratio), and cost and schedule performance (determine activities completed with significant
variances). These analyses may provide insight to potential outcomes of the project.

4.7   Human Resource Management

Project human resource management includes the processes required to make the most effective
use of the staff involved with the project. It includes all the project stakeholders; i.e., Federal
Program Managers, customers, Project Manager, system owner, individual contributors and
other functional area staff described in the Management Plan. The key elements of human
resource management are Organizational Planning, Staff Acquisition, Team Development, and
Subcontractor Management. These processes interact with each other and with the processes in
the other project areas.

4.7.1   Organizational Planning

Organizational planning involves identifying, documenting, assigning project roles and
responsibilities, and establishing reporting relationships. On most projects, the majority of
organizational planning is done early in the project and is reviewed regularly throughout the life
of the project to ensure continued applicability.

The Staffing Plan will address all aspects of staff needs. Staffing requirements will define what
skills are required from individuals or groups, and the time frames those skills are required. The
Staffing Plan will address these areas in detail and contain resource histograms of the project
lifecycle correlated with the project's resource usage staff hours. Staffing requirements are a
subset of the overall resource requirements identified during resource planning.

Some of the constraints that may limit the project team's options are the organizational structure
of the performing organization; collective bargaining agreements; preferences of the project
management team; and expected staff assignments. Therefore, organizational planning is often
closely linked with communications planning. The three project interfaces that need to be
addressed in organizational planning are organizational interfaces, technical interfaces, and
interpersonal interfaces. The interfaces involve formal and informal reporting relationships and
communications among organizational units, technical disciplines, and different individuals
working on the project. Often the interfaces occur simultaneously.

Staff Acquisition must take into account the potential available staff and previous experience, personal interests, personal characteristics and availability. If project sponsoring organization has policies governing staff assignments, those policies can act as a constraint on the staff acquisition process.

4.7.3   Team Development

In addition to the technical skills required to perform the project, the Project Manager and the project team are expected to have the necessary project management, general management and team-building skills. Such skills must be developed quickly as part of the project or the project must be restaffed appropriately. This is valid for projects managed and staffed by contractors or Federal staff.

Team building activities include management and individual actions taken specifically and primarily to improve team performance. In addition, general management skills are important to team development. Many actions, such as involving non-management team members in the planning process, and/or establishing ground rules for surfacing and dealing with conflict, may enhance team performance as a secondary effort. Professional training is also desirable for team development and individual growth. An award and recognition program is a good way to reward good performance.

Part IV contains samples of Project Management Training available in the Washington, D.C. area and the region.

4.8   Risk Management

Project risk management is the process of identifying, analyzing and responding to project risks that could result in cost and schedule overruns, and/or project failure. Risk management begins with an assessment of the environmental, operational and technical risks prior to the establishment of a project.

Once the project has been approved and is initiated, risk management becomes an integral part of the project. Risk assessments will be conducted at logical check points, or when key decisions are being made throughout the project. Risk assessments help assure that positive events are maximized and that adverse events are minimized, i.e., that the response to the risk assures that the risk is avoided, mitigated or accepted. The elements of risk management include identification, quantification, and response development and control.

4.8.1   Risk Identification

Risk identification consists of determining which risks, both internal and external, are likely to affect the project and documenting the characteristics of each risk. Products that involve proven technology will involve less risk than those which require innovation or invention, and cause less cost and schedule impact. Projects that are mandated by law are less impacted by high risk

must be made as to whether the project is realistic or economically feasible.

Common influences for risk include changes in requirements, unrealistic requirements, changing technologies, unrealistic schedules, fluctuating or reduced budgets, ill defined or understood roles and responsibilities, inadequate estimates, insufficient skilled staff and low moral. The WBS, cost and duration estimates, staffing plan, and historical data will also be reviewed to identify possible risks.

4.8.2 Risk Quantification

Risk quantification is the process of evaluating risks and risk interactions to assess the range of possible project outcomes. It is primarily concerned with determining which risk events warrant a response. It is complicated by opportunities and threats that can interact in unanticipated ways (schedule delays), single risks that can cause multiple effects, and conflicting stakeholder opportunities, just to name a few.

4.8.3 Risk Response Development

Risk response development is the definition of methods or steps that can be taken to reduce or eliminate risk. One method is avoidance of a specific risk, which can be accomplished by eliminating the cause. For example, goods or services can be acquired from outside the immediate project organization, such as subcontracting to a firm that has the experience with a particular technology. Another way is to develop a contingency plan, which define action steps to be taken if an identified risk event should occur. A third way is to hold subcontractors to the same project specifications and quality assurance standards as the prime contractor.

Contingency plans can reduce the expected monetary value of risk by reducing the probability of occurrence (mitigation). The consequences of risk can be accepted and alternative strategies for changing the planned approach can be developed. Proceeding with a project with high risk must be documented and agreed to by the customer and stakeholders.

4.8.4 Risk Response Control

Risk control involves executing the risk management plan to respond to risk events over the course of the project. When changes occur, the basic cycle of identifying, quantifying, and responding is repeated. Even the most thorough and comprehensive analysis cannot identify all risks and probabilities correctly; control and iteration of the risk assessment process are required.

4.9 Procurement Management

Project procurement management relates to the process required to acquire products from outside the organization conducting the project to support the successful completion of the project. It

- Developing procurement management plan

- Preparing the statement of work

- Preparing the product description

- Developing the requirements and specifications document
- Conducting market research

- Performing contract administration

- Coordinating procurement resources

- Preparing the proposal/solicitation vehicle

- Developing the evaluation criteria

- Performing the source selection

Procurements will be administered according to existing DOE and/or corporate procurement guidelines.

4.10   Subcontractor Management

When a project being managed by the primary contractor requires a wide range of skills and experience, it may require subcontracting with other companies. It is the prime contractor Project Manager's responsibility to ensure that the teaming partners and subcontractors are held to the same quality assurance standards as the prime contractor as specified in the Management Plan, existing DOE guidance listed in the References section, and reporting requirements listed herein.

Statements of work for the subcontractors must clearly reflect the project and state what activities and reviews are expected in their performance. Some of the primary activities which the prime contractor will address with subcontractors are:

The DOE or primary quality requirements to the subcontractor

- Acceptance criteria

- Subcontractor Management Plan and Quality Assurance Plan

- Quality assessments of subcontractor performance

- Subcontractor assessments, audits, preventive and corrective action plans

This document discusses the attributes of project management practices that will assist DOE Federal and contractor Project Mangers in the effective management of their projects. Part III of the Guide contains a Project Management Plan Guide to assist Project Managers in developing Project Management and/or Project Plans. Part IV contains a listing of Project Management Training available in the Washington, D.C. area and the region.

DEPARTMENT OF ENERGY
INFORMATION MANAGEMENT

PROJECT MANAGMENT GUIDE

PART III

PROJECT MANAGEMENT PLAN
GUIDE

September 1998

PART III - PROJECT MANAGEMENT PLAN GUIDE

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Attachment 1   Work Breakdown Structure - Basic Model

Attachment 2   Work Breakdown Structure - Expanded Model

Tables

PREFACE

This Guide will promote a project management process to better define, create and maintain processes and standards for managing Department of Energy (DOE) information management projects.

PURPOSE

This Guide provides all DOE Project Managers with high level, easy to reference guidelines that will assist them in applying sound, consistent and repeatable project management practices. It contains the format, attributes and suggested contents that quantify conscientious and consistent project management. Sources of the Guide elements are the DOE Order 4700.1, *Project Management System*, and the Institute of Electrical and Electronics Engineers (IEEE) Standard 1058.1-1987.

Each organization that uses this Guide should develop a set of practices and procedures to provide detailed guidance for preparing and updating Project Management Plans, or refer to DOE 4700.1 and IEEE Standard 1058.1 for more detailed guidance.

OVERVIEW

This Guide contains the minimal set of elements that should appear in a Project Management Plan for any project, whether its desired outcome is a product, service, tool, hardware, application system or software. It contains three sections. Section 1 defines the scope of the Guide and provides references to documents that can be used when applying this Guide. Section 2 provides definitions and terms used throughout. Section 3 contains the elements and discussion of the elements of project management.

1.1   Scope

This Guide recommends the format and content for Information Management (IM) Product Line Project Management Plans. The Project Management Plan is typically the controlling document for managing a project. At DOE Headquarters, it may be referred to as a Project Plan or Business Plan. For the purpose of this Guide, the Plan will be referred to as a Project Management Plan (hereafter referred to as the PMP).

The PMP defines the technical and managerial processes necessary to satisfy the project requirements. This Guide may be applied to all IM product line projects as described in the DOE IM Product Line Guide. Its use is not restricted by the size, complexity, or criticality of a project or product; only the level of detail will vary.

This Guide is applicable to all forms of product delivery and media. It identifies the minimal set of PMP elements.   Users may incorporate other elements by appending additional sections or subsections to their PMP's. Examples of additional, project-specific components may be found in section 3.6. A detailed list of project management elements may be found in DOE Order 4700.1.

1.2   References

Project management attributes contained in the following reference materials were incorporated in the development of this Guide.

1.   DOE Order 4700.1, *Project Management System*, Change 1: June 1992.

      DOE 4700.1 states that "it is the Department policy to manage all projects in accordance with this Order." Figure I-1 on page I-3 contains the categories of DOE Projects. Items B, C, D and E under Major Projects apply to IM Product Line products.

2.   DOE G200.1-1, *Software Engineering Methodology*, May 1997.

3.   Institute of Electrical and Electronic Engineers, *Standard for Software Project Management Plans* (IEEE Standard 1058.1-1987).

DEFINITIONS

The definitions listed here establish meanings within the context of this Guide. Definitions of other terms that may be appropriate can be found in DOE 4700.1, Attachment 3.

1. **Acceptance.** Customer acknowledgment that a product or system is ready to be accepted into production or operational status. Acceptance will only be granted after the successful performance of all necessary testing to demonstrate that the product or system will operate satisfactorily and safely in accordance with the plans and specifications.

2. **Activity.** A major unit of work to be completed in achieving the objectives of a project. An activity has precise starting and ending dates, incorporates a set of tasks to be completed, consumes resources, and results in work products.

3. **Baseline.** A quantitative expression of projected costs, schedule, and technical requirements at a specific point in time. After a baseline has been formally reviewed and agreed upon, it can be changed only through formal change control procedures. Baseline establishment will include criteria to serve as a base or standard for measurement during the performance of an effort. It is the data plan against which the status of resources and the progress of a project can be measured.

4. **Configuration Management.** The systematic evaluation, coordination, approval, disapproval, documentation, implementation and audit of all changes in the configuration of a product or system after formal establishment of its configuration identification.

5. **Customer.** The individual or organization that specifies and accepts the project deliverables.

6. **Deliverables.** A report or product of one or more tasks which satisfy one or more objectives and must be delivered to satisfy the requirements of the project agreement. The quantities, delivery dates, and delivery locations are specified in the project agreement.

7. **Deviation.** A specific, before-the-fact, written authorization to depart from a particular performance or design requirement of the product agreement.

8. **Directed Change.** A change imposed on a project, with direction to implement, which affects one or more of the project's baselines. Examples are changes to approved budgets and changes resulting from DOE policy directives and regulatory or statutory requirements.

9. **Independent Assessment.** An assessment, made outside the normal advocacy chain of a project's status or condition. It will consist of independent evaluation of all pertinent factors in order to provide a condition rating or detailed analysis of the project or system situation. Assessments are usually conducted by the Quality Assurance organization.

cycle in order to achieve the project objective(s).

11.   **Mission Need.**   A required capability within DOE's overall purpose that is typically identified through a mission analysis or study, or directed by executive or legislative authority. The identified mission need may justify system acquisition approvals, projects, planning, and budget formulation.

Justifying and obtaining approval of the mission need for a project is a prerequisite for requesting funding in the internal review budget cycle. Approval must occur prior to the planning stages of the annual internal review budget cycle. Decision guidance is provided in DOE 4700.1, Part D, beginning with page I-26.

12.   **Project.**   A project is a unique effort within a program which has firmly scheduled beginning, intermediate, and ending date milestones; prescribed performance requirements and costs; and close management, planning and control. A project is a basic building block in relation to a program which is individually planned, approved and managed. It is a set of all project functions, activities and tasks required to satisfy the terms and conditions of a project agreement. A project may be self-contained or may be part of a larger project.

13.   **Project Function.**   An activity that spans the entire duration of a project. Examples include project management in general, configuration management, quality assurance, and verification and validation of the product.

14.   **Project Integration.**   Partnering with an internal or external organization for the integration of a project into an existing similar or overlapping project for the purpose of reusing resources, sharing of human resources through matrix management, elimination of duplication, and the saving of Departmental funds.

15.   **Project Management.**   The process of leading a project by planning, organizing, staffing, tracking and coordinating oversight. It involves developing and maintaining the Project Management Plan, managing project resources, establishing and implementing management systems, including performance measurement systems. It also includes approving and implementing changes to project baselines.

16.   **Project Management Plan.**   The detailed, controlling document for managing a project. A Plan defines the technical and managerial project functions, activities, and tasks necessary to satisfy the requirements of the task assignment or project. Since the Plan is the commitment as how the project will be conducted, it will be agreed to and signed by the service provider and stakeholders.

The Plan is a consistent, coherent document developed by Project Managers as a result of going through the process of planning the scope of a project, specific project deliverable activities, staffing, activity sequencing, activity duration estimating, schedule development,

execution; document project planning assumptions and decisions regarding alternatives chosen; facilitate communications among stakeholders; define key management reviews as to content, extent, and timing; and provide a baseline for progress measurement and project control.

> **NOTE**:   The Plan may be a Project Management, Project or Business Plan.   They all accomplish the same purpose; they serve as the controlling document for managing a project.

17.   **Quality Assurance.** The planned and systematic real-time actions necessary to provide adequate confidence that a product or system will perform satisfactorily in service. Quality assurance includes assessments which comprises all those actions necessary to assure and verify that the features and characteristics of a material, process, product, system or service to specified requirements.

18.   **Records Management.**   The process of identifying records when they are generated (DOE books, papers, photographs, machine readable materials, maps, design drawings or other documentary materials) and determining the characteristic of a record to ascertain recordkeeping requirements pursuant to DOE 1324.2B, *Records Management Program.* No record shall be transferred, retired or destroyed without these determinations being made by a Federal Program Manager, Records Liaison Officer or the sites Records Management Program Manager.

19.   **Requirements Management.**   The process that establishes a common understanding of requirements between the customer and the project management team. The result is an approved Requirements Specification that becomes the baseline for determining whether the completed product satisfies customer expectations. The process involves the collection and verification of customer requirements necessary for the assessment of project goals and estimates for resources and activities needed to achieve project objectives.   The management of requirements throughout the life cycle of the project will ensure the project can be completed within planned cost and schedule estimates, and that the Project Management Plan will be revised to reflect project cost and schedule impacts of approved changes.

20.   **Review.**   A meeting at which project work product(s) are presented to stakeholders, managers, customers, users and other project personnel for comment and/or approval.

21.   **Security.**   A set of processes, activities, techniques and guidance executed to limit or eliminate the risk of alteration, destruction, waste, fraud and abuse to physical and electronic assets.

22.   **Tasks.** The smallest unit of work subject to management accountability. A task is a well-defined work assignment for project members.   The specification of work to be

usually grouped to form activities.

23.   **Testing.**   The process of testing the desired outcome of a project to verify and validate operational integrity, efficiency, and effectiveness before the end product is delivered to and accepted by the customer.

24.   **Work Package.** A specification for the work to be accomplished in completing an activity or task. A work package defines the work product(s), deliverables, the staffing requirements, the expected duration, the resources to be used, the acceptance criteria for the work product, the name of the responsible individual, and any special considerations for the project.

25.   **Work Breakdown Structure (WBS).** A graphic representation that completely defines the project by relating elements of work to each other and to the end product. The WBS is the prime tool which DOE uses in performance of its project responsibilities (DOE 4700.1). Each element of a WBS is a discrete portion of the WBS, comprising either an item of hardware, service or data. The WBS shows the relationship of all elements supporting the project and provides a sound basis for technical costs and schedule control. The WBS provides both a basis and an integrating mechanism for managing key functions of a project.

26.   **Work Product.** Any tangible item that results from a project function, activity or task. Work products include customer requirements, deliverables, project plan, functional specifications, design documents, instructional guides, installation instructions, test plans, configuration management plans, maintenance procedures, schedules, budgets, meeting minutes, and problem reports. Some subset of the work products will form the set of project deliverables.

PROJECT MANAGEMENT PLAN

The Project Management Plan (PMP) is an agreement between the service provider (either federal or contractor), and the customer that defines the management approach in which the assigned task(s) or project(s) will be conducted. The Plan provides both the customer and Project Manager with a baseline against which status can be measured. The Plan describes the service provider's approach to performing the effort and producing the products identified in the agreement, and the technical, schedule, cost and financial management control systems to be used to manage the Plan performance. The preface of a Plan describes the purpose, indicates the scope of activities, and identifies the intended audience for the Plan. A Table of Contents and lists of Figures and Tables are included in every Plan.

The assigned Project Manager will be responsible for developing the PMP, the essential elements for which are described in this section. After completing the PMP, it will be placed under configuration management so only approved changes can be made. Each version of a PMP will contain a title and a revision notice sufficient to uniquely identify the document. Revision information may include the project name, version number of the Plan, date of release, approval signature(s), a list of pages that have been changed in the current version of the Plan, and a list of version numbers and dates of release of all previous versions of the Plan.

The ordering of PMP elements presented in Table 1 is not meant to imply that the sections and subsections must be developed in that order. The order of presentation is intended for ease of use, not as a guide to the order of preparing the various elements of a PMP. Detailed descriptions of each section and subsection in a PMP are also presented. Additional components may be included in a PMP. Examples may be found in the DOE 4701, *Project Management System.*

There is an underlying assumption that by the time a project has been initiated, the following, very important pre-project activities have been completed.

1.   The Project Manager has conducted an analysis of current IM projects through the review of existing projects, projects in process, or other medium (Project Databases) for opportunities for project integration.

2.   During the process of having Office of Information Management projects funded, the CIO Policy, Planning and Mission Analysis Group has reviewed the project proposal and has determined there are no opportunities within the Headquarters IM community for project integration.

3.   A determination has been made that the new project is singular and different from any other IM projects in process.

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5.   Work Products, Schedule and Budget
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Additional Components

Index & Appendices

Provide a brief introduction of the project including a background (legislative, scientific and historical) that demonstrates the service provider's understanding of the requirements, both management and technical, associated with the proposed effort. Also discuss the current customer environment and any previous activities related to the task.

3.1.1   Project Overview

Provide a brief summary that will permit DOE management to quickly comprehend the significant components of the Plan. Present a comprehensive overview of the project and stress the logical interrelationships among the significant planned components such as project objectives, the products to be delivered, major work activities and products, major milestones, required resources, and master schedule and budget. The overview will describe all relationships with other projects, as appropriate.

3.1.2   Planned Accomplishments

Provide an overall description of planned accomplishments, including technical, schedule, cost and financial results, and how they interrelate. A Work Breakdown Structure (WBS) will be included in this section or section 3.3, Management Approach. The WBS will contain a list of work effort and products in a hierarchy of elements starting from the overall objective or end product in the statement of work, and proceeding through successive levels to elements at the lowest level of detail required for effective management of the project. Planned accomplishments may be a separate section or included in the Project Overview.

> Examples of software engineering WBS's can be found on the web site at *http://cio.doe.gov/smp*. The attachments to Part III contain hard copies of these models.

3.1.3   Project Deliverables

List all the items to be delivered to the customer, the delivery dates, delivery locations, and quantities required to satisfy the terms of the project agreement.

3.1.4   Project Reusability

Communicate proposed projects to the local IM community to share the project and present the opportunity for identifying any similar or duplicate projects in process. In cases where similar projects are in process, investigate the feasibility of project integration and resource sharing.

3.1.5   Evolution of the Project Management Plan (PMP)

The PMP must be kept current with changes to maintain the integrity of the product and project. All approved changes must be reflected in the Project Plan. Changes to the product scope (features and functions) must be reflected in the definition of the project scope (the work to be done to incorporate new requirements). The plans for producing both scheduled and unscheduled updates

changes should be included.

3.1.6   Reference Materials

Provide a complete list of all documents and other sources of information referenced in the PMP. Each document will be identified by title, report number, date, author, and publishing organization.

3.1.7   Definitions and Acronyms

Define or provide references to the definition of all terms and acronyms required to properly interpret the PMP.

3.2   Project Organization

This section will specify the process model for the project, describe the project organizational structure, define authorities, and organizational boundaries and interfaces, and define individual responsibilities for the various project elements.

3.2.1   Process Model

Define the relationships between major project functions and activities by specifying the timing of major milestones, baselines, reviews, work products, project deliverables, and approvals (sign-offs). The process model is usually described using a combination of graphical and textual notations. The process model will include project initiation and project determination activities.

3.2.2   Organizational Structure

Describe the internal management structure. A hierarchical organization chart or matrix diagrams may be used to depict lines of authority, responsibility and communication within the project.

3.2.3   Organizational Boundaries and Interfaces

Describe the administrative and managerial boundaries between the project and the parent organization, customer organization, subcontracted and any other organizational entities that interact with the project. Specify the administrative and managerial project support functions such as configuration management, quality assurance, and verification and validation.

3.2.4   Project Responsibilities and Authorities

Identify and state the nature of each major project function and activity, and identify the individuals who are responsible for those activities. A matrix of functions and activities versus responsible individuals may be used to depict project responsibilities. Identify who has authority to approve deviations from prescribed standards and make changes to requirements and scope of the project.

Provide a description of the management approach (strategy, policies, procedures) to be employed to control cost and schedule performance. Include a discussion of the organizational elements responsible for cost and schedule maintenance, requirements management, risk management, tracking and control, reporting and oversight mechanisms to be used. It also includes development of the Staffing Plan.

3.3.1 Management Objectives and Priorities

Describe the management philosophy, goals, and priorities during the project. Topics to be specified include project status reporting frequency and mechanism; risk management procedures and problem escalation; and relative priorities among requirements, schedule and budget for the project, etc. Also include a statement of intent to matrix across projects to acquire expertise and meet project goals, where appropriate.

3.3.2 Administrative Support Systems

Provide a description of the administrative support systems and controls that will be employed to facilitate execution of security, human resources, procurement, documentation, training, and subcontractor controls, where appropriate.

3.3.3 Assumptions, Dependencies and Constraints

State the assumptions or mission need on which the project is based, the external events the project is dependent upon, and the constraints under which the project is to be conducted. Identify extent of customer involvement in the project.

3.3.4 Risk Management

Identify and assess the risk factors associated with a project. Prescribe mechanisms for tracking the various risk factors and either develop a contingency statement or develop and implement a Contingency Plan based on the size and criticality of the project. Risks factors to be considered include contractual risks, technological risks, risks due to size and complexity of the product, risks in personnel acquisition and retention, and risks in achieving customer acceptance of the product. Implement security processes, activities and techniques to eliminate or limit loss or harm to assets. This activity may result in the development of a Security Plan.

3.3.5 Records Management

Engage the customer organization's Program Manager, Records Liaison Officer and/or site Records Management Program Manager to assist in identifying records that may be associated with the project's end product, service, tool or hardware design documents, application system or software documentation that may be relevant to recordkeeping requirements.

Departmental history is not lost, no system information or documentation will be deleted or destroyed until the processes of the Guideline are followed.

3.3.6   Tracking and Oversight Mechanisms

Define the reporting mechanisms, report formats, information flows, review and audit mechanisms, and other tools and techniques to be used in tracking and overseeing adherence to the PMP. Project tracking will occur at the level of work packages, completion of deliverables and logical checkpoints in the project. The relationship of tracking and oversight mechanisms to the project support functions will also be delineated. For example, define the role of Quality Assurance in the oversight activities, especially the process of conducting independent assessments.

3.3.7   Staffing Plan

Specify the numbers and types of personnel required to conduct the project. Required skill levels, start times duration of need, and methods for obtaining, training, retaining, and phasing out of personnel will be specified.

3.4   Technical Approach

Provide a description of the technical methods, tools and techniques that will be used to enable and control the planned technical results, including systems engineering, configuration management, quality assurance, testing strategy, subcontractor management. Also, include the Plan for project documentation and training.

3.4.1   Methods, Tools and Techniques

Specify the equipment, processes, components, subsystems, engineering model, team structure and other notations, tools, techniques, methods to be used to specify, design, build, test, integrate, document, deliver, modify or maintain project deliverables. In addition, the technical standards, policies and procedures governing project development of the work products and project deliverables will be included.

3.4.2   Project Documentation

Identify the Documentation Plan for the project. Specify the documentation requirements, and the milestones, baselines, reviews, and approvals (sign-offs) for documentation. The Documentation Plan will also provide a summary of the schedule and resource requirements for the documentation effort. Identify any approved deviations in documentation such as in cases where documents will be combined.

This subsection will contain plans for the supporting functions for the project. These functions may include subcontractor support, training, configuration management, quality assurance and verification and validation. Plans for project support functions will be developed to a level of detail consistent with the PMP. In particular, the responsibilities, resource requirements, schedules and budgets for each supporting function will be specified.

3.4.4 Testing

Develop a testing strategy that will validate the project's product functional correctness, design and operational integrity, risk vulnerability, and user friendliness, etc. This activity will result in a Test Plan.

3.5 Work Packages, Schedule and Budget

This section will specify the work packages and deliverables, identify the dependency relationships among them, state the resource requirements, staffing requirements, provide the allocation of budget and resources to work packages, and establish a project schedule.

3.5.1 Work Packages

Specify the work packages for the activities and tasks that must be completed in order to satisfy the project agreement. Each work package will be uniquely identified. A diagram depicting the breakdown of activities into subactivities and tasks (work breakdown structure) will be used to depict hierarchical relationships among work packages and/or deliverables.

3.5.2 Dependencies

Specify the ordering relations among work packages to account for interdependencies between them and dependencies on external events. Techniques such as dependency lists, activity networks, and the critical path method may be used to depict dependencies among work packages.

3.5.3 Resource Requirements

Provide estimates of the total resources required to complete the project. Include the numbers and types of personnel, support software, computer hardware, telecommunications, tools, office and laboratory facilities, travel, training and training materials, and maintenance requirements.

3.5.4 Budget and Resource Allocation

Specify the allocation of budget and resources to the various project functions, activities and tasks. An earned value scheme may be used to allocate budget and resources to track expenditures and resource utilization. No project should begin without authorization and allocation of resources.

Provide the schedule for the various project functions, activities, and tasks, taking into account the precedence relations and required milestone dates. Schedules may be expressed in absolute calendar time or in increments relative to a key project milestone.

3.6   Project Specific Components

The various types of IM Product Line projects will require that PMP's contain additional, project-specific components in addition to the minimal elements suggested in this Guide. Following is an example list of elements that may be required:

1.	Subcontractor	9.	Facilities Plan
2.	Security Plan	10.	Concept of Operation
3.	Configuration Management Plan	11.	Installation Plan
4.	Testing Plan	12.	Project Transition Plan
5.	Independent Verification and Validation Plan	13.	Conceptual Design Document
6.	Training Plan	14.	Product Maintenance Plan
7.	Justification of Mission Need	15.	Design Criteria Package
8.	Acquisition Plan		

Sources of this list of elements are the *Software Engineering Methodology* and DOE 4700.1. When additional elements are added, they must be developed in the format and level of detail consistent with the other sections of the PMP that the Project Manager develops for the task/project.

DEPARTMENT OF ENERGY
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PROJECT MANAGEMENT GUIDE

PART IV

PROJECT MANAGEMENT TRAINING

September 1998

PART IV - PROJECT MANAGEMENT TRAINING

This Part contains a list of Project Management Training courses available in the Washington D.C. area and the surrounding region. The training should be selected based on the needs of the organization. Although some courses are more information management focused than others, they all offer training in project management and provide the techniques and knowledge employees need to become an effective Project Manager.   Many colleges and universities offer similar training.

1.   Internal DOE Project Management Training

The following Project Management Skills Training Courses are available from DOE though the Departmental Training Program. This list of Project Management courses are not specifically focused to Information Management (IM) project management, but appear to contain the major elements of good project management.   Information regarding course scheduling may be obtained from your organization's Training Coordinator.

1.1   PMC10: Project Management CORE Overview

An 80 hour introductory course designed for new/prospective Project Managers. It covers the DOE Project Management System (DOE 4700.1), and gives an overview of a DOE Project Manager's responsibilities for managing project initiation, planning, documentation, administration, execution, transition and closeout. It includes key DOE project management elements such as leadership, teamwork, strategic planning and budgeting.

1.2.   PMMS5: Best Practices in DOE Project Management

A 40 hour introductory course designed for the more experienced DOE Project Manager who requires a quick refresher of project life cycle phases. The course provides an overview of a DOE Project Manager's responsibilities for managing project initiation, planning, documentation, administration, execution, transition and closeout. This is an abbreviated version of PMC10. This course, or PMC10, are typically attended before other project management training courses in this series.

1.3   PMC11: Project Management Overview Train-the-Trainer

An 80 hour course to prepare DOE personnel with significant project management experience for the challenging responsibility of training future DOE Project Managers. The course involves participant activities applied to real world classroom. Prospective trainers will have the opportunity to prepare and present at least one of the course's lessons.   Topics include adult learning, training presentation methods, classroom presentation skills and facilitation techniques, learning assessments and objectives,

1.4   Other DOE Project Management Courses

a.   PMMS1:   Project Planning for DOE Project Managers - 40 Hours
b.   PMMS2:   Cost and Schedule Estimation and Analysis - 40 Hours
c.   PMMS3:   Project Execution - 40 Hours
d.   PMMS11: Budgeting/Accounting for DOE Program/Project Managers- 32 Hours
e.   PMCE01:   Life Cycle Cost Estimating - 16 Hours
f.   PMCE03:   Project Risk Analysis and Management - 32 Hours

2.   Other Government Project Management Training

The following Project Management Training Courses are available from the Departments of Agriculture (USDA) and Defense (DOD).

2.1   USDA, National Capital Training Center

The telephone number for enquiring about the following courses is (703) 312-7300.

2.1.1   Course 43GY: Project Management

Cost: $485

This 4-day training course offers effective project management skills critical to the success of people who are managing an office move, implementing a new accounting system or launching a special program initiative. It addresses establishing baseline requirements for the project's feasibility, identification of problems and defining project objectives, how to effectively coordinate all project tasks and build a successful project team, develop realistic project milestones, and efficiently monitor multiple assignment. The attendee will learn full project-management cycle, how to develop and implement an effective project plan, control project schedules and costs, and how to effectively report on project status.

2.1.2   Course 43GA: Project Management for the Office Professional

Cost: $395   (Course appears to be entry level)

This 3-day training course is focused to office professionals at the GS-5 level and higher who are working with special projects and need to sharpen their project management skills. The course addresses how to become a valuable asset to your project team; understand the various roles of the project team members; perform key functions and

learn basic project management concepts (tools, techniques, procedures); systems documentation; strategies for identifying; defining and solving problems; and project plan development and implementation, including project phasing staffing, tasking, organizing and sequencing.

2.2 DOD, Defense Systems Management College

The telephone number for making inquiries abut DOD training courses is 1-888-284-4906. The e-mail is *register@dsmc.dsm.mil*.

2.2.1 SAM 101: Basic Software Acquisition Management

Cost: $ (Call for cost)

This 40-80 hour course introduces the student to software acquisition field through distance-learning coverage of the key competencies of the field. Participants learn software acquisition and development risks; DOD regulatory and technical frameworks; software development life cycle and integration processes; specific germs and concepts; software development models, paradigms, and strategies; and reference information sources (aimed at GS-9 and below).

2.2.2 SAM 201: Intermediate Software Acquisition Management

Cost: $ (Call for cost)

This is a 3-week mid-level, process oriented course that addresses acquisition strategies used for software and software-intensive systems, concepts of software and systems architecture, program software life cycle planning and test program planning, requirements management and risk mitigation, software acquisition, and the role of domain analysis and modeling in requirements analysis. The course includes a portfolio of software acquisition management products (tools).

2.2.3 SAM 301: Advanced Software Acquisition Management

Cost: $ (Call for cost)

This 3-week course is decision-oriented and seminar-based. It focuses on key activities and processes utilized to acquire software-intensive systems. Lectures, guest speakers, individual and team exercises, group discussions, and case studies extend across the domains of weapons, command and control, and management information systems. The course emphasizes issues such as interoperability, reuse, COTS, open systems, best practices and metrics. Students are challenged to critically evaluate alternative models, methods and tools through the use of real and hypothetical cases.

Cost: $ (Call for cost)

This 2-week course is designed for senior-level (DOD) personnel to help students become more effective in using science, technology and systems engineering processes and procedures throughout a system's life cycle. The common tools of systems planning, research, development and engineering are used within the framework of an integrated case study. The case study starts with a need, progresses through the acquisition milestones and phases, and ends with a demonstration of system effectiveness. Students will employ requirements analyses, risk management, technical performance measures, trade-off analyses, configuration and data management, technical reviews, forecasting, design of experiments, work breakdown structures, specifications, and a Statement of Work tailored to control and evaluate the (evolutionary) design of a target system.

3.   External Project Management Training

The following list of project management training courses are specifically IM focused and are available from the noted external (to DOE) sources.

3.1   George Washington University, Washington D.C.

The telephone number for making inquiries about George Washington University project management training courses is (703) 558-3020.

3.1.1   Managing Projects in Organizations

Tuition - $1,260

This is an intensive 5-day skills-oriented professional development program that explores the fundamentals of project management and master core skills you can apply immediately to manage projects effectively and with confidence. The course outline includes the following.

a.   Understanding the Process of Managing Projects
b.   Building Projects from a Clear Need
c.   Documenting Requirements: Building the Project Plan
d.   Capable People: The Heart of Every Project
e.   Managing Change: Keeping the Project on Course
f.   And much more

Tuition -$1,260

This course places fundamental project management skills in organizational and human resources contexts and teaches the complementary communications and human resources skills critical to a successful project.

3.1.3   Scheduling and Cost Control

Tuition - $1,260

This course enables you to put the tools pf project management to work, developing effective measures for scheduling and controlling your projects. The course focuses on proven ways to work with the constraints of time, resources (human, material and financial), and specifications that all projects face.

3.1.4.   Other George Washington University Project Management Courses

a.   Risk Management ($1,260)
b.   Contracting for Project Managers ($1,260)
c.   Quality for Managers ($945)
d.   Project Management Application ($1,260)
e.   Software Project Management (1,050)
f.   Managing IT Projects ($1,050)
g.   Software Risk Management ($1,050)
h.   Managing Software Quality ($1,050)
i.   Telecommunications Principles for Project Managers ($1,150)
j.   Systems Integration Project Management ($1,050)

3.2   Boston University, Corporate Education Center - Tyngsboro, MA

Boston University offers a similar broad range of Project Management courses as does George Washington University. Most of the courses are 3 days with a cost range from $676 - $1,095. The telephone for making inquiries is (508) 649-4200. Project Management Certificate courses include the following.

a.   Project Planning and Control ($1,095)
b.   Advanced Project Planning and Control ($795)
c.   Project Management Skills for IS Professionals ($1,095)
d.   Simulation of Real-World Project Management)$1,095)
e.   Project Management Leadership: Understanding and Managing Protocol ($795)
f.   Effective Project Cost Management ($795)

i.	Contracting/Procurement for Quality Project Management ($795)
j.	Preparing for the Project Management Professional Exam ($795)

3.3   Project Management Institute, Upper Darby, PA

The Project Management Institute is the world's leading project management professional association. They provide regional career enhancement seminar training throughout the United States. The telephone number for making inquiries is 1-800-734-4843. They offer 2 to 4-day training in the following areas.

a.	Project Management Basic Skills an A Guide to the Project Management Book of Knowledge Introduction (4-day, $1,495)
b.	Advanced Project Management Skills (4-day, $1,495)
c.	Information Systems Project Management (2-day, $750)
d.	Project Planning and Control Toolbox (2-day, $750)
e.	How to Create a Project Support Office (2-day, $759)
f.	Managing Multiple Projects (2-day, $750)
g.	Getting Work Done Through Others in a Project Environment (2-day, $750)
h.	High-Performance Remote Teams and Cross-Func. Project Teams (2-day, $750)
i.	And many others

3.4   Learning Tree International

The telephone number for making inquiries is 1-800-THE TREE (800-843-8733). The e-mail address is *http://www.learningtree.com* .

3.4.1 Course 340: Software Project Planning and Management

Tuition: $1,495 (2 Days) to $2,895 (4 Days)

This   4 Days course offers comprehensive IM focused instruction in the areas of Developing a Process Overview, Planning the Project, Insights for Managers--The Development Process Dissected, and Project Estimation Skills, Methods and Tools. Highlights of what the course addresses includes comparing and selecting lifecycle models; the role of prototyping and rapid application development; understanding development phases, key events and deliverables; developing the project manager's contract; locating valid stakeholders; work scope definition; anticipating problems through risk analysis; schedules, milestones and budgets; people management skills and team building; inspections, walkthroughs and reviews; developing requirements; traceability, tracking and control; testing; developing a baseline document plan; configuration management; work breakdown structure; and creating initial estimates, estimating size.

The telephone number for making inquiries about QAI project management training courses is (407) 363-1111.

3.5.1 Effective Methods of Managing Projects

Tuition: $1,195

This 3-day course is a collection of processes that must be performed in order to produce a product or service that meets a customer need. The course emphasizes that a project is composed of two major activities: 1) "do" procedures that represent tasks that must be performed in order to create a product; and, 2) "check" procedures that represent control methods to ensure that the work produced by the process does in fact meet the expectations of the process (and the customer). It is advertised as a powerful seminar that provides a step-by-step process for a system of controls (check procedures) that ensures throughout the project that the tasks focus on achieving the project objectives. The project management process includes the templates, tools, and control procedures needed to control and manage most information services projects. It will be particularly helpful to organizations concerned about controlling technology such as client/serve, LANs and object-oriented programming

4. Sources of Publications

4.1 ASQC Quality Press

The telephone number for making inquiries about documents is 1-800-248-1946. The complete address is:

ASQC Quality Press
611 Wisconsin Avenue
P.O. Box 3005
Milwaukee, WI 53201-3005

The ASQC Quality Press is an excellent source for books on quality. You will find a variety of the latest releases, perennial best-sellers, and the classics in the field of quality. Some of the books on project management available include the following.

a. Quality Management: Guidelines to Quality in Project Management ($32)
b. Quality Management: Guidelines for Configuration Management ($32)
c. ASQC Foundations in Quality: Self-Directed Learning Series - Certified Quality Manager (CBT, $695)
d. And many others.