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About this Course Material

ITDB3111-Project Management Course Material has been produced by the Department of Information Technology. All Course Materials produced by the Department of Information Technology is structured in the same way, as outlined below.

How this Course Material is structured.

The Course Overview

The course overview gives you a general introduction to the course. Information contained in the course overview will help you determine:

- If the course is suitable for you.
- What you will already need to know.
- What you can expect from the course.
- How much time you will need to invest to complete the course.

The overview also provides guidance on:

- Study skills.
- Where to get help.
- Course assignments and assessments.
- Activity icons.
- Chapters.

We strongly recommend that you read the overview carefully before starting your study.

The Course Content

The course is broken down into chapters. Each chapter comprises:

- An introduction to the chapter content.
- Chapter objectives
- Chapter outcomes.
- New terminology.
- Core content of the chapter with a variety of learning activities.
- A chapter summary.
- Assignments and/or assessments, as applicable.
- Answers to assignments and/or assessment, as applicable
Resources

12. Microsoft Project 2010 In Dept, 2011 by Quantum PM and Scott Daley, Que
15. Oracle Primavera P6 Version 8: Project and Portfolio Management, 2012 by Daniel L. Williams, PhD and Elaine Britt Krazer, PMP, Packt Publishing

For those interested in learning more on this subject, we provide you with a list of additional resources at the end of this Course Material; these may be books, articles or web sites.

Your Comments

After completing ITDB3111-Project Management, we would appreciate it if you would take a few moments to give us your feedback on any aspect of this course. Your feedback might include comments on:

- Course content and structure.
- Course reading materials and resources.
- Course assignments.
- Course assessments.
- Course duration.
- Course support (assigned tutors, technical help, etc.)
Your constructive feedback will help us to improve and enhance this course.

Course Overview

Welcome to ITDB3111-Project Management

This course covers the project management skills, Processes and Knowledge Areas with a strong emphasis on issues and problems associated with delivering successful IT Project.

ITDB3111-Project Management—is this course for you?

This course is intended for students who are in Advanced Diploma and are required to take a Major Elective course. No prerequisite courses are required in taking this course.

Course Objectives

The objectives of this course are:

- To discuss the principles of Project Management and Knowledge Areas.
- To analyse organizational structures, project plans, quality, team and risk management.
- To manage project execution.
- To evaluate set-targets, deliverables and conflict resolution documents.
- To use tools and case studies for Project Management.

Course Outcomes

Upon completion of ITDB3111-Project Management you will be able to:

1. Explain the concepts of Project Management and Knowledge Areas.
3. Analyze a plan using methods and tools including Establish WBS, time & effort estimates, resource allocation and scheduling.
5. Analyze risks and manage them.
6. Analyze project execution and manage it.
7. Evaluate set-targets, deliverables and conflict resolution documents.
8. Analyze team management.
9. Use tool for project management.
10. Use case studies for project management.

Timeframe

The expected duration for this course is _____ hours/week.

Formal study time required is ______ hours/week.

Self-study time expected/recommended is _____ hours/week.

Study Skills

As an adult learner your approach to learning will be different to that from your school days; you will choose what you want to study, you will have professional and/or personal motivation for doing so and you will most likely be fitting your study activities around other professional or domestic responsibilities.

Essentially you will be taking control of your learning environment. As a consequence, you will need to consider performance issues related to time management, goal setting, stress management, etc. Perhaps you will also need to reacquaint yourself in areas such as essay planning, coping with exams and using the web as a learning resource.

Your most significant considerations will be time and space i.e. the time you dedicate to your learning and the environment in which you engage in that learning.

We recommend that you take time now—before starting your self-study—to familiarize yourself with these issues. There are a number of excellent resources on the web. A few suggested links are:

- http://www.how-to-study.com/

The “How to study” web site is dedicated to study skills resources. You will find links to study preparation (a list of nine essentials for a good study place), taking notes, strategies for reading text books, using reference sources, test anxiety.
http://www.ucc.vt.edu/stdysk/stdyhlp.html
This is the web site of the Virginia Tech, Division of Student Affairs. You will find links to time scheduling (including a “where does time go?” link), a study skill checklist, basic concentration techniques, control of the study environment, note taking, how to read essays for analysis, memory skills (“remembering”).

http://www.howtostudy.org/resources.php
Another “How to study” web site with useful links to time management, efficient reading, questioning/listening/observing skills, getting the most out of doing (“hands-on” learning), memory building, tips for staying motivated, developing a learning plan.

The above links are our suggestions to start you on your way. At the time of writing these web links were active. If you want to look for more go to www.google.com and type “self-study basics”, “self-study tips”, “self-study skills” or similar.

Need Help?

Is there a course web site address?

What is the course instructor's name? Where can s/he be located (office location and hours, telephone/fax number, e-mail address)?

Is there a teaching assistant for routine enquiries? Where can s/he be located (office location and hours, telephone/fax number, e-mail address)?

Is there a librarian/research assistant available? Where can s/he be located (office location and hours, telephone/fax number, e-mail address)?

Is there a learners' resource centre? Where is it located? What are the opening hours, telephone number, who is the resource centre manager, what is the manager's e-mail address)?

Who do learners contact for technical issues (computer problems, website access, etc.)
Assignments
The learner is required to accomplish and submit assignments and/or project that will be required by the Course Lecturer. The required number of assignments and the corresponding marks will be based on the approved Course Delivery Plan for the semester. The assignments and/or project will be submitted to the Course Lecturer as per the designated submission dates, methods and other requirements. The assignments will be given as specified in the Course Delivery Plan.

Assessments
The learner is required to undergo and pass the required assessments as specified in the College By-Laws and as per the Assessment Pattern approved by the Department. These assessments includes but are not limited to:
- Quizzes
- Assignments
- Laboratory Works
- Presentations
- Mid-Semester Examination
- Final Examination
The corresponding marks will be set in the Course Delivery Plan.
Getting around this Course Material

Margin icons

While working through this Course Material you will notice the frequent use of margin icons. These icons serve to “signpost” a particular piece of text, a new task or change in activity; they have been included to help you to find your way around this Course Material.

A complete icon set is shown below. We suggest that you familiarize yourself with the icons and their meaning before starting your study.
Chapter 1-INTRODUCTION TO PROJECT MANAGEMENT

1.1. INTRODUCTION

This chapter provides the essential introductory concepts of Project Management. It discusses the processes, life cycles, skills and knowledge areas. It also covers the concepts behind the organizational aspects of Project Management such as stakeholders, teams and work environment.

1.1.1. Objectives

The objectives of this Chapter are:

- Explain what a project is, various attributes and constraints.
- Identify the different stakeholders and their functions.
- Describe the project management process and its areas.

1.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze organization structures.

1.1.3. Terminologies

- **Project**-a temporary endeavor undertaken to create a unique product, service or result.
- **Life Cycle**-refers to the process used to build the deliverables produced by the project.
- **Project Management**-the application of knowledge, skills, tools and techniques to project activities to meet project requirements.
- **Milestone**-a significant point or event in the project.
- **Project Stakeholders**-individuals or organizations who are connected to the project in one way or another and can influence the project’s outcome.
1.2. BASIC CONCEPTS

1.2.1. What is a Project?

The Project Management Body of Knowledge (PMBOK) defines a Project as a temporary endeavor undertaken to create a unique product, service or result with a definite beginning and end.

1.2.2. Project Characteristics

A project has several characteristics:

- Projects are unique.
- Projects are temporary in nature and have a definite beginning and ending date.
- Projects are completed when the project goals are achieved or it's determined the project is no longer viable.
- A successful project is one that meets or exceeds the expectations of your stakeholders.

1.2.3. Project Components

Large or small, a project always has the following three components [8]:

- **Specific scope**: Desired results or products.
- **Schedule**: Established dates when project work starts and ends.
- **Required resources**: Necessary amounts of people, funds, and other resources.

1.2.4. Project Constraints

On any project, a number of constraints are competing for attention. They are the following [6]:

- **Cost** is budget approved for the project including all necessary expenses needed to deliver the project.
- **Scope** is what the project is trying to achieve, it entails all the work involved in delivering the projects outcomes and the processes used to produce them. It is the reason and the purpose of the project.
- **Quality** is the standards and criteria to which the project’s products must be delivered for them to perform effectively.
- **Risk** is defined by potential external events that will have a negative impact on your project if they occur.
- **Resources** are required to carry out the project tasks. They can be people, equipment, facilities, funding, or anything else capable of definition (usually other than labor) required for the completion of a project activity.
- **Time** is defined as the time to complete the project, often the most frequent project oversight in developing projects.

### 1.2.5. Project Life Cycle

**Project Life Cycle** refers to the process used to build the deliverables produced by the project. **The Project Life Cycle** is often formally divided into phases that describe common activities as the project matures [9].

**Deliverables** are the results the project has to deliver in order for the customer to say the project is complete. [10].

A **Milestone**, sometimes called an event, is a significant occurrence in the life of a project [8].

![Figure 1.2.5-The Four Phases of the Project Life Cycle](image-url)
1.3. STAKEHOLDERS

Project stakeholders are individuals or organizations who are connected to the project in one way or another and can influence the project’s outcome. The project manager needs to work with different types of stakeholders in various ways. A stakeholder can do the following [4]:

- Be actively involved in the work of the project.
- Exert influence over the project and its outcome (also known as managing stakeholders).
- Have a vested interest in the outcome of a project.

The following are examples of Project Stakeholders [1]:

- **Customers/users** - The persons or organizations that will use the project’s product or service or result. Customers/users may be internal and/or external to the performing organization.
- **Sponsor** - A person or group that provides the financial resources, in cash or in kind, for the project. The sponsor leads the project through the engagement or selection process until formally authorized, and plays a significant role in the development of the initial scope and charter.
- **Portfolio managers/portfolio review board** - Portfolio managers are responsible for the high-level governance of a collection of projects or programs, which may or may not be interdependent.
- **Program managers** - Program managers are responsible for managing related projects in a coordinated way to obtain benefits and control not available from managing them individually.
- **Project management office** - A project management office (PMO) is an organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain.
- **Project managers** - Project managers are assigned by the performing organization to achieve the project objectives. As the person responsible for the success of the project, a project manager is in charge of all aspects of the project including, but not limited to:
- Developing the project management plan and all related component plans,
- Keeping the project on track in terms of schedule and budget,
- Identifying, monitoring, and responding to risk, and
- Providing accurate and timely reporting of project metrics.

- **Project team** - A project team is comprised of the project manager, project management team, and other team members who carry out the work but who are not necessarily involved with management of the project.
- **Functional managers** - Functional managers are key individuals who play a management role within an administrative or functional area of the business, such as human resources, finance, accounting, or procurement.
- **Operations management** - Operations managers are individuals who have a management role in a core business area, such as research and development, design, manufacturing, provisioning, testing, or maintenance.
- **Sellers/business partners** - Sellers, also called vendors, suppliers, or contractors, are external companies that enter into a contractual agreement to provide components or services necessary for the project.

Figure 1.3.1-The Relationship between Stakeholders and the Project [1]
1.4. **THE PROJECT MANAGEMENT PROCESS**

1.4.1 **The Project Management Institute**

The Project Management Institute or PMI, is an internationally recognized organization that has developed standards for the domain of project management including standards for portfolio management, program management, project management, and Work Breakdown Structures [2]. The most widely recognized reference of Project Management best practices is *A Guide to the Project Management Body of Knowledge (PMBOK)*, published by the Project Management Institute (PMI). The fourth and most recent edition of PMBOK (PMBOK 4) was published in 2008.

1.4.2 **The Project Management Process Groups**

The Project Management Body of Knowledge (PMBOK) Guide has established five process groups to define the project management process. These processes are as follows:

- **Initiating Process Group** - Defines and authorizes the project or a project phase.
- **Planning Process Group** - Defines and refines objectives, and plans the course of action required to attain the objectives and scope that the project is to address.
- **Executing Process Group** - Integrates people and other resources to carry out the project management plan.
- **Monitoring and Controlling Process Group** - Regularly measures and monitors progress to identify variances from the project management plan so that corrective action can be taken when necessary to meet project objectives.
- **Closing Process Group** - Formalizes acceptance of the product, service, or result and brings the project or a project phase to an orderly end.
1.4.3. Knowledge Areas

The PMBOK identifies nine knowledge areas that a project manager should consider throughout the entire life cycle of a project. Knowledge areas focus on a specific aspect of the overall domain and identify the elements that need to be considered to properly manage a project [2]:

- **Project Integration Management** - This knowledge area looks at the processes and activities that are needed to identify, define, combine, unify, and coordinate the different actions within a Project Management Process Group.
Project Scope Management - This knowledge area handles scope planning, scope definition, creating a WBS (decomposition of the scope into smaller components), scope verification, and scope control.

Project Time Management - This knowledge area concerns five different steps: activity definition, activity sequencing, activity resource estimating, activity duration estimating, and schedule development.

Project Cost Management - This knowledge area involves planning, estimating, budgeting, and controlling costs so a project can be finished within budget.

Project Quality Management - This knowledge area determines policies, objectives, and responsibilities to meet a project’s quality standards.

Project Human Resource Management - This knowledge area helps organize and manage a project’s team, the people necessary for the completion of the project.

Project Communications Management - This knowledge area involves the processes that ensure timely generation, collection, distribution, storage, retrieval, and disposition of information.

Project Risk Management - This knowledge area envelopes risk management planning, identification, analysis, responses, monitoring, and controlling of a project.

Project Procurement Management - This knowledge area involves the processes necessary to purchase products, services, or results from outside the project team.

1.4.4. Processes Mapping to Groups and Knowledge Areas

The mapping of processes to process groups and knowledge areas is presented in Table 1.5.4. Each process is presented in the phase (process group) where most of its activity takes place.
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<td>• Monitor and Control Project Work</td>
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<td>• Perform Integrated Change Control</td>
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<td>• Close Project or Phase</td>
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<td>Project Cost Management</td>
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<td>Project Quality</td>
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<td>Project Human Resource</td>
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### Knowledge Areas

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<tr>
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<td>- Plan Communications</td>
<td>- Distibute Information</td>
<td>- Report Performance</td>
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<td>Project Risk Management</td>
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<td>- Plan Risk Management</td>
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<td></td>
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<td>- Identify Risks</td>
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<td>- Perform Qualitative Risk Analysis</td>
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<td>- Perform Quantitative Risk Analysis</td>
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<tr>
<td>Project Procurement Management</td>
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<td>- Conduct Procurements</td>
<td>- Administer Procurement</td>
<td>- Close Procurements</td>
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</table>

Table 1.5.4-Mapping of the Project Management Processes to Process Groups and Knowledge Areas [1]

### 1.5. CHAPTER SUMMARY

In this chapter, you learned the basic and essential concepts that are embodied in Project Management, the influence of the organization’s structure in carrying out the different project activities as well as the Project Management Process Groups and their Processes. These introductory topics provide the foundation in carrying out the
essential activities and achieving the required milestones and deliverables in the different processes.

1.6. **ASSIGNMENT**

You are required to perform the following, either individually or in a group:

**Assignment 1.6.1**

1. Select a particular organization in which you or any members of the group have sufficient knowledge.
2. Investigate on the selected organization’s structure and come up with a drawing of its organizational chart.
3. Obtain information on an ongoing project in this organization and identify the stakeholders of this project.
4. You or your members should reflect on the following:
   - How the organization you have selected is structured in relation to the products and/or services they offer.
   - How the organization’s structure changes in relation to the project they are currently undertaking.
   - Why is the project being undertaken? What are its perceived contributions to the organization’s overall goal?
5. Submit a report containing your findings to the Course Lecturer and present this in the class.

1.7. **CASE STUDY**

The vendor provides a standard WBS work plan that outlines a 16-month implementation plan. The new hardware has been ordered. They have assigned the following resources:

- **Project Manager**: To manage vendor work and resources.
- **Trainer**: To provide training for project team and super users.
- **Clinical Consultant**: To facilitate workflow redesign.
- **Configuration Consultant**: To provide guidance and assistance for system build and customization.
• **Technical Specialist:** To provide guidance and assistance for the technical configuration related to hardware and database.

• **Technical Interface Specialist:** To provide guidance and assistance for the interface development.

**Questions:**

1. What types of requirements are needed for this project/program?
2. What types of line items would you expect to find on the budget?
3. Who would you expect to be stakeholders for this project/program?
4. What methods of communication might the project manager utilize for this project/program?

### 1.8. REFERENCES USED

2. Microsoft Project 2010 In Depth, 2011 by Quantum PM and Scott Daley, Que
5. Oracle Primavera P6 Version 8: Project and Portfolio Management, 2012 by Daniel L. Williams, PhD and Elaine Britt Krazer, PMP, Packt Publishing
9. Project Management Getting It Done by Teresa Hill et. al. taken from [http://cnx.org/content/col11374/1.1/](http://cnx.org/content/col11374/1.1/) Last edited by Teresa Hill on Nov 6, 2011 9:18 pm US/Central.
11. The Project Manager’s Guide to Health Information Technology Implementation

Chapter 2-INTRODUCTION TO PROJECT MANAGEMENT SOFTWARE
2.1. INTRODUCTION

One of the features of this course is the usage of a Project Management software tool for managing key project activities. Microsoft Project and Primavera Project Planner are examples of such software tool. Although these software tools are used in the hands-on activities of this material, the software are only used to provide students with the basic ideas on the usage of Project Management software on some key project management activities. Furthermore, the students are encouraged to explore and use other software with similar features or capabilities.

In this chapter, you’ll learn about the features, key settings and tools that are unique to MS Project and Primavera Project Planner that help you get up and running fast—and in the right way. Understanding some important option settings before you start planning will go a long way toward helping you use Project Management software more effectively.

2.1.1 Objectives

The objectives of this Chapter are:

- Identify the different deliverables or activity of the project plan.
- Identify the scheduling scheme of the project plan.
- Use a software tool in creating project plan.
- Determine the time frame, constraints, costs, and resources of the project plan.

2.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze a plan using methods and tools including Establish WBS, time & effort estimates, resource allocation and scheduling.
- Use tool for project management.
2.1.3. Terminologies

- **Calendar** - the settings that define the working days and time for a project, resources, and tasks.

- **Dependency** - a link between a predecessor task and a successor task. A dependency controls the start or finish of one task relative to the start or finish of the other task.

- **Duration** - the span of working time that you expect it will take to complete a task.

- **Outline** - a hierarchy of summary tasks and subtasks within a project, usually corresponding to major phases of work.

- **Predecessor** - a task whose start or end date determines the start or finish of another task or tasks, called successor tasks.

2.2. MAPPING THE PROJECT MANAGEMENT SOFTWARE USAGE TO THE PROJECT MANAGEMENT PROCESS GROUPS

PMBOK defines the five project Management process groups [2]:

- Initiating
- Planning
- Executing
- Monitoring and controlling
- Closing

Organizations have varying degrees of maturity and depth with regard to project management processes and a clear understanding of how a tool like Project can help in each of the project management process groups is essential. The following tables show the different project management process groups and the processes included in each with relation to their usage level of Microsoft Project.

<table>
<thead>
<tr>
<th>Project Management Stage</th>
<th>Microsoft Project Usage Level</th>
<th>Comments</th>
</tr>
</thead>
</table>


Initiating | Low | May help develop high-level order of magnitude estimates for schedule, scope, and cost.
--- | --- | ---
Planning | High | Helps define, integrate, and communicate scope, time, cost, and resource plans. Some support for risk planning.
Executing | Med-High | Helps direct who does what when, in terms of execution. Provides the roadmap and clear path to the final deliverable or result.
Monitoring & Controlling | High | Helps monitor and control change and measure the impact on scope, time, cost, and resources. Allows for effective variance analysis and decision-making for taking corrective action.
Closing | Low-Med | Useful for final variance analysis, lessons learned, developing future forecasting abilities, best practices, and benchmarking.

| Table 2.2.1 - Mapping out where Project 2010 will be the most help in managing individual projects [2] |

### 2.3. IMPORTANCE OF USING PROJECT MANAGEMENT SOFTWARE

Project Management software can dramatically improve the productivity of any project whether large or small. There are a variety of Project Management software options available for use; all of which offer the following features:

#### 2.3.1. Scheduling

Scheduling is one of the most critical tools required to manage a project to its conclusion. By making use of this feature in ‘Microsoft Project’ you can schedule a project from the information you input about the overall project, the individual tasks required to see the project through to completion, and the resources (people, equipment, materials) necessary to complete those tasks. If there are changes that occur to the tasks
or resources after the schedule has been created, you can update these and MS Project will update the schedule.

2.3.2 Resource assignments

By assigning resources you create the association between specific tasks and the resources (one or more) required to complete them. These resources include the work resources (people and equipment required to conclude a task) and material resources (materials or supplies).

2.3.3. Quality management

Quality management is the set of activities planned at the beginning of the project that help achieve quality in the project being executed, and which are defined on the basis of the quality standards set by the project manager and the company delivering the product.

2.3.4. Tracking progress

For the project to finish on schedule the path of series of tasks must be completed on schedule. This critical path completion will dictate the project’s finish date. Microsoft Project defines the critical path by determining the critical tasks and the tasks having ‘slack’, meaning which tasks will be finished early or late according to start date and scheduled duration.

By knowing and tracking the critical path of the project, as well as resources assigned to critical tasks, the finish date of the project can be determined. Keeping track of the completion and status of critical tasks is essential to keeping the project on course to being completed on time.

2.3.5. Report generation

It is important to generate timely reports about ‘completion of work, use of resources, cost expended, quality of work and the forecasts. It gives better picture to project
stakeholders about the status and progress of the project. Various types of reports in variety of forms can be generated by using project management software such as “Status report, progress report, variance report, trend report, Forecasting reports, etc.” These reports also help stakeholders to take proactive decisions to enhance opportunities and decrease threats about the project deliverables.

2.4. GETTING STARTED WITH MICROSOFT PROJECT
If you are using Microsoft Project for this course, see the Microsoft Project Laboratory Manual on Getting Started with Microsoft Project. You may remove section 2.5.

2.5. GETTING STARTED WITH PRIMAVERA PROJECT PLANNER VERSION 3.0
If you are using Primavera Project Planner for this course, see the Primavera Project Planner Laboratory Manual on Getting Started with Primavera Project Planner. You may remove section 2.4.

2.6. CHAPTER SUMMARY
This chapter introduces Microsoft Project and Primavera Project Planner 2010. It provides an overview on how to use some key tools to help get things started, standardize your project-management approach and make new project setup more efficient. You learned the importance of setting up projects, understanding some important option settings, such as how the default task type drives scheduling to reflect the way you and your organization operate.

2.7. HANDS-ON
You are required to perform the following, either individually or in a group:

If you are using Microsoft Project, see the Microsoft Project Laboratory Manual and perform the following:

2.7.1. Laboratory Work: Setting Up-Initializing a New Project

3. 2.7.2. Laboratory Work: Change the Working Time-Working With Calendars

If you are using Primavera Project Planner, see the Primavera Project Planner Laboratory Manual and perform the following:

1.1 Laboratory Work: Setting Up-Initializing a New Project

1.6 Laboratory Work: Change the Working Time-Working With Calendars
2.8. REFERENCES USED


5. PMP Training, Project Management taken from http://vinsys.in/importance-of-using-project-management-software/

6. Primavera Lab Manual, Higher College of Technology, Muscat
3.1. INTRODUCTION

This chapter introduces the processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase. It shows how initial scope is defined, financial resources are committed and internal and external stakeholders and those who will interact and influence the overall outcome of the project are identified. All this information is captured in the project charter.

3.1.1. Objectives

The objectives of this Chapter are:

- Identify feasible project.
- Develop and explain project charter.
- Identify the roles and responsibility of a project team.
- Describe the structure of a project team.

3.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze organization structures.
- Analyze a plan using methods and tools including Establish WBS, time & effort estimates, resource allocation and scheduling.
- Use case studies for project management.

3.1.3. Terminologies

- Project Stakeholders—individuals or organizations who are connected to the project in one way or another and can influence the project’s outcome.
- Project Statement of Work— a narrative description of products or services to be delivered by the project.
- **Business Case** - provides the necessary information from a business standpoint to determine whether or not the project is worth the required investment.
- **Contract** - an input if the project is being done for an external customer.

### 3.2. PROJECT INITIATION

The Initiating process is what gets a project off the ground. The goal is to get approval from the customer, management, and other stakeholders to begin planning. The project charter formalizes the request from a sponsor for responding to a business need. The project charter is usually a short document that refers to other more-detailed documents such as a new offering request, a request for proposal, or any other perceived business need or client request.

### 3.3. THE DEVELOP PROJECT CHARTER PROCESS

The project charter formalizes the request from a sponsor for responding to a business need. The project charter is usually a short document that refers to other more-detailed documents such as a new offering request, a request for proposal, or any other perceived business need or client request. Figure 3.3.1 shows the inputs, tools and techniques, and outputs for the Develop Project Charter process [1].

![Figure 3.3.1 – The Develop Project Charter Process [1]](image)
3.3.1. DEVELOP PROJECT CHARTER: INPUTS

3.3.1.1. Project Statement of Work

The Statement of Work (SOW) is a narrative description of products or services to be delivered by the project. The SOW typically references:

- **Business need** - An organization’s business need may be based on a market demand, technological advance, legal requirement, or government regulation.

- **Product scope description** - This documents the characteristics of the product that the project will be undertaken to create.

- **Strategic plan** - The strategic plan documents the organization’s strategic goals, therefore, aligning all projects the strategic plan.

3.3.1.2. Business Case

The business case provides the necessary information from a business standpoint to determine whether or not the project is worth the required investment. The business case is created as a result of one or more of the following:

- **Market demand** (e.g., a car company authorizing a project to build more fuel-efficient cars in response to gasoline shortages),

- **Organizational need** (e.g., a training company authorizing a project to create a new course to increase its revenues),

- **Customer request** (e.g., an electric utility authorizing a project to build a new substation to serve a new industrial park),

- **Technological advance** (e.g., an electronics firm authorizing a new project to develop a faster, cheaper, and smaller laptop after advances in computer memory and electronics technology),
- Legal requirement (e.g., a paint manufacturer authorizing a project to establish guidelines for handling toxic materials),
- Ecological impacts (e.g., a company undertakes a project to lessen its environmental impact), or
- Social need (e.g., a non-governmental organization in a developing country authorizing a project to provide potable water systems, latrines, and sanitation education to communities suffering from high rates of cholera).

3.3.1.2.1 Feasibility Study

Feasibility studies, aim to objectively and rationally uncover the strengths and weaknesses of an existing business or proposed venture, opportunities and threats present in the environment, the resources required to carry through, and ultimately the prospects for success. In its simplest terms, the two criteria to judge feasibility are cost required and value to be attained.

A well-designed feasibility study should provide a historical background of the business or project, a description of the product or service, accounting statements, details of the operations and management marketing research and policies, financial data, legal requirements and tax obligations. Generally, feasibility studies precede technical development and project implementation.

A feasibility study evaluates the project's potential for success; therefore, perceived objectivity is an important factor in the credibility of the study for potential investors and lending institutions. It must therefore be conducted with
an objective, unbiased approach to provide information upon which decisions can be based.

### 3.3.1.2.2 Common factors

The acronym TELOS refers to the five areas of feasibility - Technical, Economic, Legal, Operational, and Scheduling.

- **Technology and system feasibility**

  The assessment is based on an outline design of system requirements, to determine whether the company has the technical expertise to handle completion of the project. When writing a feasibility report, the following should be taken to consideration:

  - A brief description of the business to assess more possible factors which could affect the study
  - The part of the business being examined
  - The human and economic factor
  - The possible solutions to the problem

  At this level, the concern is whether the proposal is both technically and legally feasible (assuming moderate cost).

- **Legal Feasibility**

  Determines whether the proposed system conflicts with legal requirements, e.g. a data processing system must comply with the local Data Protection Acts.

- **Operational Feasibility**

  Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it
satisfies the requirements identified in the requirements analysis phase of system development.

The operational feasibility assessment focuses on the degree to which the proposed development projects fits in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture, and existing business processes.

To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters such as reliability, maintainability, supportability, usability, productability, disposability, sustainability, affordability and others. These parameters are required to be considered at the early stages of design if desired operational behaviors are to be realized. A system design and development requires appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the design. Therefore operational feasibility is a critical aspect of systems engineering that needs to be an integral part of the early design phases.

- **Economic Feasibility**

The purpose of the economic feasibility assessment is to determine the positive economic benefits to the organization that the proposed system will provide. It includes quantification and identification of all the benefits expected. This assessment typically involves a cost/benefits analysis.
• Technical Feasibility

The technical feasibility assessment is focused on gaining an understanding of the present technical resources of the organization and their applicability to the expected needs of the proposed system. It is an evaluation of the hardware and software and how it meets the need of the proposed system.

• Schedule Feasibility

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Schedule feasibility is a measure of how reasonable the project timetable is. Given our technical expertise, are the project deadlines reasonable? Some projects are initiated with specific deadlines. It is necessary to determine whether the deadlines are mandatory or desirable.

3.3.1.3. Contract

A contract is an input if the project is being done for an external customer.

3.3.1.4. Enterprise Environmental Factors

The enterprise environmental factors that can influence the Develop Project Charter process include, but are not limited to:

- Governmental or industry standards,
- Organization infrastructure, and
- Marketplace conditions.

3.3.1.5. Organizational Process Assets
The organizational process assets that can influence the Develop Project Charter process include, but are not limited to:

- Organizational standard processes, policies, and standardized process definitions for use in the organization;
- Templates (e.g., project charter template); and
- Historical information and lessons learned knowledge base.

3.3.2. DEVELOP PROJECT CHARTER: TOOLS & TECHNIQUES

3.3.2.1. Expert judgment

This is often used to assess the inputs used to develop the Project Charter. Such judgment and expertise is applied to any technical and management details during this process. Such expertise is provided by any group or individual with specialized knowledge or training, and is available from many sources, including:

- Other units within the organization,
- Consultants,
- Stakeholders, including customers or sponsors,
- Professional and technical associations,
- Industry groups,
- Subject matter experts, and
- Project management office (PMO)

3.3.3. DEVELOP PROJECT CHARTER: OUTPUT

3.3.3.1. Project Charter

The Project Charter documents the business needs, current understanding of the customer’s needs, and the new product, service, or result that it is intended to satisfy, such as:

- Project purpose or justification,
- Measurable project objectives and related success criteria,
3.3.4. PROJECT INITIATION TEMPLATES

This section contains sample templates which support the project initiating process. During the initiating process you are creating the documents which are needed to define a new project, or a new phase of an existing project. Many times a feasibility study is performed or a business case created. These are considered to be a part of the project initiating process group since they are created prior to the start of a project. The most critical part of the initiation process is the project charter. The project charter formally authorizes a project, and once it's signed the project can then progress to the planning process.

3.3.4.1. Business Case

A Business Case helps to determine whether or not a project justifies an organization's investment into a project. The Business Case defines the problem and its impact and performs a Cost Benefit Analysis for the proposed solution. It also looks at possible alternative solutions. Often overlooked, the Business Case also checks to see that the project aligns with the organization's strategic plans.
See sample business case template:

3.3.4.2. Feasibility Study

A good Feasibility Study helps to objectively decide whether to proceed with a proposed project. A Feasibility Study should have broad considerations when considering whether to undertake a new project. It should consider things such as technological limitations, the marketplace, your marketing strategy, staffing requirements, schedule and financial projections.

See sample feasibility study template:

3.3.4.3. Project Statement of Work

A Project Statement of Work should identify the Business Need, document the Product Scope and show that the project is aligned with the organization's Strategic Plan. The PMBOK identifies the Statement of Work as a narrative description of the products or services to be delivered by a project. The Project Statement of Work references the Business Need, Product Scope Definition and Strategic Plan and is used as an input to the Project Charter.

See sample project statement of work template:
http://www.projectmanagementdocs.com/project-initiation-templates/project-statement-of-work.html

3.3.4.4. Stakeholder Management Strategy

The stakeholder management strategy identifies and documents the approach to take in order to increase support and decrease negative
impacts of stakeholders throughout the life of the project. It should identify the key stakeholders along with the level of power and influence they have on the project. Then the Stakeholder Management Strategy should document the strategies which will be used to manage the stakeholders according to their power and interest in the project.

See sample stakeholder management strategy template:


3.3.4.5. Project Charter

The Project Charter formally authorize a project, it states the scope of the project, gives the Project Manager authority over the project, provides summary milestones, states the project budget and identifies funding sources.

See sample project charter template:

Single page version:

- http://www.projectmanagementdocs.com/project-initiation-templates/project-charter.html
- http://www.brighthubpm.com/project-planning/5159-project-charter-example-for-every-project-manager/

Some organizations prefer a detailed project charter. Multi page version:
3.4. THE ORGANIZATION AND ORGANIZATIONAL STRATEGY

The organizational culture, style, and structure influence how projects are performed. An organization’s degree of project management maturity and its project management systems can also influence the project [1].

3.4.1. Organizational Cultures and Styles

Cultures and styles may have a strong influence on a project's ability to meet its objectives and are typically known as "cultural norms". Most organizations have developed unique cultures that manifest in numerous ways including, but not limited to [1]:

- Shared visions, values, norms, beliefs, and expectations
- Policies, methods, and procedures
- View of authority relationships
- Work ethic and work hours

3.4.2. Organizational Structure

Organizational structure is an enterprise environmental factor which can affect the availability of resources and influence how projects are conducted. Organizational structures range from functional to projectized, with a variety of matrix structures between them. Table 3.4.2 shows key project-related characteristics of the major types of organizational structures [1].
Table 3.4.2-Organizational Influences on Projects [1]

The structures are as follows [10]:

### 3.4.2.1. The Functional Structure

The functional organization structure (Figure 3.4.2.1) brings together people who perform similar tasks or who use the same kinds of skills and knowledge in functional groups. In this structure, people are managed through clear lines of authority that extend through each group to the head of the group and, ultimately, to a single person at the top.

![Functional Structure Diagram](image)

Figure 3.4.2.1 – A Functional Structure for Projects [10]

The functional structure has the following advantages:

- Functional groups are reservoirs of skills and knowledge in their areas of expertise.
- Functional groups’ well-established communication processes and decision-making procedures provide timely and consistent support for the group’s projects.
- Functional groups provide people with a focused and supportive job environment.

The functional structure has the following drawbacks:
- The functional structure hampers effective collaboration between different functional groups.
- The functional group members’ main interest is to perform the tasks in their group’s specialty area effectively, rather than to achieve goals and results that may involve and affect other groups in the organization.
- A functional group may have difficulty getting buy in and support for its project from other functional groups that must support or will be affected by the project.

3.4.2.2. The Projectized Structure

The projectized organization structure (Figure 3.4.2.2) groups together all personnel working on a particular project and are often under the direct authority of the project manager for the duration of the project.

![Diagram of Projectized Structure]

Figure 3.4.2.2 – The Projectized Structure [10]

The projectized structure has the following advantages:
• All members of a project team report directly to the project manager. This clarified and simplified reporting structure reduces the potential
• Project team members can more easily develop a shared sense of identity, resulting in a stronger commitment to one another and to the success of the project.
• Everyone on the team shares the processes for performing project work, communication, conflict resolution, and decision making.

The projectized structure has the following disadvantages:
• Higher personnel costs
• Reduced technical interchange between projects
• Reduced career continuity, opportunities, and sense of job security

3.4.2.3. The Matrix Structure

The matrix organization structure (Figure 3.4.2.3) combines elements of both the functional and projectized structures to facilitate the responsive and effective participation of people from different parts of the organization on projects that need their specialized expertise.

![Figure 3.4.2.3 – The Matrix Structure](image)

Figure 3.4.2.3 – The Matrix Structure [10]
A matrix environment is classified as weak, strong, or balanced, depending on the amount of authority the project managers have over their teams.

- **Weak matrix**: Project team members receive most of their direction from their functional managers. Project managers have little, if any, direct authority over team members and actually function more like project coordinators than managers.
- **Strong matrix**: Companies with strong matrix structures choose project managers for new projects from a pool of people whose only job is to manage projects.
- **Balanced matrix**: This type of matrix environment is a blend of the weak and strong environments. People are assigned to lead projects or serve as team members based on the projects’ needs rather than on their job descriptions.

Matrix environment introduces the following challenges, which the project manager must successfully address:

- Team members working on multiple projects respond to two or more managers.
- Team members may not be familiar with one another’s styles and knowledge.
- Team members may focus more on their individual assignments endless on the project and its goals.

### 3.4.3. Portfolio Management

PMI defines a **portfolio** as “a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives.” **Strategy** drives portfolios, and portfolios drive projects [3].

**Portfolio management** refers to the centralized management of one or more portfolios, focusing on ensuring that projects and programs are reviewed to prioritize resource allocation, and that the management of the portfolio is consistent with and aligned to organizational strategies [1].

### 3.4.4. Organizational Process Assets
Organizational process assets include any or all process related assets, such as formal and informal plans, policies, procedures, and guidelines as well as the organization’s knowledge bases such as lessons learned and historical information.

3.5. DEFINING ROLES AND RESPONSIBILITIES

A typical project entails performing specific pieces of work, making decisions, and coordinating the activities of others. To accomplish the project with a minimum of time and resources, each piece of work must be done in the correct order, and each person must work at peak efficiency, being sure not to repeat.

3.5.1. Characterizing Authority, Responsibility, and Accountability

The following concepts can help you define and clarify how team members should relate to each other and to their assigned tasks:

- **Authority**: The ability to make binding decisions about your project’s products, schedule, resources, and activities. Examples include your ability to sign purchase orders that don’t exceed $3,000 and your ability to change a scheduled date by no more than two weeks.

- **Responsibility**: The commitment to achieve specific results. An example is your promise to have a draft report ready by March 1.

- **Accountability**: Bringing consequences to bear in response to people’s performance, such as your boss noting in your annual performance appraisal that you solved a tough manufacturing problem.

3.5.2. Delegating Assignments the Right Way

**Delegating** is giving away something you have. It helps to decide what to delegate and understand different degrees of delegation and also how to support delegations and achieve the best results possible.

- Deciding what to delegate

  Authorities are delegated for four reasons:
To free yourself up to do other tasks
To have the most qualified person make decisions
To get another qualified person’s perspective on an issue
To develop another person’s ability to handle additional assignments prudently and successfully

Understanding degrees of delegation
Consider the following six degrees of delegation, each of which builds on and extends the ones that come before it:

✓ Get in the know. Get the facts and bring them to me for further action.
✓ Show me the way to go. Develop alternative actions to take based on the facts you’ve found.
✓ Go when I say so. Be prepared to take one or more of the actions you’ve proposed, but don’t do anything until I say so.
✓ Go unless I say no. Tell me what you propose to do and when, and take your recommended actions unless I tell you otherwise.
✓ How’d it go? Analyze the situation, develop a course of action, take action, and let me know the results.
✓ Just go! Here’s a situation; deal with it.

Delegating to achieve results
Steps to improve the person’s chances for successful performance:
1. Clarify what you want to delegate.
2. Choose the right person.
3. Make the delegation correctly.
4. Be available to answer questions.
6. Promptly address problems that arise.

3.5.3. Developing a Responsibility Assignment Matrix (RAM)
Defining and sharing team roles and responsibilities upfront can help improve performance and identify and head off potential difficulties during a project. One way to display team roles and responsibilities is in a **Responsibility Assignment Matrix (RAM)**. The RAM is a table that depicts each project members’ role in the performance of different project activities. The elements and format of a RAM (Figure 3.5.3) is as follows:

- Project deliverables are in the left-hand column.
- Project audiences are in the top row.
- The role each audience will play in performing the work to produce each deliverable is in the intersections of the rows and columns.

The RAM in Table 3.5.3 indicates which of the following three roles people can have in a project’s activities:

- **Primary responsibility (P):** You’ll ensure the results are achieved.
- **Secondary responsibility (S):** You’ll ensure some portion of the results is achieved.
- **Approval (A):** You’re not actually working on the deliverable, but you approve the results produced by others who are.

The RAM is just a format; for each project, roles are defined and assigned if deemed appropriate. The following roles, for example, may be use in addition to the three already defined:
- **Review (R)**: You review and comment on the results of an activity, but your formal approval isn’t required.
- **Output (O)**: You receive products from the activity.
- **Input (I)**: You provide input for the activity work.

Additionally, roles and assignments are identified by using a coding structure such as **RACI or PARIS**:

![RACI and PARIS Diagram](image)

<table>
<thead>
<tr>
<th>Deliverable:</th>
<th>Office, Role or person</th>
<th>Office, Role or person</th>
<th>Office, Role or person</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Traffic Report</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Utility Locates</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Intersection Design</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 3.5.4 – How to construct RAM

**RACI:**
- **Responsible** - owner, the person who owns the work. Each deliverable/activity must have an owner.
- **Approval** - the person who approves the deliverable or activity. There should only be one approver.
- **Consulted** - this person delivers information required to do the work.
- **Informed** - a person that needs to be informed of the progress of the work.
Deliverable: | Project Manager Mark Cross | Environmental Coordinator Tammi Bailey | Traffic Office Frank Morelli | Utilities Cindy Santos
---|---|---|---|---
Enviro. Permits | A | R | | |
Traffic Report | A | R | | |
Utility Locates | I | I | R | |
Intersection | A | C | R | C |
Design

**RACI** – Responsible, Approval, Consulted, Informed

Table 3.5.5 – Sample RAM using RACI

**PARIS**
- Participant - involved but not at a critical level
- Accountable - must answer to management for the project task status
- Review needed or required
- Input needed or required
- Sign Off Required

<table>
<thead>
<tr>
<th>Deliverable:</th>
<th>Team Leader Marcia Weeks</th>
<th>Environmental Office</th>
<th>Traffic Design Frank Morelli</th>
<th>Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enviro. Permits</td>
<td>A</td>
<td>S</td>
<td></td>
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<td>Traffic Report</td>
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<tr>
<td>Utility Locates</td>
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</tr>
<tr>
<td>Intersection Design</td>
<td>A</td>
<td>R</td>
<td>S</td>
<td>R</td>
</tr>
</tbody>
</table>

**PARIS** – Participant, Accountable, Review, Input, Sign off

Table 3.5.6 – Sample RAM using PARIS

There are many possible variations to this coding structure; the project team may create unique codes that are more meaningful to the project such as:
- Verifies - the person who ensures the work meets quality standards.
- Final Authority - the person who puts the final stamp on the completed work.
3.6. CHAPTER SUMMARY

This chapter focused on the essential prerequisites that justify the need to undertake a project as well as how to setup and manage a Project Team. The Initiating Process Group provides the justification for the project through the preparation of documents such as the Project Charter. The initial project scope is identified and the project team’s members are sourced out.

3.7. ASSIGNMENT

You are required to perform the following, either individually or in a group:

Assignment 3.7.1

An organization that specializes in providing telecommunication services is contemplating on a project involving network security services in anticipation for the implementation of 4G LTE network connectivity. Based on the knowledge you have gained from the assignments in Chapter 1, this chapter’s contents and using the provided templates and samples accomplish the following requirements:

2. Fill-up the Sections 1, 2, 4 & 5.
3. Identify your team members and their roles and responsibilities, and then create an initial Responsibility Assignment Matrix.
4. Submit a report containing your findings to the Course Lecturer and present this in the class.

3.8. CASE STUDY

Higher College of Technology (HCT) is in the process of developing an Online Application of Appeal System. Ministry of Manpower will sponsor and finance the project. The project will start on January 2015 and should finish at the end of April 2015. Team members will only be hired for this project. All members of the project team will report directly to the Project Manager.

You will be the assigned Project Manager and should always be present during the duration of the project. You will receive a monthly salary of 1250RO.
Team members will consist of the following: Ms. Manal will be the assigned Tester. Her monthly salary is 625Ro and she will do the work for March and April only. Mr. Talib will be the Software Engineer with monthly salary of 890RO, who will worked together with the project manager.

Ms. Mariam with a monthly salary of 875RO will be the Database Administrator who will work during January, February and April only, Mr. Issa will be the Network Engineer who will receive a monthly salary of 1050RO. He will work during February, March and April only together with Mr. John with 980RO monthly salary who will be in charge on the security of the system. Mr. Ruel with a monthly salary of 1000RO will manage the information system of the project from January to April.

There are just a few major deliverables: User registration module, modules for application for appeal for resit and make-up exams, and appeal against exam result, data warehouse for the system, 24-hour network connectivity, secured information, and secured database with back up facility, test results, and posting of approved results.

Prepare a Budget (Cost) Plan for manpower services.

3.9. REFERENCES USED

Chapter 4-PROJECT PLANNING

4.1. INTRODUCTION
This chapter deals with the processes needed to create the Project Plan. The Planning Process Group consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives. The planning processes develop the project management plan and the project documents that will be used to carry out the project. The usage of Microsoft Project will be introduced particularly in the creation of the project’s schedule.

4.1.1. Objectives

The objectives of this Chapter are:

- Determine the project deliverables and its characteristics.
- Construct work breakdown structure of the project.
- Identify the schedule, costs and resources of the project.
- Describe different kind of management plan.

4.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze a plan using methods and tools including Establish WBS, time & effort estimates, resource allocation and scheduling.
- Analyze concepts of Quality Management, Assurance and Control.
- Analyze risks and manage them.
- Evaluate set-targets, deliverables and conflict resolution documents.
- Use case studies for project management.

4.1.3. Terminologies

- **Deliverables** - the products we hope to achieve when the project is completed.
- **Work Breakdown Structure (WBS)** - a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required
deliverables, with each descending level of the WBS representing an increasingly detailed definition of the project work.

- **PERT (Program Evaluation and Review Technique)** - a duration-based estimating technique that uses three points (pessimistic, most likely, and optimistic) to determine the best estimate of duration on a task-by-task basis.

- **Quality of a project** - measured by whether the project meets or exceeds customer expectations.

- **Change Request** - a request to change some aspect of the project after it has been approved and committed.

### 4.2. ESTABLISH PROJECT DELIVERABLES

The **deliverables** of a project are the products we hope to achieve when the project is completed. Deliverables typically include physical properties, content properties (documents or other written artifacts), technical properties, and acceptance criteria. A deliverable is not considered complete until the tasks associated with that deliverable are accepted by predetermined and measurable results.

#### 4.2.1. Steps in establishing project deliverables

Establishing project deliverables consists of the following steps:

1. Document each deliverable from the client’s point of view.
2. Review project objectives, key assumptions, and scope with the client relative to the deliverables we are identifying and defining.

There are other questions you can ask regarding assumptions, such as the following:

- Are they still the same?
- Is the content the same?
- Has your audience changed?
- Are the resources still going to be available to you?
3. Review with the client the overall project approach to ensure that the deliverables can and will be achieved.
4. Define the product acceptance criteria for each deliverable and Establish metrics for each of the acceptance criteria.

Product acceptance criteria may include, but are not limited to, the following:

- Quality expectations
- Schedule dates
- Functionality—does the product work as it should?
- Appearance
- Performance levels
- Practicality—is the product suitable for the majority of users?
- Clarity—is the product easy to use and understand?
- Capacity—does the product fulfill the intended use of the product?
- Accuracy
- Availability—is the product readily available to the consumer?
- Maintainability—does the product have the capability to be repaired within a reasonable amount of time?
- Reliability—will the product have the same result each time it is used?
- Flexibility—when external changes occur, can the product easily be conformed to new situations?

4.3. CREATING THE WBS

4.3.1. What is a WBS?

The Work Breakdown Structure (WBS) is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables, with each descending level of the WBS representing an increasingly detailed definition of the project work. The WBS organizes and defines the total scope of the project, and represents the work specified in the current approved project scope statement [1].
4.3.2. Creating a WBS

To create a partial WBS:

1. **Create the list of work that results in producing your previously identified deliverables.**
   
   When you are meeting with your team for creating a WBS, describe the scope of work and what is to be delivered so the team won’t get off track.

2. **Organize the work.**
   
   Create logical groupings. You can do this by phase, by geography, by organization, by key work products, chronologically, or any other way that your team feels will accomplish this task.

3. **Deconstruct each task and review with the team.**
   
   Make sure that each task is deconstructed to a level where resources can be assigned and cost estimates given. Because your team helped to create the WBS, you will want to review it and make adjustments as needed. Your review should include the following:
   
   ▪ Show the team what has been done so far.
   ▪ Go through the WBS and fix and/or confirm groupings.
   ▪ Adjust task and activity names, if necessary.
   ▪ Change wording, if necessary, to make it clearer but do not adjust intent.

4. **Verify that the WBS is correct and complete**

   The best way to verify completeness and correctness is to ask this question at the lowest level: “Will these tasks fully complete the required deliverable?”

   ▪ **Common Obstacles**
     Even though you are acting as a peer on this process, your facilitation skills will be needed if you encounter any of these obstacles:
     
     o Discussing or adding new requirements
     o Talking about the solution rather than the work
o Wanting to establish dependencies too early
o Wanting to assign resources too early
o Being so overly detailed that you spend more time creating the WBS than managing it
o Concern over levels of a WBS:
  ✓ Commonly a WBS has between five and seven levels.
  ✓ It may take only three or four levels to create a budget-level deliverable.
  ✓ If you have seven or more levels, typically this would then become a subproject or a program with multiple subprojects.

4.4. DEVELOPING A BUDGET PLAN

After resource and staffing planning has taken place, the project manager can develop an estimate of resource costs. A finance plan (or as it is sometimes called, a cost plan) should be credible enough that there will be sufficient budget in place before work begins, particularly when you are dealing with projects that require several subcontractors, vendors, and so on. Be actively involved in the work of the project.

To create a Budget Plan, the following task must be done:
4.4.1. Cost estimating

Estimating types:

- **Parametric Modeling** - This type is considered “top-down.” It uses project characteristics (parameters) in a mathematical model to predict project costs. The difference in accuracy can be anywhere from −25% to +75%.

- **Analogy Estimating** - This is another top-down estimating method. The difference in accuracy may be −10% to +25% when the current project is very similar to the analogous project.

- **Definitive Estimating** - This type often has a −5% to +10% level of accuracy. You estimate the cost of individual work items so that when you summarize, or roll up, the individual estimates you can get a project total. This type of estimating is considered bottom-up.

4.4.2. Cost budgeting

The total effort required to perform the project is determined in the estimating and scheduling process. Until the final schedule has been agreed upon, estimating isn’t complete because as you schedule you may reassign resources, which may change effort estimates for individual tasks.

The estimated resource budget (in this abbreviated example) plus non-labor costs (excluding contingency and management reserves) becomes your baseline cost budget (Table 4.4.2).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Resource</th>
<th>Est. Effort</th>
<th>Loaded Rate</th>
<th>Budget</th>
<th>Actual Effort</th>
<th>Actual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Michelle</td>
<td>80 h</td>
<td>$85</td>
<td>$6,800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Jeness</td>
<td>40 h</td>
<td>$85</td>
<td>$3,400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Carrie</td>
<td>1,800 h</td>
<td>$60</td>
<td>$108,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Jocelyn</td>
<td>120 h</td>
<td>$100</td>
<td>$12,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Todd</td>
<td>480 h</td>
<td>$35</td>
<td>$16,800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Budget</td>
<td></td>
<td></td>
<td></td>
<td>$147,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4.3. Cost control

Cost control entails monitoring actual cost performance to identify and act on cost variances. It also includes vigorous control of changes to the project scope to prevent unnecessary cost increases. The following is a cost management plan template that may be useful when you create your cost plan:

- **Section 1: Estimates**
  - ✓ Describe how you derived your estimates.
  - ✓ Describe the estimates derived from labor resources.
  - ✓ Describe estimates required for non-labor resources.
  - ✓ Describe estimates from contingency funds associated with known risk events.
  - ✓ Describe the estimate of the management reserve that may be needed for unknown risks that may arise.

- **Section 2: Cost Budgeting**
  - ✓ Allocate costs per work package.
  - ✓ Allocate costs to time elements such as months, quarters, or years
  - ✓ Define spending plans to answer, “Will the project partially fund itself?”

- **Section 3: Cost Control**
  - ✓ Document procedures for retrieving cost information.
  - ✓ Use earned value to determine whether funds are adequate within predetermined ranges.
  - ✓ Compare planned costs to actual costs.
  - ✓ Establish cost-control procedures.

- **Section 4: Establish a Cost History**
  - ✓ Build a WBS with actual costs of activities so as to establish cost history for similar projects.
  - ✓ Utilize or create a historical database to capture cost information.
Audit existing finance controls to see if they worked properly.

4.5. DEVELOPING THE PROJECT SCHEDULE

Develop Schedule is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule. Entering the activities, durations, and resources into the scheduling tool generates a schedule with planned dates for completing project activities. Developing an acceptable project schedule is often an iterative process.

4.5.1. How to Create a Project Schedule?

The following represents the steps necessary to create and understand a project schedule:

1. Define scheduling activities.

The WBS we described earlier shows only the major tasks within logical groupings. What you want to do now is further define those tasks into subtasks (if appropriate) and activities that can be scheduled and are associated with deliverables.

Name the tasks and subtasks. At this point you will want to have some sort of numbering convention, such as in Figure 4.5.1.1. Finally, name the activities that create a work package. These activities are also called schedule activities because you can assign a resource to the activity as well as an estimated duration for that activity.

```
<table>
<thead>
<tr>
<th>Tasks</th>
<th>Subtasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>4.1</td>
</tr>
<tr>
<td>2.0</td>
<td>4.2</td>
</tr>
<tr>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td></td>
</tr>
</tbody>
</table>

  Check water pressure
  Create zones for coverage
  Pick up materials
  Dig the yard

  Reserve a ditch witch
  Pick up the ditch witch

Work Package

Activities to be scheduled:

- 4.2.1 Borrow pickup
- 4.2.2 Buy oil and gas
- 4.2.3 Bring a ramp for loading and unloading
- 4.2.4 Arrange for Joe to dig the yard
```
2. **Determine activity sequencing.**

Activity sequencing establishes logical relationships (dependencies) between the project activities. Project teams work together to identify the dependencies between tasks. You have to know the types of dependencies first. There are three types of dependencies:

- **Mandatory** dependencies use hard logic (that is, task A must be completed before task B).
- **Discretionary** dependencies use soft logic or preferred logic. For example, using soft or preferred logic, you typically would paint the walls before you would lay carpet; however, if the painter is running late on another project, you can, at your discretion, choose to install the carpeting first (with plastic to cover it) and have the painting done later.
- **External** dependencies determine when some activities can be scheduled.

The result of sequencing tasks is a network diagram. Two types of diagramming techniques can be used. One is the Arrow Diagramming Method (ADM), shown in Figure 4.5.1.2.1, and the other is the Precedence Diagramming Method (PDM), shown in Figure 4.5.1.2.2.

- **Arrow Diagramming Method (ADM)**
  - Activity identified on the arrow (AOA).
  - Circles represent the start or finish of an activity.
  - Uses only finish-to-start relationships.
  - Can use multiple time estimates to determine durations.
  - May need dummy activities to complete the logic (dashed line) that are used to show only complex precedence activities such as finish to start.
Precedence Diagramming Method (PDM)

- Activity identified on the node (AON).
- Can use four precedence relationships:
  - Finish to start
  - Start to finish
  - Finish to finish
  - Start to start
- Uses only one duration
- Other project information can be displayed on the node.

Precedence relationships simply show how tasks relate to each other based on how the network diagram was built, specifically the dependencies between tasks. In most cases, one activity cannot start until another activity has finished. This is referred to as a finish-to-start relationship, and it is the most common form. However, there are four ways, listed in Table 4.5.1.2.3, that one or more activities can be related to each other.
3. **Estimate resources.**

Your resource plan helped you determine the resources you need, but now you have to estimate what these resources will cost. The project manager works with the resources assigned to do the work to first estimate the time needed for activities. Table 4.5.1.3.1 lists factors that help bring reality to the estimate.

<table>
<thead>
<tr>
<th>Productivity</th>
<th>Other factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of effective work hours</td>
<td>Size of team</td>
</tr>
<tr>
<td>Tools and techniques</td>
<td>Number of clients</td>
</tr>
<tr>
<td>Skill level</td>
<td>Client availability</td>
</tr>
<tr>
<td>Motivation</td>
<td>Understanding of objectives</td>
</tr>
<tr>
<td>Working environment</td>
<td>Project complexity</td>
</tr>
<tr>
<td>Leadership and direction</td>
<td>Experience of team</td>
</tr>
<tr>
<td>Time spent on rework</td>
<td>Time on other work</td>
</tr>
<tr>
<td>Number of tasks involved</td>
<td>Availability of historical data</td>
</tr>
</tbody>
</table>

Table 4.5.1.3.1 Factors that bring reality to estimates [3]
4. Determine activity durations.
You now know the scope of each activity. The Associated General Contractors of America uses productivity rates to determine activity durations.

Activity duration = work quantity / production rate

5. Develop the schedule.
You now understand the concept of dependencies as well as lead and lag time. Next, we will cover other essentials that will help you develop a schedule:

- Critical path
- Float and slack
- Forward and backward pass logic

**Critical Path Method (CPM)** calculates a single, deterministic early and late start and a finish date for each activity based on specified, sequential network logic and a single duration estimated. The focus of CPM is calculating float to determine which activities have the least scheduling flexibility.

- A **forward pass** is performed, calculated from the early start and early finish dates of all network activities.
- Then a **backward pass** is performed, calculated from the latest start and latest finish dates of all network activities. Any task that has no float is considered critical.

Critical path tasks have no float or slack in them. That’s why they are critical. Without float, if a task on the critical path takes longer than expected, it will delay the end of the project.

- **Free float or free slack** is the amount of time an activity can be delayed without delaying the early start of any immediately following activities.
- **Total float or total slack** is the amount of time an activity may be delayed from its early start without delaying the planned project finish date.
The word **float** is used interchangeably with the word **slack**. It is a mathematical calculation and can change as the project progresses and changes are made to the project plan.

Late start – early start = slack

Figure 4.5.1.5.1 shows an example of determining the dependencies between tasks. Figure 4.5.1.5.2 performs the forward pass. Tasks that have no predecessor begin the early start with the 0 (see A7, C6, D8, and F6). The forward pass is noted on the top of the box or node. Starting with 0 as the early start of the first task, add the duration; this becomes the early finish date. The early finish date follows the arrow(s) to the next node(s) and becomes that node’s early start.

---

**Figure 4.5.1.5.1 - Determine Dependencies [3]**

**Figure 4.5.1.5.2 - Perform a Forward Pass**
Figure 4.5.1.5.3 - Perform a Backward Pass

Figure 4.5.1.5.4 shows how to determine float and the critical path. Float is determined by simply subtracting the early start from the late start, or the early finish from the late finish. Now you know this:

- The critical path is D8, E5, H7, M8, and N3 because these tasks have no float.
- Total float for path A, B, G, L, N = 14. Tasks A and B have a free float of 3 that can be shared between the two tasks without impacting the rest of the path, which is 11.
- Total float for path C, G, L, N = 18. Task C has a free float of 7 before impacting the rest of the path, which has 11.
- Total float for path D, E, G, L, N = 11. There is no free float for an individual task—they must share 11.
- Total float for path D, E, H, I, N = 5. Only task I can use this float because the remainders of those tasks are on the critical path.
- Total float for path D, J, M, N = 4. Only task I can use this float because the remainders of those tasks are on the critical path.
- Total float for path F, K, J, M, N = 4. The float is shared so there is no free float.

Figure 4.5.1.5.4 - Determining Float and Critical Path

Figure 4.5.1.5.5 – ADM- Float and Critical Path
Figure 4.5.1.5.6 - Perform a Forward Pass
Figure 4.5.1.5.7 - Perform a Backward Pass

Figure 4.5.1.5.7 Floats and critical paths are:

- Critical path: 5, 10, 20, 30, 35, 45 and 5, 20, 30, 35, 45 because these tasks have no float.
- Total float for path 5, 10, 25, 45 = 3.
- Total float for path 5, 10, 25, 35, 45 = 3.
- Total float for path 5, 10, 20, 25, 45 = 3.
- Total float for path 5, 10, 20, 25, 35, 45 = 3.
- Total float for path 5, 10, 20, 25, 45, 45 = 3.
- Total float for path 5, 20, 25, 45 = 3.
- Total float for path 5, 20, 25, 35, 45 = 3.
- Total float for path 5, 20, 30, 40, 45 = 5.
- Total float for path 5, 15, 30, 40, 45 = 7.

4.6. DEVELOPING THE HUMAN RESOURCE PLAN

The project manager must determine the resources needed to complete the full scope of the project. You already have a team put together, but they are not the only resources that will be used on the project. You must also work with functional managers and possibly your Human Resources (HR) department to gain commitment of needed resources.

Steps needed to create a human resource plan include the following:

1. Determine human and non-labor resources.
2. Determine resource skill sets.
Most of the time, a project manager doesn’t get to choose their team members. You use those people who are assigned by others. You will want to know if the resources are:

- Expert
- Highly competent
- Competent
- Novice

3. Create a resource calendar. A resource calendar lets you know how many resources you need as well as when you need them.

4. Determine resource assumptions.

5. Determine resource risks and mitigation strategies.

---

### HUMAN RESOURCE PLAN TEMPLATE

#### Introduction

This section of the Human Resource Plan explains the purpose and importance of having a human resources management plan. It should provide a general description of what the plan includes and explain how the project manager and project team can use the plan to help them manage the project effectively.

Human resources management is an important part of the Software Upgrade Project. The human resources management plan is a tool which will aid in the management of this project’s human resource activities throughout the project until closure. The human resources management plan includes:

- Roles and Responsibilities of Team Members Throughout the Project
- Organization Charts
- Staffing Management Plan to Include:
  - How resources will be acquired
  - Timeline for resource skill sets
  - Training required to develop skills
  - How performance reviews will be conducted
  - Recognition and rewards system

The purpose of the human resources management plan is to achieve project success by ensuring the appropriate human resources are acquired with the necessary skills, resources are trained, any gaps in skills are identified, team building strategies are clearly defined, and team activities are effectively managed.

#### Roles and Responsibilities

Roles and responsibilities of team members and stakeholders must be clearly defined in any project. Depending on the organizational structure, project team members may represent many different groups, departments, and act in the interest of different functional managers. Additionally, team members may have varying degrees of authority and responsibility. When listing rules and responsibilities the following should be included:

- Role – description of the portion of the project for which the member is accountable
- Authority – the level at which the member may make decisions, apply project resources, or make approvals
- Responsibility – the work a team member must perform to complete assigned work activities
- Competency – the skill(s) required to complete assigned project activities

The roles and responsibilities for the Software Upgrade Project are essential to project success. All team members must clearly understand their roles and responsibilities in order to successfully perform their portion of the project. For the Software Upgrade Project the following project team roles and responsibilities have been established.
Project Manager (PM), (1 position): responsible for the overall success of the Software Upgrade Project. The PM must authorize and approve all project expenditures. The PM is also responsible for approving that work activities meet established acceptability criteria and fall within acceptable variances. The PM will be responsible for reporting project status in accordance with the communications management plan. The PM will evaluate the performance of all project team members and communicate their performance to functional managers. The PM is also responsible for acquiring human resources for the project through coordination with functional managers. The PM must possess the following skills: leadership management, budgeting, scheduling, and effective communication.

Design Engineer (DE), (2 positions): responsible for gathering coding requirements for the Software Upgrade Project. The DEs are responsible for all upgrade design, coding, and testing of the upgraded software. The DEs will assist the implementation lead in the distribution and monitoring of the software upgrades throughout the network infrastructure. The DEs will be responsible for timely status reporting to the PM as required by the communications management plan. The DEs may not authorize any project expenditures or allocate any resources without PM approval. DE’s performance will be managed by the PM and communicated to the Design Technology Group Manager (DE’s Functional Manager). DEs must be proficient in programming HTML, C++, and Java programming languages.

Implementation Manager (IM), (1 position): The IM is responsible for the distribution, implementation, and monitoring of the new software upgrade. The IM is responsible for working with the DEs to ensure all coding on new software conforms with organizational security regulations. The IM is responsible for coordinate outage windows with each department to facilitate the rollout of the software upgrades with minimal to no disturbance to operations. The IM will report status to the PM in accordance with the project’s communications management plan. The IM’s performance will be evaluated by the PM and communicated to the IM’s functional manager (Network Manager). The IM must be proficient in managing network architecture.

Training Lead (TL), (1 position): The TL is responsible for training all network users on the features provided by the upgrades to the existing software. The TL will coordinate training times, locations, and training sessions for the project in accordance with the project communications management plan.

Functional Managers (FM), (2 positions): While not part of the project team, functional managers are responsible for providing resources for the project in accordance with the project staffing plan. Functional managers are responsible for working with the PM to determine skill sets required and approving resource assignments. Functional managers are also responsible for conducting performance appraisals of assigned resources based, in part, on the PM’s feedback regarding project performance.

**Project Organizational Charts**

In this section the Human Resource Plan provides a graphic display of the project tasks and team members. The purpose of this is to illustrate the responsibilities of team members as they relate to the project tasks. Tools such as responsible, accountable, consult, inform (RACI) or responsibility assignment matrix (RAM) may be used to aid in communicating roles and responsibilities for the project team. Additionally, organizational or resource breakdown structures may be used to show how responsibilities are assigned by department or by type of resource respectively. It should be noted that the level of detail may vary depending on project complexity.

The following RACI chart shows the relationship between project tasks and team members. Any proposed changes to project responsibilities must be reviewed and approved by the project manager. Changes will be proposed in accordance with the project’s change control process. As changes are made all project documents will be updated and redistributed accordingly.

<table>
<thead>
<tr>
<th>Requirements Gathering</th>
<th>Design Engineers</th>
<th>Implementation Manager</th>
<th>Training Leads</th>
<th>Functional Managers</th>
<th>Department Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements Gathering</td>
<td>A</td>
<td>R</td>
<td>R</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Coding Design</td>
<td>A</td>
<td>R</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coding Input</td>
<td>A</td>
<td>R</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software Testing</td>
<td>A</td>
<td>R</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Preparation</td>
<td>A</td>
<td>C</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>A</td>
<td>C</td>
<td>R</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Conduct Training</td>
<td>A</td>
<td>R</td>
<td>R</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Key:
R – Responsible for completing the work
A – Accountable for ensuring task completion, sign off
C – Consulted before any decisions are made
I – Informed when an action decision has been made

**Staffing Management**

This part of the Human Resource Plan contains information on several areas including: when and how human resource requirements will be acquired, the timeline for when resources are needed and may be released, training for any resources with identified gaps in skills required, how performance reviews will be performed, and the rewards and recognition system to be used. It is important to note that depending on the scope of the project there may be other items included in staffing management (governments and/or regulatory compliance, organizational health and safety, etc).

**Staff Acquisition:**
For the Software Upgrade Project the project staff will consist entirely of internal resources. There will be no outsourcing/contracting performed within the scope of this project. The Project Manager will negotiate with functional and department managers in order to identify and assign resources in accordance with the project organizational structure. All resources must be approved by the appropriate functional department manager before the resource may begin any project work. The project team will not be co-located for this project and all resources will remain in their current workspace.

**Resource Calculations:**
The Software Upgrade Project will last for five weeks. All resources are required before the project can begin. The resource histograms below illustrate that design engineers are required to perform 40 hours per week per engineer for the first three weeks of the project. Their requirements are then scaled back to 5 hours per engineer in the fourth week. After the fourth week, the design engineers will be released from the project. The implementation manager will also be released from the project after week 4. The training lead will be required to perform 15 hours of work in the first week and a full 40 hours of training during week 5.
Training:
There is currently no training scheduled with regards to the Software Upgrade Project since the organization has adequate staff with required skill sets. However, if training requirements are identified, funding will be provided from the project reserve.

Performance Reviews:
The project manager will review each team member’s assigned work activities at the onset of the project and communicate all expectations of work to be performed. The project manager will then evaluate each team member throughout the project to evaluate their performance and how effectively they are completing their assigned work. Prior to releasing project resources, the project manager will meet with the appropriate functional manager and provide feedback on employee project performance. The functional managers will then perform a formal performance review on each team member.

Recognition and Rewards:
Although the scope of this project does not allow for ample time to provide cross-training or potential for monetary rewards there are several planned recognition and reward items for project team members:

- Upon successful completion of the Software Upgrade Project, a party will be held to celebrate the success of each team member with the team members’ families present.
- Upon successful completion of the project, any team member who satisfactorily completed all assigned work packages on time will receive a certificate of thanks from the CEO.
- Team members who successfully complete all of their assigned tasks will have their photo taken for inclusion in the company newsletter.
- The company will provide free family movie tickets for the top two performers on each project.
Table 4.6.1-Human Resource Plan Template

The following is a template that includes the elements of a resource and staffing management plan:

- **Section 1: Human Resources**
  - Quantity
  - Cost assumptions
  - Dates needed
  - Date released
  - Special needs
  - Special skills
  - Training needs
  - Office and material requirements

- **Section 2: Non-labor Resources**
  - You will want to list the type of resource, the source of the resource, the quantity, and the cost of each resource:
    - Training
    - Facilities, such as floor space furniture and moving costs
    - Dates needed
    - IT hardware such as computers, printers, and the like
    - IT software for administrators, end users, and technical support
    - Publishing items such as binders, reproduction expenses, and office supplies
    - Environmental needs such as asbestos, soil preparation, site work, and so on
    - Construction material and equipment

- **Section 3: Resource Knowledge, Skills, and Abilities**
  - Task name
 getType of resource
✓ Quantity of resources needed for tasks
✓ Skills
✓ Experience level:
✓ Expert
✓ Highly competent
✓ Competent
✓ Novice

- Section 4: Resource Calendar
  ✓ Insert your resource calendar in this section.
- Section 5: Resource Assumptions
  ✓ Insert your documented assumptions in this section.
- Section 6: Resource and Staffing Risks
  ✓ Resource
  ✓ Risk
  ✓ Mitigation strategy

4.7. DEVELOPING THE COMMUNICATIONS PLAN

4.7.1. Why create a communications plan?

When there is an extensive undertaking, communication of information and coordination of efforts across teams are critical success factors. The objective is to ensure accurate, consistent, and timely communication of information to the business teams, project teams, and management.

The project manager will be engaged in many types of project communications modalities including, but not limited to, the following:

- Project plans (such as schedules, budgets, risk and resource plans)
- Project meetings
- Status reporting
- Organizational charts
- Requirements
- Contracts
- Presentations
• Decision memoranda
• Policies and procedures
• Historical records

To be able to do all of this effectively, you must create a communications plan. The project manager should be the focal point for the flow of communications in a project environment. Let’s take a look at three common scenarios:

• **Between the Project Manager and the Customer** – The project manager receives the project goals from the customer.

• **Between the Project Manager and the Sponsor** – The project manager receives the project priority from the sponsor. The project manager sends performance information such as budget and schedule results to the sponsor.

• **Between the Project Manager and the Project Team** – The project manager provides the project standards to the project team and receives performance results from the project team.

To be successful with these communications, you need to determine the communication needs of stakeholders.

<table>
<thead>
<tr>
<th>Communication Item</th>
<th>Objective</th>
<th>Content</th>
<th>Media</th>
<th>Execution and Timing</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to project</td>
<td>Provide introduction to senior executives</td>
<td>PowerPoint deck</td>
<td>In-Person</td>
<td>A quick 30-minute meeting at the start of the project</td>
<td>Minimal</td>
</tr>
<tr>
<td>Introduction to project</td>
<td>Provide introduction to employees of a department</td>
<td>PowerPoint deck</td>
<td>In-Person</td>
<td>A quick 30-minute departmental status meeting</td>
<td>Minimal</td>
</tr>
<tr>
<td>Introduction to functionality of the BI tools</td>
<td>Increase awareness about the BI tools</td>
<td>BI tools demo</td>
<td>Webinar</td>
<td>Open for all employees during the project deployment phase</td>
<td>Minimal</td>
</tr>
<tr>
<td>Status update about the project</td>
<td>Status update about the project</td>
<td>Word document</td>
<td>Email</td>
<td>Status update about the project at a periodic interval</td>
<td>Minimal</td>
</tr>
<tr>
<td>New feature</td>
<td>Introduce new features to business users</td>
<td>Newsletter</td>
<td>Email and/or lunch-and-learn session</td>
<td>Post deployment phase</td>
<td>Minimal</td>
</tr>
</tbody>
</table>

Table 4.7.1. Sample Communication Plan
4.7.2. Determine the Needs of Stakeholders

You interviewed your stakeholders in Phase 1 to determine their issues and concerns, and whether they supported the project. Now you want to establish communication objectives for each of the stakeholders. For example:

- A communication objective for the project sponsor is to keep the project manager in the loop regarding strategic changes to the business.
- A communication objective of the project manager is to keep the team informed of what is going on and to provide credit and recognition when it is due.
- You must include the project team, sponsor, suppliers, and the delivery and performing organizations’ management and others who may need information regarding the project.

Table 4.7.2.1 identifies some of the key stakeholders and the type of information they may require.

<table>
<thead>
<tr>
<th>Business Stakeholders</th>
<th>Key Knowledge Need</th>
<th>PM Communication Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Management</td>
<td>• Information to understand business impact of business initiatives</td>
<td>• Gather necessary information from project teams</td>
</tr>
<tr>
<td></td>
<td>• Consistent, cross-discipline information</td>
<td>• Present cross-team information in management information format</td>
</tr>
<tr>
<td></td>
<td>• Planned versus actual</td>
<td>• Meet cross-enterprise requirements for project information</td>
</tr>
<tr>
<td></td>
<td>• Progress</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Cost</td>
<td></td>
</tr>
<tr>
<td>Project Manager</td>
<td>• Information to support decision-making</td>
<td>• Define cross-team standards</td>
</tr>
<tr>
<td></td>
<td>• Defined plans to assess progress</td>
<td>• Gather, review, and integrate information</td>
</tr>
<tr>
<td></td>
<td>• Budget/actual financial information</td>
<td></td>
</tr>
<tr>
<td>Other Business Communities</td>
<td>• Information on business projects</td>
<td>• Disseminate information broadly</td>
</tr>
<tr>
<td></td>
<td>• Forum for discussion on issues</td>
<td>• Provide database for information access and update capability</td>
</tr>
<tr>
<td></td>
<td>• Background on business initiatives</td>
<td>• Present information for management assessment/decision making</td>
</tr>
<tr>
<td></td>
<td>• Information on issues requiring management direction</td>
<td></td>
</tr>
<tr>
<td>Core and Extended Project Teams</td>
<td>• Standards and templates</td>
<td>• Define templates and examples as required</td>
</tr>
<tr>
<td></td>
<td>• Forum for discussion of commitments and issues</td>
<td>• Define and implement standard processes</td>
</tr>
<tr>
<td></td>
<td>• Support for planning and administration</td>
<td>• Host inter-team meetings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Project planning and support</td>
</tr>
</tbody>
</table>

Table - 4.7.2.1 - Key Stakeholders [3]
4.7.3. What Should You Communicate?

Communication that is designed to support the information needs of each stakeholder and to support the flow of information between stakeholders is critical for project success. Here are several elements that should be communicated to stakeholders, based on their needs:

- **Progress Reports** - Highlight progress from the previous report.
- **Status Reports** - Provide project details for management review.
- **Forecast Reports** - Forecast project outcomes.
- **Report Cards** - Provide a management summary of each project. The report cards can also be consolidated and submitted to the quality assurance office for review.
- **Project Issues** - Highlight critical items affecting projects. The issues and action items should be maintained in a data repository; the results are consolidated and reports provided to the project manager.
- **Budget/Actual** - Provide the project budget and actual expense information.
- **Project Changes** - Highlight changes affecting project scope, vendor agreements, overall project plans, or deviations from the project.
- **Vendor Information** - Identifies and tracks those vendors supporting projects. Updates to the vendor information will be presented to the project manager as changes occur.
- **Consolidated Work Plans** - Consolidate all project plans to produce an extract of significant project deliverables. The deliverables list is reviewed on a biweekly basis with those who have a need to know.

4.7.4. When Should You Communicate?

Each stakeholder group may have different needs for receiving information. It is useful then to create a communications matrix. Table 4.7.4 shows an example of a communications matrix.
Table 4.7.4 - A Communications Matrix [3]

4.7.5. Communications Deliverable Template

A table similar to Table 4.7.5 can be used to identify and control the development and delivery of each communications deliverable.
### Table 4.7.5 - A Communications Deliverable Template [3]

<table>
<thead>
<tr>
<th>Audience</th>
<th>Messages</th>
<th>Media</th>
<th>Responsible Party</th>
<th>Date</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliverable</td>
<td>Approved?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project description</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audiences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key messages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication timing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback mechanism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advance notification</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication sign-offs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication Tools</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status web page</td>
<td>Provides anyone access to a project web page. Show web link.</td>
</tr>
<tr>
<td>General announcements</td>
<td>Announcements that go to everyone on the project. Show web link.</td>
</tr>
<tr>
<td>Global email</td>
<td>Allows for targeted email to predefined databases and responsibilities. Show global access telephone number.</td>
</tr>
<tr>
<td>Emergency numbers</td>
<td>List of specific numbers to an individual assigned as an emergency contact.</td>
</tr>
<tr>
<td>Voicemail</td>
<td>Used to send broadcast messages to all voicemail recipients. Show local telephone access number.</td>
</tr>
<tr>
<td>Executive status report line</td>
<td>At specific milestones executives receive an hourly update as to the completion of that milestone. Provide this status number only to executives.</td>
</tr>
</tbody>
</table>

- The **audience** could be team members, customers, business partners, managers, executives, and/or professionals who need to understand what deliverables are being developed and when they will be available.
- The **messages** column is defined by the specific communication this audience needs to be informed of at the appropriate time (prior to the completion of development or after delivery of the product).
- The **media** column indicates the type of communication (web, one-on-one, one-on-group, presentation, phone, email, and so on) that would go out to the specific audience.
The responsible party column identifies the person or organization that will develop the deliverable. If it is a group, the individual leader of the group should be identified by name.

The date column defines the timing of each communication. Delivery of these messages on a timely basis is necessary for the success of the project.

The owner column identifies the person who will provide direction and approve the finished product. This person will sign off on the communications plan before distribution. This individual approves draft communications before they are released.

4.8. DEVELOPING THE PROCUREMENT PLAN

The procurement management process consists of six separate processes and related activities involved in procuring goods and services needed for the project from external sources:

4.8.1. Deciding whether to make the product or buy it

The reason for “making” a product in-house must be substantiated by facts and figures. The facts should substantiate:

- Cost issues—have you covered everything?
- Intellectual property—how will you protect it?
- Proprietary and confidential processes—are they in place? Do you have to obtain nondisclosure agreements?
- Complete control over the product—do you really have it? Or do you really need it?
- Supplier unreliability or incompetence—how do you know? Have you checked references and feedback from previous times this vendor has been used?
- Volumes too small to attract a supplier—which suppliers have you checked?
- Quality control—can you measure it against existing criteria for quality or do you need to create a new quality control measurement?
Do you want to maintain a backup source?
Do politics or the environment impact your decision?

Whenever you are outsourcing, you have decided to buy. The following represents some reasons why organizations would choose to buy:

- You lack the required technical experience.
- The supplier is the leader in their field.
- The supplier can provide discounts.
- Strategic partnerships are possible.
- It costs less to buy than to make.
- You prefer one brand over another.

4.8.2. Conducting procurement solicitation process

Solicitation planning entails the writing of the various procurement documents needed to support issuance of solicitations and developing evaluation criteria that will be used to select the best value suppliers.

Knowing the estimated dollar value of the procurement will help you determine what procurement solicitation process you will choose. The dollar values are determined within your organization. Let’s look at the differences among several types of proposals:

- Preferred Vendors or General
- Requests for Quotes
- Requests for Information
- Requests for Proposals

4.8.3. Acquiring vendors and subcontractors

A vendor is an external organization or individual providing products or services under contract to the client or to the project performance group. Vendors are also referred to as outside contractors or subcontractors.

A subcontractor is a group or individual providing products or services to the project. Commonly, subcontractors are considered vendors.

4.8.4. Developing contractual statements of work
Once it has been determined that you will outsource your work item(s), it is time to prepare the statements(s) of work to enable the procurement process to begin. A good CSOW helps you do that. The elements of a CSOW include but are not limited to the following:

- Clear roles and responsibilities
- Location of work
- Security issues if necessary, such as access to proprietary information, key codes, building access codes
- Milestones and deliverables with acceptance criteria
- Clear description of quantities, technical specifications, and quality expectations
- Progress reports
- Payments
- Change control

4.8.5. Procurement Plan Template

The following represents a template that can be used to create your project procurement plan:

- Section 1: Specifications
  - Design specifications
  - Performance specifications
  - Functional specifications
- Section 2: Source Selection Package
  - Bid documents (usually standardized)
  - List of qualified vendors (expected to bid)
  - Proposal evaluation criteria
  - Bidder conferences and schedules
  - How change requests will be managed
  - Supplier payment plan
- Section 3: Procurement Actions
  - What procurement actions the project team is authorized to execute on its own without reference to the procurement department
✓ What status reports the project team will require from the procurement department on outsourced items
✓ How multiple providers will be managed
✓ How procurement will be coordinated with other aspects of the project
✓ Purchasing decisions (including authority to commit)
✓ Make-or-buy decisions with supporting data

- Section 4: Procurement Documents
  ✓ Requests for quotes
  ✓ Requests for information (RFIs)
  ✓ Requests for proposals (RFPs)

- Section 5: Types of Contracts
  ✓ Firm fixed price (FFP)
  ✓ Fixed-price incentive (FPI)
  ✓ Cost plus fixed fee (CPFF)
  ✓ Cost plus incentive fee (CPIF)
  ✓ Cost plus percentage of cost (CPPC)
  ✓ Cost plus award fee (CPAF)
  ✓ Time and materials (T&M)

- Section 6: Contract Administration
  ✓ Change management
  ✓ Specification interpretation
  ✓ Adherence to quality
  ✓ Warranties
  ✓ Subcontractor management
  ✓ Production surveillance
  ✓ Waivers
  ✓ Contract breach
### Procurement Plan Format

**For goods (materials, equipment and supplies)**

<table>
<thead>
<tr>
<th>Item description</th>
<th>Month needed</th>
<th>Quantity</th>
<th>From where to buy?</th>
<th>Estimated cost</th>
<th>Procurement Method</th>
<th>Procurement Schedule</th>
<th>Contract award</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Upgrade (IT)</td>
<td>April</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>March</td>
</tr>
<tr>
<td>License Renewal (IT)</td>
<td>April</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>March</td>
</tr>
<tr>
<td>Oil and Gas Software (OGS)</td>
<td>April</td>
<td>1</td>
<td>AnGis</td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>March</td>
</tr>
<tr>
<td>Oil and Gas OGS (OGS)</td>
<td>April</td>
<td>1</td>
<td>Amazon</td>
<td></td>
<td>Direct Contract**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Software License Renewal (IT)</td>
<td>May</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>May</td>
</tr>
<tr>
<td>New Software (IT)</td>
<td>May</td>
<td>1</td>
<td>Limited Tender</td>
<td>March 4, 2013</td>
<td></td>
<td></td>
<td>April 11, 2013</td>
<td>May</td>
</tr>
<tr>
<td>License Renewal (IT)</td>
<td>June</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>April 22, 2013</td>
</tr>
<tr>
<td>Energy Efficiency Project in Schools Lighting Fixtures to include fluorescent tubes (FL), electronic- ballasts, lamps etc</td>
<td>June</td>
<td>1</td>
<td>LCD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Energy Efficiency Project in Hospitals**
- Lighting Fixtures to include Solar PV, Stand-alone, fluorescent tubes (FL), CFL, LED, lamps etc

<table>
<thead>
<tr>
<th>Item description</th>
<th>Month needed</th>
<th>Quantity</th>
<th>From where to buy?</th>
<th>Estimated cost</th>
<th>Procurement Method</th>
<th>Procurement Schedule</th>
<th>Contract award</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Purchase (OGS)</td>
<td>July</td>
<td>1</td>
<td>Kingdom Software</td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>July</td>
</tr>
<tr>
<td>Solomon Project Module (IT)</td>
<td>August</td>
<td>1</td>
<td>Solomon</td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>August</td>
</tr>
<tr>
<td>License Renewal (IT)</td>
<td>August</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>August</td>
</tr>
<tr>
<td>Generator Replacement (Admir)</td>
<td>August</td>
<td>1</td>
<td>Local Competitive Bidding</td>
<td>July 1, 2013, July 13, 2013, August 8, 2013, August 15, 2013, August 20, 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solomon Baa</td>
<td>November</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>November</td>
</tr>
<tr>
<td>License Renewal</td>
<td>December</td>
<td>1</td>
<td></td>
<td></td>
<td>Direct Contract</td>
<td>-</td>
<td>-</td>
<td>December</td>
</tr>
<tr>
<td>Item description</td>
<td>Month</td>
<td>Work order</td>
<td>Quantity</td>
<td>From whom</td>
<td>Estimated cost</td>
<td>Procurement Method</td>
<td>Procurement Schedule</td>
<td>Bid evaluation and contract award</td>
</tr>
<tr>
<td>----------------------------------</td>
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<tr>
<td>Inter/Interrior</td>
<td>July</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Local Competitive Bidding</td>
<td>May 15, 2013</td>
<td>June 1, 2013</td>
</tr>
<tr>
<td>Repairs to Painter Doors</td>
<td>August</td>
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<td></td>
<td>Local Competitive Bidding</td>
<td>June 19, 2013</td>
<td>July 1, 2013</td>
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<tr>
<td>Roof Decking</td>
<td>August</td>
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<td></td>
<td></td>
<td></td>
<td>Local Competitive Bidding</td>
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Table - 4.8.1–Procurement Plan Template
4.9. DEVELOPING THE QUALITY MANAGEMENT PLAN

Quality of a project is measured by whether the project meets or exceeds customer expectations. The expectations, of course, are the product (deliverables), service, or result the customer will receive throughout the project.

A project quality plan is simply a set of actions defined at the onset of the project that will produce quality results during the execution of the project.

4.9.1. Quality Planning

There is a difference between planning for quality and creating the quality plan. Planning for quality is the prerequisite to the quality plan.

There are nine basic steps in the quality planning process:

1. Review the documents for quality language.
2. Identify a quality team and leader.
3. Identify plan components and owners.
4. Negotiate specific quality assurance (QA) requirements.
5. Plan the QA and quality control (QC) steps for the project.
6. Educate the project team on QA/QC guidelines.
7. Incorporate QA/QC tasks into the project plan.
9. Collect and report QA/QC data and re-plan if necessary.

4.9.2. Collect the Right Data

The development of the quality plan document begins with the collection of all the information needed for the project. The data to collect will depend on what product, service, or result is being delivered, and might include the following:

- Customer quality characteristics or product description
- Attribute description
- Technical specifications with tolerance ranges
- Blueprint drawings
- Configuration diagrams
- Legal or regulatory guidance documents
- Standards documents
- Calendar
Measurement devices
Any other relevant information from the scope statement or other project documents to get started

4.9.3. Establish Valid Requirements

Indicators help you determine whether your processes are capable of meeting your customer’s needs. An indicator is defined as a measure of meeting valid requirements. Indicators are used to monitor both the effectiveness or condition of a part of the work process (process indicators) and the quality of the output or outcome of the process (quality indicators).

No matter what type, all indicators should have the following characteristics:

- **Measurable** - They can be expressed quantitatively (in time, dollars, customer specifications, and so forth).
- **Verifiable** - Multiple, independent observers of the process should be able to agree on the results obtained from measuring the process. Accurate records should be kept so the measurements can be tracked over time.
- **Cost-effective** - Indicators must be chosen with economy of time and cost in mind. Ideally, data for indicators will be available from existing sources and/or management information systems.

4.9.4. The Quality Management Plan

The quality management plan describes how the project management team will execute the project while complying with policies, standards, or legal requirements. The following represents a quality plan template that you may find useful:

- **Section 1: Quality Control Activities** - Describe the planned approach for verifying that the required quality has been obtained.
- **Section 2: Project Management Quality Activities** - Describe activities such as compliance reviews, templates, and checklists.
- **Section 3: Quality Assurance Checkpoints** - Describe points in the project when checks will be made to verify that the quality control
activities and project procedures have been implemented effectively.

- **Section 4: Quality Roles and Responsibilities** - Define the quality roles of all participating in the project—for example, the functional manager delivers the work product as described in the acceptance criteria pertaining to that work product.

- **Section 5: Work Products and Quality Characteristics** - Describe the work products for each deliverable and the set of attributes assigned to them.

- **Section 6: Quality Criteria** - Describe the measurable properties of work products that must be implemented to ensure that the level of quality for a particular quality characteristic will be met.

- **Section 7: Quality Contributors** - Include project elements such as skills, standards, tools, methods, and procedures that when applied will contribute to achieving specified quality criteria and customer satisfaction.

- **Section 8: Quality Standards** - When appropriate, include a mapping of quality contributors and project procedures to required quality standards such as the International Organization for Standardization (ISO) or the American National Standards Institute (ANSI).

- **Section 9: Technical Specifications** - These may be separate documents, but include them in the quality plan.

- **Section 10: Project Schedule** - Attach a Gantt chart that shows the activities and time scales necessary to implement quality tasks.

- **Section 11: Assumptions** - Define important assumptions on which the quality plan is based.

- **Section 12: Dependencies** - Describe any external dependencies on which the plan depends.

- **Section 13: Risks** - Describe the risks that will affect quality.
- **Section 14: Costs** - Define the costs associated with implementing this project quality plan, not including costs accounted for elsewhere in the project management master plan.

- **Section 15: Corrective Actions** - Describe the procedures for taking corrective actions for the problems encountered during project execution.
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(for acceptance) <Name> <Project Title> Project Manager

ACCEPTED: ___________________________________ Date: ___ - ___ - ___
(for release) <Name, Title> <Project Title> Project Sponsor on behalf of the <Project Title> Project Steering Committee

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Table - 4.9.1– Quality Management Plan Template

4.10. DEVELOPING A CHANGE MANAGEMENT PLAN
Change is inevitable. Just when you think the project plan is cast in stone, a change pops up. You want to be able to do the following:

- Manage each request for change, in order to ensure that any new scope, cost, and/or schedule of the project remains under control and has full traceability
- Make sure each request for change is assessed by all affected functional areas
- Make sure each assessed change request has a decision made (accepted, rejected, or deferred) by the appropriate authority

The project manager drives the decision-making process and ensures that all the stakeholders who might be impacted by the change are fully involved.

The change management process includes sub-processes to:

- Briefly assess each proposed change
- Analyze the potential impact of the proposed change on the project as a whole
- Decide how to proceed with a change request (CR) after its impact has been analyzed
- Monitor the progress of approved changes until they are complete

Additionally, a change review board (CRB) or change control board (CCB) should be engaged if the changes affect the project scope, the original schedule, and/or costs beyond the authority level delegated to the project manager.

### 4.10.1. What is a Change Request?

A change request is a request to change some aspect of the project after it has been approved and committed. Change requests may affect one or several of the following:

- Work to be done or work in progress, with regard to schedule, solution definition, deliverables, and so on
- Business plans or procedures, including project costs or acceptable risk levels
- Obligations within a statement of work, or other formal agreements with customers or vendors

### 4.10.2. The Change Request Process
The change request procedure is launched when a change is requested after specific deliverables are approved, and anytime after exiting the planning phase if the change would affect the project’s schedule, scope, or costs. The end result of the procedure is one of the following:

- The change is accepted and will be implemented.
- The change is rejected.
- The change is deferred.

**Step 1: Submit, Receive, and Review the Change Request**

In this step a change request is submitted and assigned a number. The change request documents the need and rationale for the proposed change.

**Step 2: Conduct an Impact Analysis**

The purpose of this sub-process is to provide the approving body with the detailed information it needs to decide whether to implement a proposed change.

**Step 3: Make a Decision on the Change Request**

The purpose of this step is to describe how to proceed with a CR after impact analysis has been completed.

**Step 4: Follow Escalation Procedures**

The purpose of this sub-process is to describe what steps are required when a change request accepted by a project team is outside of the authority level for that team and project manager.

**Step 5: Manage Change Orders**

The purpose of this step is to manage the implementation of the change requests by revising the project management plans and procedures to reflect the approved change and periodically checking the status of the associated CR.

---

4.11. DEVELOPING THE RISK MANAGEMENT PLAN
Risk is often thought of as something negative, something that should be avoided. Depending on whether one is a risk seeker or opposed to risk, opinions will often lead to very different results.

4.11.1. Risk Identification

Identifying risk events is a major part of the up-front planning process. It should be incorporated into the planning process before implementation occurs.

Risk identification must occur as early in the project as possible, but is typically the last of the subsidiary plans to be created before the overall project plan is finalized.

These tools can be used for risk identification:

- Documentation reviews
- Information-gathering techniques:
  - Brainstorming
  - Delphi technique—another way of obtaining group input for ideas and problem-solving. A question is posed and sent out for answers. When the answers are returned, the results get distributed to all who participated by a facilitator who sent out the original questions. There may be voting involved, but in any case, anonymity is the key with this process.
  - Interviewing
  - Root cause analysis
  - Checklists analysis
  - Assumptions analysis
  - Diagramming techniques, such as cause and effect or flow charting
  - SWOT (strengths, weaknesses, opportunities, and threats) analysis

4.11.2. Risk Categories
Organizational risks include cost, time, and scope objectives that are internally inconsistent, lack of prioritization of projects, insecure funding, and resource competition.

External risks could include a shifting legal or regulatory environment; labor issues; country risk; weather; unavailability of raw materials; permitting difficulties; postulated events such as vandalism, terrorism, or sabotage; or social and environmental issues.

Other risks include the following:

- Personnel
- Human resource management
- Financial
- Operational
- Natural and man-made disasters
- Political
- Economic cycle/marketing
- Contractual/legal
- Requirements changes
- Design changes
- Task omissions
- Estimating and scheduling errors
- Technical errors
- Staff turnover, illness or death, unplanned vacations and leaves of absence
- Late delivery of external deliverables
- Priority changes that result in loss of resources, including support work
- Late approvals and acceptances
- Extended learning curves
- Unavailable or unreliable tools and methods
- Assumptions that turn out not to be true

4.11.3. Perform Qualitative Risk Assessment
After you have identified the risks, the next process for risk management is qualitative analysis. In this process, you want to determine the likelihood of occurrence and the impact of the risk if it does occur.

- **Sizing the Probabilities of Risk Likelihood**
  Project stakeholders must agree on the break points between severity descriptors and percentages associated with them in order to be consistent in their assessment regarding the likelihood that a risk event will occur:
  - Very low may indicate a 5% likelihood of occurrence or that the risk event hasn’t happened within the past five years.
  - Low may indicate a 20% likelihood of occurrence or that the risk event has happened within the past five years.
  - Medium may indicate a 40% likelihood of occurrence or that the risk event has happened once or twice within the past 24 months.
  - High may indicate a 60% likelihood of occurrence or that the risk event has happened once within the past 12 months.
  - Very high may indicate an 80% likelihood of occurrence or that the risk event has happened on a regular basis over the past 24 months.

- **Sizing the Impact of Risk Events or the Amount at Stake**
  Impacts, or consequences associated with risk, are examined to assess the consequences to project objectives. The following are examples of using severity descriptors:
  - Very low may mean having insignificant impact on the project objectives (for example, 5–10% slippage on the schedule and/or budget).
  - Low may mean having minor outcomes that are unlikely to have a permanent or significant effect on the project objectives (for example, a 20% chance that materials won’t arrive when planned).
Medium may mean having a potentially serious impact that can be managed without major impact to the project objectives (for example, a 40% chance that training will be delayed by one month).

**4.11.4. Plan Risk Responses**

Risk-response planning is the process of developing responses to the risks identified and analyzed in the previous steps. Possible responses to any risk include avoidance, transference, mitigation (reducing the probability and/or impact), and acceptance. After responses are developed, they should be recorded on the risk register.

**4.11.5. Create the Risk Management Plan**

The following presents a Risk Management Plan Template:

- **Section 1: Management Strategy**
  - Describe the risk methodology you used for the following:
    - Risk identification
    - Risk categories
    - Risk probability and impact
    - Risk priorities
    - Risk assumptions

- **Section 2: Risk-Response Plan**
  - Describe your response strategies (mitigation, sharing, transference, and so forth) for each risk.
  - Document the detailed response for each risk and whether it is cost/schedule-effective.
  - Describe what will happen if the risk event occurs.
  - Describe triggers, including timeframes.
  - Assign a responsible person for each risk response.

- **Section 3: Risk Monitoring**
  - Describe what dates and actions were taken to mitigate risk.
Document whether those mitigation strategies were successful. (Was there a contingency plan and was it sufficient as planned?)

Describe successive actions needed to overcome or reduce the risk.

Establish a review schedule.

Validate assumptions.

Review the risks

Section 4: Risk Control

Confirm that risk strategies are still valid.

Take corrective action when risk events occur that are outlined in the risk-response plan.

Assess actual impacts in terms of time, cost, and quality.

Ensure that the master project management and risk plan is being followed.

Ensure that the change control plan is being followed.

Make revisions as needed
DOCUMENT ACCEPTANCE and RELEASE NOTICE

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(for acceptance) (<name>, <Project Title>, Project Manager)

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(for release) (Project Sponsor, <name>)
on behalf of the <Project Title> Steering Committee

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Table - 4.11.-Risk Management Plan Template

4.12. CHAPTER SUMMARY
This chapter presented the essential processes within the Planning Processes Group which focuses on the development of the overall Project Management Plan. The usage of Project Management software, in this case Microsoft Project was also given particularly in the development of the WBS and the project’s schedule. Planning a project can be as simple or elaborate as you make it but no matter what, proper planning will decide the fate of a project.

4.13. ASSIGNMENT

You are required to perform the following, either individually or in a group:

Assignment 4.13.1

You have just determined the following major activities required for the implementation of a new telephone system:

A: Conduct station reviews (3): Predecessor none
B: Obtain network requirements (2): Predecessor none
C: Create station designs (2): Predecessor A
D: Create network cable design (4): Predecessor B
E: Build out switch room (8): Predecessor B
F: Install patch panel in switch room (2): Predecessor E
G: Install hardware (3): Predecessor E
H: Install cable (2): Predecessors D, E
I: Tie down cable to patch panel (3): Predecessors F, H
J: Install, program, and test stations (2): Predecessors C, G, I
K: Conduct continuity tests (4): Predecessor J
L: Test software (1): Predecessor K

1. Using the precedence diagramming technique, draw the network diagram for this project and calculate the ES, EF, LS, and LF of each of its activities.
2. Determine the critical path.
3. Show all float

Assignment 4.13.2
Answer the given questions based on the given table below. Conduct further research for your solutions in the PERT exercise.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Predecessor</th>
<th>Successor</th>
<th>Optimistic</th>
<th>Most Likely</th>
<th>Pessimistic</th>
<th>PERT Duration</th>
<th>Critical Tasks</th>
<th>Variance of Critical Tasks</th>
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<tbody>
<tr>
<td>A</td>
<td>None</td>
<td>B, D, E</td>
<td>6</td>
<td>7</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>A</td>
<td>C</td>
<td>8</td>
<td>10</td>
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</tr>
<tr>
<td>C</td>
<td>B, D</td>
<td>G</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td></td>
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</tr>
<tr>
<td>D</td>
<td>A</td>
<td>C</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>A</td>
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<td>2</td>
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1. Create the network diagram.
2. Determine the critical path.
3. Determine the variation for each task on the critical path
4. What is the total variation for the project?
5. What is the standard deviation of this project?

4.14. CASE STUDY

Toys with Us Ltd. would like to create a new toy for 5 to 9 year olds. They hire you to be the Project Manager. You will prepare the first version of the project schedule for the project named “TOYS.” The title of the Project should be “Toys for 5 to 9 year olds.”

When preparing the schedule, you will use day as the planning unit with 4 workdays per week that should start every Saturday. The Project must start on 1st of September 2015. To prepare the TOYS calendar, you must consider the schedule of the holidays from 12th to 16th of September 2015. The project will have the following activities (using activity ID M1 with increment of 2) and details:

**M1.** The first task should be Market Research with 10 days duration (5 days for Surveys and 5 days for Research and Analysis). It should be done by the System Analyst (SA) using laptop and printer.

**M3.** Product Design should start at the same time with Market Research with duration of 15 days. Part of this task is Design, Concept Modules and
Design Selection with 5 days for each task. The Designer (D) is the one in charge of this task together with the System Analyst using laptops and printer.

**M5.** After Market Research is **Product Development** that will be done by the Product Developer (PD) together with the Designer within 20 days. Part of this task is Prototyping. They will use desktop, scanner, printer and plotter.

**M7.** After Market Research, Product Design and Product Development, next is **Production Planning** that should be done by you together with the Designer and System Analyst. It will take 25 days for this task. Part of this task is Production Design that will take for 15 days and Production testing that will take for 10 days. They need laptop, projector, printer and scanner.

**M9.** After Product Development and Production Planning, the next is **Marketing** will take 15 days to be done by the Account Executive (AE). In this task includes Marketing strategy (3 days), Marketing Plan (5 days) and Marketing Collateral (7 days doing brochures, advertising and commercials).

**M11.** **Project Management** is next after Product Development, Production Planning and Marketing and it should be your main task and will take 30 days using laptop, printer and scanner.

A. Defining the Project schedule.
B. Creating the calendar, setting workdays and holidays.
C. Assign Finish to start relationship between activities in the PERT View.
D. Creating a resource table and assigning the resources to the Project activities.
E. Organize the Work Break Structure.
F. Draw the PERT diagram indicating start to end activities.
G. Identify the critical path from the PERT diagram.
H. Compute the total float/slack for each activity.
I. Compute for the total project float.

### 4.15. HANDS-ON

You are required to perform the following, either individually or in a group:
If you are using Microsoft Project, see the Microsoft Project Laboratory Manual and perform the following:

4.14.1 Laboratory Work: Outlining (Creating the WBS)
4.14.2 Laboratory Work: Estimating Duration
4.14.3 Laboratory Work: Using WBS Codes

If you are using Primavera Project Planner, see the Primavera Project Planner Laboratory Manual and perform the following:

1.2 Laboratory Work: Estimating Duration
1.7 Laboratory Work: Entering the WBS and Using WBS Codes

4.16. REFERENCES USED

4. http://nptel.ac.in/courses/112107142/30
5. Primavera Laboratory Manual, Higher College of Technology, Muscat

Chapter 5-PROJECT EXECUTION
5.1. INTRODUCTION

This chapter deals with the processes needed to create the Project Plan. The Executing Process Group consists of those processes performed to complete the work defined in the project management plan to satisfy the project specifications. This Process Group involves coordinating people and resources, as well as integrating and performing the activities of the project in accordance with the project management plan.

5.1.1. Objectives

The objectives of this Chapter are:

- Describe how to manage and direct project plan.
- Apply quality management plan and assessment to the project.
- Determine and perform managerial process and skills in holding project team.

5.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze organization structures.
- Analyze concepts of Quality Management, Assurance and Control.
- Analyze risks and manage them.
- Analyze project execution and manage it.
- Evaluate set-targets, deliverables and conflict resolution documents.
- Analyze team management.

5.1.3. Terminologies

- **Seller** - A provider or supplier of products, services, or results to an organization.
- **Risk** - An uncertain event or condition that, if it occurs, has a positive or negative effect on a project’s objectives.
- **Resource** - Skilled human resources (specific disciplines either individually or in crews or teams), equipment, services, supplies, commodities, material, budgets, or funds.
- **Quality** - The degree to which a set of inherent characteristics fulfills requirements.
- **Contract** - a mutually binding agreement that obligates the seller to provide the specified product or service or result and obligates the buyer to pay for it.

5.2. **OBTAINING AND MANAGING PROJECT RESOURCES**

Project resources are the most valuable commodity on your project. Obtaining and managing resources includes the following tasks:

- Acquire resources
- Activate resources
- Orient and assimilate your team

5.2.1. **Acquire Resources**

There are nine steps to this process:

1. Review corporate guidelines for recruiting and staffing procedures, particularly regarding Equal Employment Opportunities (EEO) guidelines.
2. Review candidate résumés and compare to the staffing plan to see whether an interview should be conducted.
3. Conduct the interview.
5. Review assessments and determine whether the candidate meets your requirements.
6. Contact the sourcing organization and provide feedback.
7. Plan for new staff training, if needed.
8. Update the resource and staffing plan.
9. Update the organizational chart.

5.2.2. **Activate Resources**
As the project progresses, staffing continues in order to extend existing resource commitments or to acquire replacement staff, and is dependent on the recruiting and procedures of the delivery organization. This process has six steps:

1. Review the existing resources and future staffing requirements.
2. Review constraints such as budget, specific staff providers only, citizenship requirements, availability for travel, and so on.
3. If external resources are needed, check the current labor pool.
4. Develop a staff requisition document in compliance with corporate standards and include special skill requirements if needed.
5. Evaluate trade-offs between numbers of personnel available and needed skills.
6. Agree on a timetable for completion of recruitment processes

5.2.3. Orient and Assimilate the Team

The purpose of this process is to provide all new members of the project team with a clear understanding of the project, their roles within the project, and the facilities they will need to perform their duties on the project. This process is done in six steps:

1. Review the goals and objectives of the project, including information about the client, the project management system, technical approach, deliverables, and so on with the new team member.
2. Review the detailed project plans that they are part of.
3. Ensure that appropriate facilities or office space and tools needed are supplied (either by the functional manager or the project office).
4. Assign and review the work package with the new member.
5. Confirm work assumptions and gain commitment from the new member.
6. Review the team rules that have been established.

5.3. STEPS IN PROJECT EXECUTION
5.3.1. Build Deliverables

The first and most important step in the execution phase is the construction of each of the project deliverables specified within the project specified within the project charter. During this activity, a detailed design of each deliverable is created and the deliverables are physically constructed and tested. The deliverables are then reviewed by the Quality manager and the customer to determine whether they meet the quality criteria and the acceptance criteria. If all of the criteria have been met, the deliverables are signed off on by the customer, ready be handed over to the customer environment. After all the deliverables have been produced and signed off by the customer, the project is ready for closure.

5.3.2. Monitor and Control

Alongside the build deliverables activity, the project manager performs a suite of management processes to monitor the control the time, cost, and quality of each deliverable being produced as follows:

5.3.2.1. Perform Time Management

This is the process of monitoring and controlling the time spent by staff on the project. Timesheets may be used to track and record time spent.

5.3.2.2. Perform Cost Management

Ensuring the delivery of projects within budget is always a difficult task. To monitor and control cost effectively, a cost management process is put in place to identify project costs and to record the rate of consumptions of the project budget.

5.3.2.3. Perform Quality Management

To ensure that the project produces deliverables that meet customer requirements, it is necessary to use a formal quality management process. This process involves quality assurance and control
activities as specified in the quality plan to manage a project’s level of quality.

5.3.2.4. Perform Risk Management

While managing time, cost and quality can be full time job, another key process within project management is the mitigation of project risks. To perform risk management on a project, you need to monitor and control project risks by taking the steps necessary to prevent risks and also minimize the impact on the project should those risks occur.

5.3.2.5. Perform Issue Management

Unforeseen issues often arise that impact the ability of the project to meet its stated objectives. The key to success is having a process in place to review and resolve issues before they severely impact on the project.

5.3.2.6. Perform Procurement Management

Project often require goods and services from external suppliers to help them meet the objectives sets. In these situations, a procurement management process is put in place to monitor and control the performance of project suppliers.

5.3.2.7. Perform Acceptance Management

You may deliver a suite of top class deliverables, but unless the customer accepts that your deliverables meet their requirements then the success of the project will be compromised. To gain the customers approval of each deliverables, acceptance reviews should be undertaken as part of an acceptance management process.

5.3.2.8. Perform Communications Management

Everyone on the team needs to be kept regularly informed of the progress of the project. By completing the communications activities listed in the communications plan, you will ensure that every stakeholder within the project receives the right information at the right time.
5.3.3. Perform Phase Review

With all your deliverables signed off on by the customer, you are almost ready to close the project. But first, a phase review is undertaken to ensure that all of the required activities in the execution phase have been completed and the project is ready to proceed to the closure phase.

5.4. DIRECTING AND MANAGING PROJECT EXECUTION

Efficient execution of the project relies on the direction and leadership of the project manager, the support of senior management, resource managers, and the commitment of team members, but mostly relies on the project manager.

Directing and managing project execution includes the following tasks:

- Use your expert judgment
- Use the project management information system to execute the tasks on your project
- Execute the communications plan

5.4.1. Use your expert judgment

You were chosen to be a project manager because you have proven that you have the leadership and managerial expertise to bring the project to fruition. This, along with your team members and the technical expertise they provide, is a great start in managing project tasks. Other avenues of expertise are also available to you and your team, including your in-house experts, outside consultants, and your stakeholders, as well as professional and technical associations. Use other experts when you need them, and your expertise will improve exponentially.

5.4.2. Use the Project Management Information System (PMIS) to execute the tasks on your project

A PMIS provides you with an information collection and distribution process for all of your project management documents, access to intranet or Internet
sites, scheduling software, and configuration management databases, and so forth.

In the absence of an active PMIS, you’ll have to create your own project control book to manage the project. Let’s take a look at some tools that may be useful to you as you create your project control book and manage the project:

- **Work Authorization Form**
  
  Most of your resources are internal, but for those who are external to the project, you must provide a notice to proceed. Figure 5.4.2.1 represents a work authorization form.

  ![Work Authorization Form](image)

  Figure 5.4.2.1 - Work Authorization Form [3]

- **Extra Work Authorization Form**
  
  You want to be sure that suppliers and vendors understand that work not approved is work not paid. Figure 5.4.2.2 represents a form for extra work authorization.
5.4.3. Execute the Communications Plan

The following things are to be done in the execution of the Communications Plan:

- **Information Distribution**
  
  A considerable amount of information must be distributed during a project. You’ll create project reports that describe the status of the project, the status of issues, approved changes, and lessons learned during the time cycle for the reports.

- **Performance Reporting**
  
  Performance reporting includes the processes of collecting and disseminating performance information. This includes status reporting, progress measurement, and forecasting.

  - **Status Reporting**
    
    Status reporting describes where the project now stands since the last status report. The elements of a comprehensive status report should include these elements:
    
    ✓ Status summary of the health of the project.
    ✓ Accomplishments for the report period, including the following:
- Milestones achieved
- Milestones planned but not achieved
- Deliverables completed
- Work packages planned but not completed

- Accomplishments planned for the next period
  - Milestones to be achieved
  - Deliverables to be completed
  - Summary of issues

- Risks
- Changes
- Action items

- **Progress Reporting**
  Progress reporting describes what the project team has accomplished since the project began. These are elements of a progress report:
  
  - Progress of deliverables identified in the work statement
  - Comparisons of expenses to the expected budget to date
  - Effectiveness of the project to date
  - Current challenges in completing the project
  - Quality assessment
  - Risks

- **Communicating with your Sponsor**

  Other than friendly chatter, there are typically three other types of communications you will have with your sponsor:
  
  - **Incident communications**- Occurs if there is a complaint from a client or a problem that needs solving with the sponsor’s assistance.
Informal communications - You will want to meet with the sponsor on a regular basis to informally discuss the project (such items as overall state of the project, progress, and performance, as well as successes).

Formal communications - This is typically done in report form and includes the following:

- Summary of accomplishments for the current period and planned accomplishments at the next reporting period at the milestone and deliverable level
- Summary of cost and schedule information
- Review of change orders, issues, and risks
- Issues or risks that impact the sponsor and require the sponsor’s involvement or support
- Discussion of sponsor concerns
- Identification of opportunities and threats related to actions requested by the sponsor

Communicating with the Project Team

The three types of communications you have with your sponsor will be the same for your project team. During incident communications, again you will assess the degree of urgency associated with the incident.

The second type is informal communications. You will meet with the project team (face to face or electronically) on a regular basis (daily, weekly, monthly, as appropriate) to informally discuss the project.

Formal communications are the third type of communication. You should create pre-agreed-upon status reports.

5.5. IMPLEMENTING THE QUALITY MANAGEMENT PLAN
Implementing the quality plan begins with quality assurance, which is a proactive process that helps execute the project and delights the customer. Quality assurance begins when you begin the work on the project. The Quality Assurance Plan should be multifunctional (so the plan can be repeated elsewhere in the organization) and prevention oriented.

5.5.1. Details

Quality assurance is preplanned. It is an integral part of your Project Quality Management Plan; with predetermined check steps that you have placed within your project to ensure that the project fulfills its goals.

5.5.2. Data Quality Definitions

Whenever you are collecting data about anything, be sure that they conform to the following:

- **Accuracy** is the most important element when it comes to data. With accurate data, you can validate your requirements.
- **Reliability** is ensuring that the data is consistent every time. You have tested the data using the same processes and come up with the same results each time.
- **Completeness** is defined as being satisfied with the end result and knowing that there is nothing more you need to do.
- **Precision** is having a degree of exactness based on certain predetermined measurements.
- **Data** are considered timely when they are up-to-date and when the information is available on time. Timeliness can be affected by the rate at which an item is updated, the rate of change, and when the information is actually used or required.
- **Integrity** is when data are protected from deliberate bias or manipulation for political or personal reasons.

5.5.3. Cost of Quality
Cost of quality refers to the total cost of all efforts to achieve product or service quality, such as reworking.

5.5.4. Cost of Conformance

Prevention and appraisal activities are considered a cost of conformance to quality. Design reviews, training, and quality planning are also associated with the costs of prevention activities.

5.5.5. Cost of Nonconformance

Joseph Juran, a noted quality expert, spoke often of the cost of not conforming to quality, referring to the impacts of internal and external failure. Internal failures are those that occur before leaving the organization and include scrapping, reworking, repairing, and evaluating defects.

5.5.6. Quality Audits

One of the quality assurance tools is a project audit. A project audit can be performed randomly or at specified times within each phase of the project. The intended outcome of the audit is to confirm the following:

- The planned project quality requirements are met.
- The products are safe and fit for the customers’ use.
- All laws and regulations have been followed.
- Data systems to track, measure, and report quality attributes and quality characteristics are accurate and adequate.
- Any variances identified during quality checks are addressed by appropriate corrective action.
- Any opportunities for continuous improvement are noted for future action.

5.6. PERFORMING QUANTITATIVE RISK ASSESSMENT

The risk management plan is a living document throughout the project life cycle. Some risks will not happen; others happen that you did not plan for. Use your risk register to document new risks and what you’ll do with identified ones.

5.6.1. Perform Quantitative Risk Analysis
The results of your qualitative analysis determined which risks you’ll use in this process. Normally you would work on risks that were qualified as high impact and high probability of occurrence. Any risk that is high probability and high impact should be treated with a sense of urgency.

### 5.6.2. Interviewing

Follow these steps to conduct a successful data collection interview:

1. Interview project stakeholders and subject matter experts in order to quantify the probability and consequences of risk on the project objectives.
2. The project manager must then define the benefits and boundaries of the project and document the rationale of the risk ranges discovered during the risk qualification process.
3. The project manager must prepare for the risk interview by performing triage on key risk elements in order to establish risk ranking.
4. Set up a meeting with the subject matter experts and those who planned and will manage the work.
5. Conduct the interview. Everyone’s views are valuable but do challenge the ranges they may give you.
6. If the relationship between risk and probability is uncertain, then you as the project manager may choose to perform three-point estimating as you did while using the Program Evaluation and Review Technique (PERT) in Phase 2 for project tasks.

### 5.6.3. Sensitivity Analysis

Sensitivity analysis is a simple tool that investigates how estimated performance varies with changes in the pre-identified key assumptions that are based on the project objectives. Generally, five steps are involved in creating a sensitivity analysis:

1. Design the experiment.
2. Assign ranges of variation to input factors.
3. Generate the input vectors through the design.
4. Create the corresponding output distribution.
5. Assess the relative importance of inputs.

5.7. **CONDUCTING PROCUREMENT**

Procurement procedures will impact how many suppliers will be approached in a given procurement event, in what manner the agency will go to the market, and the type of contract that is intended to be established. These factors must be considered before you can actually choose a vendor or contractor.

5.7.1. **Obtain Seller Responses**

In this phase, the process of obtaining seller responses involves announcing the opportunity to respond to a buyer’s request (advertising, Internet, and so forth), as well as holding bidder conferences where questions are asked and responded to by an audience of all potential bidders.

- **Bidder Conferences**
  Bidder conferences are held before potential sellers submit their proposals.

- **Advertising**
  Advertising or publishing a request for information (RFI) in trade journals, newspapers, or other industry publications expands exposure to potential bidders.

- **Internet Search**
  Many commodities can be obtained over the Internet for a firm fixed price. However, if the commodities are highly complex or are associated with high risk, you should not use the Internet because of the costs involved.

5.7.2. **Select the Seller**

The process of selecting the seller involves determining the best-value contractors by considering price, schedule, technical issues, and other factors. The project manager works closely with the procurement officer (buyer) to
evaluate proposals, review independent estimates, and score proposals against evaluation criteria.

- **Proposal Evaluation Techniques**

  There are several ways to evaluate a proposal. A weighting system is one method for quantifying qualitative data to minimize the effect of personal prejudice on source selection. There are four steps to this process:

  1. Assign a numerical weight to each of the evaluation criteria.
  2. Rate the prospective sellers in each criterion with a raw score.
  3. Multiply the rate score by the weight given that proposal element.
  4. Total the resultant products to compare an overall score.

  Table 5.7.2 looks at weighted scores of vendors based on predetermined selection criteria.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Vendors</th>
<th>Weighted Score</th>
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<tr>
<td></td>
<td>Raw Score</td>
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<tr>
<td></td>
<td>A  B  C</td>
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<tr>
<td>Ability to Deliver Technology</td>
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<td>5</td>
</tr>
<tr>
<td>Financial Capacity</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Understanding Our Need</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Management Approach</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Life Cycle Costs</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.7.2 - Choosing Vendors via Scoring Model [3]

5.7.3. Award Contract

**Procurement negotiations** are used to clarify and gain mutual agreement on the elements and requirements of the contract prior to signing the contract. Final contract language should include all terms and agreements that were negotiated. Planning for negotiations requires several steps:
1. **Develop objectives.** If you are the buyer, what is the maximum you are willing to pay? If you are the seller, what is the minimum you are willing to accept?

2. **Assess your opponent to see what motivates them.** Is your opponent interested in profitability, keeping people employed, developing a new technology, or wanting to use your name for future reference?

3. **Describe your strategy and tactics.** Know before you begin what techniques you’ll use to swing your opponent to your point of view.

4. **Assemble your facts.** Do your financial and other homework! Your opponents are doing their homework about you and your business, and will use these facts to their favor.

5. **Conduct a complete price/cost analysis.** That way, you know what the contract items should cost before committing to a fee or type of contract.

6. **Arrange the details of the negotiations.** Specify where the negotiations will occur, the type of table to be used (round or square), who will face the windows, and so on.

There are typically five stages of negotiation for project management:

- **Orientation** - Introductions are made.
- **Exploring** - Issues are searched and identified.
- **Bargaining and Decision Making** - This is where bargaining occurs and concessions are made.
- **Resolution** - The two positions are summed up, and final concessions are made and documented.
- **Closing** - The ultimate goal; this ensures that both parties have identical agreement and marks the end of negotiations.

### 5.8. MANAGING THE PROJECT TEAM

You want to improve team performance by improving individual competencies and team interactions that enhance the culture of the team.
5.8.1. Team Management and Development Tools

There are a variety of tools that will assist you in developing and managing your team such as:

- Ground rules
- Team building
- Training
- Coaching
- Abraham Maslow’s hierarchy of needs
- Frederick Herzberg’s hygiene theory
- Theory X and theory Y
- Expectancy theory
- Achievement theory
- Types of power
- Performance problems
- Rewards and recognition
- Conflict resolutions

5.8.2. Team Building

It takes a while for a team to start working as a team—even if individually, team members are superior workers. A high level of conflict exists at the beginning of a project’s life cycle. In 1965, psychologist Bruce Tuckman theorized that teams have to go through five stages before they truly become a team: forming, storming, norming, performing, and adjourning.

Let’s take a closer look at these stages:

- **Forming** - People are usually guarded, polite, reserved, and impersonal.
- **Storming** - People exhibit infighting, chaos, conflict, opting out, turf battles, cliques, and power plays.
- **Norming** - People are organized, developing skills, solving problems, and resolving conflicts.
Performing - People are cooperative, productive, resourceful, and capable.

Adjourning - People exhibit a sense of loss and anxiety at having to break up.

As the project manager, you must allow time for these stages to occur. Forming and storming do not take as long as you might think, and soon you’ll see norming and performing. Table 5.8.2 represents a team-building plan.

<table>
<thead>
<tr>
<th>Team Building #1</th>
<th>Activity:</th>
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<tr>
<td>Planned Date:</td>
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<td>Owner:</td>
<td></td>
</tr>
<tr>
<td>Cost Estimate:</td>
<td></td>
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</thead>
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<tr>
<td>Owner:</td>
<td></td>
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<tr>
<td>Cost Estimate:</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Team Building #3</th>
<th>Activity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Date:</td>
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<tr>
<td>Owner:</td>
<td></td>
</tr>
<tr>
<td>Cost Estimate:</td>
<td></td>
</tr>
<tr>
<td>Approved By:</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.8.2 - Sample Team Building Plan [3]

5.8.3. Rewards and Recognition

There are differing schools of thought about rewards and recognition systems. Here are a few suggestions for consideration:

- Rewards must be flexible enough to enable the teams to decide how their team members will be rewarded
- It can be demoralizing to promote teamwork and continue to reward individuals.
- Define goals that can be achieved through collaboration as a team as opposed to a group of people acting as individuals in a cooperative manner.
- Team behaviors that are expected must be explicitly communicated to all those affected and an explanation given as to what defines success and how those behaviors will be recognized and rewarded.
• Be sure that team members perceive that the recognition and rewards are fair.
• Some of the most career-enhancing rewards are nonfinancial in nature.
• Whatever choice is made, recognize and reward good performance.

5.8.4. Conflict Resolution
Conflict is a natural occurrence in the project management experience. Resolving conflicts doesn’t come naturally to most people. You’ll perform conflict resolution many times in your project, and there are several approaches to conflict:
• Forcing or dictating a solution pushes one viewpoint at the expense of others and offers only win/lose solutions. Hard feelings may come back in other ways.
• When you avoid conflict, you withdraw or retreat from the actual or potential conflict situation. It does not solve the problem.
• When you accommodate conflict, you attempt to smooth over the situation. You emphasize areas of agreement rather than areas of difference, but this provides only short-term solutions.
• When you compromise your position, you are looking for bargains for solutions that bring a degree of satisfaction to all parties. This provides a definitive resolution.
• You can collaborate and reach consensus by incorporating multiple viewpoints and insights. This leads to consensus and commitment and provides long-term resolution.
• Confronting the situation treats conflict as a problem to be solved by examining alternatives and requires give-and-take and open dialogue. Confrontation provides the ultimate resolution.

5.9. CHAPTER SUMMARY
This chapter has covered the important processes that make up the Executing Process Group. The execution of project activities to achieve the deliverables must be performed based on the plans outlined in the planning stage in accordance with the
guidelines presented in this chapter. As execution of the project goes on, certain changes and adjustments are made and quality, risks and team harmony must be taken into account.

5.10. ASSIGNMENT

You are required to perform the following, either individually or in a group and present your findings in a report to be submitted to the Course Lecturer:

Answer the following questions:

- What are the challenges associated with acquiring resources?
- What could happen if a new team member is not oriented to the project?
- As a project manager, what should you do when you are assigned to a project but feel you don’t have the expertise to do the work?
- What should a team member do when it is clear the assigned project manager simply doesn’t have the skills needed to manage the project (for example, the project is behind schedule, meetings have become finger-pointing sessions, or the project manager doesn’t return calls and sits in the office all day with the door shut)?
- List at least five expectations a project sponsor may have of you (the project manager) and five commitments a sponsor will make to you (the project manager).
- Describe items that are considered a cost of quality and items that are considered a cost of nonconformance.
- What is the purpose of a quality audit?
- Why is a bidder’s conference important?
- When should a bidder’s conference take place?
- Who should conduct the bidder’s conference and why?

5.11. CASE STUDY

Higher College of Technology would launch the IT Open Day on 6th of March 2015. They assigned you as the Project Manager of this event. The project charter and contract had been signed. The following are the activities to be undertaken in preparation for the launching of IT Open Day:
a. The first task is collecting inputs for Project charter (5 days). Part of this task is Project Statement of Work. You are the person responsible for this task.

b. Identify the stakeholders will start at the same time with collecting inputs for Project charter that will take 10 days and should be done by Portfolio Manager.

c. After collecting inputs for project charter and identifying the stakeholders, the next task is assessing the tools and techniques. This task should be done by Project Sponsor and Project Manager. It will take 10 days to finish the task. Part of this task is to provide expert judgment.

d. After assessing tools and techniques, the next tasks are: creating charter template (5 days), at the same time with creating charter template is project justification (3 days) and also project approval requirements (5 days). The person responsible is the Project Manager, Project Sponsor and the customer.

e. After creating charter template, project justification and project approval, the next task is setting up the project management office. Part of this task is to locate for venue which will take 15 days and should be done by the portfolio manager.

f. Defining roles and responsibilities should be the next task after identifying the stakeholders, and setting up the project management office. It should be done within 20 days and the person in charge is the Project Manager and Project Sponsor.

In one of your team meetings, it has been reported that there’s a lot of issues and it is found that many of the issues could have been prevented had a simple review checklist been used. You prepare a code review checklist and ensure the code is reviewed as per the checklist. With the project done you decide to communicate the completion details and closure of contracts.

1. What type of communication (Incident, Formal or informal) are you going to use to communicate the completion details and closure of contracts?

2. Analyze the above scenario and categorize if your action is preventive or corrective. Justify your answer.

5.12. HANDS-ON
You are required to perform the following, either individually or in a group:
If you are using Microsoft Project, see the Microsoft Project Laboratory Manual and perform the following:

5.10.1 Laboratory Work: Assigning Resources
If you are using Primavera Project Planner, see the Primavera Project Planner Laboratory Manual and perform the following:

1.5 Laboratory Work: Assigning Resources

5.13. REFERENCES USED

4. Method 123 Project Management Methodology-Professional (MPMM)
5. Primavera Lab Manual, Higher College of Technology, Muscat

Chapter 6-PROJECT MONITORING AND CONTROLLING
6.1. INTRODUCTION

The Monitoring and Controlling process group involves taking measurements and performing inspections to find out whether there are variances in the plan. If you discover variances, you need to take corrective action to get the project back on track and repeat the affected project Planning processes to make adjustments to the plan as a result of resolving the variances.

6.1.1. Objectives

The objectives of this Chapter are:

- Explain how to manage and control the project.
- Determine and identify the suitable management direction at the project execution.
- Determine how to control possible risk during the execution of the project.

6.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze a plan using methods and tools including Establish WBS, time & effort estimates, resource allocation and scheduling.
- Analyze concepts of Quality Management, Assurance and Control.
- Analyze risks and manage them.
- Analyze project execution and manage it.
- Evaluate set-targets, deliverables and conflict resolution documents.
- Use case studies for project management.

6.1.3. Terminologies

- Acceptance Criteria. Those criteria, including performance requirements and essential conditions, which must be met before project deliverables are accepted.
- Control. Comparing actual performance with planned performance, analyzing variances, assessing trends to effect process improvements,
evaluating possible alternatives, and recommending appropriate corrective action as needed.

- **Identify Risks** [Process]. The process of determining which risks may affect the project and documenting their characteristics.

- **Corrective Action.** Documented direction for executing the project work to bring expected future performance of the project work in line with the project management plan.

- **Preventive Action.** A documented direction to perform an activity that can reduce the probability of negative consequences associated with project risks.

### 6.2. Monitoring and Controlling Project Work

During the work of monitoring and controlling you can see the progress of a project, which is determined by comparing the actual work results against the project plan. In this task you will monitor and control changes, verify that deliverables have been completed and accepted, and monitor and control scope, schedule, cost, and quality.

#### 6.2.1. Integrated Change Control

Integrated change control is the process of managing changes to the project plan, project documents, and organizational process assets, as well as monitoring changes and seeing that the approval process is followed. To minimize the number of changes, make sure the questions in Table 6.2.1 are asked and answered by a responsible party before asking for a formal change request.
6.2.2. Scope Control

Scope control requires adjustments to cost, schedule, or other project objectives. A baseline change usually requires approval from the change control board. Work that affects the scope and is not approved falls under the term scope creep. Scope creep is deadly to the project. Failure to manage scope creep will cause unauthorized schedule delays and budget overruns.

6.2.3. Schedule Control

Schedule control is all about managing the schedule baseline. In the Planning Phase, you learned about fast-tracking and crashing a project to stay within the schedule baseline, but if schedule changes are approved, the schedule baseline changes. At every status meeting you should emphasize that the project needs to stay on schedule.

6.2.4. Cost Control

Keeping the budget under control can happen only if you know exactly where you stand on the budget. Elements affected by cost include the following:

- Controlling changes to the project budget
- Cost estimating
- Project cash flow
- Company cash flow
- Direct labor costing
- Overhead rate costing
- Others, such as incentives, penalties, profit-sharing, and the like

6.2.5. Ensuring Project Deliverables Conform to Quality Standards

To make sure that the quality process is being followed, the acceptance criteria of a deliverable should include the following:

- Content properties (documents, software, and so on)
- Physical properties
- Ownership properties (trademarks, patents, and the like)

All team members are responsible for taking whatever action is necessary to keep the variances within acceptable limits.

- **Requirements Verification and Validation**
  The difference between verification and validation is simple:
  - When you verify a requirement you ask the question “Are you building the product right?” Verification looks at quality checkpoints along the way to see that standards are correct for the level of quality needed.
  - When you validate a requirement you ask the question “Are you building the right product?” Validation means that the goal has been met and the customer is delighted.

- **Requirements Traceability Matrix**
  A requirements traceability matrix (RTM) is used to make sure that all stated requirements can map back to system components or deliverables to fulfill those requirements. Table 6.2.5 illustrates a high-level traceability matrix. In this example, the “U” represents the user and the “S” represents the system.
Table 6.2.5 - Requirements Traceability Matrix [27]

- **Collecting Metrics**
  One of the outputs of the plan quality process is quality metrics. You define what you want to measure to analyze performance. The following is a list of metrics that could be collected on your project. This list is not exhaustive but may help provide additional ideas for your project:
  - Cost
  - Schedule
  - Productivity
  - Quality of deliverables
  - Quality of project

- **Quality Control**
  Quality control in project management requires that the project manager use appropriate tools at predetermined intervals in order to meet project goals. These tools include the following:
  - Cost/benefit analysis
  - Control charts
  - Benchmarking
  - Design of experiments
  - Statistical sampling
  - Flowcharting
  - Cause and effect diagrams
6.3. MANAGING RISKS
Managing risks is something you’ll do throughout the life of the project. You need to manage them as soon as they occur—with help from your team, of course. The first thing you have to do is document the risk event. Table 6.3.1 shows a sample of a risk event worksheet that can be used to manage the risk event. This table is using a qualitative approach to determine probability and impact.

6.3.1. Preventive and Corrective Action
Risks do occur during the execution phase and have to be controlled. When you are managing a risk event that was not previously identified, you may think of ways the risk could have been avoided.

- **Preventive action** should be documented as part of your lessons learned.
- **Corrective action** is simply correcting the situation after it has been identified and updating your risk register to include the risk and what you did, to prevent it from happening again.
6.4. CHAPTER SUMMARY

This chapter presented focused on the Monitoring and Controlling Process Group. Monitoring and controlling project work and risk are two critical processes that ensure that the project is right on track. Integrated control, quality and risk management techniques were discussed which provides basic foundational knowledge for this project management stage.

6.5. ASSIGNMENT

You are required to perform the following, either individually or in a group and submit your answers to the Course Lecturer:

Assignment 6.5

You can answer the following questions through the use of the Internet or other Project Management books. Present a scenario or use diagrams to support your answers.

1. What information can a fishbone diagram give you?
2. A histogram is used for what purpose?
3. What is a Pareto chart?
4. What quality control tool is used when data are displayed on a graph that shows observed data in a time sequence in order to see the output or performance of a manufacturing or other business process?
5. When should a scatter diagram be used?
6. Describe the Taguchi method (design of experiments). Is this a good tool to use in a society where change is constant? Why or why not?
7. List two metrics that can be taken during a project in each of the following categories:
   a) Cost
   b) Schedule
   c) Productivity
   d) Quality of deliverables
   e) Quality of the project

6.6. CASE STUDY

SamPhone Company, a leading manufacturer of handheld computers, is currently in the process of developing its next generation device, the model SP175x. A key feature of the SP175x is its color display. According to the original project schedule, the SP175x is to be released 1 month from now. Because the amount of time required to convert the existing software to capitalize on the color display was significantly underestimated, the project has fallen behind schedule. The project manager estimates that without additional resources, the development project will be 3 months late. He has also estimated that increasing the project’s budget of 3 million RO by 30 percent would permit the project to be completed on schedule. The added budget would be used primarily to staff the project with additional software engineers. If released on schedule, first quarter demand for the SP175x is forecast to be 200,000 units at an initial price of 450RO. Demand data for similar products suggest that unit sales will increase 5 percent per quarter over the product’s 3-year life. Despite pricing pressures in the market, accounting SGV data indicate that SamPhone is able to maintain a 20 percent contribution margin to profit and
overhead through continuous process improvements and efficiencies accruing from producing in larger volumes. Answer the following:

1. What has a larger impact on SamPhone’s profits, delaying the SP175x’s introduction by 3 months or increasing the project’s budget by 30 percent?
2. Are there other factors you would consider in addition to profit?

6.7. HANDS-ON

You are required to perform the following, either individually or in a group:

If you are using Microsoft Project, see the Microsoft Project Laboratory Manual and perform the following:

6.6.1. Laboratory Work: Setting Baseline in Tracking Gantt View
6.6.2. Laboratory Work: Resetting the Baseline

If you are using Primavera Project Planner, see the Primavera Project Planner Laboratory Manual and perform the following:

5.1 Laboratory Work: Setting Baselines in Tracking Gantt View
5.2 Laboratory Work: Resetting the Baseline

6.8. REFERENCES USED

4. Primavera Lab Manual, Higher College of Technology, Muscat
5. Universitas Gadjah Mada, for case scenario

Chapter 7-PROJECT CLOSURE

7.1. INTRODUCTION
This chapter deals with the basic tasks needed to perform project closure. It provides learners with the proper methods on how to perform formal acceptance of project deliverables, how to transfer the deliverables into operation, process information from lessons learned in project activities and how to assess the performance of the project team.

### 7.1.1. Objectives

The objectives of this Chapter are:

- Determine the process in accepting or rejecting projects.
- Identify the necessary measures and documents in finalizing the project.

### 7.1.2. Outcomes

Upon completion of this chapter, the student will be able to:

- Explain the concepts of Project Management and Knowledge Areas.
- Analyze organization structures.
- Analyze a plan using methods and tools including Establish WBS, time & effort estimates, resource allocation and scheduling.
- Analyze concepts of Quality Management, Assurance and Control.
- Evaluate set-targets, deliverables and conflict resolution documents.
- Use case studies for project management.

### 7.1.3. Terminologies

- **Close Procurements** - The process of completing each project’s procurement.
- **Close Project or Phase** - The process of finalizing all activities across all of the Project Management Process Groups to formally complete the project or phase.
- **Contract** - a mutually binding agreement that obligates the seller to provide the specified product or service or result and obligates the buyer to pay for it.
• **Report Performance** - The process of collecting and distributing performance information, including status reports, progress measurements, and forecasts.

7.2. **FORMALIZING PROJECT ACCEPTANCE**

When it is time to obtain signed acceptance from the customer, a formal acceptance document should be created that (see Figure 7.2.1) officially records the results of reviews, inspections, and tests conducted throughout the project to validate that deliverables meet acceptance criteria. The product as a whole receives final acceptance upon project completion. This final acceptance comes from the customer and the organizations that will use and support the product.

![Deliverable Acceptance Document](image_url)

Figure 7.2.1 - Deliverable Acceptance Document [3]

7.2.1. **Acknowledgement That Objectives Are Met**

When the objectives have been met, you need to get acknowledgement from the customer and others to officially end the project. This acknowledgement may
be formal acceptance, usually the signing of an acceptance document (sign-off), or it may come in a more informal way, such as when the customer pays for the product and uses it over a period of time.

7.2.2. Product Acceptance

Acceptance should be based on an evaluation of the product using acceptance criteria set during the early phases of the project. You set requirements when the project began, and those have to be met for the product to be accepted. Testing the product against the acceptance criteria validates it.

7.2.3. Non-acceptance of the Product

At this stage of the project, you shouldn’t have any deliverables that are not acceptable. If you find that the deliverables are incomplete or not correct, penalties may be assessed for non-completion (if spelled out in the contract) and final payment to the contractor may be withheld.

7.2.4. Operations Turnover

Turning the product over requires that training, documentation, and initial support activities be part of the project deliverables. It is important to plan for the turnover. Be sure that the people with the right skills are available and that those who will take responsibility for the product are in attendance.

7.3. TRANSFERING OWNERSHIP OF DELIVERABLES

A formal document should be signed by the operations manager and the project manager acknowledging transfer and control. Figure 7.3 is a sample of a formal transfer document.
### Figure 7.3 - Formal Product Transfer to Operations [3]

#### 7.4. OBTAINING LEGAL AND ADMINISTRATIVE CLOSURE

Most of the time a procurement officer and someone in the legal department actually close out the project, but they need information from you as the project manager. Procurement personnel want to know that all contract line items are fulfilled so that final payments can be made, and that a contractor closeout letter has been sent to the contractor.
### 7.4.1. Contract Closeout Template

It’s difficult to remember everything that has to be done during this phase, so using a template will guide you through the process of closing out a contract. Figure 7.4.1.1 is a sample of a contract closeout template you may wish to use. This table contains some elements of the government process for closing out a contract.

<table>
<thead>
<tr>
<th>Task</th>
<th>Completed: Yes or No</th>
<th>If Not, Why Not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the contract file contain an executed copy of the contract, negotiation background data, appropriate determinations, and all required documentation?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>2. Have all contract changes been formalized, and does the file contain executed copies of the related modifications with appropriate backup information?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>3. Does the contract file contain copies of all applicable delegations of authority to administer the contract?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>4. Have all financial matters been resolved (disputes, liabilities, credits, or refunds, etc.)?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>5. Does the file include adequate documentation to evidence receipt, inspection, and acceptance of all deliverables?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>6. Have all reports required under clauses been received?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>a. Reporting of royalties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Notice and assistance regarding patent and copyright infringement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Patent rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Have security items been retrieved, such as badges and building access entry?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>8. Has equipment been returned, such as laptops and printers?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>9. Has there been a closeout meeting with the supplier?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>10. Has the supplier performance evaluation been sent to the contract administrator?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>11. Has a final invoice for this supplier been sent to accounting?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>12. Have lessons learned been documented for this supplier?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>13. Have all unused funds been closed from financial systems?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
<tr>
<td>14. Have all other outstanding actions been taken and adequately documented in the file?</td>
<td>□ Yes □ No</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7.4.1 - Contract Closeout Template [3]
7.4.2. Contract Closeout Letter to Contractor

Figure 7.4 represents a memorandum that can be used to formally acknowledge that the contract has been closed. This memo should be sent to each vendor, contractor, or seller that has a negotiated contract.

![Sample Project Closeout Letter](image)

Figure 7.4.2 - Sample Project Closeout Letter [3]
7.5. **COLLATING LESSONS LEARNED**

Lessons learned during the life cycle of the project help the project manager use what was learned throughout the remainder of the project. They are documented by the project manager. After questions have been answered, you will want to document the answers in a lessons learned by phase template, such as the one in Figure 7.5. Notice that this template doesn’t include a box for what went wrong.

![Lessons Learned by Phase Template](image)

Figure 7.5 - Lessons Learned by Phase Template [3]

7.5.1. **Independent Evaluators**

When a very large project is complete, we recommend that a third party or parties not connected with the project conduct the evaluation. The evaluators should have access to people with the technical and business expertise needed to evaluate the various aspects of the project and the product.
7.5.2. Project Team Reviews

If an external review is not conducted, the project team itself can perform the review because they most likely have all project records available to them and will have been intimately involved throughout the project. It is important to remember to invite team members who have left the project, not just those who remain at the end.

7.5.3. Planning for the Review

A post-project review requires some planning; unless the project is quite small, you may not be able to conduct it in one meeting. The following represents what needs to be done to prepare for the final evaluation:

- Review the project files.
- Conduct interviews.
- Gather and analyze data.
- Review client/user acceptance.
- Evaluate realized costs, benefits, operational efficiency, and product performance—this may not be known until a product has been in the marketplace for a while and can produce measurable results.
- Measure operating efficiency and product performance.
- Evaluate the technical approach.
- Evaluate training and documentation provided to external customers and internal clients.
- Evaluate relationships and communications.
- Evaluate vendors and vendor-provided products.
- Verify attainment of project goals.
- Measure the success of quality improvement.
- Evaluate work efforts.
- Recommend changes to standards and procedures.

7.5.4. Project Evaluation Review Questions

The purpose of a post-project assessment is to assess product, project, and contract acceptance. The assessment can be conducted by independent
evaluators or by the project team. Figure 7.5.4 contains project evaluation review questions to assist you in preparing your lessons learned.

<table>
<thead>
<tr>
<th>PROJECT EVALUATION REVIEW QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Project</td>
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<td>Name of Evaluator</td>
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<td>19</td>
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<tr>
<td>20</td>
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</tbody>
</table>

Figure 7.5.4. Project Evaluation Review Questions [3]

7.6. MEASURING PROJECT TEAM PERFORMANCE

Most of the team members have left the project, and you are ready to provide feedback to their managers about their performance on your project. This will be easy because the hard work is already done.
7.6.1. Provide Feedback on the Team’s Performance

Figure 7.6.1 represents a sample of feedback from the project manager to a team member. Because many of the questions are subjective, you must be specific with the feedback if the score was below or above a C.

![Team Member Performance Report]

Figure 7.6.1 - Team Member Performance Report [3]

7.6.2. Provide Feedback on the Project Manager’s Performance

One of the most useful tools you will use is feedback on yourself as the project manager. Figure 7.6.2 is a sample of a project manager’s performance review.
7.7. CHAPTER SUMMARY

This chapter covered the basic processes performed to finalize all activities across all Process Groups to formally close the project. The delivery and transfer of the project deliverables, achieving administrative closure, processing and feedback of lessons learned from the project and project team performance measurement have been given focus.

7.8. ASSIGNMENT

You are required to perform the following, either individually or in a group:

Assignment 7.8

Answer the following questions. You may use the Internet or other Project Management textbooks for further readings.
1. What should the project manager do if the final outcome of the project is not accepted?

2. Does formal project acceptance release you, the project manager, from further obligations?

3. What do you do if the customer says he will sign the document but wants additional concessions from you?

4. Why should the project manager write a performance review of team members when feedback has been provided to the team members since the project began?

5. What should you do if you are uncomfortable providing less-than-satisfactory feedback?

6. Is it appropriate to ask your team members to write their own performance reports?

7.9. CASE STUDY

Your company has won a number of government contracts dealing with construction. This includes setting up roads and bridges. This is a very big prestigious project so your company would like to ensure everything is planned well in advance. You will manage the project that has teams located in different parts of the world. The team structure or locations cannot be changed and you need proper communication channel. One of the subject matter experts indicates that during the months of December and January the construction work of the bridge across the Wadi would need to stop on account of past history of flooding of the Wadi. The customer has requested you for additional work. This work will affect the budget, but not the schedule of the project. You and the site engineer have analyzed the impact of this change to cost, and have written up a change request and requested approval from change control board. When you successfully delivered all project deliverables within the specified schedule, your Project Sponsor wants you to transfer ownership of deliverables.

If you are the change control board, are you going to approved it? Yes or No? Justify your answer.

7.10. HANDS-ON
You are required to perform the following, either individually or in a group:
If you are using Microsoft Project, see the Microsoft Project Laboratory Manual and perform the following:

7.9.1 Laboratory Work: Entering Percent Complete and Actuals
If you are using Primavera Project Planner, see the Primavera Project Planner Laboratory Manual and perform the following:

4.2 Laboratory Work: Entering Percent Complete and Actuals

7.11. REFERENCES USED

4. Oracle Primavera P6 Version 8: Project and Portfolio Management, 2012 by Daniel L. Williams, PhD and Elaine Britt Krazer, PMP, Packt Publishing
5. Primavera Lab Manual, Higher College of Technology, Muscat