

Chapter 1

Overview of Project Management

CONTENTS

1.1	<u>INTRODUCTION</u>	3
1.1.1	<u>PROJECTS AND PROGRAMS</u>	3
1.1.2	<u>PROJECT MANAGEMENT</u>	4
1.1.3	<u>PROJECT MANAGER</u>	4
1.2	<u>PROCESS DESCRIPTION</u>	5
1.2.1	<u>PROGRAM/PRODUCT LIFE CYCLE</u>	5
1.2.2	<u>PROJECT LIFE CYCLE</u>	6
1.2.3	<u>PROJECT PHASES</u>	6
1.2.3.1	<i>Definition Phase</i>	7
1.2.3.2	<i>Planning Phase</i>	7
1.2.3.3	<i>Execution Phase</i>	8
1.2.3.4	<i>Closeout Phase</i>	8
1.2.4	<u>PROJECT PROCESSES</u>	9
1.2.4.1	<i>Initiation Process</i>	9
1.2.4.2	<i>Planning Processes</i>	9
1.2.4.3	<i>Executing Processes</i>	10
1.2.4.4	<i>Controlling Processes</i>	10
1.2.4.5	<i>Closing Processes</i>	10
1.3	<u>PROJECT MANAGEMENT APPLICATION</u>	10
1.4	<u>PROJECT MANAGEMENT CHECKLIST</u>	12
1.4.1	<u>BEGINNING A PROJECT</u>	12
1.4.2	<u>DURING PROJECT PLANNING</u>	12
1.4.3	<u>DURING PROJECT EXECUTION</u>	13
1.5	<u>REGULATIONS</u>	13
1.6	<u>DEFINITION OF TERMS</u>	13
1.7	<u>RESOURCES</u>	14

This page intentionally left blank.

Chapter 1

Overview of Project Management

1.1 Introduction

This chapter provides a brief overview of project management, its purpose, activities, and responsibilities. The detailed activities will be covered in subsequent chapters. This material has been condensed from multiple sources. The sources are listed along with other recommended web resources in Section 1.8, Resources, and provide more detail and direction for managing projects. Check them out!

The following sections will discuss what projects are, what project management is, and what project management generally entails. Next is a summary of project life cycles and their phases, along with the processes and activities of project management. The chapter concludes with checklists, definitions, and further resources.

1.1.1 Projects and Programs

A project is a group of activities undertaken to meet one or more specific objectives. These objectives could include solving a problem, building or upgrading a system or product, launching a product or service, implementing a strategic plan, changing a process, or one of many other unique efforts.

Projects can differ in size from small and simple to large and complex. However, to accomplish specific objectives, projects are temporary and have specific starting and completion dates. Ongoing operations such as operating a maintenance facility or publishing a magazine are not projects. Performing a specific aircraft avionics upgrade or printing a monthly issue of a magazine are projects. Limited, specific performance times and objectives are how projects differ from programs. Programs are generally much larger efforts than projects, with longer duration. Relative to projects, they are ongoing rather than temporary efforts. While this chapter focuses primarily on project management, most of what is presented will also apply to programs. Programs are made up of multiple projects and in many cases can be treated as longer, more complex projects.

Projects are often divided into smaller components or activities, usually based on technical and functional disciplines such as engineering, manufacturing, testing, and procurement. The relationships between programs, projects, and activities are shown in Figure 1-1. Some projects are divided along product lines instead of activities.

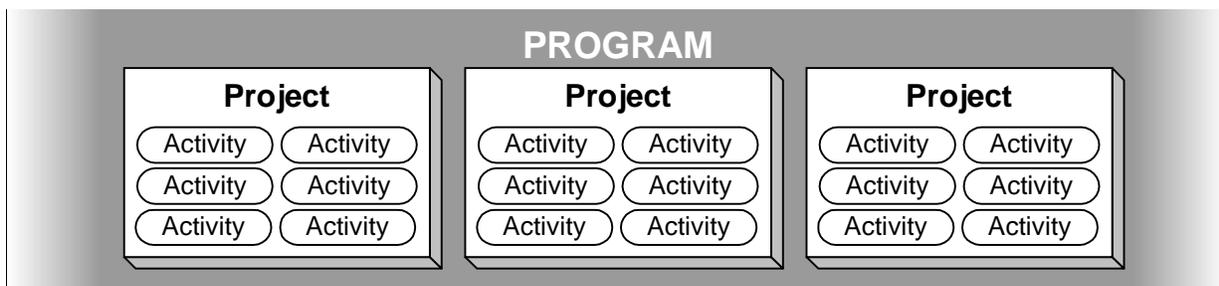


Figure 1-1 Relationships Between Programs, Projects, and Activities.

Projects are successfully complete when their objectives have been achieved. Projects should be terminated when it can be seen they will fail to meet their objectives.

1.1.2 Project Management

Successful projects rarely happen by themselves. They must be planned and executed. They must have support from management and from the organization in general. To be successful projects must also have a responsible and empowered manager to drive, direct, and monitor the project. Project management is that discipline which employs skills and knowledge to achieve project goals through various project activities. It involves controlling costs, time, risks, project scope, and quality through project management processes.

The functions of project management include:

- Planning – Planning the project and establishing its lifecycle.
- Organizing – Organizing resources: personnel, equipment, materials, facilities, and finances. Coordinating work and resources.
- Leading – Assigning the right people to the right job. Motivating people. Setting the course and goals for the project.
- Controlling – Evaluating progress of project and, when necessary, applying changes to get it back on track.

Performing these functions in an organized framework of processes is the job of the Project Manager.

1.1.3 Project Manager

The selection of a Project Manager (PM) has a major effect on the success of the project. The PM should have the skill, knowledge, and personality necessary to bring the project to fruition. In addition to these traits, the PM must be given the level of responsibility and authority necessary to perform the job.

The actual role of the project manager depends on the structure of the organization in which he or she works. Organizations can be function-oriented, project-oriented, or some type of matrix in between. In a heavily project-oriented organization the PM may have relatively unlimited authority, answering only to upper management. At the other end of the spectrum is an organization that manages by function. The PM must deal with functional managers as equals, or possibly even superiors, and negotiate for resources. Most organizations fall somewhere in between these two extremes. Figure 1-2 depicts the level of PM authority associated with different types of organizations. It is essential that the PM understands the workings of the organization and knows the level of authority that goes with the job. It is also essential that upper management grant authority and establish an environment which will enable the PM to successfully accomplish the project objectives.

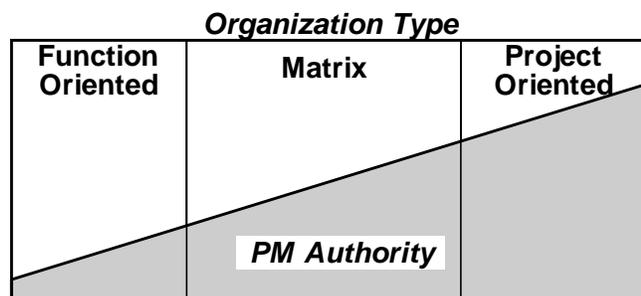


Figure 1-2 Organization Type and PM Authority

Project Managers need both management and technical skills. The key management skills are those needed to perform or direct project management activities, and are listed in Table 1-1.

Table 1-1 Management Skills for Project Managers

Skill	Description
Integration Management	Coordinate development of the Project Plan, execution of the Plan, and the change control process to ensure all aspects of the project are working together.
Scope Management	Establish scope of the project at the start. Develop and implement plans and procedures to verify that scope is achieved and maintained. Define and oversee the proc-

Skill	Description
	ess for controlling changes to the scope.
Risk Management	Identify potential risks. Mitigate large risks and plan how to deal with smaller risks. Monitor the project to detect and resolve problems.
Time Management	Estimate the duration of project activities, sequence activities, and develop and control the project schedule.
Cost Management	Estimate project costs and develop and control the project budget.
Quality Management	Establish and control processes to ensure project goals are met to the satisfaction of the stakeholders. This includes quality planning, quality assurance, and quality control.
Communications	Define methods and lines of reporting and information distribution. Who gets reports and project information, how often, and what is the content?
Procurement Management	Oversee procurement and delivery of materials, equipment, and services needed for the project. Includes planning, solicitation, source selection, and contract administration.
Human Resources Management	Develop good leadership qualities. Plan team organization, obtain the right people to staff the positions, and develop their skills as individuals and as a team.
Earned Value Management	A Systematic approach to project control integrating cost and schedule control with performance control. (See Chapters 6 and 7.)

The Project Manager's technical skills should include at least some technical understanding in the project field. Remember, however, the PM will not be doing the technical work but is to direct the work done by others. The essential level of expertise is the ability to understand what is being done by others, not necessarily how.

1.2 Process Description

To understand how a project is brought to fruition, the PM must understand project processes. The PM must also understand the differences between program and project life cycles. It is also important to understand the difference between life cycle phases and project management processes.

1.2.1 Program/Product Life Cycle

As stated earlier, programs are generally large efforts spanning long periods of time and are composed of multiple projects. They are usually associated with developing or acquiring systems such as aircraft, weapons, training operations, communications, etc. An example product life cycle with its associated phases and their products is shown in Figure 1-3.

This example has five phases, Planning through Operation, each of which produces a specific output, including a satisfied user for the last phase. At the end of each phase a decision is made to continue or not to the next phase. When the product is completed, it is implemented, and after being in operation for some length of time, it is retired. Various industries employ different life cycles, depending on their products. Each phase of a product life cycle can consist of one or more projects.

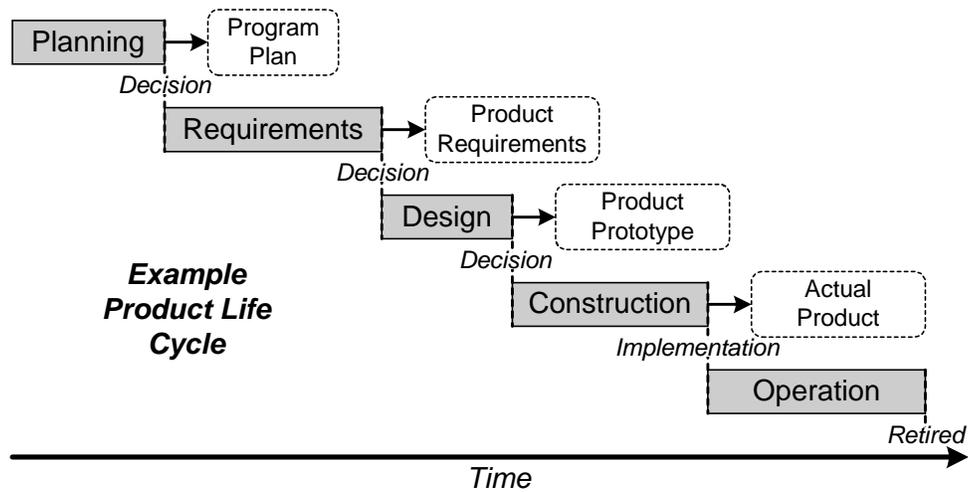


Figure 1-3 Example Product Life Cycle

1.2.2 Project Life Cycle

Projects, like programs, have life cycles and are usually performed in phases. Each phase accomplishes specific work toward reaching the project goal and produces one or more deliverables, depicted in Figure 1-4. These are tangible, real items used in attaining the final goal of the project, and could include plans, studies, designs, or software or hardware prototypes. The end of a phase is defined by completing its deliverable.

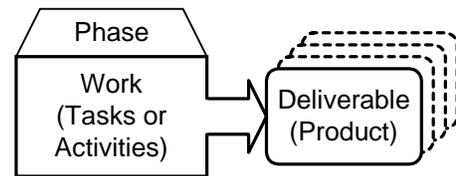


Figure 1-4 Phases Produce Deliverables

Figure 1-5 illustrates an example project life cycle, with its phases and their major deliverables.

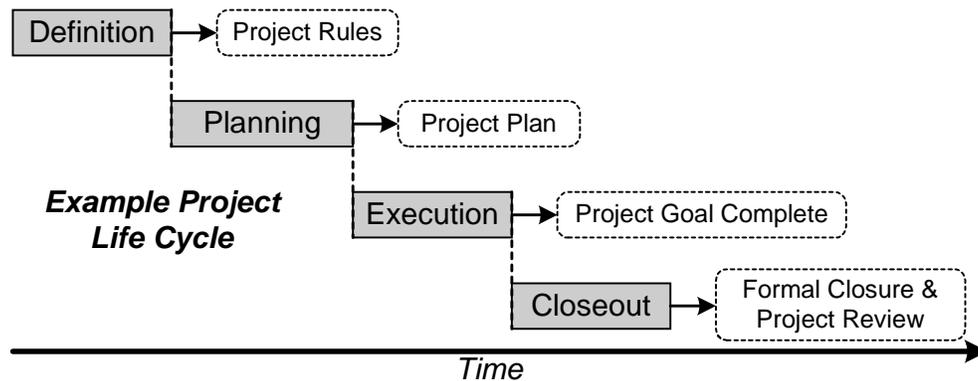


Figure 1-5 Example Project Life Cycle

While major aspects of project management are applicable across all projects, life cycles may vary, depending on the type of project and the organization performing the work. It is important to implement an appropriate life cycle for the product. Chapter 2 of this book introduces and discusses various software development life cycles. This chapter deals with a generic project life cycle.

1.2.3 Project Phases

The phases identified in Figure 1-5 are common across most projects. However, they may be called by different names or split into additional phases. They may even be iterative, where, for example, a prototype is designed, built,

and tested, then the results are used to design, build, and test a new prototype. Project phases should in most cases be comparable to the generic project phases discussed here.

1.2.3.1 Definition Phase

This phase begins when a Project Charter is created by upper management that defines the project's purpose and identifies a project manager. The Charter should also include a statement of support authorizing the PM to perform his or her functions. During this phase, the rules of the project are defined. The PM and stakeholders determine the goals, scope, and constraints of the project. Key individuals and groups are identified as members of the project core team and their roles are defined by the PM and upper management. Communications channels, authority, and the chain of command are also defined by upper management with the PM. These project rules are written in three documents, the Project Statement of Work (PSOW), the Project Responsibility Matrix, and the Project Communication Plan. The PSOW establishes the scope of the project and documents what is to be accomplished. For an internal project the PSOW becomes the primary requirements document. However, the PSOW is not the same as a contract Statement of Work (SOW). For a project where much of the work is contracted, the SOW is binding, contractual agreement. These documents are described in Section 1.6, Definition of Terms. Figure 1-6 depicts the input, major activities, and products of the Definition Phase.

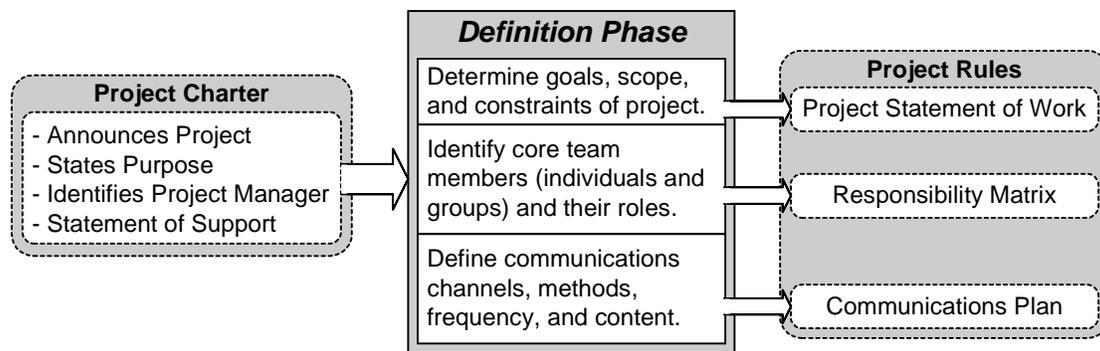


Figure 1-6 Project Definition Phase

1.2.3.2 Planning Phase

The planning phase uses the Project Rules as a foundation and defines the path to achieve the project goals. It is performed by the PM and the core project team, interfacing with appropriate elements of the organization, and identifies the actual work to be done. It includes estimating time, cost, and resources required to perform the work, and produces plans to serve as a baseline and direct the work. A key part of schedule planning is identifying the *critical path*. This is the chain of interdependent, sequential project activities which takes the longest time to complete, and thus determines the minimum schedule for the project. Planning also includes risk identification and risk reduction efforts. The results of the Planning Phase become the Project Plan.

Figure 1-7 shows the inputs, activities, and products of the Planning Phase. Note the feedback loop from the phase activities to the Project Rules. This indicates that the rules may need to be modified after more detailed analysis in this phase reveal deficiencies or inefficiencies in the rules. This illustrates the iterative nature of project management. Remember the Project Plan is fluid and the PM should expect changes.

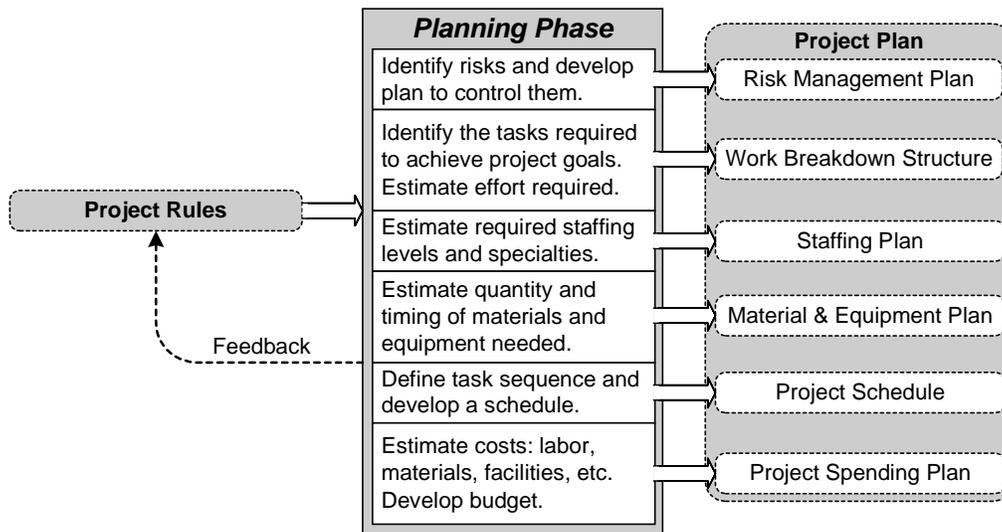


Figure 1-7 Project Planning Phase

1.2.3.3 Execution Phase

With a Project Plan for guidance, the actual project work can begin in earnest. This is the phase where the project goals are achieved. While Figure 1-8 may make it look far simpler than the Planning Phase, the Execution Phase entails directing the various work groups in their activities, monitoring their progress, solving problems and resolving issues that will certainly come up, making changes to the plan, and coordinating these changes. These activities are part of the executing and controlling processes discussed in Section 1.2.4. If your planning has been done well, you will have a smoother ride through this phase. This phase is complete when the product is complete or the project goals are reached.

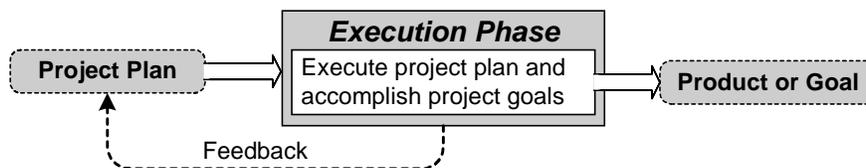


Figure 1-8 Project Execution Phase

1.2.3.4 Closeout Phase

The Closeout Phase begins with the delivery of the product or completion of the project goals. It consists primarily of tying up loose ends. Any unresolved issues from the contract or Statement of Work are resolved in this phase. The contract is signed off as fulfilled and all other paperwork is completed. A very important activity of this phase is assembling the project history. This is a summary of all that has been accomplished. It should include information that will allow you or a follow-on project manager to understand what was done, and why. Of particular importance is a compilation of lessons learned from the project so you or others in your organization can do things better on the next project. Figure 1-9 summarizes the Closeout Phase.

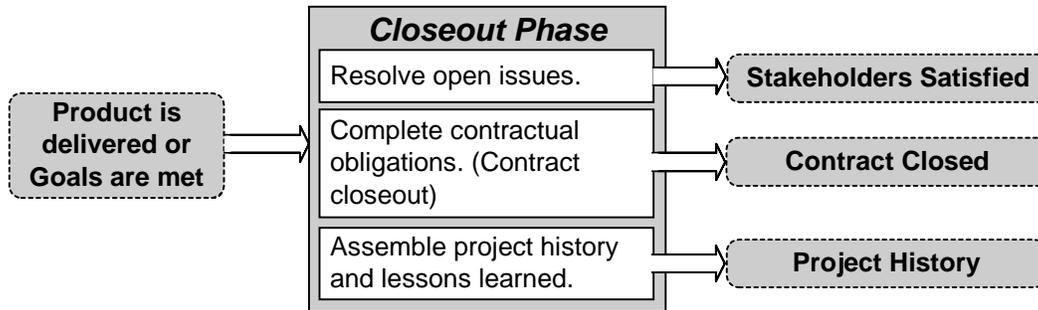


Figure 1-9 Project Closeout Phase

1.2.4 Project Processes

The Program Management Institute (PMI) defines five major process groups used in projects. Processes are sequences of activities that accomplish specific functions necessary to complete or enable some portion of the project. These are not phases themselves but can be found both in projects and in each major phase of a program or large project. Because the activities in later phases may require changes in the products of earlier phases, these processes become iterative and often overlap phases as well as each other. An example of this would be an issue in the Execution Phase requiring a change to plans made in the Planning Phase. This overlap is shown in Figure 1-10.

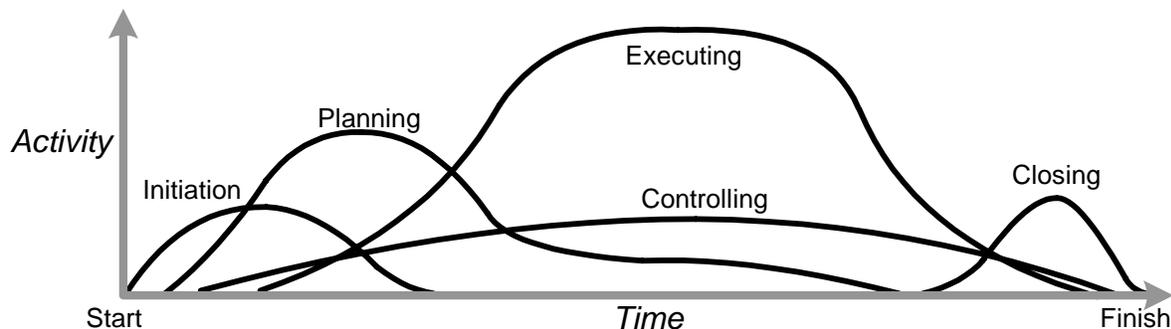


Figure 1-10 Project Management Processes Overlap, per PMI

1.2.4.1 Initiation Process

The initiation process consists of formally validating or authorizing the project. It often includes some form of analysis, such as a feasibility study, a preliminary requirements study, a concept of operations, or a preliminary plan.

1.2.4.2 Planning Processes

Planning processes establish the scope or boundaries of the project. They lay the foundation and define an expectation baseline. Future proposed changes are evaluated against this baseline. What must be balanced here and throughout the project are schedule, cost, and quality. Changes to the scope of the project will almost certainly affect at least one of these, requiring changes in the others to achieve balance again. Likewise, changes in one or more of these three constraints will require changes in the others and/or changes to the scope or expectations of the project. This balance is shown in Figure 1-11. Note that these do not necessarily define scope but they do constrain it.

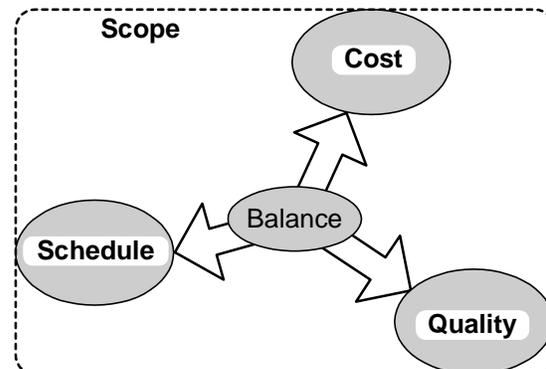


Figure 1-11 Balancing Constraints Within Project Scope

Other planning processes include the following:

- Definition of activities needed to perform project
- Estimating activity duration
- Development of a schedule
- Risk management
- Communications planning
- Staff planning
- Organization definition
- Sequencing of activities
- Resource planning
- Estimating costs
- Developing a spending plan or budget
- Quality planning
- Procurement planning
- Developing a Project Plan

1.2.4.3 Executing Processes

The executing processes are those that direct or enable the actual work of the project. They consist of the following:

- Executing the Project Plan.
- Quality assurance activities.
- Procurement activities.
- Developing team and individual competencies.
- Communicating to team members and stakeholders.

1.2.4.4 Controlling Processes

Controlling processes are ongoing throughout most of the project. They include verifying that the project is proceeding according to plan or determining where and how much a deviation is occurring. They are absolutely essential to the progress and success of the project. They include:

- Monitoring, measuring, and reporting the performance of project activities.
- Verifying the project is continuing within scope.
- Controlling changes to the project scope.

These processes are in-turn enabled by these supporting processes:

- Schedule Control
- Cost Control
- Quality Control
- Risk Monitoring and Control.

1.2.4.5 Closing Processes

The closing processes are accomplished following the completion of the project objectives. Their purpose is to resolve any open issues, complete any paperwork required for formal completion of the project, and gather information useful for evaluating project performance for future reference. The first process is Contract Closeout, where any remaining contract issues are settled. The other process is Administrative Closure, where formal documents terminating the project are generated, and an appropriate history of project performance and lessons learned is gathered.

1.3 Project Management Application

The application of the previous information to a real project will depend on several things. A PM assigned to an ongoing project has little control over how the project is set up. In this case the new PM will need to quickly learn the following:

- Project purpose and objectives
- Major risks

- Project phases and their deliverables
- Project budget and current spending status
- Project schedule and current status
- Current problems and issues
- Project team organization and contacts
- Project management processes in place or planned
- Life cycle of the product the project is supporting
- Communications – who gets what information when

A new project requires the PM to learn or establish the items in the previous list. After understanding the purpose and goals of the project, the PM will need to select an appropriate project life cycle. If it is a small, straightforward software development effort, all the software development life cycle phases are performed as part of the execution phase, as shown in Figure 1-12. Remember to distinguish between project phases and software development phases. Also note that this example portrays only one of several possible life cycle models.

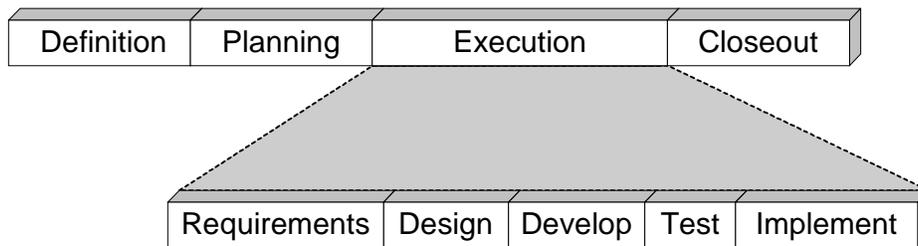


Figure 1-12 Software Development Phases Are Part of Project Execution Phase

If the software development effort is larger or more complex, the development life cycle will still be performed in the execution phase of the overall project or program. However, each phase of software development now becomes a project in its own right, with all the phases of an individual project. This is shown in Figure 1-13.

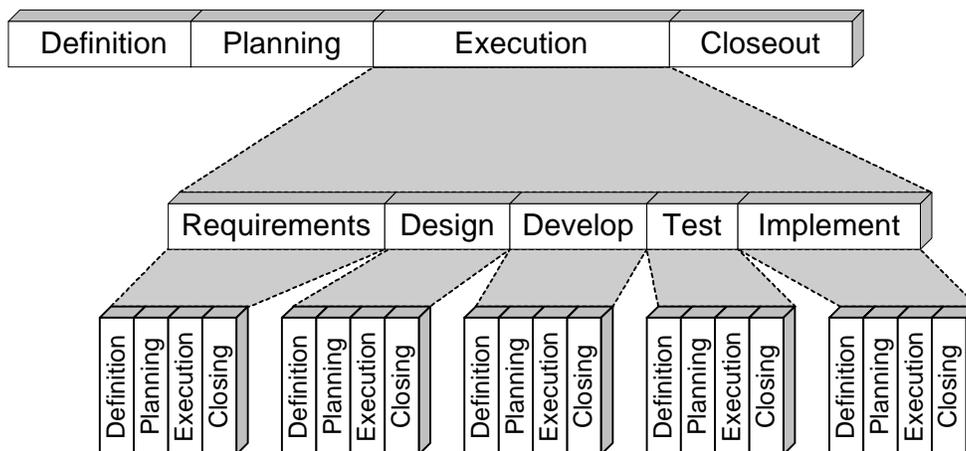


Figure 1-13 Complex Development Phases Become Projects Themselves

If the PM is managing a project team developing software, then he or she will manage both project and software development phases. If managing a contract effort, the PM will manage the overall project, but the actual development effort will be managed by a contractor PM.

With a contracted software development effort, you will also need to add a procurement phase to your project. This additional phase will take the outputs from the previous stage, including a Statement of Work, and perform procurement activities to contract with an outside organization to perform the work. This additional phase is shown in Figure 1-14.

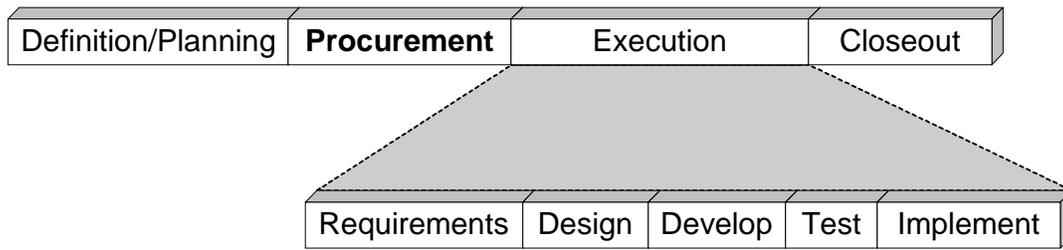


Figure 1-14 Project With Procurement Phase

Knowing the project goals and selecting a project life cycle establish the foundation on which to build the project.

1.4 Project Management Checklist

This checklist is provided to guide you in essential actions to ensure your project is on track in meeting cost, schedule, and performance requirements. If you cannot check an item off as affirmative, you need to either rectify the situation or develop a contingency plan to solve problems that may arise. For example, if the staff does not have sufficient technical skill to do the work, you will need to remedy the situation by providing training, or by obtaining sufficiently skilled people.

1.4.1 Beginning a Project

- The project has specific goals to accomplish and you understand the reasoning behind them.
- All stakeholders (interested parties) understand and agree on the expected project outcomes.
- Upper management is solidly behind the project.
- You understand the level of authority you have been granted in relation to the project and the rest of the organization and the level of authority is appropriate.
- You understand how the organization operates, including how to get things done within the organization.
- You understand what you are responsible for delivering at both a macro and a micro level.
- You know the high-priority risks your project faces.

1.4.2 During Project Planning

- You know which external interfaces are not under your control.
- You know the estimated size of the software to be developed, and how the estimate was made.
- Funding has been allocated for the project.
- A credible budget has been prepared, based on project scope and work estimates.
- Adequate time has been allocated to complete the project.
- Adequate staff is or will be available to complete project tasks.
- The project staff has sufficient expertise to perform the work.
- Facilities and tools are or will be available for the project team.
- You know of potential funding cuts and when they might come.
- You know what major problems have plagued projects of this type in the past.
- An appropriate life cycle has been selected for the project and you understand that life cycle.

- You have a credible Work Breakdown Structure (WBS).
- All requirements have work tasks assigned to fulfill them.
- All work tasks are associated with project requirements or support activities.
- Special requirements or constraints are documented.
- You have a budget, schedule, and performance baseline established and documented.
- You have identified the critical path for the project.
- You have a process established to monitor the project and detect problems and departures from the baseline.

1.4.3 During Project Execution

- You know what your project's expenditures are to-date and any difference between that and your budget.
- You know the status of project activity completion along the critical path and any difference between that and the schedule.
- You are aware of any issues or problems with quality or performance that may impact the critical path.
- You are aware of any contract performance issues.

1.5 Regulations

Clinger-Cohen Act of 1996, The National Defense Authorization Act for Fiscal Year 1996.

DoD Regulation 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs, 10 June 2001, Part 2; 2.8 Support Strategy, Part 2; 2.9 Business Strategy and Part 5; Program Design.

DoDD 5000.1, The Defense Acquisition System, 4.5 Effective Management.

DoDI 5000.2, *Operation of the Defense Acquisition System*, 4.7 The Defense Acquisition Management Framework.

FAR -- Part 39; *Acquisition of Information Technology*; (FAC 97-27); 25 June 2001.

OMB Circular A-130; *Management of Federal Information Resources*; Revised -- February 8, 1996.

1.6 Definition of Terms

Baseline – A standard against which future status, progress, and changes are compared and measured. Most plans developed during the Planning Phase are used as baselines. The budget usually serves as one baseline, the schedule as another, etc.

Communications Plan – Document that defines the lines, content, method, and frequency of communications between the project manager, members of the project team, stakeholders, and management.

Critical path – The sequence or chain of interdependent activities in the project that takes the longest time to complete. This sequence determines the shortest schedule for the project. Any delay in a critical path activity increases the project schedule.

Life Cycle – The complete set of phases something goes through, beginning with its conception and ending with its retirement from service.

Process – A series of related activities or steps that accomplish a specific purpose.

Project Charter – Document that announces the project by name, states its purpose, identifies the project manager, and announces his or her authority.

Project Manager (PM) – Individual with responsibility and authority for directing the project.

Project Statement of Work (PSOW) – Document that defines the goals, scope, and constraints of the project. It states what needs to be done, not how to do it.

Responsibility Matrix – Document that identifies members of the project team and defines their roles.

Stakeholders – Those persons and organizations that have an interest in the performance and completion of the project. The customer or user of a product created through a project is usually a primary stakeholder.

Statement of Work (SOW) – A contractual document that defines the work to be performed for a specific project under contract.

Work Breakdown Structure (WBS) – A breakdown of the project into its constituent tasks or activities. It lists the specific work needed to complete all aspects of the project.

1.7 Resources

AllPM - Project Managers Homepage. www.allpm.com

Best Manufacturing Practices (BMP), TRIMS Risk Management and Best Practices software downloads: www.bmpcoe.org/pmws/index.html

Best Manufacturing Practices (BMP) Library. Download KnowHow software and copies of DOD 5000.1, 5000.2, etc: www.bmpcoe.org/pmws/download/knowhow.html

Can-Plan project management software download: www.geocities.com/billmcmillan2000/CAN-PLAN.html

Complete Idiot's Guide to Project Management, Second Edition. Baker, Sunny and Kim. USA: Alpha Books, 2000.

Defense Acquisition Deskbook:. <http://web2.deskbook.osd.mil/default.asp?>

Defense Acquisition Deskbook, Program Management: http://web1.deskbook.osd.mil/CS_PM.asp

Defense Systems Management College. Back issues of *Program Manager Magazine*. www.dsmc.dsm.mil

DoD Software Clearing House: www.dacs.dtic.mil

Gantthead Online Community for IT Project Managers: www.gantthead.com

Guide to the Project Management Body of Knowledge, A, 2000 Edition, Project Management Institute. USA: John Wiley & Sons, Inc., 1999.

Guidelines for the Successful Acquisition and Management of Software-Intensive Systems (GSAM), Version 3.0, OO-ALC/TISE, May 2000. Available for download at: www.stsc.hill.af.mil/gsam/guid.asp

Project Management Forum: www.pmforum.org

Project Management Institute (PMI): www.pmi.org

Project Management Knowledge Base. Extensive free library. www.4pm.com

Project Manager Magazine, Defense Systems Management College. Subscribe at: www.dau.mil/forms/order_pm.asp

Software Program Managers Network (SPMN). Sponsored by the Deputy Under Secretary of Defense for Science and Technology (DUSD (S&T), Software Intensive Systems Directorate: www.spmn.com

SPMN Risk Radar software download: www.spmn.com/rsktrkr.html

SPMN Guidebooks available for download at: www.spmn.com/products_guidebooks.html

Software Technology Support Center (STSC), OO-ALC/TISE: www.stsc.hill.af.mil

TechRepublic Information Technology Forum: www.techrepublic.com

Ten Step Project Management Process Site: www.tenstep.com