

**THE ONLY BOOK
YOU CAN SIMPLY
LEARN PROJECT
MANAGEMENT.**

**PROJECT
MANAGEMENT
REVEALED**



**INTERNATIONAL
ORGANIZATION
FOR PROJECT
MANAGEMENT™**

© COPYRIGHT IO4PM™
WWW.IO4PM.ORG

PROJECT MANAGEMENT REVEALED

TRAINING BOOK

SECOND EDITION

BY IO4PM™

WWW.IO4PM.ORG

© COPYRIGHT INTERNATIONAL ORGANIZATION FOR PROJECT MANAGEMENT™

Dedication

To all of the IO4PM™ students, thank you for inspiring us, keeping us focused, and making sure we do our best to help you grow in your career with your skills and knowhow. Without you, your engagement and your loyal support, IO4PM™ could not come where it is today.

TABLE OF CONTENTS

CLICKABLE

WELCOME	6
ABOUT IO4PM™ - INTERNATIONAL ORGANIZATION FOR PROJECT MANAGEMENT™	7
WHAT IS PROJECT MANAGEMENT?	8
ORGANIZATIONAL INFLUENCES AND PROJECT LIFECYCLE	12
PROJECT MANAGEMENT PROCESSES.....	15
ROLES IN PROJECT MANAGEMENT	19
SCOPE MANAGEMENT	27
TIME MANAGEMENT.....	42
COST MANAGEMENT	57
QUALITY MANAGEMENT	65
HUMAN RESOURCES MANAGEMENT	77

COMMUNICATIONS MANAGEMENT	90
RISK MANAGEMENT	98
PROCUREMENT MANAGEMENT	109
STAKEHOLDER MANAGEMENT	125
THANK YOU	131

WELCOME

Hi! I'm Yeliz.

I love that you are taking your time to read your Project Management book. I want to briefly share with you why we wanted to write this book for you and how you can get the best use out of it.

Within the context of our Project Management certification programs we made a thorough research in Project Management education space.

The conclusion was: We failed to find one single textbook, we could sincerely recommend to our students!

We talked to our successful students and found out that, almost none of the Project Management books in the market could really help them make a smooth entry to Project Management. Significant number of Project Management books in the marketplace claim that they cover all details of Project Management, but what they are not telling is that, they don't have understandable, clear and logical content to help their readers comprehend and most importantly love Project Management!

Therefore, we wrote for you **Project Management Revealed** and brought it for your service!

We are absolutely confident that Project Management Revealed will make you proficient in Project Management, so that you will have an outstanding opportunity to love Project Management and keep on taking the tangible benefits of being a Project Management professional.

Take some coffee to enjoy and some paper to take your notes, and spend some quiet time to read your Project Management book!

Afterwards you will have a great understanding about Project Management domain and be prepared to pass your Project Management certification exam. You will be ready to deliver great products and services to your clients and employers and to build your bright career and future!

Yeliz Obergfell
Vice President - Student Experience
IO4PM™ - International Organization for
Project Management™

ABOUT IO4PM™ - INTERNATIONAL ORGANIZATION FOR PROJECT MANAGEMENT™

IO4PM™ is an independent institute which helps organisations and professionals get accredited with worldwide renowned and valid Project Management certification programs and prove their competence in Project Management domain. We empower professionals worldwide to build their careers, and companies to create and sell their outstanding products and services.

Your Accredited Project Manager, Accredited Program Manager, Accredited Product Manager, Accredited Service Manager, Accredited Project Quality Manager and Accredited Project Requirements Analyst Certification Programs have proven their worldwide Acceptance and Reputation by being the choice of more than 535'000 Project Management Practitioners in 143 Countries.

Project Management is a set of open Product and Service Delivery Frameworks, and yet before IO4PM™ was established, there used to be no reasonable way for Project Management Practitioners like yourself to obtain Project Management Certifications and to prove your competence in Project Management domain. Project Management Practitioners had to

pay expensive fees for the one way profit-driven Project Management Certification Programs of other Certification Entities.

IO4PM™ aims to remove the barriers set in front of the Project Management Practitioners in developed and emerging markets by saving them from paying unreasonable fees for Project Management Classroom Trainings and Project Management Certification Examinations before they certify their knowhow in Project Management.

Moreover, feel free to check out "What makes Your Certification Programs Best of the Industry?" section on our www.io4pm.org web portal to read why we perform and serve you far more better than our competition.

IO4PM™ provides 6 major online Project Management Certification Programs which are designed by our consortium of renowned business and people Leaders, coaches, mentors, experts and authorities from all major industries. You can check your Project Management Certification Programs from this [List of Project Management Certifications](#).

WHAT IS PROJECT MANAGEMENT?

DEFINITION OF A PROJECT

A project is a temporary effort to create unique product, service or result. A project has a definite start and end.

A project management plan is created by a project manager. This plan requires buy-ins from all stakeholders. The plan should be realistic, time-bound and achievable.

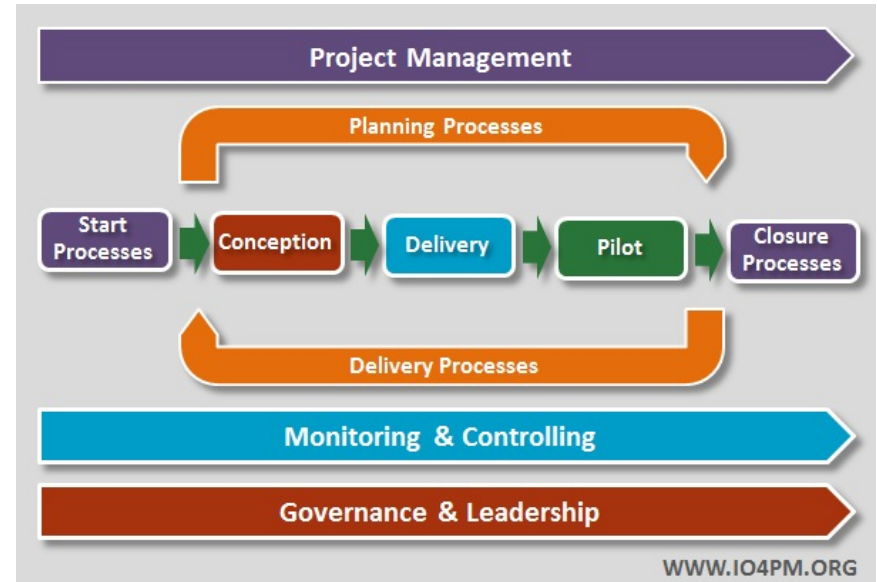
OPERATIONAL WORK

An organization can either have operational work or project work. The difference between operational work and project work is that the operational work is always ongoing whereas project work has a definite end.

WHAT IS PROJECT MANAGEMENT?

Project Management is not about managing people alone. Project management can be divided into different process groups and knowledge areas. Process groups include initiating, planning, executing, monitoring and controlling, and closing. Knowledge areas include integration, scope, time

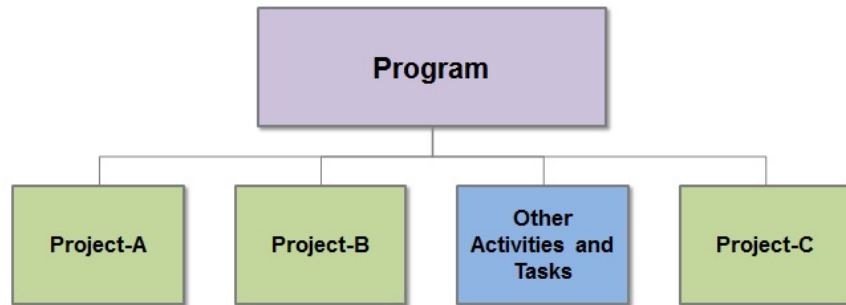
cost, quality, human resources, communication, risk, procurement and stakeholder management.



Project Management and Program Management High Level Overview

WHAT IS A PROGRAM?

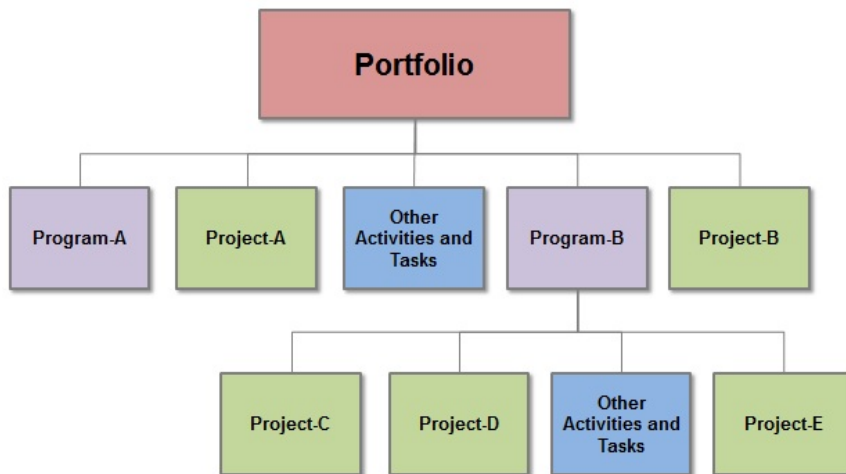
A group of projects is termed as a Program. There are several projects carried out in an organization and managing these projects independently becomes a challenge for the organization. Hence, a group of related projects is combined together in a program.



Relationship between Program and Projects

WHAT IS A PORTFOLIO?

A portfolio includes a group of programs and individual projects that are implemented to achieve a specific strategic business goal.



Relationship between Portfolio, Program and Projects

PROJECT MANAGEMENT OFFICE

The project management office (PMO) is a centralized department that manages projects. The PMO can:

- Central location and authority for providing policies, methodologies and templates for managing projects within the organization
- Trains individuals in project management within the organization
- Assists them with project management tools
- Provide project managers for different projects, these project managers and the PMO office are responsible for the results of those projects

The project management office is a department of many individuals. The PMO has responsibilities such as:

- Manage needs and interconnectedness between projects
- Provide resources
- Participate in project review meetings
- Monitor compliance with organizational processes
- Provide templates
- Provide centralized communication about projects

- Be a part of change control board
- Help prioritize projects

BUSINESS VALUE

Business value is defined as the total sum of tangible and intangible elements of a business i.e. the total value of the business. Monetary assets, fixtures, stockholders, equity, utility are some of the examples of tangible elements. Intangible elements include goodwill, reputation, brand recognition, public benefit, trademarks, etc. Effective management of ongoing operations help in creating value for the business. All organizations, profit driven or non-profit organizations are focused on attaining business value for their activities.

OBJECTIVES

The project objectives are defined in a project charter. A project is considered as complete when the objectives of the project are met. A project is terminated if the project objectives are not met. Objectives may be defined at a high-level initially, however, will be defined in detail as the project progresses. Project manager is responsible to achieve project objectives. Quality management, risk management, stakeholder management, scope management all has an impact on project objectives.

If these knowledge areas are managed well, they can help in successfully achieving the project objectives.

You can also use a Project Charter to articulate the need of the project effectively. Below is a sample template of a Project Charter.

PROJECT CHARTER	
Project Title & Description	
Business Case:	Stakeholder Names: 1) 2) 3) 4)
Project Objective:	Project Manager: Resources Preassigned: 1) 2) 3) 4)
High Level Stakeholder Requirements:	Product Description / Deliverables: 1) 2) 3) 4) 5) 6) 7)
Project Risks (high level): 1) 2) 3) 4)	Approval Requirements: 1) 2) 3)

Project Charter Example

MANAGEMENT BY OBJECTIVES (MBO)

MBO is a management philosophy with three steps:

- Establish clear, concise, well-articulated and realistic objectives
- Periodic reviews required to check if objectives are met

- Implement corrective actions wherever deviations are observed

CONSTRAINTS

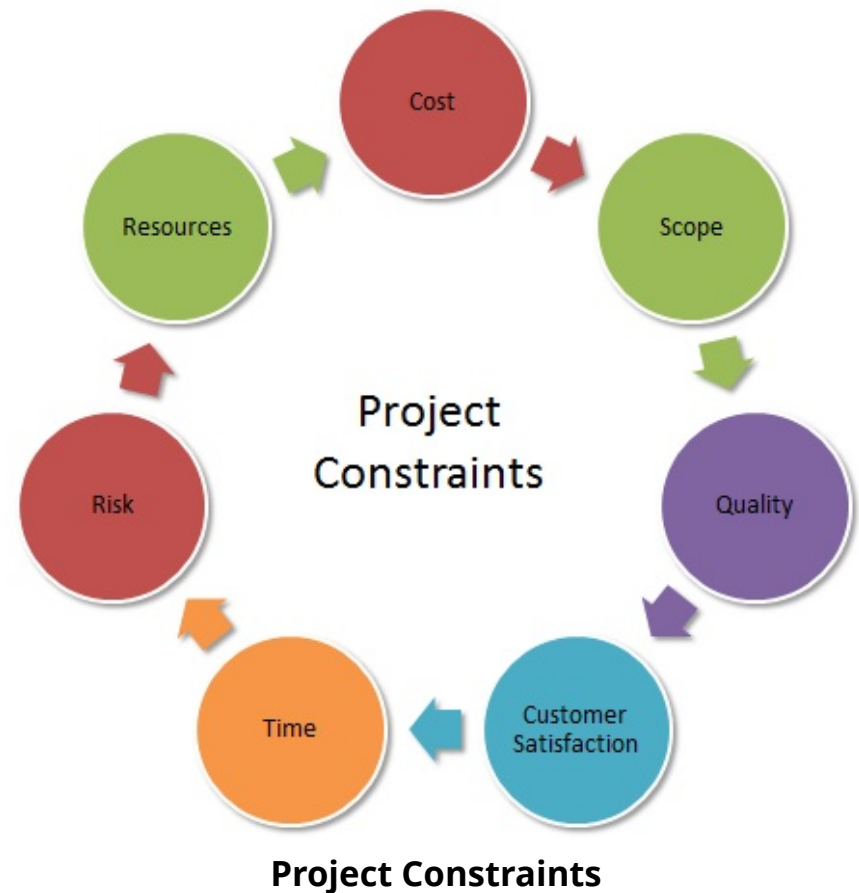
Constraints can be in the area of time, cost, risk, scope, quality, resources, customer satisfaction and others. Constraints help evaluate competing demands. The priority of each constraint is set by the management. A change to one constraint can have an impact to other constraints of the project.

Project inevitably goes through many changes due to the competing demands we were talking about earlier. Each change request goes through a change request process. A project manager has to evaluate these changes and identify the impact on all the constraints of the project through integrated change control process.

STAKEHOLDERS AND STAKEHOLDER MANAGEMENT

Stakeholders can be project managers, sponsors, team members, project management office, portfolio managers, program managers, functional managers, and sellers. Basically, stakeholders are those individuals, groups or organizations that are positively or negatively impacted by the product or

the project. The project may fail if stakeholders are not informed, their inputs are not solicited or their needs and expectations are not satisfied. A project manager is required to analyze and manage stakeholder's needs and levels of influence throughout the lifecycle of the project.



ORGANIZATIONAL INFLUENCES AND PROJECT LIFECYCLE

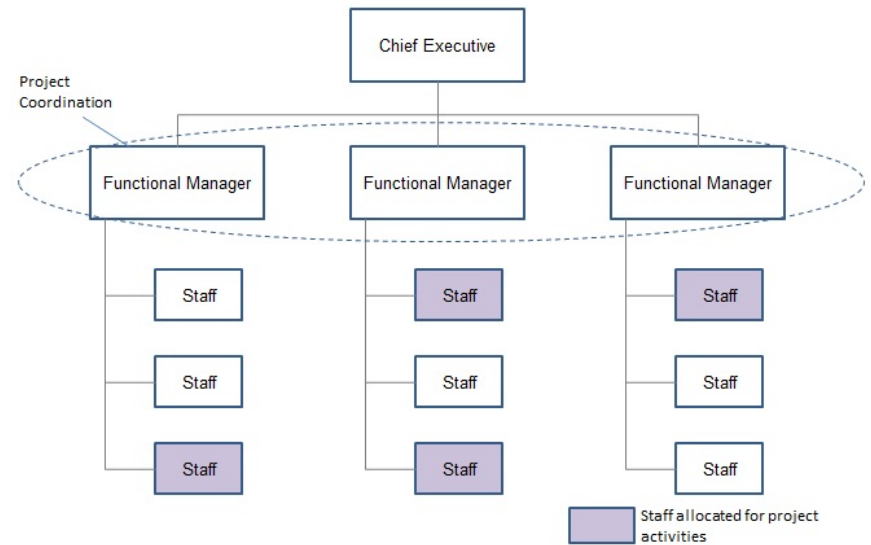
ORGANIZATIONAL STRUCTURE

A project operates within people, process and technology of an organization. Projects have an impact on the culture, policies, procedures and other aspects of an organization. The organizational structure has a major influence on the execution of the project. The organizational structure decides the resources, communication methods and other aspects of project management.

Different types of organizational structures include:

FUNCTIONAL ORGANIZATION

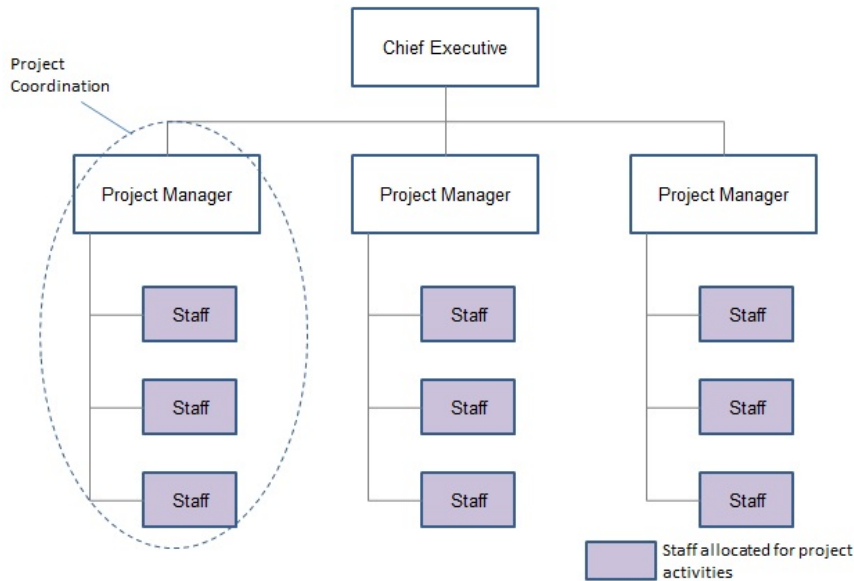
This is the most common form of an organization. Organizational departments are grouped by areas of specialization within different functions. In these organizations, projects generally occur in silo environments, i.e. within the same function. Team members complete the project work over and above their responsibilities to normal departmental work. Communication primarily occurs within the same function.



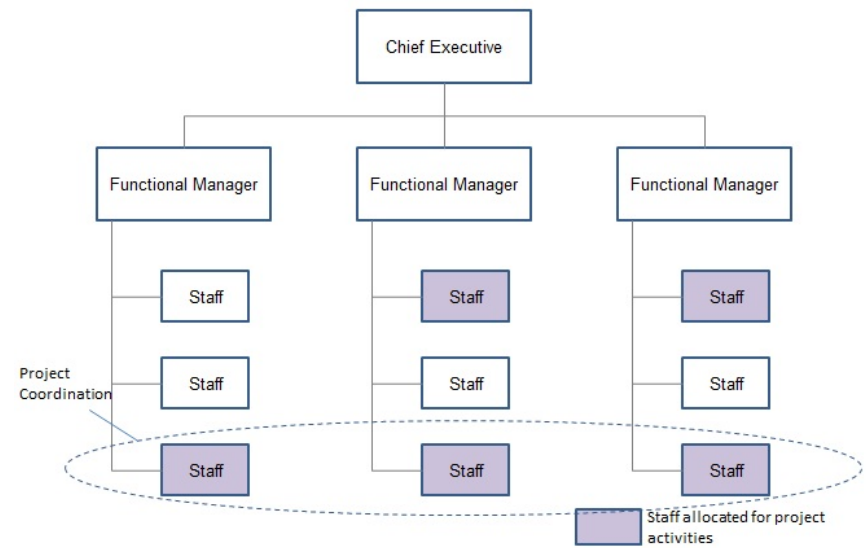
Functional Project Organization

PROJECT-CENTRIC ORGANIZATION

In a project-centric organization environment, the entire company is organized by projects, and the project manager is in control of the projects. Individuals or employees are assigned to projects and report into a project manager. Once the project is over, they need to be assigned to another project. Communication primarily occurs within the same project.



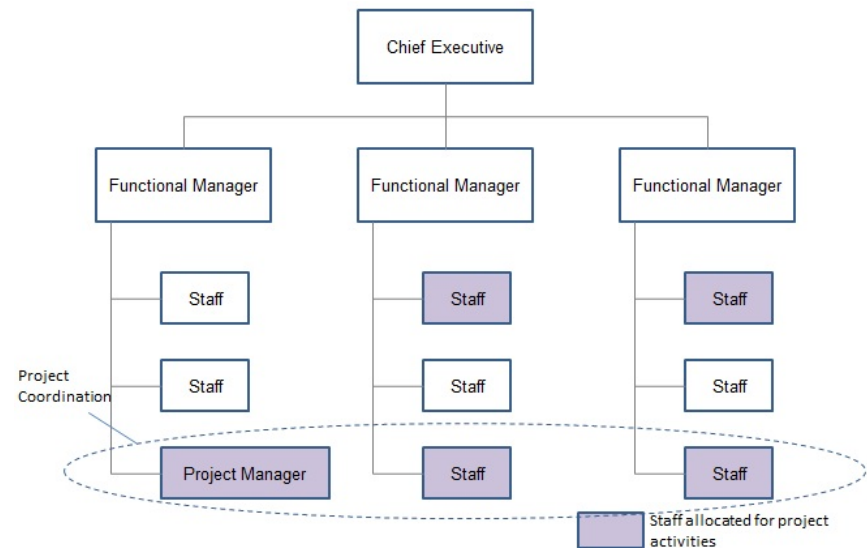
Project Centric Project Organization



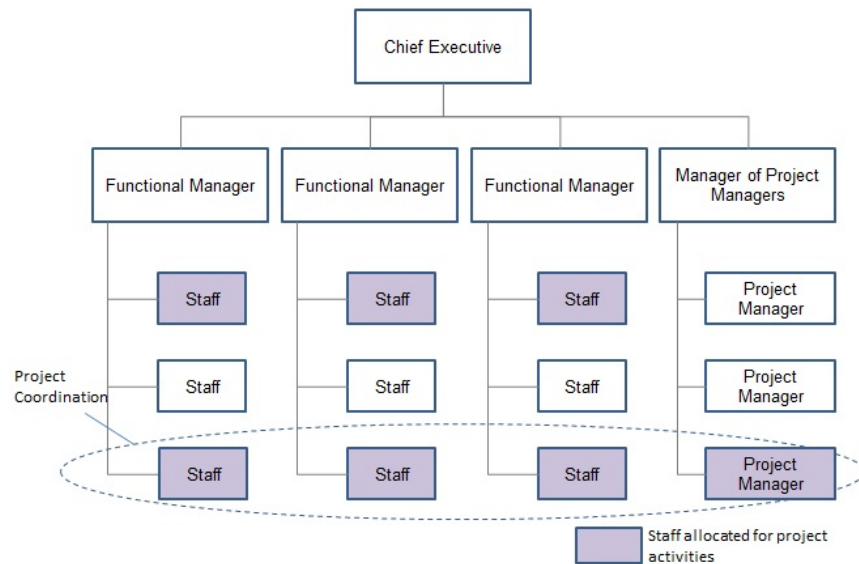
Weak Matrix Project Organization

MATRIX ORGANIZATION

In a matrix organization, the team members report into two bosses: the functional manager and the project manager. Communication goes from team members to both bosses. The matrix organization is created to get the best potential from both functional and project-centric types of organizational structure. Team members have departmental work and they also do project work.



Balanced Matrix Project Organization



Strong Matrix Project Organization

Depending on the strength of the matrix organization, the power or level of authority varies between the project manager and the functional manager. In a strong matrix organization, the power remains with the project manager. In a weak matrix organization, the power remains with the functional manager. The project manager is considered to be a coordinator or an escalator. In a balanced matrix, the power is equally balanced between the project manager and the functional manager.

LIFE CYCLE

A progression through a series of developmental stages is termed as a lifecycle.

PRODUCT LIFE CYCLE

The product life cycle starts at the conception of a new product and ends at its withdrawal.

PROJECT LIFE CYCLE

A project life cycle is required to be executed to produce the deliverables of the project. The life cycle of a project can span from initiation phase to its closure phase and may involve some additional or some reduced steps varying from industry to industry.

PROJECT MANAGEMENT PROCESS

A project management process includes Initiating, Planning, Executing, Monitoring and Controlling, and Closing process groups.

LESSONS LEARNED

The lessons learned document includes the experience of the project manager on what was done right or what was done wrong on the project and what should a project manager do differently on the project.

PROJECT MANAGEMENT PROCESSES

The project management processes involve:

- **Start** – Initiating the project
- **Plan** – Planning the project
- **Act** – Executing the project
- **Check and Act** – Monitoring and Controlling the project
- **End** – Closing the project



Project Management Processes

INITIATING PROCESS GROUP

Official authorization of the project is received in the Initiating Process Group. The project manager receives necessary information to begin the project. It formally starts a new project.

Initiating Process Group can involve starting the project selection process. A project charter is created, stakeholders are identified and high-level needs of these stakeholders are identified. Outputs of this process group involve project charter,

identified stakeholders, and the strategy for managing those stakeholders.

INPUTS TO INITIATING PROCESS GROUP

The inputs to Initiating Process Group may include:

- Business case
- Product description
- Linkage of company's strategy with the project
- Likely stakeholders
- Contracts
- Current Industry Standards
- Change Control System
- Defined processes and procedures
- Templates from past projects
- Historical Work Breakdown Structures (WBS)
- Historical Estimates
- Understanding company's culture
- Possible team members

Let's discuss these points in detail:

PROGRESSIVE ELABORATION

The process of continually refining estimates and scope is termed as Progressive Elaboration.

PROJECT MANAGER ASSIGNED

The project manager is assigned during the Initiating phase in the project.

BUSINESS CASE

Business Case defines the reason why the project was started. The project manager needs to know the reason why the project was started. If the reasons are known, the project activities get impacted in the right way and the project team is able to bring the right outcome for the project.

HIGH-LEVEL PLANNING IS DONE DURING PROJECT INITIATING

High-level planning involves:

- 1 Creation of High-level WBS
- 2 Perform order of magnitude estimating
- 3 Perform high-level risk identification

The high-level planning effort is a part of creating project charter, which is further used to document project objectives, milestone schedules, and initial budget of the project.

PLANNING PROCESS GROUP

Planning process allows creation of a blue-print of the project i.e. getting the project organized before

actually doing the work. Project planning presents a good opportunity to save time, resources and money. A detailed analysis of whether the project team can achieve the project objectives is done in the Planning process. All of the knowledge areas of the project are assessed and a roadmap is identified to accomplish the project successfully.

Planning Process Group involves:

- Creating a Project Management Plan
- Identifying Stakeholders and their needs
- Collecting Requirements
- Defining Scope
- Creating WBS
- Defining Work packages and Activities
- Sequencing Activities
- Estimating Activity Resources
- Estimating Activity Durations
- Developing Schedule
- Estimating Costs
- Determining Budget
- Planning Quality
- Developing Human Resource Planning
- Planning Communication
- Planning Risk Management
- Identifying Risks

- Performing Qualitative and Quantitative Risk Analysis
- Planning Risk Responses
- Planning Procurements

The output of the planning effort includes project management plan and project documents. Project planning is iterative. The individual management plans are combined together into the overall project management plan. The amount of time spent in project planning and the level of detail achieved in the plan should be appropriate to the needs of the project. Some projects cannot be fully planned to a detailed degree at the start of the project. These projects are organized by phases. Everyone is involved in the project planning process. Project manager compiles the project plan with inputs from stakeholders, historical records, company policies, etc.

As changes occur, project plan needs to accommodate those changes.

EXECUTING PROCESS GROUP

Completing the work as defined in the project management plan and meeting the project objectives is the purpose of Executing Process

Group. The focus is on managing people, following processes, and distributing information.

The actions required for Executing Process Group are:

- Direct and Manage Project Execution
- Perform Quality Assurance
- Acquire Project Team
- Develop Project Team
- Manage Project Team
- Distribute Information
- Manage Stakeholder Expectations
- Conduct Procurements

The process of project management is iterative and thus, not always performed in the same sequence. Thus, execution means executing the latest revision of the project management plan.

MONITORING AND CONTROLLING PROCESS GROUP

Monitoring and Controlling Process Group requires several activities. It involves measuring the performance of the project with the project management plan, approving change requests, including corrective and preventive actions and defect repair.

The actions required in Monitoring and Controlling Process Group are:

- Monitor and Control Project Work
- Perform Integrated Change Control
- Verify Scope
- Control Scope
- Control Schedule
- Control Costs
- Perform Quality Control
- Report Performance
- Monitor and Control Risks
- Administer Procurements

CLOSING PROCESS GROUP

Project is completed only when the project closure is completed. The actions required for Closing Process Group are:

- Close Project or Phase
- Close Procurements

Once the administrative pieces of project closure are completed and formal sign-off that the product of the project is acceptable is received from the customer, other stakeholders, and/or the sponsor, the project is closed. The project manager can thus release any resources who had been helping to close the project.

ROLES IN PROJECT MANAGEMENT

Project Management involves multiple individuals. Each individual plays a crucial role. Let's look at the different roles involved in Project Management.



Roles in Project Management

ROLE OF A PROJECT MANAGER

The role of a project manager is to manage the entire project to meet its objectives.

The role may include:

- Assigned to the project no later than project initiating
- Helps write the project charter
- In charge of the project; not necessarily the resources
- Does not have to be a technical expert
- Influences the project team and the atmosphere in which the team works by promoting good communication, isolating the team from having to deal with politics, enhancing the positive aspects of cultural differences, and resolving team issues
- Ensures professional interaction between the project team members and other stakeholders
- Coordinates interactions between the project and key stakeholders
- Selects appropriate processes for the project
- Identifies and analyses constraints and assumptions
- Leads and directs project planning efforts
- Identifies dependencies between activities

- Must understand how to handle unrealistic schedule requirements to produce a realistic schedule
- Understands and enforces professional and social responsibility
- Identifies and delivers required levels of quality
- Assists the team and other stakeholders during project execution
- Defines the project change management plan
- Maintains control over the project by measuring performance and determining if there are any variances from the plan
- Determines the need for change requests, including recommended corrective and preventive actions and defect repair, and either approves or rejects changes as authorized or submits the change request to the change control board
- Uses metrics to see variances and trends in project work
- Works with team members to resolve variances from the project management plan
- Keeps the team members focused on risk management and possible responses to the risks
- Develops time and cost reserves for the project
- Must have the authority and accountability necessary to accomplish the project management work
- Must say “no” when necessary
- The only one who can integrate the project components into a cohesive whole that meets the customer’s needs
- Spends more time being proactive than dealing with problems (being reactive)
- Accountable for project success or failure
- Performs project closing at the end of each phase and for the project as a whole
- Performs or delegates most of the project management activities
- Overall, applies project management knowledge and uses personal and leadership skills to achieve project success

ROLE OF A PROGRAM MANAGER

The program manager is responsible for managing a group of related projects. Projects are combined into programs to provide coordinated control, support and guidance. The program works to meet project and program goals.

The role of the program manager may include:

- Managing related projects to achieve results not obtainable by managing each project separately
- Ensuring selected projects support the strategic goals of the organization
- Providing oversight to adjust projects for the program's benefit
- Guiding and supporting individual project manager's efforts

ROLE OF A PRODUCT MANAGER

This role is focused on strategic activities to deliver market requirements.

The role includes:

- Product Manager should be able to study the market needs and identify the current opportunities and threats based on these finding and observations
- He should be able to explore the opportunities and minimize the threats to make his organization successful
- For products which are already in the market, he should monitor their performance and also keep a close check on competitors' products

- He should play an important role in launching a new product in the market as per the market study
- He should also be a sounding board for his operational team to stop production of any of its non-performing products
- Responsible to manage product's performance in the market

ROLE OF A SERVICE MANAGER

A Service Manager is primarily responsible for managing service delivery for a given product or a service.

He/She is primarily involved in:

- Monitoring the overall performance of his Service area
- Identifying metrics for performance and tracking them
- Continue relationships with different teams including the Information Technology (IT) team, Business Partners and others
- Responsible to manage team's performance in the service area

ROLE OF A PRODUCT QUALITY MANAGER

Product Quality Manager is primarily responsible for managing the product quality.

His role includes:

- Product Quality Manager has to identify the critical parameters/metrics that could fail the product when in use
- He is responsible to identify and implement audit mechanisms for these products. The audit mechanism can include total products to be sampled, the quality audit process, identification and selection of quality auditors, their training process, calibrating quality auditors, among others.
- Quality Audit Manager should also create a mechanism to track and monitor quality performance of the product

ROLE OF A PROCESS REQUIREMENTS ANALYST

The primary role of a process requirements analyst is to gather, analyze, document and validate the needs of the project through various stakeholders. The role encompasses working with the project or the product manager.

The role can be divided into:

- Identification of stakeholders: Stakeholders are any individual who is impacted by the process. They can be sponsor, management team, process owner, project manager, subordinates, analysts, users, among others. Project manager also plays a key role in identifying the stakeholders and the requirements analyst works with him for the identification.
- Defining Business Needs: The business needs can include business requirements, functional requirements, non-functional requirements, user requirements, information on size and complexity of the project, assumptions and constraints.
- Analyze Requirements: Analyze requirements include identifying the stated and un-stated needs of the customer. Conflicting and unambiguous requirements are identified and further clarified.
- Document Requirements: Documenting the requirements is another important role of a requirements analyst. The documentation has to be clear, concise, unambiguous and complete.
- Validate and Prioritize Requirements: This is an important role where the analyst reaches out to project stakeholders to validate the

documented requirements. Validating requirements is further accompanied by prioritizing them.

ROLE OF A SPONSOR

The role of a sponsor prior to (or during) project initiation:

- Has requirements that must be met
- Is a project stakeholder
- Advocates for or champions the project, especially while the project concept is being put together
- Serves as a voice for the project or spokesperson to those who do not know about the project, including upper management
- Gathers the appropriate support for the project
- Ensures buy-in throughout the organization
- Provides funding
- Provides the project statement of work
- Provides information regarding initial scope of the project
- May dictate milestones, key events, or the project end date
- Determines the priorities between the constraints

- Provides information that helps develop the project charter
- Gives the project manager authority as outlined in the project charter
- Helps organize work into appropriate projects
- Sets priorities between projects
- Encourages the finalization of high-level requirements and scope by the stakeholders
- Guides the process to get the project approved and formalized, assisted by the project manager as necessary

The role of a sponsor during project planning:

- Provides the project team with time to plan
- May review the WBS
- Supplies list of risks
- Determines the reports needed by management to oversee the project
- Provides expert judgment
- Helps evaluate trade-offs during crashing, fast tracking, and reestimating
- Approve the final project management plan

The role of a sponsor during project execution, monitoring and controlling:

- Protects the project from outside influences and changes

- Enforces quality policies
- Provides expert judgment
- Helps evaluate trade-offs during difficult times, tracking, and reestimating
- Resolves conflicts that extend beyond the project manager's control
- Approves or rejects changes or authorizes someone representing him or her to do so
- May direct that a quality assurance review is performed
- Clarifies scope questions
- Works with the project manager to monitor progress

The role of a sponsor during project closing:

- Provides formal acceptance of the deliverables
- Supports the collection of historical records from past projects

ROLE OF THE TEAM

The team is a group of people who will complete work on the project. The team may help to:

- Identify and involve stakeholders
- Identify requirements
- Identify constraints and assumptions
- Create the WBS

- Decompose work packages for which they are responsible into schedule activities
- Help identify dependencies between activities
- Provide time and cost estimates
- Participate in risk management process
- Comply with quality and communications plan
- Help enforce ground rules
- Execute the project management plan to accomplish work defined in the project scope statement
- Attend project team meetings
- Conduct process improvements
- Recommend changes to the project, including corrective actions

Some team members may have project management responsibilities in addition to their responsibilities of implementing work. If so, they are considered part of project management team.

ROLE OF STAKEHOLDERS AS A GROUP

The stakeholder is anyone who can positively or negatively influence the project, including the customers or users, the project manager and team, the project's sponsor, program and portfolio managers, the PMO functional manager's within the

organization, and external sellers that provide services or materials for the project.

The stakeholders may be involved in:

- The creation of the project charter and the project scope statement
- Project management plan development
- Approving project changes and being on the change control board
- Identifying constraints
- Identifying requirements
- Risk management

The stakeholders may also become risk response owners.

ROLE OF A FUNCTIONAL MANAGER

A functional manager manages and owns the resources in a specific department, such as IT, engineering, public relations, or marketing, and generally directs the technical work of individuals from that functional area who are working on the project.

The degree to which a functional manager is involved in the project depends on the form of organizational structure:

In a matrix organization, the functional manager shares responsibility for directing the work of individuals with the project manager. In a project-centric organization, the project manager does all of the directing. In functional organization, the functional manager does all of the directing. It is the responsibility of the project manager to avoid any conflicts with the functional manager and coordinate the respective needs regarding the use of resources to complete the project work.

The activities of a function manager may include:

- Assign specific individuals to the team, and negotiate with the project manager regarding resources
- Let the project manager know of other projects that may impact the project
- Participate in the initial planning until work packages or activities are assigned
- Provide subject matter expertise
- Approve the final schedule during schedule development
- Approve the final project management plan during project management plan development
- Recommend changes to the project, including corrective actions
- Manage activities within their functional areas

- Assist with problems related to team member performance
- Improve staff utilization

ROLE OF A PORTFOLIO MANAGER

The portfolio manager is responsible for governance at an executive level of the projects or programs that make up a portfolio. A project is included in a portfolio based on the value of the project, the potential return on investment, whether it meets the corporate strategy, whether the level of risk associated with the project is acceptable, and other factors critical to organizational success.

The role of a portfolio manager may include:

- Managing various projects or programs that may be largely unrelated to each other
- Ensuring selected projects provide value to the organization
- Working with senior executives to gather support for individual projects
- Getting the best return from resources invested

SCOPE MANAGEMENT

When a construction site is being built, the constructor raises a fence on the site defining the boundaries of the construction. This process of building a fence is called scoping. Scope management is the process of defining what work is required and then making sure all of that work – and only that work – is done.

Scope management plan should include the detailed process of scope determination, its management and its control. This needs to be planned in advance.

Project manager must seek formal approval on a well-defined and clearly articulated scope. To identify scope, requirements must be gathered from all stakeholders. Gathering requirements from only a few stakeholders or only the sponsor might lead to incorrect definition of scope.

Large projects require more time, effort and resources to gather requirements and thus defining the scope is important.

Scope definition helps us make sure that we are doing all the work but only the work included in the scope management plan. Gold plating a project (adding extras) is not allowed.

Changes in scope must be taken into consideration all the knowledge areas of project management such as time, cost, risk, quality, resources and customer satisfaction. Integrated change management process is required to approve changes to scope of a project. Integrated Change Management includes updating of Change Request Form by Change Originator and also tracking the change on Change Control Register.

CHANGE CONTROL REGISTER					
Process Name: <input type="text"/>					
Change Request No. With Date	Track Lead	Description of Change	Impact	Status (approved/ rejected / on-hold/implemented)	Authority for Approval/Rejection

Change Control Register

Continuous monitoring of scope is required to determine what is and is not included in the project

Change Request ID #: _____

Date of submission:		Priority <input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
Change Originator:		
Change Receiver:		
Attention Area:		
Process / Sub Process:		
BU Head:		
Change Request category:		
Project Manager / Project Lead:		

Description	
Scope of Change	
Impact on Solution Doc, LOI, SOWs, Project Plan, SLAs or other as described	
Impact on Schedule	
Business, Process & System Impact	
Financial Impact (Cost estimate associated with the CR)	
Total estimated Effort required	
Implication of not making change	
Key Benefits of accepting CR	
Potential threats of accepting CR	
Supporting documents (If Any)	Attachments Attachments Attachments

Change Request Approval status	
<input checked="" type="checkbox"/> Approved <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Rejected <input type="checkbox"/> Cancelled	Approved by: Title: Date Approved / Meeting
Client Sponsor: Name: Title: Date Approved:	
Organization Sponsor: Name: Title: Date Approved:	
Comments	

Change Request Form

PRODUCT SCOPE

Product Scope is nothing but “What customer wants?” An organization can execute another project to identify a product scope or it could be the part of requirements gathering of your project.

An example of product scope would be:

On a project to build a new software application, the product scope is “a new workflow application that fulfils the requirements of our internal and external customers.” To determine if the project successfully achieved the product scope, the resulting application (the new product) is compared to the application requirements, which are recorded in the requirements documentation and the project scope statement for the project.

PROJECT SCOPE

The project scope is the work the project will do to deliver the product of the project (i.e. the product scope). In the software application development example, the project scope is the work that is to be done to develop the software application. This work includes the planning, coordination, and management activities (such as meetings and reports) that ensure the product scope is achieved.

These efforts are a part of project management plan and are further a part of the scope management plan. At the end of the project or the phase, the completed work is compared against the scope baseline in the project management plan to determine if the scope has been successfully completed.

SCOPE MANAGEMENT PLAN

Scope management plan contains – scope planning, execution and control. Scope management is created as a part of Project Management Planning process and it is not included as a separate scope management process. Scope management plan tries to answer:

- How will the scope be achieved by the project?
- The tools required to accomplish the project scope
- The enterprise environmental factors required for accomplishing project scope
- The organizational process assets required
- How the scope is managed and controlled throughout the project?

Organizations should have templates, forms, or standards for scope management. These are critical for any project. Scope management plan may have

topics that can be standardized for the organization, however, every scope management plan is unique. The project manager uses the scope management plan as a baseline to guide and measure the project until closing. As discussed earlier, scope management plan is a part of project management plan.

Like other knowledge areas, a scope management plan may not be developed at one time. However, it could be developed in stages, or iterated during project planning. The project manager first determines how to define the scope. Once the project is completely planned, the project manager has enough information to decide how the scope will be executed and controlled. These decisions then become part of the scope management plan. The project manager can use another aspect of iteration. In this iteration, the later parts of project planning, such as the Human Resources planning process, can add a new scope to the process, thereby changing the scope management plan.

A project manager is required to have a good understanding of the project scope to create a scope management plan. It is a major mistake to work on a project before the product and project scope are

identified. Creating a scope management plan is a required part of project management.

SCOPE MANAGEMENT PROCESS

Scope management process can be described as:

- 1 Determine Requirements: The project charter describes project's business case. The project manager should ensure that all requirements support the project's business case.
- 2 Needs of the stakeholders should be taken into consideration while defining product and project scope.
- 3 Work Breakdown Structure (WBS) to be used to break the scope into smaller and more manageable pieces.
- 4 Scope management process should be created from the customer's viewpoint.
- 5 Scope performance is to be measured and adjusted as needed during the course of the project.

Saying "NO" could become inevitable to avoid allowing unnecessary activities on the project because unnecessary scope adds cost, time and efforts on the project which is not required.

COLLECT REQUIREMENTS

Stakeholders of a project play a very critical role in providing project requirements. Requirements are the need of any project or a product. Requirements should be able to fulfill the stated objectives. Requirements should not be included just because someone wants it. Requirements may be related to Quality, the business process, regulatory requirements, compliance, project management, among others. All of the requirements (including products and process) are taken into consideration by the Collect Requirements Process.

The initiating phase involves defining the high-level requirements of the project and product during the project charter phase. The Collect Requirements process goes into the details of seeking additional and more specific inputs on those requirements and any related supposition from all stakeholders. Any miss in gathering these requirements may result in the failure of the project or may result in many changes or may even result in conflicts throughout the project journey. Hence, this process of collect requirements is critical.

Identification of project stakeholders is the first step before collecting requirements. You can use a

stakeholder register to record this information. The next step is to collect requirements from stakeholders. Do you think, it will be that easy to collect requirements? For certain projects, there could be multiple hundreds of stakeholders. Likewise even the methods required for collecting those requirements may be different for different stakeholders. The project manager needs to engage devoted effort to collect all the requirements before work is initiated on the project. If this is not done appropriately, a large number of changes are required on the project leading to high cost and high efforts. Reviewing historical information and lessons learned could be involved in the effort of collecting requirements. The project manager makes a conscious choice to choose the most appropriate technique for project and the stakeholders. Identification of risks during the risk management process could also use the same techniques of collecting requirements process.

REVIEWING HISTORICAL RECORDS

Historical records and lessons learned are very critical for the project team that helps in gaining understanding of what were the requirements on similar projects and thus, help identify relevant processes. It also helps a new person understand expectations from the respective teams. Lessons

learned from other projects may highlight common mistakes done by other project managers in defining the area of scope to ensure such requirements are not missed on current projects.

INTERVIEWING

This technique may also be called as “expert interviewing”. Various methods of interviews could be conducted by the project manager with project stakeholders to identify their requirements for the product or the process. The interviews can be conducted as one-on-one, emails, phone calls, group setting, letters or any other method.

FOCUS GROUP

In a focus group, the moderator or the facilitator plays a key role to gather inputs and thoughts that helps get the opinions and requirements for the product or an aspect of the project from a specific set of stakeholders or subject matter experts.

FACILITATED WORKSHOPS

The process of bringing together the individuals / stakeholders of different perspectives to define the requirements of the product or service is called as facilitated workshops.

BRAINSTORMING

The method of brainstorming strives for “group think”. It really does not just mean a meeting with people to discuss ideas or seeking individual thoughts. Brainstorming helps produce large number of ideas in a short period of time. A participant of the brainstorming session can share an idea of determining the scope. That idea generates an idea from another participant which leads to yet another idea, and so on.

The participants of a brainstorming session can vary. Individuals from different functions, backgrounds and perspectives can benefit the brainstorming session in a great way. The participants need not be just the individuals from the organization, they could be from outside the organization as well.

NOMINAL GROUP TECHNIQUE

This technique is done in continuation to the brainstorming meeting where the ranking of the most powerful ideas is done by the meeting participants.

DELPHI TECHNIQUE

This is a consensus technique with a difference. In this technique, the participants do not meet each

other. A request for information is sent to the experts and their participation details are kept anonymous. Their responses are compiled, and the results are sent to back to them for further review until a final consensus is reached.

MIND MAPS

A mind map diagram is used to generate ideas and classify them into logical groups. It is a tool used to visually organize the information. Many ideas are connected directly to the central core idea, and other ideas branch out from these.

AFFINITY DIAGRAMS

The ideas generated from any other requirements gathering techniques are grouped by similarities in this technique. A title is given to each group of requirements.

QUESTIONNAIRES AND SURVEYS

A questionnaire is designed to seek responses from respondents. The benefit of questionnaires and surveys is that it can be sent out to a large group.

OBSERVATIONS

Observation technique involves watching a potential user of a product at work.



Affinity Diagram Example

PROTOTYPES

A model of the proposed product is a prototype. Stakeholders are presented the prototype to seek feedback. Multiple versions of prototype may be created till all the requirements are captured, the model is finalized and approved.

GROUP DECISION-MAKING

There are multiple ways to make decisions in a group. Requesting inputs from all stakeholders may result in generating multiple ideas. These ideas may lead to confusion and may also lead to conflicts.

They need to be reviewed, analyzed, approved or rejected and prioritized before recording them in project documents. A unanimous agreement on a requirement from the group makes the decision making easy. A single person making a decision for the entire group is known as dictatorship technique. This has an advantage of quick decision making, however, also has a disadvantage of other stakeholders not agreeing in decision making done by the individual.

In group decision-making there are many conflicting opinions. In these situations, groups may take a majority approach. In this technique, the group takes a decision which is supported by more than half of the members. In case there is no majority support, the group may go with the decision of largest number of supporters. This is known as plurality technique. There is another technique known as the consensus approach. In this technique, the decision is made which is acceptable for the group. In case if there are certain members of the group who did not support the decision, they will willingly accept that most members of the group support.

REQUIREMENTS DOCUMENTATION

Once the team collect all requirements, it is time to document them. The documentation should be clear and unambiguous. This documentation is an output of Collect Requirements Process.

If the representation of information is not done appropriately, the collected requirements may be misunderstood. Hence, it is advisable to NOT assume that the collected requirements will meet the objectives. Thus, it is important to ask the stakeholders if the collected requirements would be meeting the stated objectives. This helps ensure that the right requirements are collected and end output will be acceptable.

BALANCING STAKEHOLDER REQUIREMENTS

Balancing stakeholder requirements involve prioritizing requirements. It also involves resolving any conflicts between them. It is an important aspect of Collect Requirements Process. The project manager has to ensure that the requirements are met within the stated project objectives. If the requirements cannot be met, then the project manager needs to identify options to adjust the competing demands of scope, time, cost, quality, resources, risk, and customer satisfaction.

Balancing stakeholder requirements is not limited to the Collect Requirements Process, it goes beyond this. At a later stage in the project, it is identified that certain stakeholder requirements do not match those of the project or those of other stakeholders. In this situation, a conflict may arise between stakeholders. Thus, the project manager may need to balance the requirements against the interests of the project and resolve any conflicts.

Clear project objectives are a prerequisite for balancing stakeholder requirements. Another prerequisite is to identify and prioritize ALL the requirements from ALL of the stakeholders during Collect Requirements Process. If these prerequisites are not met, balancing stakeholder requirements is an impossible task.

RESOLVING COMPETING REQUIREMENTS

Each department of the organization has their own interest in the project. For example, the risk team may slow down the pace of the project if they identify any risk and the operations team would have an interest of completing the project faster. Having an amicable solution for both departments is crucial.

These issues are complex and an intervention from management is required to resolve them. While resolving competing requirements, the project manager should identify which of the competing requirements resonate with the project business case. A thorough review of project charter, the scope statement and constraints will also be important factors in this regard.

Any project request that does not relate to the objectives of the project should be rejected. If the requirement is related to the reasons the project was initiated but it does not fall within the project charter, this request should also be rejected. Change requests related to the project charter need to be discussed with project sponsor for approval. When considering constraints, if the most important constraint is cost, then any requirements that would increase the cost would not likely to be accepted. Those that contain the cost (without serious impact on other project constraints) would more likely be accepted. Requests that do not fall within these guidelines can become part of a future project instead.

REQUIREMENTS MANAGEMENT PLAN

Requirements Management Plan is an output of Collect Requirements process. The plan answers the questions such as:

- Which are the methods used to identify requirements?
- What analysis is required for identified requirements?
- How will the requirements be prioritize?
- How would the requirements be managed?
- How would the requirements be tracked?
- What is required out of requirements traceability matrix?

REQUIREMENTS TRACEABILITY MATRIX

In large projects, if the requirements are not documented well, there is likelihood that they may be lost. Determining requirements can involve one requirement leading to more refined requirements and clarifications. This can make it difficult for the project manager and the project team to remember where the requirements came from. Objectives of the project may not be met if these reasons for requirements are missed. Requirements Traceability Matrix is another output of Collect Requirements Process. The matrix is used throughout the project in analyzing proposed changes to product or project

statement is a time consuming activity and may require multiple stakeholder participation including experts from outside the organization. The project manager avoid including the following two things while defining the project scope statement:

- 1 Scope that is not approved: Project manager should identify areas where people requested scope but it was not approved to be included in the project.
- 2 Scope that is not needed: Project manager should clarify areas where the scope could easily be misunderstood.

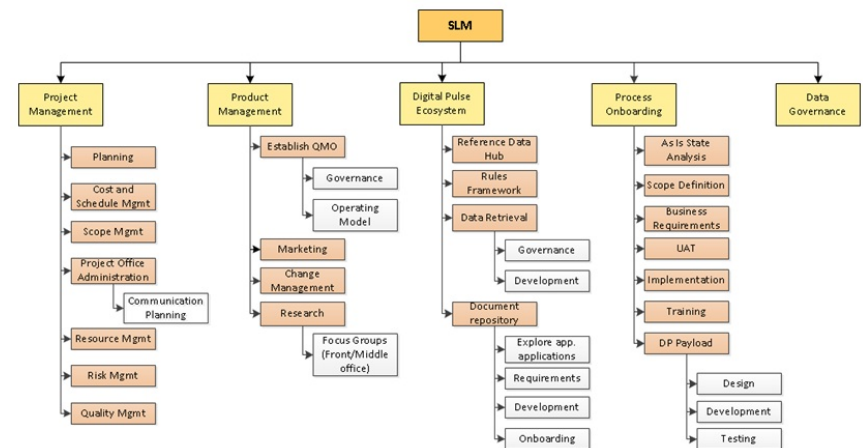
Scope baseline is a combination of project scope statement and WBS and WBS dictionary. Scope baseline is a part of project management plan. Project Scope statement can include:

- Product Scope
- Project Scope
- Deliverables
- Acceptance criteria of the product
- Out of scope activities
- Constraints and assumptions

CREATE WORK BREAKDOWN STRUCTURE (WBS)

All projects (large and small) require a WBS. It is a required element in project management. A WBS

shows the complete scope of the project broken down into manageable deliverables. A project will take longer than the scheduled time if a WBS is not available. Project managers may also miss out on certain important activities without the WBS. Thus, without a WBS, the project can be negatively impacted.



List of Activities as Actionables Example

Most project managers make a list of activities as actionables. This may result in overlooking some deliverables. Additionally, a list can be cumbersome and does not allow the project manager to clearly break down a large project into small appropriate pieces. People do not get an understanding of the

project by looking at the list. A list is created by one individual. Looking at the list, people do not know who has created the list. These are some of the major drawbacks of creating a list of activities.

A WBS on the other hand has enormous advantages. Using a WBS, no actionable is missed. A project manager can easily break down the work into work packages, and the WBS shows how the work packages are drilled down. A WBS is created with input from stakeholders and the team. This automatically helps in seeking their buy-in and thus leads an improvement in their performance. Creation of WBS is a process that allows the team to walk through the project in their minds and thus improve the project plan. Thus, the execution of the project is much easier and less risky. The involvement of people increase and all feel that the project is more achievable. A WBS shows a complete hierarchy of the project, making it easier to see how one deliverable relates to another.

It's important to note that the WBS is NOT a corporate organizational structure though it looks like one. It has a different function that allows you to break down a seemingly overwhelming project into pieces you can plan, organize, manage and control.

The creation of WBS is a top-down effort. It involves decomposing the deliverables, and the work required to produce them, into smaller pieces called work packages.

Following are the rules to be followed for creating a WBS:

- 1 A team is involved in creating a WBS
- 2 The first level is completed before proceeding any further in creating the WBS
- 3 Each level of WBS is a sub-level (a smaller piece) of the level above
- 4 The entire project can be understood by looking at all the levels of a WBS
- 5 WBS does not include deliverables other than the project

A deliverable is considerable to be a work package when:

- 1 It can be estimated (both realistically and confidently)
- 2 It can be completed quickly
- 3 It can be completed without interruption (without the need for more information)
- 4 May be outsourced or contracted out

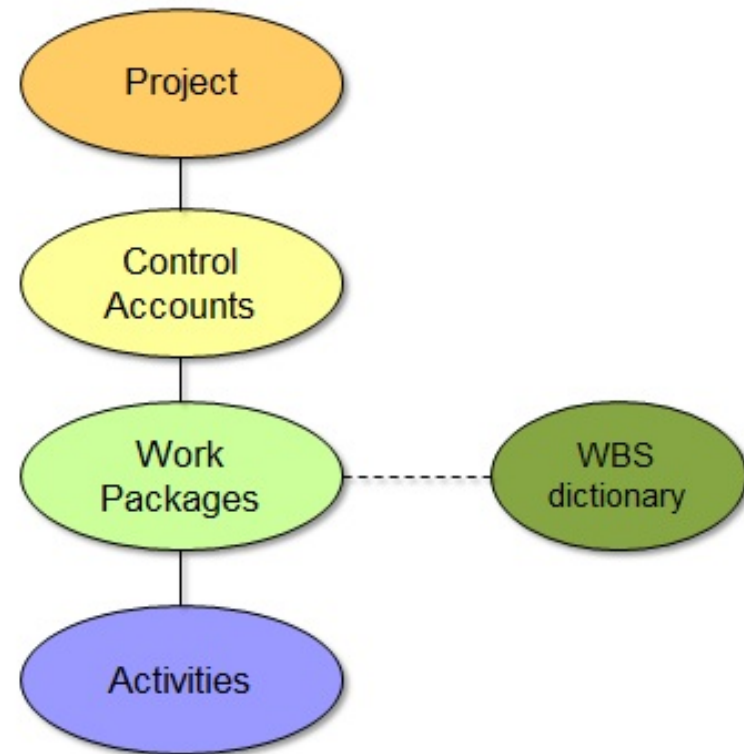
WBS levels are numbered at a later stage. Work packages are distinguished in the WBS using the identification numbers assigned after completion of the WBS. For some projects, the costs are not managed at a work package level. Instead, they are managed at higher level in WBS, called the control account.

As the planning process progresses, the team breaks down the work packages from the WBS into activities that are required to produce the work packages. Note that this further breakdown of WBS into an activity list is done as a part of the time management process of Define Activities. The team uses the project scope statement, WBS, and the WBS dictionary to help define which activities are required to produce the deliverables.

The foundation of any project is “WBS”. After creation of WBS, everything that occurs in planning is related to WBS. The project has a hierarchy and WBS is a graphical picture of that hierarchy. WBS identifies all the deliverables to be completed. The activity is not a part of the project if it is not in the WBS. The project is built on the foundation of a WBS. WBS is extremely important on a project. It should exist for every project. It ensures that the project team is thinking

through all aspects of the project. Additionally, it can be reused for other projects too and it does NOT show dependencies.

The project manager decomposes the project using a WBS. The term “deconstruction” and “decomposition” are the same. This diagram indicates the relationship of the components of a WBS.



Relationship between WBS Components

WBS DICTIONARY

For each work package, a WBS dictionary provides a description of work to be done. Benefits of WBS dictionary include, avoiding scope creep and providing clear description of the deliverable. Output of Create WBS process is a WBS dictionary. A WBS dictionary can have multiple uses:

- It informs when work package is going to start, thus acting as a work authorization system
- Schedule milestone, acceptance criteria and other information about the work package are included in a WBS dictionary
- It can be used as a control mechanism of what work is done
- The stakeholders have an increased understanding of the efforts involved in a work package with a WBS dictionary

WBS Dictionary			
Control Account ID#	Work Package Name	Date of Update	Responsibility
Work Involved			
Acceptance Criteria			
Assumptions			
Risks			
Resources Aligned			
Duration			
Schedule Milestones			
Cost			
Due Date			
Interdependencies			
Before the work package _____			
After the work package _____			
Approved By			

WBS Dictionary

SCOPE BASELINE

The final, approved version of certain pieces of a project management plan is termed as a baseline. In scope management, baselines are the WBS, WBS dictionary and the scope statement. All of these need to be approved by the management and stakeholders before beginning the work. These baselines help in comparing the progress of the project to where the baseline says it should be.

For any deviations from the scope baseline, a change request is needed. This change request goes through perform Integrated Change Control and if approved, gets added to the scope statement, WBS and WBS dictionary. Any other components or documents involved also need to be updated.

Meeting the requirements and the scope baseline are the measures of success of a project.

VERIFY SCOPE

The process of keeping the project on-track in terms of the approved scope by frequent discussions between customer or sponsor and seeking their acceptance on completed deliverables.

The inputs to Verify scope are:

- Inputs from Perform Quality Control process – validated deliverables
- Scope statement, WBS and WBS dictionary
- Requirements Traceability Matrix
- Requirements documentation

The outputs of Verify scope are:

- Accepted deliverables
- Change requests
- Updates to the project documents

Verify scope process can be done at the end of each process phase. It can also be done as a part of monitoring and controlling throughout the project.

Verify scope process provides a formal acceptance by the customer of interim deliverables whereas Close project or phase is to get final acceptance or sign-off from the customer for the project or phase as a whole.

CONTROL SCOPE

Measuring the scope performance (for project and/or product) and managing scope baseline changes are two major deliverables of Control Scope process. A project manager needs to control scope frequently

to ensure that the scope is being completed as per plan. The project needs to be properly managed using the Control Scope process.

Two components required for Control Scope Process are Scope Baseline from project management plan and current completed work on the project. Requirements documentation and Requirements traceability matrix can also be helpful in Control Scope process. A project manager identifies if there are any deviations against the baseline. A corrective or preventive action is recommended in case deviations exist. Change request originates in case any changes are required. The project manager needs to identify and perform Integrated Change Control process and subsequently update the required documents.

Control Scope process believes in a proactive approach. A project manager's primary job is to control the project to meet the baselines as per the project management plan. Changing scope without following the Change Management process is not advisable.

TIME MANAGEMENT

A project manager's key responsibility is to create a realistic project schedule. Before the project execution begins, the project manager should identify if the planned end date is achievable.

SCHEDULE MANAGEMENT PLAN

Schedule Management Plan requires thinking proactively before executing the project. It involves thinking through several points, including:

- Individuals involved in the scheduling process
- Approach required to plan schedule of the process
- Use of organizational processes and procedures
- Tools used for scheduling
- Method to manage and control the project to schedule baseline and manage any deviations

The schedule management plan is created as a part of Develop Management Plan process in Integration Management. A project manager must create a schedule management plan and it is observed that in real world scenarios most of the project managers miss on this important aspect.

A schedule management plan should include the methodology used to create the schedule. The project manager should also describe the use of scheduling software. He should identify the measurement guidelines i.e. should he measure the process progress in hours, days, weeks, months or quarters. The schedule management plan should also include the duration for each activity and the efforts required for those activities. All of this should establish the project baseline. This baseline is to be used to monitor and control the project during various phases. Project manager should also include a plan to mitigate any variances observed in the schedule. Change Control Procedure should be in place to manage schedule changes. Reporting requirements should also be established.

The measures of performance need to be planned in advance and then captured and reported. Schedule management plan is a part of project management plan and can be formal or informal. It expedites the schedule estimation process by providing guidelines on how estimates should be stated. During the monitor and control phase, the deviation from the schedule baseline can be analyzed and acted upon. Reporting of project is also determined by schedule management plan.

DEFINE ACTIVITIES

In scope management, we had created a WBS. WBS resulted in Work packages. Work packages are used as inputs in the Define activities process. These work packages are broken down further into activities to ensure that work packages are delivered. Each activity is then estimated, scheduled, monitored and managed. Thus, these activities should be small enough. Sequencing of these activities is the next process.

It's important to note that in the real world, project managers may create activities when they are creating work packages. Also, some project managers create network diagrams at work package levels and not at activity level.

For defining activities, a project manager needs two critical things:

- 1 Scope baseline (scope statement, WBS and WBS dictionary)
- 2 Availability of a project team

Defining the activities involve making the estimates. Involving the team early on in defining activities ensures that the estimates are more accurate.

When the project manager is defining the activities, there may be too many components to adequately break-down the components and schedule it. In these situations, project manager's use a technique called "rolling wave planning". In this method, the project manager need not plan all the details of the project right at the start. He can plan activities to the detail needed to manage the work only when he starts that phase of the project life cycle. There is a likelihood that project managers can use this planning method as an excuse for not planning the project appropriately. This is not advisable.

Activity list and Activity Attributes are two outcomes of Define Activities process. Activity attributes is the documentation of the details of the activities. Milestones are also to be determined in the Define Activities process.

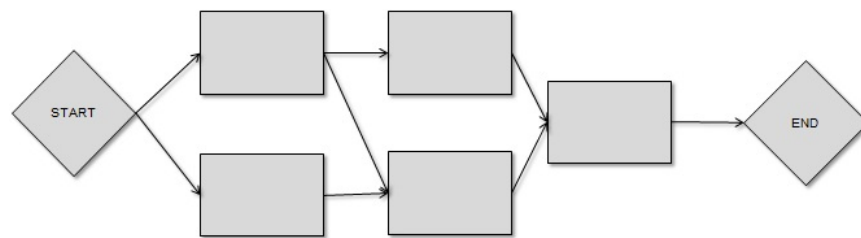
MILESTONES

Timeline for each of the defined activities is not considered as a milestone. Milestones are interim deliverables of the project schedule. A summary of milestones is included in the project charter. For controlling the project, a project manager can impose milestones (like a sponsor) during the Sequence Activities or Develop Schedule processes.

Deviations from the planned activities are detected when the milestone arrives and the project has not completed the activities required for the milestone. A list of appropriate milestones is created as a part of Define Activities process. This milestone list becomes a part of the project management plan and is added to the project scope statement and WBS dictionary as part of iterations in planning.

SEQUENCE ACTIVITIES

The output of Define Activities is a list of activities and milestones. In sequence activities process, these activities and milestones are sequenced in the order of work performance.



Sequence Activities

METHODS TO DRAW NETWORK DIAGRAMS

There are several network diagram methods including:

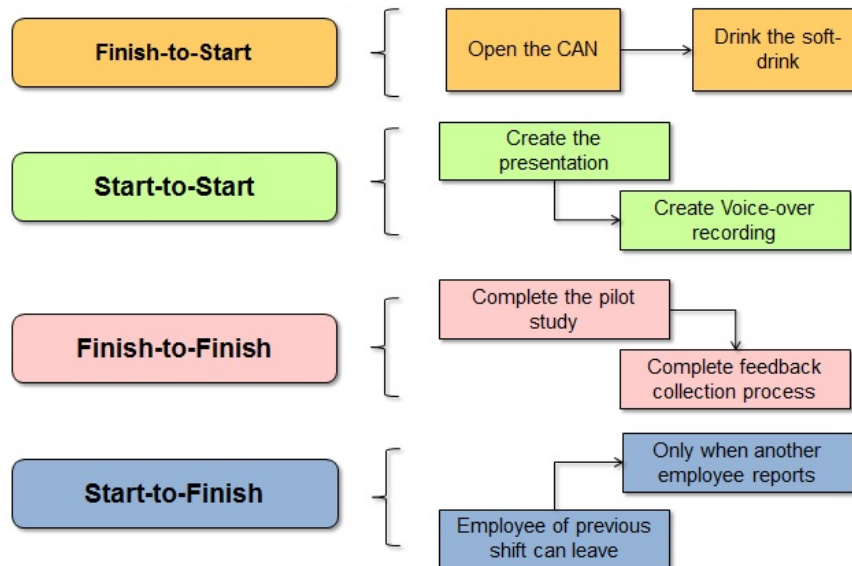
- Precedence Diagramming Method (PDM)

- Arrow Diagramming Method (ADM)
- Graphical Evaluation and Review Technique (GERT)

Project managers generally use PDM these days.

PRECEDENCE DIAGRAMMING METHOD (PDM) or ACTIVITY-ON-NODE (AON)

- Finish-to-Start (FS): The successor can start only after an activity finishes. This is the most commonly used relationship. Example: You must open the “can” of soft-drink before you start to drink it.
- Start-to-Start (SS): The successor can start only after an activity starts. Example: You must start creating a presentation and wait for one-week lag in order to have enough slides completed to start the voice-over recording.
- Finish-to-Finish (FF): The successor can finish only after an activity finishes. Example: You must finish the pilot before you finish gathering the complete feedback.
- Start-to-Finish (SF): The successor can finish only after an activity starts. This relationship is rarely used.



Precedence Diagramming Method (PDM)

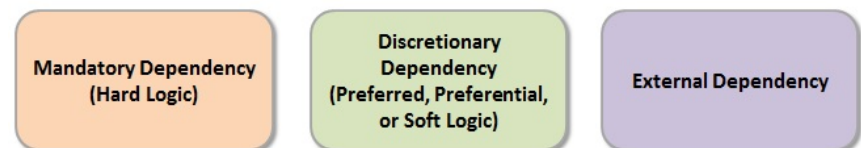
GRAPHICAL EVALUATION AND REVIEW TECHNIQUE (GERT)

GERT is a computer simulation technique that allows loops between activities. GERT is a modification to the network diagram drawing method. An example could be designing a program and testing it. After testing, it may or may not need to be redesigned.

TYPES OF DEPENDENCIES

Sequence of activities can be based on multiple dependencies. Some of them are listed below:

- **Mandatory Dependency (Hard Logic):** A mandatory dependency is the natural flow of work being done (e.g. you must give the command to print before you can print). It may be required by the contract.
- **Discretionary Dependency (Preferred, Preferential, or Soft Logic):** A project team cannot easily change other types of dependencies, however, they can change the discretionary dependency. A discretionary dependency is determined by the project manager and the project team. Discretionary dependency is quite useful when there is a need to compress the project schedule or fast track the project.
- **External Dependency:** Parties outside the project can also influence the project. External Dependency is based on the needs of a party outside the project (e.g. labor union, regulators, etc)



Types of Dependencies

LEADS AND LAGS

A lead may be used to indicate that an activity can start before its predecessor activity is completed. For example, editing of a book may start before the write-up is finished.

A lag is inserted waiting time between activities, such as needing to wait for completion of the application testing before final roll-out of the application.

Sequence Activities process can also result in identification of new risks. It may also lead to updates to activity list and activity attributes.

ESTIMATION – AN INTRODUCTION

Critical points to be remembered for estimating activity resources or estimating activity durations are:

- Accuracy of estimation improves if it is done basis WBS
- Accuracy is also improved if estimation is done by the same person who does the work
- Historical information provides critical insights for the process of estimation
- Estimation will be more accurate if there are minimal or no changes in schedule, cost and scope baselines

- Project manager should manage the project schedule without any deviations to the schedule baseline
- Project manager should manage project budget without any deviations to the cost baseline
- Integrated Change Control is used to approve or reject all change requests
- Any issues related to schedule, cost, scope, quality, or resources can lead to change requests
- A project managers role is to analyze the project requirements, create new estimates basis inputs from team members and his experience with relevant projects, and resolve any differences to produce realistic objectives
- Periodic recalculation of Estimate to Complete (ETC) is required to ensure adequate time, funds, resources, etc are available for the project
- Project management plan should be revised as changes are approved and necessary work is completed
- A non-acceptable project management practice is Padding
- Any agreed-upon estimates must be met by the project manager

- Estimates must be reviewed periodically to see if they are achievable and to check for padding and risks
- Reduction or elimination of risks can result in decreased estimates
- Providing accurate and feasible estimates is the responsibility of a project manager

ESTIMATE ACTIVITY RESOURCES

The type and quantity of needed resources are determined after the activities are sequenced. A resource could be an equipment, materials or people. Lack of resources is a common problem with all projects and hence, a project manager must plan and coordinate resources to avoid these problems.

This results in getting two outputs:

- 1 Defined activity resources requirements
- 2 Resource breakdown structure (RBS)

ESTIMATE ACTIVITY DURATIONS

The Estimate Activity Durations process is to estimate how much time each activity will take. It is completed after defining and sequencing the activities and the type and quantity of resources for each activity are identified. Who should play a role of estimating these durations? Ideally, the estimators should be those who will be doing the work.

However, the estimators are more often project team members who are more familiar with the work that needs to be done. The estimators need to have access to:

- Activity resource requirements
- Resource calendars
- Historical data of the organization
- Lessons learned about activity durations
- Past project calendars
- Defined scheduling methodology
- Company culture – enterprise environmental factors
- Existing systems – estimating softwares and productivity metrics

Later in project planning, during the risk management efforts, the time estimates and any other information gathered during the estimating process are considered when creating a risk register.

Many project managers estimate activity durations like this. Padding undermines a project manager's ability of developing realistic schedules and budgets.

A pad is an extra time and cost added to an estimate because the estimator does not have enough information. The potential need for time and cost

arises when the project has many unknowns and information is not available to clarify the unknowns. This can be addressed with reserves through the risk management process. Risk management is an important process that converts uncertainties into identifiable opportunities and threats (risks). Estimators need to identify these risks and discuss with the project manager. These risks should not remain hidden.

If many of the estimates are padded, the project will have an extravagant schedule. In this case, there is no need of creating a schedule or a budget. In actual real-world projects, the schedule and the budget are used as baselines against which project manager's measure project's performance. Thus, these baselines should be as realistic and accurate as possible and project manager's need to adhere to them. Padding is a poor sign of project management and it damages the reputation of a project manager.

Padding will not be required if:

- A WBS is available with estimators
- A WBS dictionary is also available with the estimators
- Time and cost reserves on the project are identified through actual calculations

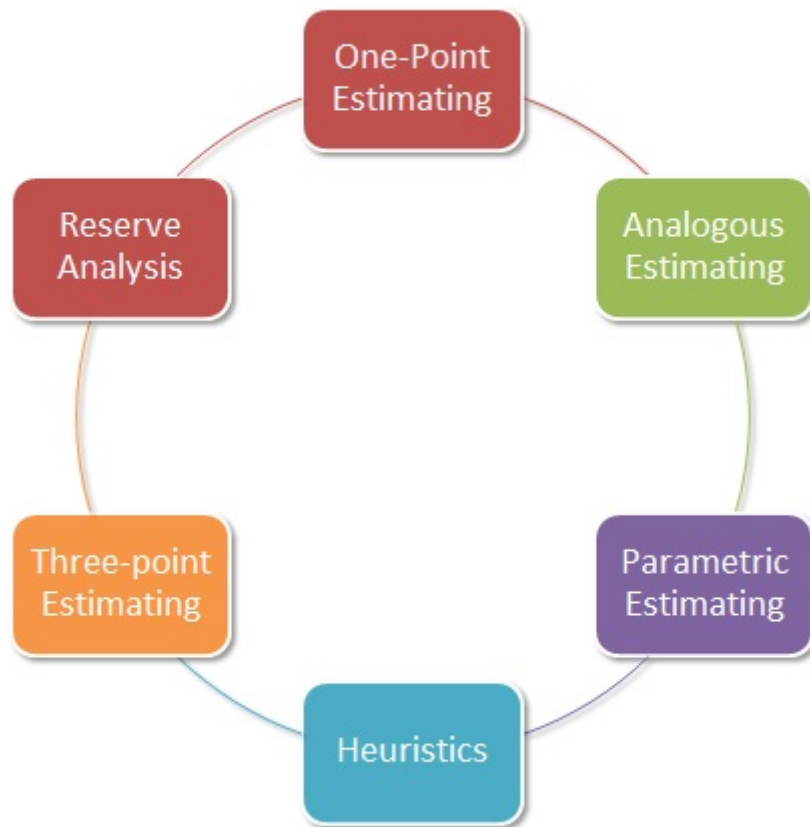
- Risks and unknowns are identified

HOW IS ESTIMATING DONE?

The three methods used for estimating include analogous estimating, parametric estimating, three-point estimating or reserve analysis. Estimation activity need to be completed by individuals who are doing the work.

A project manager plays a key role during the process of estimation. Some of his activities are outlined:

- Enough information is provided to the team to properly estimate each activity
- Complete calibration should be made between project manager and estimators to know how refined their estimates may be
- Validate the estimates
- Prevent padding
- Formulate a reserve
- Assumptions made during estimating are recorded for later review



Estimation Methods

ONE-POINT ESTIMATING

Basis this technique, an estimate is made per activity. For example, the person doing the estimating says that the activity will take one month. The estimator may estimate this time basis expert judgment,

historical information, or it could just be a guess. The technique is thus problematic.

The negative effects of one-point estimating on the project are:

- If an estimator estimates that it will take 15 days for an activity to be complete, and it takes only 10 days, it can make the person who provided the estimate look untruthful and untrustworthy
- It can hide critical information about risks and uncertainties from the project manager
- It can decrease the buy-in to the project management process as it results in a schedule that no one believes in
- It forces people into padding their estimates
- It often results in estimators working against the project managers to protect their interest

So, where could we use one-point estimates? For projects that do not require a detailed, highly reliable schedule, a one-point estimate can be used. A three-point estimate is preferable.

ANALOGOUS ESTIMATING

The last few projects similar to this one took nine months, so this one should also. Similarly, last three times this activity was completed, each took fifteen

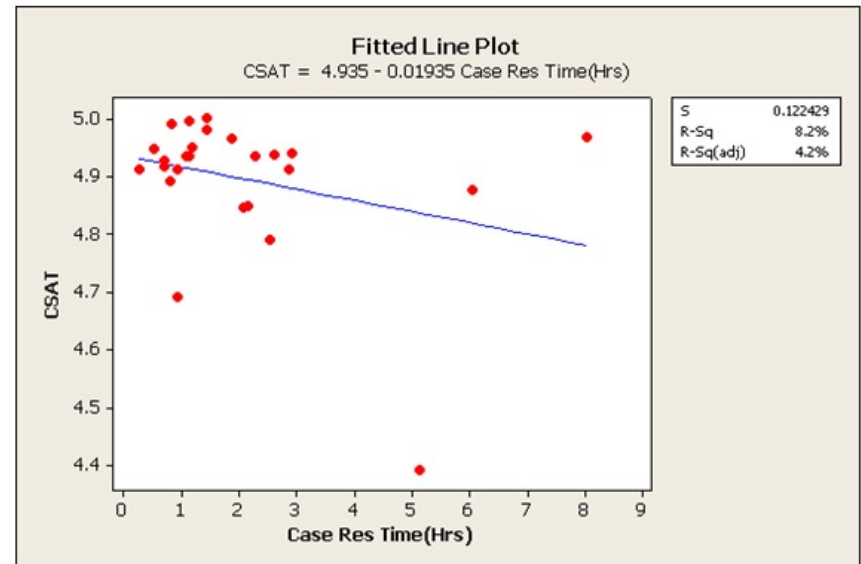
days, since we have no other information to use, we will use fifteen days as the estimate for this activity and review the estimate when more details are available. Expert judgment and historical information is used to estimate using analogous estimating technique.

PARAMETRIC ESTIMATING

Parametric estimating looks at the relationships between the X's (variables) on the Y's (activity) to calculate estimates. The data primarily comes from historical records – such as previous projects, industry requirements, standard metrics, other sources.

There are two ways the estimator might create parametric estimates:

- Regression analysis (scatter diagram): A regression analysis identifies the impact of an X on a Y i.e. impact of a variable on an activity by creating a mathematical formula to use in future parametric estimating.
- Learning curve: Example: The average handle time of an employee in a call center reduces as his tenure increases because of improved efficiency.



Parametric Estimations

HEURISTICS

A heuristic means rule of thumb. An example of a heuristic is the 80/20 rule or the Pareto principle. This rule suggests that 80% of quality problems are caused by 20% of potential sources of problems. Results of parametric estimating can become heuristics.

THREE-POINT ESTIMATING (PERT ANALYSIS, PROGRAM EVALUATION & REVIEW TECHNIQUE)

Since there is a very low probability of meeting the project deadline on exactly one date, it is often best

to state estimates in a range using three-point estimates. Analyzing what could go right and what could go wrong can help estimators determine an expected range of activity, and if they state this range using three time (or cost) estimates, the project manager can better understand the potential variation of the activity estimates and the overall project estimate. With the three-point estimate, the estimators give an Optimistic (O), Pessimistic (P), and most likely (M) estimate for each activity. This ultimately provides a risk-based expected duration estimate by taking either the average or weighted average (using PERT analysis) of the three estimates.

RESERVE ANALYSIS

Identification of risks is done by Estimating. Elimination of risks is done by completing the risk management process. This makes the estimates more accurate and it also reduces the range of time and cost estimates. Time and money is saved by the risk management process.

One of the critical responsibilities of a project manager is to establish a reserve to accommodate for the risks that remain in the project after the risk management planning process have been completed. An initial reserve is estimated in the risk

management process. The Plan Risk Response process is executed to reduce the risk and a revised reserve is created. Project planning is thus an iterative process.

Contingency reserves and management reserves are two types of reserves for a project. Management reserves are additional funds kept as a contingency reserve to cover unforeseen risks. Contingency reserves are for the risks remaining after the Plan Risk Responses process.

There is a major difference between reserves and padding. In padding, the team members determine how much of a pad they want to attach to their estimate. This is an arbitrary guestimate. In creating reserves, the information required to reliably calculate the additional time or funds the project may need, is available with the project manager.

DEVELOP SCHEDULE

After completing the network diagram and activity estimates, information is updated in a schedule. A schedule is calendar based.

To develop a finalized schedule, following steps need to be followed:

- Keep a check on priorities of stakeholders
- Create multiple ways of completing work
- Identify risks and impact on other projects
- Negotiate resource availability with managers
- Leads and lags to be applied to the schedule
- Crashing, fast tracking, and reestimating to be used to compress schedule
- Adjust components of a Project Management Plan
- Use scheduling tool and perform calculations to determine optimum schedule
- Use models such as Monte Carlo analysis to simulate project & identify project completion date
- Level resources if necessary
- Seek approval on the final schedule from the team who created it
- Seek stakeholder buy-in & formal management approval

Many of the actions of Develop Project Management Plan process (in Integration Management Chapter) are performed as a part of Develop Schedule process.

SCHEDULE NETWORK ANALYSIS

For creating a final schedule, a schedule network analysis is completed using an initial schedule. Multiple techniques can be used to create the final schedule such as:

- Critical path method
- Schedule compression
- What-if scenario analysis
- Resource leveling
- Critical chain method

CRITICAL PATH METHOD

A critical path is the longest path in a network diagram. The following steps are carried out in a critical path method:

- 1 Longest path is determined through the network diagram
- 2 Earliest and latest time when an activity can start is determined
- 3 Earliest and latest date when an activity can be completed is also determined

NEAR-CRITICAL PATH

A near-critical path is close in duration to the critical path. If the critical path and near-critical path are closer to each other in length, it increases the risk of the project. The project manager should focus on

monitoring and controlling activities on both critical and near-critical paths to avoid any delays to project completion.

FLOAT (SLACK)

Floats are mainly of three different types:

- Total Float (slack): The amount of time the activity can be delayed without delaying the project end date. Total float is considered as a primary type of float.
- Free Float (slack): The amount of time the activity can be delayed without delaying the early start date of the successor(s).
- Project Float (slack): The amount of time the activity can be delayed without delaying the externally imposed project completion date required by the management or by the customer.

“Float” and “slack” mean the same. Critical path activities have “zero” float. Delayed projects or projects that have imposed dates can have negative float. Float is an advantage for the project. A float can be used by the project manager to:

- 1 Effectively manage the project
- 2 Achieve better allocation of resources

For example, if you have a new resource who is still learning and if you feel he will take longer to complete the task, you can allocate him to the activity which has maximum float. Thus, even if the activity is taking longer, it is less likely that the project will be delayed.

The amount of float also indicates the time flexibility the project members may have for each activity.

Formula for calculating float:

Float = Late Start (LS) – Early Start (ES)

Float = Late Finish (LF) – Early Finish (EF)

Either formula will give the same result.

SCHEDULE COMPRESSION

Unrealistic timeframe is one of the most common problems of any project. If the customer or stakeholders have requested for a date that cannot be met, or if the project has deviated considerably from the baseline, the project schedule requires compression. It is the responsibility of the project managers to push back, present options, and make sure the project is achievable by properly planning the project and using schedule network analysis techniques like schedule compression. The schedule

compression technique helps in determining if the desired project completion date can be met and if not, what can be changed to meet the requested date. This can be done right at the project planning stage. This technique is also used during integrated change control to look at the impacts changes to other parts of the project (i.e. cost, scope, risk, resources, quality, etc) have on schedule. The objective is to compress the schedule without changing the scope of the project.

FAST TRACKING

This technique involves doing critical path activities in parallel that were originally planned in a series. Some of the disadvantages of fast tracking are:

- Results in rework
- Increases risk
- Requires more attention to communication

CRASHING

In crashing maintaining the project scope is important. This technique involves making cost and schedule trade-offs to determine how to compress the schedule the most for the least cost. Crashing always results in increased cost. It trades time with money.

WHAT-IF SCENARIO ANALYSIS

In creating a finalized, realistic schedule, it is helpful to ask “What if a particular factor changed on the project? Would that produce a shorter schedule?” The assumptions for each activity can change and, therefore, the activity durations can also change. One of the ways to calculate the effect of these changes is through a Monte Carlo Analysis.

MONTE CARLO ANALYSIS

The outcome of the project is simulated by computer software in Monte Carlo analysis. It is based on the three-point estimate (optimistic, pessimistic, and most likely) for each activity and network diagram.

Following are the benefits of the simulation:

- It suggests the probability of completing the project on any specific day
- It suggests the probability of completing the project for any specific amount of cost
- It suggests the probability of any activity actually being on the critical path
- It suggests the overall project risk

It is more accurate than other methods as it simulates the actual details of the project and calculates probability.

Monte Carlo analysis help deal with “path convergence”, places in the network diagram where multiple paths converge into one or more activities, thus adding risk to the project. Monte Carlo analysis is also used as a risk management tool to quantitatively analyze risks.

RESOURCE LEVELING

A resource-limited schedule is produced using resource leveling. If resources are limited, leveling lengthens the schedule and increases the cost and other constraints.

CRITICAL CHAIN METHOD

Critical Chain method uses a network diagram and develops a schedule by assigning each activity to occur as late as possible to still meet the end date. You add resource dependencies to the schedule, and then calculate the critical chain. Starting at the end date, you build duration buffers into the chain at critical milestones. These reserves, spread throughout the project, will provide cushions for delays in the scheduled activities. You manage these buffers so that you meet each individual milestone date and thus the project milestone completion date as well.

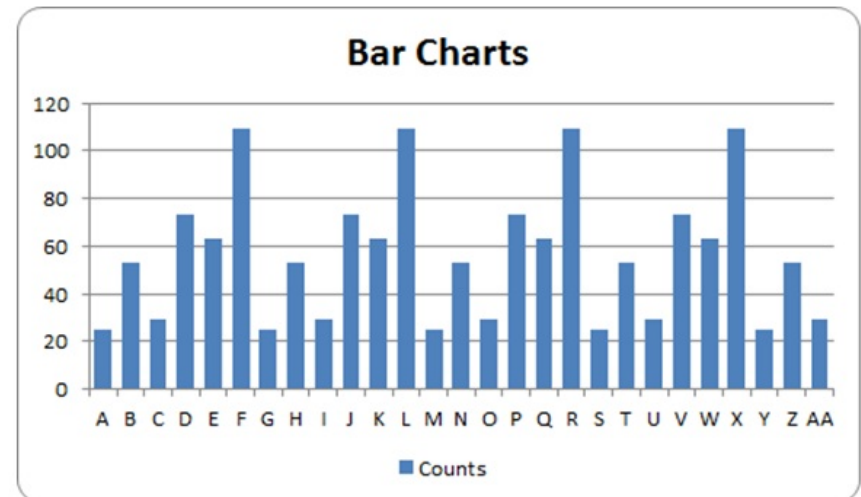
PROJECT SCHEDULE

The schedule can be shown with or without dependencies (logical relationships) and can be shown in any of the following formats, depending on the needs of the projects:

- Network diagrams
- Milestone chart
- Bar chart

MILESTONE CHART

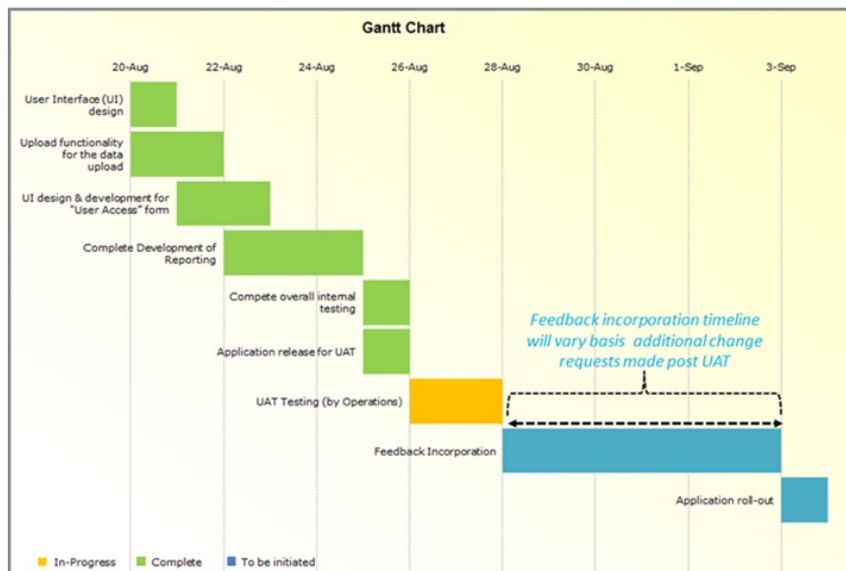
These are similar to bar charts but they only show events. Milestone charts are good tools for reporting to management and to the customer.



Milestone Chart

BAR CHARTS (Gantt Chart)

Bar charts are weak planning tools, but they are effective for progress reporting and control. They are not project management plans. Bar charts do not help organize the project as effectively as a WBS and a network diagram do. They are completed after the WBS and the network diagram in the project management process.



Gantt Chart Example

CONTROL SCHEDULE

Schedule control means looking for things that are causing changes and influencing the sources of the change. If the project can no longer meet the agreed-upon completion date (the schedule baseline), the project manager might recommend the termination of the project before any more company time is wasted.

COST MANAGEMENT

Time Management and Cost Management are strongly connected. Many of the topics covered in Cost Management are covered in Time Management as well.

In Time Management chapter we studied the creation of work packages. These work packages were further divided into activities. In multiple projects, cost estimates are created basis these activities. However, in large projects, cost estimates are created at control account level. This level will be equal to a work package level or higher than that.

COST MANAGEMENT PLAN

Though the Cost Management Plan is a required part of Project Management Plan, unlike time and scope management, it is not listed as a part of formally defined cost management process. The Develop Project management Plan in Integration Management involves creation of the cost management plan. It is important to note that the step of creating the cost management plan exists irrespective of where it is created. Cost Management Plan focuses on:

- Planning cost for the project

- Managing project to the cost
- Control cost
- Manage cost variances

Cost management plan forms a part of project management plan. Like other project management plans, even cost management plans requires proactive thinking.

Some important steps involved in cost management plan are:

- The way in which the cost estimates should be stated
- Cost estimates accuracy levels
- Instructions for identifying, tracking and reporting cost performance
- Reporting formats
- Bifurcation and definitions of direct and indirect costs
- Maximum cap for cost expenditure
- Change control procedures required for cost changes

Maximum cap for cost expenditure allows project manager and members to allow variation for cost. As the cost increases beyond the ceiling provided, actions should be taken to control it. These ceiling

numbers (maximum cap) are proactively thought through by the project manager in the cost management planning stage.

LIFE CYCLE COSTING

Life cycle costing is taking into consideration of the whole life of the product, and not just the cost of the project. For example, a product costs \$50,000 which has a very low maintenance cost (\$5000) over its life period. An alternate product is available for \$38,000 however, has higher maintenance cost amounting to \$50,000 over the product's life. As a project manager, would you prefer reducing the cost of the project by saving \$12,000 (by buying the alternate product)? – remember, this increases the maintenance cost for the company by \$45,000. Or would you take into consideration the entire life cycle costing of the product and forgo \$12,000 for a future saving of \$45,000 for the company?

VALUE ANALYSIS

Value analysis focuses on decreasing cost of the project without any degradation in scope and performance levels. A systematic identification of various functions, assignment of values to those functions and identifications of less costly resources and activities to be performed maintaining the

performance levels is done in value analysis. Value Analysis concurs with value engineering.

COST RISK

Any risk related to cost such as procurement risk, cost management risk is termed as cost risk. This risk is not just covered in risk management and requires to be covered in all phases of the project.

ESTIMATE COSTS

This process is related to estimating cost for each identified activity of the project.

The costs required to complete the project involve:

- 1 Quality efforts
- 2 Risk efforts
- 3 Project management activities
- 4 Resources
- 5 Direct and Indirect costs
- 6 Overhead costs
- 7 Others

TYPES OF COST

There are two types of cost:

- Variable cost: As understood by the name, these costs vary with the amount of work being done. For example, cost of raw material, labor wages, etc.

- Fixed cost: These are non-variable costs. These costs are fixed and includes set up cost, working capital, lease (rent), etc.

A cost can be direct or indirect cost:

- Direct Costs: The costs that can be directly attributed to the work done in the project is considered as Direct Costs. Example include: travel and entertainment expenses, stationary cost, labor salaries, etc.
- Indirect Costs: The overhead items or costs incurred that cannot be apportioned to a specific project or activity and can be used for multiple projects are termed as Indirect costs.

INPUTS TO ESTIMATING COSTS

Following are the inputs that help in estimating costs better and quicker:

- Scope Baseline: Scope baseline includes the project scope statement, WBS and WBS dictionary. It helps in allowing the project manager to know what is in-scope and what is out-of-scope.
- Project Schedule: A schedule is required before a budget is created. The project schedule contains the list of activities, the allocated resources and the time when work will occur.

Cost expenditure can be controlled if the project team is aware of the timing on when to buy the product. The other way that it can be controlled is when project expenditures are made in a time-phased manner. Thus, a schedule can affect cost. Likewise, cost can also affect schedule. If an activity is to be executed on a project when the cost of purchasing the raw material is very high, the activity may need to be pre-poned or post-poned for the reasons to accommodate the surge in price.

- Human Resources Plan: The system to reward project members, rates of labor required and number of resources (individuals) required for the project and their cost are arrived at by the human resource plan. This plan enables the project manager to keep the resources motivated to work achieving savings and still ensuring the cost of the project is controlled.
- Risk Register: Risk is an effective contributor to reduce time and money associated with the project. Cost is required to the work required to manage and control risks. These costs can also lead to more risks such as cost risks. Thus, risk is both an input and output of Estimate Cost process.

- **Historical Records and Lessons Learned:** Historical records from past projects are extremely helpful to make the cost calculations and the estimates easier. The templates provided by these records help in executing these efforts faster and quicker.
- **Project Management Costs:** Project management efforts also require costs. The expense of the project manager, status reports, change analysis, execution, etc are included in these costs.

Risk Register							
Sr. No.	Risk ID	Risk Description	Consequence		Likelihood		Rating
			Current	Target	Current	Target	Level of Risk
1	1.1	Loss of data	Major	Insignificant	Moderate	Unlikely	Extreme
2	1.2	Loss of back-up	Major	Minor	Rare	Rare	High
3							
4							
5							
6							
7							
8							
9							
10							

Risk Register

HOW IS ESTIMATING DONE?

Costs can be estimated using the methods that we have already learned in the Time Management Chapter i.e. One-point estimating, analogous estimating, parametric estimating, and three-point

(PERT) estimating. Another method of estimation that we will now study is bottom-up estimating technique.

BOTTOM-UP ESTIMATING

A project is finely distributed in the form of activities and work packages. The technique of bottom-up estimating involves estimation of costs involved at each activity or work package, rolling it up into control units and then finally to the overall project estimate. This is another reason why a WBS should be well created by the project team. The process of creating estimates involves the following items:

PROJECT MANAGEMENT SOFTWARE

Project management software can help in speeding up the calculations required to estimate costs. These calculations could include direct, indirect, overhead, fixed cost calculations for several hundred activities.

DETERMINING RESOURCE COST RATES

Resources can be internal human resources, vendors, consultants, suppliers, external technicians, among others. Project managers must have a know-how of the rate involved for the resource cost.

RESERVE ANALYSIS

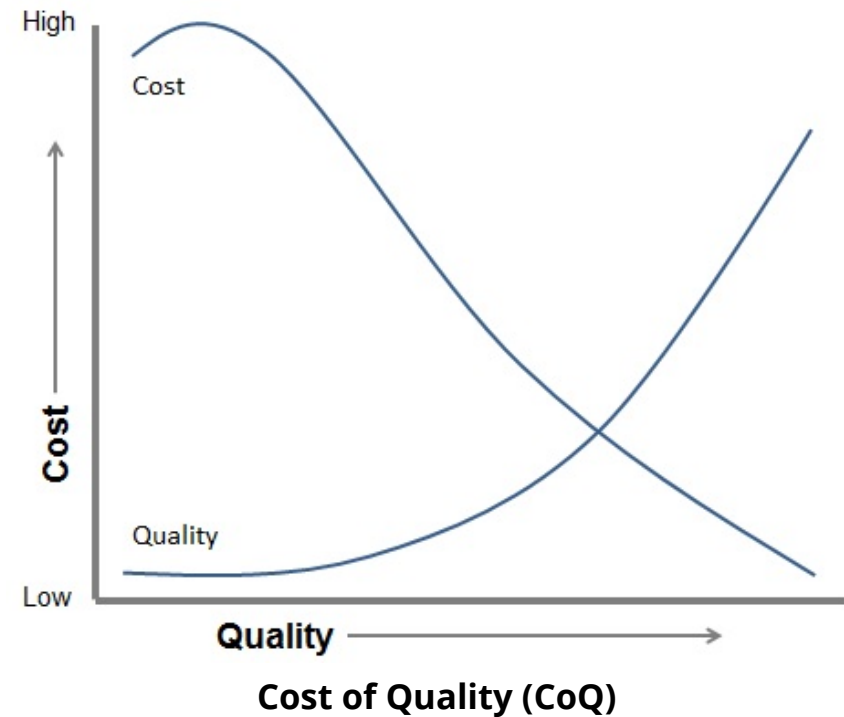
Reserve analysis involves identification of activities which have significant risks and determination of the total efforts (time and money) required to manage these risks if they occur. There are two types of risks: Known and Unknown risks. Contingency reserves deal with known risks. Management reserves deal with unknown risks. Padding should be avoided when doing a reserve analysis.

COST OF QUALITY

Quality efforts are required for the project. The amount of money added due to these efforts are bifurcated as Cost of Quality.

ACCURACY OF ESTIMATES

Estimation of Costs is an iterative process. Costs estimated during early stages of the project have lesser accuracy and the ones estimated at later stages have higher accuracy. Cost estimation should be made by the project manager in the form of ranges. Thus, the ranges will be higher at the start of the project and will narrow down as project progresses.



There are different types of ranges for different scenarios i.e. for preliminary cost estimation, the range will vary, for cost estimation during the conceptualization stage the range will vary and similarly for feasibility and final estimation, the ranges will vary. The ranges will narrow down from broad level to lower levels. Some of the techniques are described:

- ROUGH ORDER OF MAGNITUDE (ROM) ESTIMATE: This estimate is generally made

during project initiation phase. A typical range of estimates for ROM is +/- 50%, however, this percentage will vary depending on how much is known by the project team about the project when creating estimates.

- BUDGET ESTIMATES: Done during the project planning stage. The ranges varies from -10% to +25%.
- DEFINITIVE ESTIMATE: It is a more refined project cost estimate. A few project managers use a range of +/- 10% and others use -5% to +10% of range from actual.

When the Estimate Cost process is completed, it results into:

- Activity Cost Estimates with the explanation of how these costs were derived
- Changes or updates to other project management documents such as risk register, change control register, among others

DETERMINE BUDGET

In the process, the project manager determines the amount of funds the organization needs to have available for the project by calculating the total cost of the project. This calculation leads to creation of a Budget.

A project manager MUST perform risk management activities and include reserves (contingency and management) when estimating the total cost of the project. The cost budget is cost baseline plus management reserves. The cost budget indicates the total money the organization should have allocated for the project.

For creation of a budget, the process of cost aggregation is used. In this concept, the activity costs are rolled up into work package costs, work package costs are then rolled up into control account costs and control account costs are finally rolled up into project costs. Contingency cost is added to the cost baseline. Management reserves are added as a final step.

Comparison of cost baseline and cost budget is done by the project manager to parametric estimates, expert judgment or historical records for a sanity check. If there are significant variances between the reference data and project estimates, the project manager needs to investigate and ensure that the estimates are correct.

Checking of the cash flow is the next thing to do. There could be situations where the funding is not

available when it is required by the project. Hence, all the activities need to be planned in a time-phased manner and may be shown as an S-curve.

The next step is to identify any constraints in the project charter. Project manager needs to reconcile the cost baseline and cost budget with these constraints. The reconciliation is done as a part of Integration Management process. If the project estimate exceeds the constraints, the project manager must meet the stakeholders and explain the reasons of exceeding the constraints and also share options to reduce project costs. Else, an unrealistic budget is made available and it is considered to be a project manager's fault.

The output of Determine Budget process is Cost Baseline. The efforts involved in determining budget process may lead to changes in other project management documents.

CONTROL COSTS

Control costs process is focused on controlling cost of the project as described in any other knowledge area in the control section.

A few activities that could be helpful for controlling costs include:

- Use of cost management plan; a cost management plan helps the project manager plan for controlling cost of the project.
- Use of Organizational process assets; Organization policies, procedures, tools or reporting formats related to controlling costs can be used.
- Prevention of unnecessary changes; this is an important activity. Prevention process involves identification the root-causes where high costs are involved and mitigating them.
- Measure costs; another important factor that the project manager must be completely involved in throughout the lifecycle of the project is measuring the project cost for variation from the baseline. This triggers either into corrective or preventive actions.

PROGRESS REPORTING

The project manager should avoid usage of guestimates for reporting progress. One of the following techniques can be deployed by the project manager:

- 50/50 Rule: An activity is considered 50% complete when it begins and gets credit for the rest 50% only when it is completed.
- 20/80 Rule: An activity is considered 20% complete when it begins and gets credit for the rest 80% only when it is completed.
- 0/100 Rule: An activity is considered 0% complete when it begins and gets credit for the 100% only when it is completed.

EARNED VALUE MEASUREMENT

The benefits of Earned Value include:

- Provides the ability to the project manager to track the project cost very well
- Allows the project manager to look at other more productive aspects of the project
- Does not allow any space for guestimation of project progress numbers

The performance measurement baseline is a combination of scope, schedule and cost baselines. Earned value measures project performance against scope, schedule and cost baselines (performance measurement baseline). Earned value measurement is better, because it integrates cost, time and the work done (or scope) and can be used to forecast future performance and project completion dates and costs.

QUALITY MANAGEMENT

Rework and defects are a direct outcome of lack of attention to quality. The higher the rework, more time and money being wasted and busting the cost and schedule baseline.

Lack of attention to quality needlessly add considerable risk to the project which results in tremendous amount of rework and added expense.

It is important to know at the onset of the project what acceptable quality is and how it will be measured on the project. This process of performing Quality Management process helps avoid many issues at a later stage of the project.

DEFINITION OF QUALITY

The degree to which the project fulfills the requirements is defined as Quality.

A project cannot achieve quality if all of the stated and unstated requirements are defined in the project scope statement.

DEFINITION OF QUALITY MANAGEMENT

The process of creating and following policies and procedures to ensure that a project meets the defined needs it was intended to meet from the customer's perspective is termed as Quality Management. Quality Management process ensures no deviations occur from project requirements. Plan Quality, Perform Quality Assurance and Perform Quality Control are a part of Quality Management process.

QUALITY THEORISTS

A few important quality theorists include:

- Philip Crosby: Phil Crosby propagated that quality is "conformance to requirements". The concepts of cost of poor quality, prevention over inspection and "zero defects" were also popularized by him.
- Joseph Juran: Joseph Juran defined quality as "fitness for use" and advocated involvement of top management to address quality issues. The 80/20 principle developed by Vilfredo Pareto was propagated by Joseph Juran.
- W. Edwards Deming: The 14 points to quality management and Plan-Do-Check-Act cycle were propagated by Dr. W. Edwards Deming.

ACTIONS REQUIRED TO ENSURE QUALITY ON THE PROJECT

- Review of project charter and project scope statement
- Gather customer's voice about the definition of quality
- Identify the specific (desired) levels of performance in the products and components of the products
- Identify the levels at which the project can be controlled (i.e. at work package level, at activity level or more detailed levels)
- Identify if there are any activity levels and/or processes are applicable to the project
- Determine the quality standards and processes to use, when, and on what parts of the project
- Set standards to reach the level of quality performance
- Set metrics to measure quality from customer's and stakeholder's viewpoint
- Identify the procedures to effectively control the processes followed and standards are met
- Test the validity of assumptions before they result in problems
- Make sure the team members understand the definition of quality for their work

- Collect problems, errors, and complaints, and review what can be done to prevent them from reoccurring on the project
- Have teams "roaming" the project looking for quality improvements

GOLD PLATING

Gold plating is all about giving the customer extra value of the product (such as more functionality, higher-quality parts, more scope than required, higher performance). Some organizations do have the policy that promotes adding value to customers and going over and beyond fulfilling their requests, it is not recommended by advanced quality thinkers. The team's impression of what is valued by the customer and what the customer does not want is often termed as Gold Plating. Most projects have difficulty in achieving the objectives of the project, gold plating can be done on certain projects and may not be done on certain others. This creates a gap in customer's expectations and hence gold plating is not recommended.

MARGINAL ANALYSIS

The point where the benefits (revenue) that is to be received from improving quality equals the

incremental cost to achieve that quality is termed as Marginal Analysis.

CONTINUOUS IMPROVEMENT (OR KAIZEN)

Continuously looking for small improvements in the process is termed as Continuous Improvement. Kaizen is a Japanese word where “Kai” means “Change” and “Zen” means “for the better”.

JUST IN TIME (JIT)

The concept of JIT involves having the suppliers deliver raw materials just when they are needed, thus reducing inventory to close to zero. JIT has supplemented reduction in high inventory costs which is unnecessary.

TOTAL QUALITY MANAGEMENT (TQM)

This philosophy encourages companies and their employees to focus on finding ways to continuously improve the quality of their products and their business practices at every level of the organization.

RESPONSIBILITY FOR QUALITY

The ultimate responsibility of the product or project quality lies with the project manager. However, the entire organization has responsibility relating to quality.

IMPACT OF POOR QUALITY

Poor quality leads to:

Increased costs

Low morale

Low customer satisfaction

Increased risk

Rework

Schedule delays

UNDERSTANDING THE DIFFERENCE BETWEEN PLAN QUALITY, PERFORM QUALITY ASSURANCE AND PERFORM QUALITY CONTROL

Plan Quality focuses on:

- Defining quality for the project
- Identifying how quality will be achieved

Perform Quality Assurance focuses on:

- Work being done on the project
- Ensures that the team follows the processes as planned to produce project’s deliverables

Perform Quality Control focuses on:

- Examination of actual deliverables of the project
- Ensure deliverables are correct and they meet the planned level of quality

PLAN QUALITY

The Plan Quality process requires inputs from:

- Organizational process assets
- Enterprise environmental factors
- Stakeholder register
- Scope baseline (scope statement, WBS, WBS dictionary)
- Schedule baseline
- Cost baseline
- Risk register
- Occupational Safety and Health Administration (OSHA): OSHA set standards for safety of workers in a plant.
- The United Nations Conventions on Contracts for International Sale of Goods (CISG): The CISG standard governs international sales transactions.

Objective of Plan Quality process is identification of relevant organization/industry practices, standards, requirements for quality of the project, product of the project, and project management efforts.

The output (result) of Plan Quality process is a Quality Management plan.

As a part of Plan Quality process, the project manager needs to look for any standards that can help the project to avoid “Reinventing the Wheel”, that can help in higher quality levels. Some available standards include:

- ISO 9000: Created by International Organization for Standardization (ISO) to help ensure organizations have quality procedures and that they follow them.

The project manager should also ensure that the project must comply with Organizational process assets and Enterprise Environmental Factors. The project manager must also plan the project so that it meets customer’s quality standards. The project manager must then define any additional project specific standards and procedures that are needed. It should be noted that when the project manager defines additional standards and procedures, he should take appropriate care that these new practices do not violate other relevant standards.

The project manager then needs to determine what work is required to meet those standards created for the project. Determination of specific measurements that will be made each week, each month or for each deliverable should be made to ensure compliance with all standards.

It is important to note that the level of quality efforts should be appropriate to the needs of the project. Quality must be balanced with other project constraints. Let's now learn a few tools and techniques used in Plan Quality process:

COST BENEFIT ANALYSIS

This technique helps the project manager weigh the benefits of the quality efforts versus the costs to determine appropriate quality level and requirements for the project.

COST OF QUALITY (COQ)

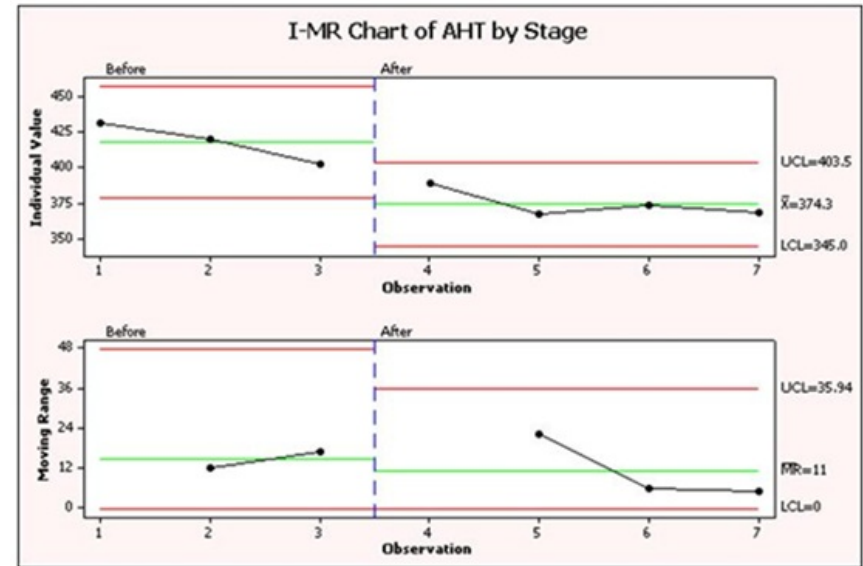
COQ involves looking at costs of conformance and non-conformance to quality and creating an appropriate balance. The costs of conformance should be lower than costs of non-conformance.

CONTROL CHARTS

Control charts are SET UP in Plan Quality as a part of the effort to define quality on the project. They are UTILIZED in Perform Quality Control to help determine if the results of a process are within acceptable limits.

During the Perform Quality Control process, samples are taken and plotted on the charts. The control

chart shows whether the samples are within control limits.



Control Chart

A control chart can be used to monitor project performance figures such as cost and schedule variances. It primarily helps monitor production and other processes to see if the results are within acceptable limits (i.e. "in control"). A "special cause variation" means the process is out of control.

UPPER AND LOWER CONTROL LIMITS

Control limits are acceptable range of variations of a process's results. They are shown as two dashed lines. The acceptable range of measurements between the upper and lower control limits is set by the project manager and stakeholders based on the organization's quality standard. This range is calculated based on +/- 3 sigma (standard deviations). Data points outside this range indicate the process is out of control.

MEAN (AVERAGE)

The mean is indicated by a line in the middle of the control chart. It shows the middle of the range of acceptable variation.

SPECIFICATION LIMITS

Specification limits represent the customer's expectations or contractual requirements for performance and quality on the project. Specification limits are not calculated like control limits. They are stated by the customers. If the data points are outside the control limits, the process is termed as "Out of Control", however, if the data points are outside the specification limits, the process starts producing defects.

OUT OF CONTROL

The process is out of a state of statistical control when:

- A data point falls outside the control limits
- There are non-random data points; these may be within the upper and lower control limits, such as the rule of seven.

Think of out of control as lack of consistency and predictability in the process or its results.

RULE OF SEVEN

The rule of seven is a thumb rule (also known as heuristics). It refers to a group or series of non-random data points that total seven on one side of the mean. The rule of seven tells the project manager that even if these points are within the control limits, they are not random and the process may be out of control.

ASSIGNABLE CAUSE / SPECIAL CAUSE VARIATION

If there is an assignable cause or special cause variation, it means a data point or series of data points require investigation to determine the cause of variation.

BENCHMARKING

This technique involves looking at other projects to get ideas for improvement on the current project and to provide a basis (or benchmark) to use in measuring quality performance.

DESIGN OF EXPERIMENTS (DOE)

DOE uses experimentation to statistically determine what variables will improve quality. DOE is faster and a more accurate statistical method that allows project managers to systematically change all of the important factors in a process and see which combination has a lower impact on the project.

STATISTICAL SAMPLING

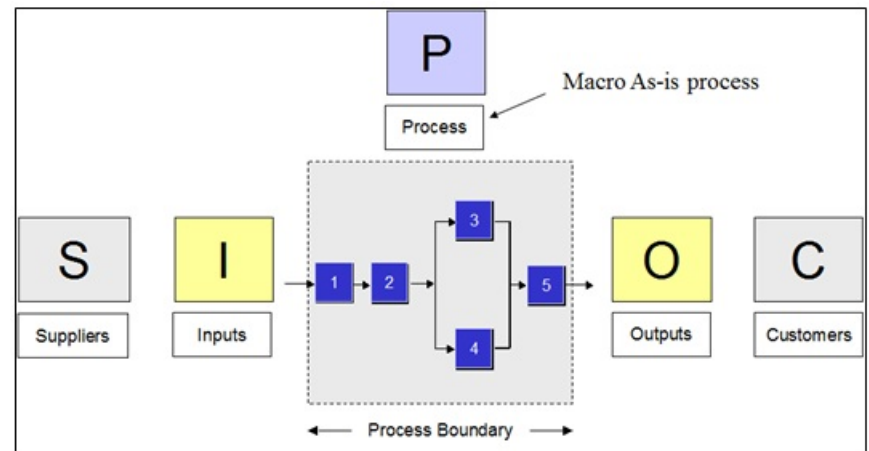
Doing quality audits for all the manufactured products in a project might be a time-consuming task. Here, it is best to take a sample of a population. Sampling is used when:

- Auditing the population may take too long
- It costs too much
- Auditing can also be destructive

The sample size and frequency of measurements are determined as a part of the Plan Quality process, and the actual sampling is done in Perform Quality Control.

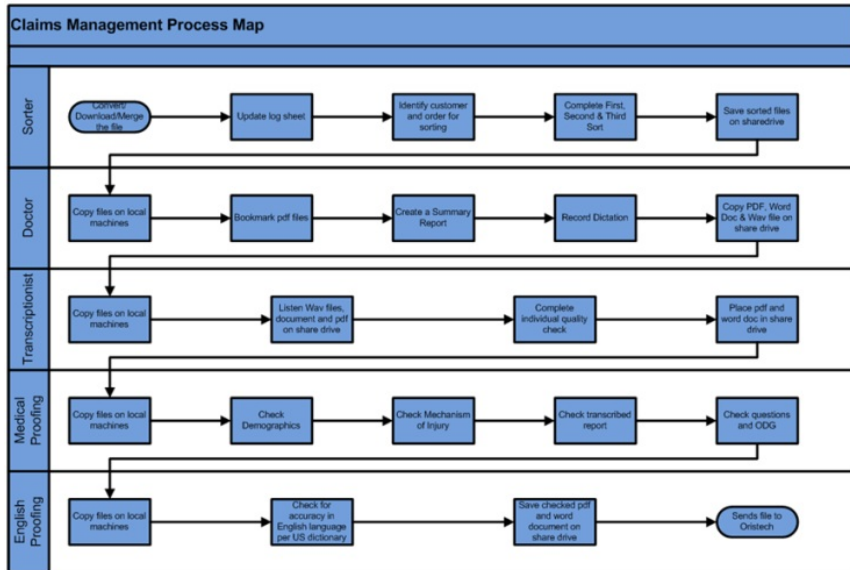
FLOWCHARTING

The Macro-level flow charting is termed as SIPOC. SIPOC is an acronym for Supplier (S), Inputs (I), Process (P), Output (O) and Customer (C).



Macro-level Flow Charting (SIPOC)

A flowchart shows how a process or system flows from beginning to end and how the elements interrelate. Flow charts can be used in many parts of project management.



Process Flowchart

OUTPUTS OF PLAN QUALITY

Following are the results of the Plan Quality process:

- Quality Management Plan: The quality management plan is the process to determine what quality is and to put a plan in place to manage quality.
- Quality Metrics: The project manager needs to think through the areas on the project that are important to measure and decide what measurement systems are acceptable.
- Checklist: A quality checklist is the list of items to inspect, a list of steps to be performed, or a

picture of the item to be inspected, with space to note any defects found.

- Process Improvement Plan: The plan for improving the processes is called the process improvement plan and it becomes a part of project management plan. Process improvement plan helps save time by increasing efficiency and preventing problems. It also saves money and increases the probability that the customer will be satisfied.
- Project Management Plan and Project Document Updates: Updates to the project management plan and project documents are needed throughout the project management process.

Billing Errors	Monday
Wrong Account	<input type="text" value=" "/>
Wrong Amount	<input type="text" value=" "/>
A/R Errors	
Wrong Account	<input type="text" value=" "/>
Wrong Amount	<input type="text" value=" "/>

Quality Check List

PERFORM QUALITY ASSURANCE

Perform Quality Assurance is an execution process that is performed while the project work is being done. Following tools and techniques are used by Perform Quality Assurance process:

PLAN QUALITY AND PERFORM QUALITY CONTROL TOOLS AND TECHNIQUES

The tools and techniques of Plan Quality and Perform Quality Control processes are used as a part of Perform Quality Assurance process.

QUALITY AUDITS

A team of auditors is responsible to see if the project is complying with company policies, standardized practices, and procedures and to determine whether the policies, practices and procedures being used are efficient and effective.

PROCESS ANALYSIS

The process analysis should be planned in at certain points in the project. Process analysis is a part of continuous improvement effort on a project and focuses on identifying improvements that might be needed in processes.

OUTPUTS OF PERFORM QUALITY ASSURANCE

Perform Quality Assurance leads to the following outputs:

- Change requests
- Updated standards and processes
- Updated project management plan and project documents

PERFORM QUALITY CONTROL

Perform Quality Control is a process of ensuring a certain level of quality in a deliverable, whether it be a product or a service. Control means measure, and that is a major function of Perform Quality Control process. It measures products or services to determine whether they meet the quality standards.

In large companies, a quality control department may complete much of quality control work and report the findings to the project manager. The project manager must be able to read and understand the quality measurement reports.

Quality Control occurs throughout the life of the project. A few important terms related to quality control are described:

MUTUAL EXCLUSIVITY

Two events are said to be mutually exclusive if they cannot both occur in a single trial.

PROBABILITY

Probability refers to the likelihood that something will occur. It is expressed as a decimal or a fraction, on a scale of zero to one.

NORMAL DISTRIBUTION

A normal distribution is a shape of a bell curve and is the most common probability density function. It is used to measure variations.

STATISTICAL INDEPENDENCE

Statistical independence means the probability of one event occurring does not affect the probability of another event occurring.

STANDARD DEVIATION (OR SIGMA)

A measure of range is its standard deviation. This concept is also sometimes stated as a measure of how far you are from the MEAN.

SEVEN BASIC TOOLS OF QUALITY

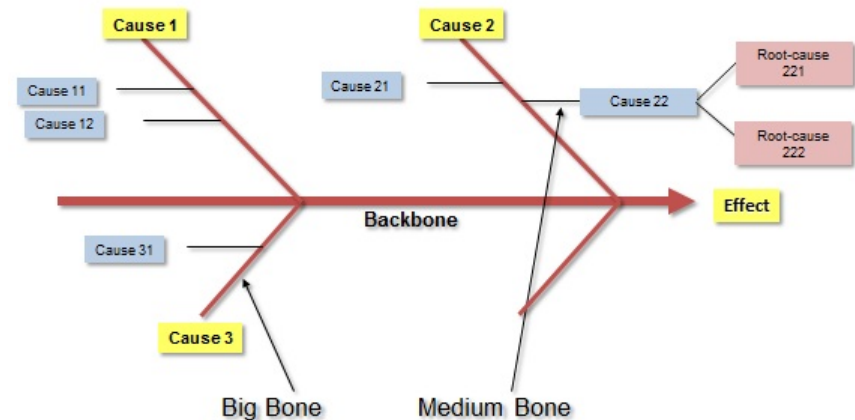
The following tools are known as seven basic tools of quality:

- Cause and effect diagram
- Flowchart
- Histogram
- Pareto Chart
- Run Chart
- Scatter Diagram
- Control Chart

CAUSE AND EFFECT DIAGRAM (FISHBONE DIAGRAM OR ISHIKAWA DIAGRAM)

Cause and effect diagram is:

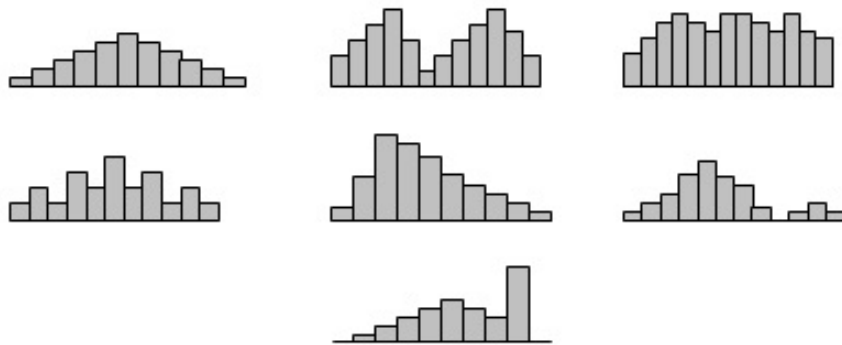
- A creative way to look at the root causes
- Helps stimulate thinking, organizes thoughts and generate discussion
- Can be used to explore the factors that will result in a desired future discussion



Cause Effect Diagram

HISTOGRAM

A histogram displays data in the form of bars or columns. This tool shows what problems are worth dealing with. A typical histogram presents data in no particular order.



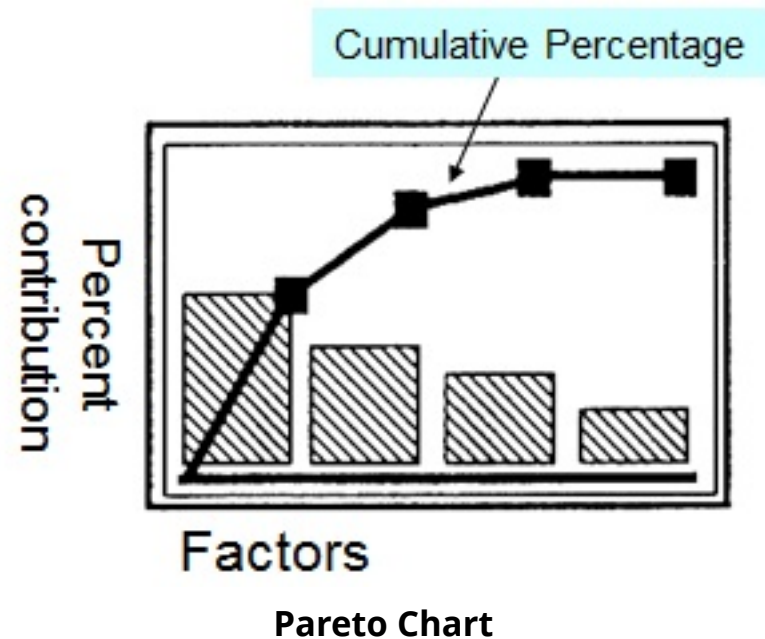
Histogram Diagrams

PARETO CHART (PARETO DIAGRAM)

A Pareto chart is a type of histogram, but it arranges the results from most frequent to least frequent to help identify which root causes are resulting in most problems. It is based on 80/20 rule which states that 80% of the problems are due to 20% of the causes.

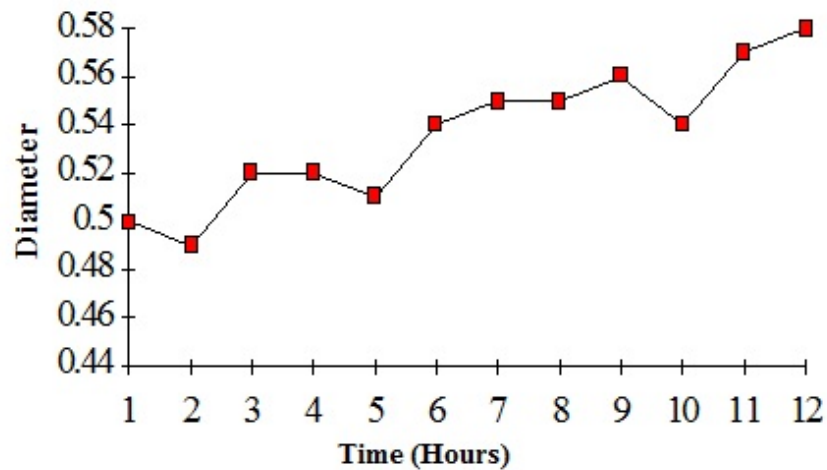
Pareto charts:

- Help focus attention on the most critical issues
- Prioritize potential “causes” of the problem
- Separate the critical few from the trivial many

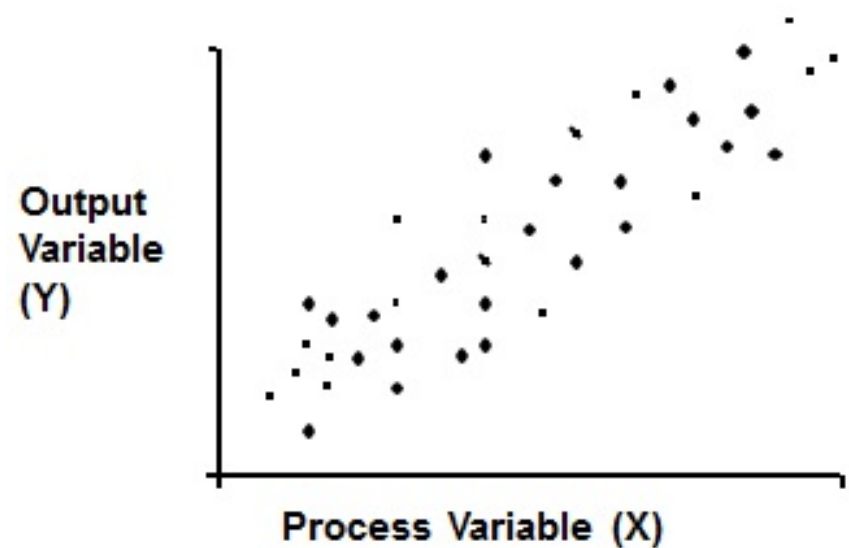


RUN CHART

A run chart allows the project manager to look at history to see if there is pattern of variation. It is a useful tool for controlling quality.



Run Chart



Scatter Diagram

SCATTER DIAGRAM

The scatter diagram tracks down variables to see if they are related.

OUTPUTS OF PERFORM QUALITY CONTROL

The outputs of Perform Quality Control process are:

- Measurements
- Validated changes
- Updates to project management plan and project documents
- Change requests
- Lessons learned
- Validated deliverables

HUMAN RESOURCES MANAGEMENT

Human Resources Management involves:

- An integral part of project management is an important function of human resource function i.e. creating recognition and reward system
- Team members competencies need to be improved and it is a critical responsibility of a project manager
- Executing process group primarily includes Human Resource Management
- Human Resource activities done by a project manager requires documentation and is formal in nature
- Formal roles and responsibilities are to be assigned to project team members to assist the project manager in effective project execution
- Project is coordinated by the project manager and planned by the teams
- Resource availability must be continually confirmed by the project manager
- The project team consists of a project manager, project management team and other team members of a project. A project

management team includes some of the team members to help assist the project manager with project management activities.

- Team building activities are a required part of project management. A project manager formally plans team building activities in advance.
- The project manager must track team member performance

The human resources responsibilities increase as the size of the project team increases. The human resource management process involves:

- Identification of team members
- Defining roles and responsibilities
- Creation of reward systems
- Improving team member's performance
- Track team and individual performances

ROLES AND RESPONSIBILITIES

Clear identification of roles and responsibilities of management, team members, and other stakeholders on the project, using tools such as responsibility assignment matrix is a key activity of a project manager.

ROLE OF A PROJECT SPONSOR / INITIATOR

A sponsor is the one who provides financial resources for the project. A sponsor could also be a customer, senior management, others. Management serves as a protector of the project.

HUMAN RESOURCE RESPONSIBILITIES FOR PROJECT MANAGERS

The list of responsibilities of project managers is:

- Determine the resources required for the project
- Negotiate with resource managers for optimal available resources
- Create a project team directory
- Create project job descriptions for team members and other stakeholders
- Make sure all roles and responsibilities are clearly assigned on the project
- Understand the team member's needs for training related to their work on the project, and make sure they get the training
- Create a formal plan covering such topics as how the team will be involved in the project and what roles they will perform – a human resource plan
- Insert reports of team member's performance into their official company employment record

- Send out letters of commendation to team members and their bosses
- Make sure team member's needs are taken care of
- Create recognition and reward system – described in Human Resource Plan section

DEVELOP HUMAN RESOURCE PLAN

One of the outcomes of develop human resource plan is defining the roles and responsibilities of team members. The Develop Human Resource Plan process involves:

ORGANIZATION CHARTS AND POSITION DESCRIPTIONS

There are multiple ways to record and communicate roles and responsibilities including Responsibility assignment matrix, organization breakdown structures, resource breakdown structures, position descriptions. Additionally, any roles and responsibilities expected of the team members need to be clearly assigned, in addition to the project activities the team members are expected to complete.

RESPONSIBILITY ASSIGNMENT MATRIX

This chart is used for cross-referencing team members with activities or work packages they are to accomplish.

RACI CHART (Responsible, Accountable, Consult, and Inform)

This chart is a form of responsibility assignment matrix that defines roles assignment more clearly than the matrix discussed earlier.

Key Stakeholders	Project Phase				
	Define	Measure	Analyse	Improve	Control
Resource 1	A		I	A, I	I
Resource 2	R	R	R	R	
Resource 3		C	C	C	C

RACI Matrix

Sr. No.	Members	Role	Define	Measure	Analyze	Improve	Control
1	Name 1	Champion	Approver	Approver	Approver	Approver	Approver
2	Name 2	Sponsor	Approver	Informed	Informed	Informed	Informed
3	Name 3	Quality Director	Approver	Informed	Informed	Informed	Approver
4	Name 4	MBB	Approver	Approver	Approver	Approver	Approver
5	Name 5	BB	Resource	Resource	Resource	Resource	Resource
6	Name 6	Project Lead	Resource	Resource	Resource	Resource	Resource
7	Name 7	SME	Resource	Resource	Resource	Resource	Resource
8	Name 8	Trainer	Member	Member	Resource	Resource	Resource
9	Name 9	Processor	Member	Member	Resource	Resource	Resource
10	Name 10	Processor	Member	Member	Resource	Resource	Resource

ARMI Matrix

Another tool that can be used in place of RACI Matrix is known as ARMI Matrix where A stands for Approver, R - Resource, M - Member and I - Interested Party.

POSITION DESCRIPTIONS

Position descriptions are like job descriptions but only created for project work. They are usually documented in text format.

HUMAN RESOURCE PLAN

A human resource plan is an output of Develop Human Resource Plan. The human resources planning requires a plan for when and how team members are added, managed, controlled, and released from the project.

The Human Resource Plan includes:

- Roles and Responsibilities
- Project Organization Charts
- Staffing Management Plan

Sr. No.	Role	Name of your team member (s)	His/Her Strengths	His/Her Weaknesses
1	Shaper		Shapers bring the drive and courage to overcome obstacles. The shaper is committed to achieving ends.	Shapers offend people and will display aggression in the pursuit of goals. Two or three shapers in a group can lead to conflict.
2	Implementer		Implementers turn ideas into practical actions. They tend to work for the team in a practical and realistic way.	Implementers are conservative, inflexible, and slow to respond to new possibilities.
3	Complete Finisher		Finishers finds errors and omissions. They deliver their contributions on time and pay attention to details.	Finishers worry unduly and are reluctant to delegate. They tend to be over anxious.
4	Coordinator		The coordinator is a positive thinker who supports goal attainment and effort in others. They clarify goals and delegate well.	Coordinators can be seen as manipulative. They might not stand out in a team.
5	Team worker		Team workers tend to keep team spirit up and allow other members to contribute. They bring cooperation and diplomacy to a team.	They tend to be indecisive in moments of crisis and are reluctant to offend.
6	Resource Investigator		The resource investigator explores opportunities and develops contacts. They are good negotiators.	They are over-optimistic and may lose interest quickly. They are not the sources of original ideas.
7	Plant Innovator		A plant brings creativity, ideas, and imagination to a team. They can solve difficult problems.	Plants ignore incidentals and may be too preoccupied to communicate effectively.
8	Monitor Evaluator		The monitor evaluator is not deflected by emotional arguments. They are serious-minded and bring objectivity and judgment to options.	The evaluator may appear dry, boring, and overcritical. They are not good at inspiring others.
9	Specialist		Specialists bring dedication and initiative. They provide needed knowledge and technical skills.	They may contribute only on a narrow front and dwell on technicalities.

Position (Role) Descriptions

STAFFING MANAGEMENT PLAN

Staffing Management Plan is a part of Human Resource plan and includes:

- Plan for staff acquisition
- Resource calendars
- Staff release plan
- Staff training needs
- Rewards and recognition
- Compliance
- Safety

REWARDS AND RECOGNITION SYSTEM

Planning a system to reward resources can be a significant effort.

A project manager must be able to motivate the team, especially when working on a project in a matrix organization. Rewards and recognition is one of the most effective way to motivate and gain cooperation from your team regardless of the reporting relationship.

The reward system might include several actions such as:

- Say “thank you” more often
- Award prizes such as Team Member of the Month recognition

- Award prizes for performance
- Recommend team members for raises or choice work assignments
- Send notes to team member’s managers about great performance
- Plan milestone parties or other celebrations
- Acquire training for team members
- Adjust project to assign people to activities they have been waiting to work on or remove them from disliked activities as a reward

Creating a reward and recognition system requires planning in advance of starting the project work.

ACQUIRE PROJECT TEAM

Acquiring the project team involves the following:

- There could be some resources who are preassigned to the project. Knowing those resources and confirming their availability is required
- Best possible resources should be negotiated by the project manager
- Hiring new employees
- Working with virtual teams
- Managing risks of scarce resources

PREASSIGNMENT

Some resources are assigned in advance to the project. A project manager has to work with these resources.

NEGOTIATION

Some resources may have to be acquired through negotiation. To negotiate resources from within the organization, the project manager should:

- Know the needs of the project and its priorities within the organization
- Be able to describe the WIIFM (What's In It For Me) to the resource manager by assisting the project manager
- Do not ask for the best resources if the project does not need them
- Be able to prove why the project requires the stated quality and quantity of resources. Use of network diagram and project schedule is helpful
- Work with resource manager to deal with situations as they arise

VIRTUAL TEAMS

Virtual teams do not meet face to face. Thus, you can have the best of team members from different parts of the world.

HALO EFFECT

The “halo effect” is something to be aware of when dealing with team members. There can be a tendency to rate the team members high or low on all factors due to the impression of a high or a low rating on some other specific factor.

DEVELOP PROJECT TEAM

Develop Project team is a part of project execution. The process generally results in decreased turn-over, improved individual knowledge and skills, and improved teamwork.

TEAM BUILDING ACTIVITIES

Team building activities help the project team work as a cohesive group working for the best interest of the project and thus enhances the project performance. A few things to know include:

- It is a project manager's job to guide, manage, and improve the interactions of team members
- Trust and cohesiveness amongst team members should be improved by the project manager
- All project activities should include team-building activities

- Throughout the life of the project, team building activities require concerted efforts and continued focus
- WBS creation is a team-building tool
- Team building should start early in the life of the project

Team building is also a science. There are formally identified stages of team formation and development. The stages are:

- Forming; People are brought together as a team
- Storming; There are disagreements as people learn to work together
- Norming; Team members begin to build good working relationships
- Performing; The team becomes efficient and works effectively together
- Adjourning; The project ends and the team is disbanded

Team building activities can include:

- Taking classes together
- Milestone parties
- Holiday and birthday celebrations
- Outside-of-work trips
- Creating the WBS

- Getting everyone involved in some planning exercises

TRAINING

Training opportunities for team members help improve their skills. They also decrease overall project cost and schedule by increasing efficiency. Conducting training is a cost to the project and should be paid by the project. It should be documented in the human resource plan.

GROUND RULES

Ground rules help establish standards and expectations for the team. The rules can address:

- Honesty in all communications
- Conflict resolution methods
- Escalation procedures
- Whether it is allowable for people to interrupt with another team member
- Acceptable ways to interrupt when someone is talking during the meeting
- Consequences of late attendance
- Rules for taking phone calls, email etiquettes, reading text messages during the meeting

Setting rules can help eliminate conflicts or problems with the team during the project because everyone

knows what is expected of them. For virtual teams, ground rules are especially important.

CO-LOCATION (OR WAR ROOM)

A project manager might try to arrange for the entire team in each city to have offices together in one place or one room. This is called co-location and helps improve communication, decrease the impact of conflict (since all the parties are right there), and improves identify for the project team and for management in a matrix organization. A war room is a central location for project coordination. A war room is used for creating WBS, network diagram, schedule, etc.

REWARDS AND RECOGNITION

As defined in the human resource plan, the project manager appraises performance and gives out team-member-appropriate rewards and recognition in the Develop Project Team process.

TEAM PERFORMANCE ASSESSMENT

The project manager completes formal and informal team performance assessments as part of developing the project team. These assessments evaluate and enhance the effectiveness of the team as a whole.

MANAGE PROJECT TEAM

Manage project team involves day to day management of people. Developing the team is different from managing the project team. It involves:

- Encouraging good communication
- Working with other organizations
- Using negotiation skills
- Using leadership skills
- Observing what is happening
- Using an issue log
- Keeping in touch
- Completing project performance appraisals
- Making good decisions
- Influencing the stakeholders
- Being a leader
- Actively looking for and helping resolve conflicts that the team members cannot resolve on their own

OBSERVATION AND CONVERSATION

A little attention to things such as tone of emails, phone conversations can tell us what's happening in the project (even for virtual teams). A project manager should continue to talk to people instead of just looking at the reports to understand the nerve of the project.

PROJECT PERFORMANCE APPRAISALS

Evaluation of employee's performance by their supervisors is termed as Project Performance Appraisal. These days a 360-degree review has started taking place, where feedback from supervisors, subordinates and even co-workers is included. It helps in providing a clear picture of actual performance.

ISSUE LOG

Issue logs help project managers effectively control issues so they do not impact the project. It is used to manage team members and stakeholders.

POWERS OF THE PROJECT MANAGER

One of the major difficulties for a project manager is getting people to cooperate and perform. This is a major issue in a matrix organization. The different types of power for the project managers include:

- Formal (legitimate): This power is based on the position of the project manager
- Reward: This power stems from giving rewards
- Penalty (Coercive): This power comes from the ability to penalize team members
- Expert: This power comes from being the technical expert or even the project management expert

- Referent: Referent is the power of charisma and fame. This power comes from another person liking the project manager, respecting him, or wanting to be like him.

MANAGEMENT AND LEADERSHIP STYLES

A project manager needs to use multiple leadership approaches throughout the life cycle of a project. The term is called "situational leadership". It refers to using different leadership styles, based on the people and project work he or she is dealing with.

The leadership and management styles include:

- Directing; This style involves telling others what to do
- Facilitating; When facilitating, project manager coordinates inputs of others
- Coaching; In coaching, the manager helps others achieve their goals
- Supporting; A supporting leadership style means the project manager provides assistance along the way
- Autocratic; This is a top-down approach. Here, the manager has the power to do whatever he or she wants
- Consultative; This is a bottom-up approach. It uses influence to achieve results. The manager

obtains others' opinions and acts as the servant for the team

- Consultative-Autocratic; In this style, the manager solicits input from team members, but retains the decision-making authority for him or herself
- Consensus; This style involves problem solving in a group, and making decisions based on group agreement
- Delegating; With a delegating style, the manager establishes goals and then gives the project team sufficient authority to complete the work
- Bureaucratic; This style focuses on following procedures exactly
- Charismatic; Charismatic managers energize and encourage their team in performing project work
- Democratic or participative; This style involves encouraging team participation in the decision-making process
- Laissez-faire; The French term "laissez-faire" has been translated as meaning "allow to act", "allow to do", or "leave alone". A laissez-faire manager is not directly involved in the work of the team, but manages and consults as

necessary. This style can be appropriate with a highly skilled team

- Analytical; This style depends on the manager's own technical knowledge and ability. Analytical managers often make the technical decisions for the project, which they communicate to their teams
- Driver; A manager with a driver style is constantly giving directions. His or her competitive attitude drives the team to win
- Influencing; The style emphasizes teamwork, team building, and team decision making. These managers work with their teams to influence project implementation

CONFLICT MANAGEMENT

Conflict is INEVITABLE because of the following reasons:

- Requirements of many stakeholders
- Limited power of the project manager
- Necessity of obtaining resources from functional managers

Conflicts can be avoided by:

- Informing the team of: Exactly where the project is headed, Project constraints and

objectives, The content of the project charter,
All key decisions and Changes

- Clearly assigning work without ambiguity or overlapping responsibilities
- Making work assignments interesting and challenging
- Following good project management and project planning practices

The seven sources of conflict in the order of their frequency are:

- 1 Schedule
- 2 Project priorities
- 3 Resources
- 4 Technical opinions
- 5 Administrative procedures
- 6 Cost
- 7 Personality

Conflict is best resolved by those involved in the conflict. The key conflict resolution techniques are:

- **Confronting (Problem Solving):** Confronting means solving the real problem so that the problem goes away. Confronting leads to a win-win situation.
- **Compromising:** This is lose-lose situation, since no party gets everything. This technique

involves finding solutions that bring some degree of satisfaction to both parties.

- **Withdrawal (Avoidance):** In this technique, the parties retreat or postpone a decision on a problem. Withdrawal is not usually the BEST choice for resolving conflict.
- **Smoothing (Accommodating):** This technique emphasizes agreement rather than differences of opinion
- **Collaborating:** In this technique, the parties try to incorporate multiple viewpoints in order to lead to consensus
- **Forcing:** This technique involves pushing one viewpoint at the expense of another

PROBLEM SOLVING METHOD

Problem solving method could include:

- 1 Define the root problem
- 2 Analyze the problem
- 3 Identify solutions
- 4 Pick solution
- 5 Implement solution
- 6 Review solution and validate improvement

OTHER GOOD TO KNOW TERMS, TOPICS AND THEORIES

EXPECTANCY THEORY

Employees who believe their efforts will lead to effective performance and who expect to be rewarded for their accomplishments will remain productive as rewards meet their expectations.

ARBITRATION

In arbitration, neutral party hears and resolves a dispute.

PERQUISITES (PERKS)

Some employees receive special rewards, such as bonus, gain-share, good offices, etc.

FRINGE BENEFITS

There are “standard” benefits formally given to employees, such as educational benefits, insurance, and profit sharing.

MOTIVATION THEORY

Here are four motivation theories a project manager needs to know:

MCGREGOR'S THEORY OF X AND Y

McGregor believed that all workers fit into one of two groups, X and Y.

Theory X – managers who accept this theory believe that people need to be watched every minute. They believe employees are incapable, avoid responsibility, and avoid work whenever possible.

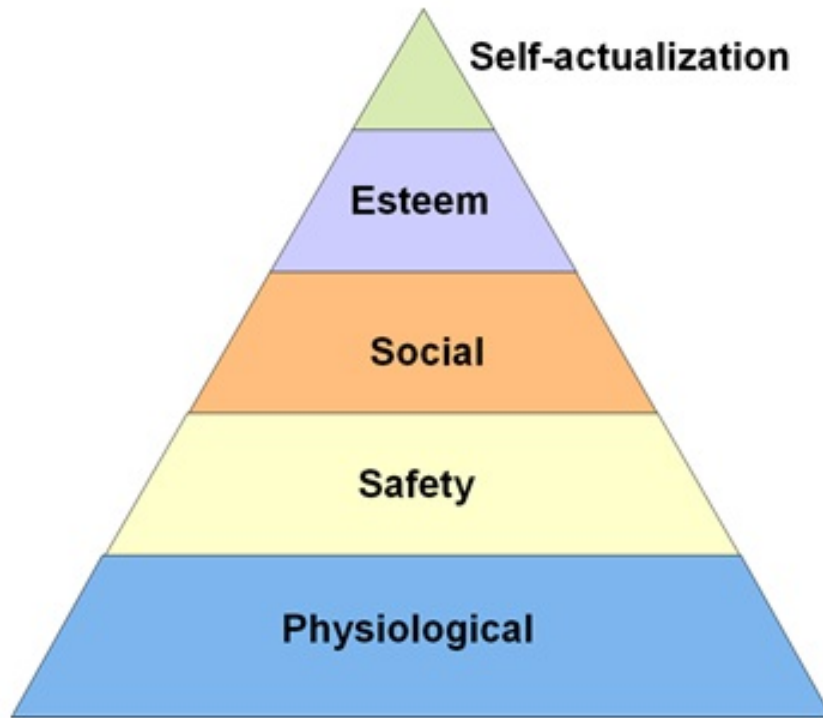
Theory Y – managers who accept this theory believe that people are willing to work without supervision, and want to achieve. They believe employees can direct their own efforts.

MASLOW'S HIERARCHY OF NEEDS

Maslow's pyramid (also called hierarchy of needs) include physiological needs, safety needs, social needs, esteem needs and self-actualization needs.

DAVID MCCLELLAND'S THEORY OF NEEDS (OR ACQUIRED NEEDS THEORY)

This theory states that people are most motivated by one of three needs listed in the table. A person falling into one category would be managed differently than a person falling into another category.



Maslow's Pyramid (Hierarchy of Needs)

HERZBERG'S THEORY

Herzberg's Theory deals with hygiene factors and motivating agents.

Poor hygiene factors may destroy motivation, but improving them, under most circumstances, will not improve motivation. Hygiene factors are not sufficient to motivate people.

Examples of hygiene factors are:

- Working conditions
- Salary
- Personal life
- Relationships at work
- Security
- Status

What motivates people is the work itself, including such things as:

- Responsibility
- Self-actualization
- Professional growth
- Recognition

This brings us to the end of the Human Resource Management chapter. The work that is done as part of creating the human resource plan on a project and acquiring, developing, and managing the team greatly impacts the next knowledge area, communications management.

COMMUNICATIONS MANAGEMENT

85% - 90% of a project manager's time is spent in communicating. Communication related issues are the most frequent problems faced by the project manager. There is a need of structured communications management plan.

Communicating on projects requirey an understanding of:

- Understanding the communication requirements from stakeholders
- Sharing with stakeholders on what communication is required from them
- Frequent updates to communication plan as per changing needs of the project

STAKEHOLDERS

The project managers need to be experts in project management and stakeholders are technical experts in what needs to be done and how it needs to be done. Proper project management requires the project manager to identify the stakeholders, determine their requirements, expectations and influence; then incorporate that information into the product or project scope as needed.

Stakeholders are extremely important and an indispensable part of any project. A project manager, during the initiation phase, has the responsibility to identify the stakeholders, and then throughout the lifecycle of the project, should continue to manage their expectations, involvement and their influence on the project.

Steps involved from stakeholder identification to managing their expectations and influences throughout the project:

- Identify ALL the stakeholders
- Determine ALL of their requirements
- Determine their expectations
- Determine their interests
- Determine their level of influence
- Plan how the project manager will communicate with them
- Execute Communicate
- Manage their expectations and influence

IDENTIFY STAKEHOLDERS

The following are created or performed in the process of Identify Stakeholders.

STAKEHOLDER ANALYSIS

Stakeholder analysis involves:

- Identification of stakeholders
- Assessing their impact or influence on the project

To achieve the above, the project manager has multiple ways:

- He can use the initial list of stakeholders from project charter
- He can use records from past projects
- He can also use data gathering techniques such as brainstorming, interviewing
- New stakeholders can suggest additional names of stakeholders required for the project

Tools such as power/interest grids and salience models can be used to group stakeholders by qualifications like authority levels, impact or influence, or requirements. The results of these classifications help project managers determine how, what and when to communicate with each stakeholder.

STAKEHOLDER REGISTER

Stakeholder register is an output of Identify Stakeholders process. All the information about the stakeholders is compiled in the Stakeholder Register.

Stakeholder Register										
Project Title					Project Number					
ID	Name	Title	Department / Supervisor	Contact Information	Impact					
					Major Requirements	Main Needs	Influence (1 to 5)	Role(s)	Responsibilities in project	Classification
1										
2										
3										

Stakeholder Register

STAKEHOLDER MANAGEMENT STRATEGY

A strategy of how stakeholders will be managed is an output of Identify Stakeholders process. Either stakeholder's are managed individually or as groups. A project manager needs to identify which approach would be easier and less time consuming. Some stakeholders require more time and some less for getting managed. Stakeholders can be an asset to the project or they may be a problem, depending on how well is the project planned. Both negative and positive aspects of stakeholder's involvement in the project should be managed.

PLAN COMMUNICATIONS

Planning communications involve considering the performing organization's environment (i.e. Enterprise Environmental Factors), including its culture and expectations. The performing organization's processes, procedures, historical records, lessons learned and other information (i.e. organizational process assets) should also be taken into consideration. The output is the Communications Management Plan which is a component of Project Management Plan.

During project initiating, the efforts begin to identify stakeholders and their communication requirements. In planning, it is determined how to apply that information. The information and communication needs of the stakeholders are taken into consideration in the Plan Communications process.

A clear and concise communication requires handling communications in a structured way and choosing the best type of communication for the situation. Information can be expressed in the following ways:

- Formal written: It is used when there are complex problems, for project management

plan, for project charter, memos, communicating over long distances

- Formal verbal: Used during presentation and speeches
- Informal written: Used for Emails, handwritten notes, text messages, instant messaging
- Informal verbal: Used in meetings, conversions

COMMUNICATION MODELS

Project management requires a more structured approach to communications. Communication models are comprised of three parts: the sender, the message and the receiver. Each message is encoded by the sender, gets transmitted to the receiver and is decoded by him. There are certain "noise" factors in communication models such as receiver's education, language, cultural effect of the way the message is decoded by the receiver.



Project Communication Models

EFFECTIVE COMMUNICATION

For effective communication, the sender should decode the message carefully, identify the communication method to be used to send the message and confirm if the message is understood. The sender can be aware of the following communication factors:

- Nonverbal; Most of what is communicated is non-verbal. It is based on physical mannerism. About 55% of all communication is non-verbal.
- Paralingual; Pitch and tone of voice also help to convey a message.

EFFECTIVE LISTENING

The receiver should decode the message carefully and confirm the message is understood. This includes watching the speaker to pickup physical gestures and facial expressions, thinking about what to say before responding, and using active listening, in which the receiver confirms that he/she is listening, expresses agreement or disagreement, or asks for clarification.

COMMUNICATION TECHNOLOGY

Planning communications involve determining the specifics of how to communicate each item. Communication can take place through face-to-face

interactions, by telephone, fax, mail, or email; through virtual or in-person meetings; and through intranet or internet-based forums for information. These different means of communications is termed as Communication Technology.

COMMUNICATION METHODS

Communication methods can be grouped into the following categories:

- **INTERACTIVE COMMUNICATION;** In this method two or more people interact with each other. An individual provides information which is received by the other person who then responds to the information given by the individual. Meetings, conference calls, video conferences are examples of Interactive communication.
- **PUSH COMMUNICATION;** Unlike interactive communication, this method involves sending the information to the recipient with no expectation of receiving the feedback. This is one-way streaming of information. Status reports, mass-mailers, project updates sent to a large population are examples of push communication.
- **PULL COMMUNICATION:** In this method, the sender places the information at a central

location (like a sharepoint or a share drive) and the recipients responsible to use the information or need the information retrieve the details from that location.

CONTROL OF COMMUNICATIONS

- The project manager cannot control all of the information
- The project manager needs to control the flow of communication and the information shared in the communication
- About 85-90% of the project manager’s time is spent in communicating

MEETINGS

There are several rules for meetings. Some of them are:

- Meetings should have a time limit, and project manager should keep to it
- Recurring meetings should be scheduled in advance
- Meeting with the team should be regular (however, need not be often)
- Each meeting should have a specific purpose and agenda
- The agenda should be distributed to the meeting attendees before the meeting

- Team should stick to the agenda during meeting
- Team members and meeting attendees should know their role in meetings before hand (for example, one member could be the minute taker and the other could be a time-keeper)
- Meetings to include right audience
- Effective facilitation is required by project manager to chair and rules are to be kept in view
- For each action, the action owner and deliverable date to be assigned in the meeting
- Minutes to be documented and published

Action Plan Tracker						
		% Complete		Status		
		0%: Not Started		Red: Behind Target		
		50%: In Progress		Yellow: Behind Target - Potential Impact to Business/Process		
		75%: On track and towards completion		Blue: On Target - No Impact to Business/Process		
		100%: Completed and Approved		Green: Deliverable Completed & Approved		
Sr. No.	Action Item	Target Completion	Individual Responsible	% Complete	Status	Remarks/ Comments

Action Plan Tracker

Meeting Title			
MINUTES	(Meeting Date)	(Meeting Time)	(Meeting Location)
MEETING OWNER			
TYPE OF MEETING			
FACILITATOR			
NOTE TAKER			
TIME KEEPER			
ATTENDEES			
Agenda Topics			
(Time Alloted)	(Agenda Topic)	(Presenter)	
DISCUSSION			
CONCLUSION			
ACTION ITEMS	PERSON RESPONSIBLE	DEADLINE	
(Time Alloted)	(Agenda Topic)	(Presenter)	
DISCUSSION			

Meeting Minutes

COMMUNICATION CHANNELS

Communication channels can be calculated using the formula:

$N(N - 1) / 2$ where N = the number of people.

COMMUNICATION MANAGEMENT PLAN

A communication management plan documents how the project manager manages and controls communication. Communications are very complex. Hence,

communication management plan must be in writing. All stakeholder needs must be addressed. Communication management plan becomes a part of project management plan.

DISTRIBUTE INFORMATION

The project manager is responsible for distributing project related information to many stakeholders of the project. Different stakeholders need to receive different information in various formats, and the project manager should have identified in advance on what each stakeholder needs to know, how, and when. Implementing the Communications Management Plan is the output of Distribute Information Process. A project manager should be able to distribute (send) information and also needs to make sure that it is effective and efficient for the recipient.

MANAGE STAKEHOLDER EXPECTATIONS

Managing stakeholder expectations requires proactive actions from the project manager to make the stakeholders feel that their needs and concerns are atleast being considered, even if they are not agreed to. The efforts of managing stakeholder expectations also allows the communication channels to be open between the stakeholders and the project managers so that the stakeholders can

inform the project managers of potential risks, changes and other related information.

Attention to stakeholder's needs is required for managing their expectations when the work is being done. This helps in building trust, resolving conflicts, preventing problems and increases belongingness of the stakeholder for the project. The project manager can review multiple project documents such as stakeholder register, stakeholder management strategy, communications management plan, issue logs, and changes to determine the actions required to manage stakeholder expectations.

COMMUNICATION BLOCKERS

The communication blockers include noisy surroundings, improper encoding and decoding of messages, making negative statements, culture, language, hostility, distance between those trying to communicate, among others.

REPORT PERFORMANCE

Collecting information related to work performance, analyzing it, creating reports and sending them to respective stakeholders is involved in reporting performance of the project. Report performance is a part of communications management plan.

The reports should provide all the information needed by stakeholders to the level of detail required by them. The needs of the projects should be considered while designing the reports. The most appropriate method is to be used to send the reports. The method used to send reports plays a crucial role in getting the report read and acted upon. A project manager must not spend all the time only doing reporting activities. The project management plan can be used to identify performance measurement baseline. This baseline can be used in the reports to measure the performance of the project. All reports must give a clear, concise and true picture of the information that is being depicted. Reports should not just include schedule, but also include cost, scope and quality performance as well. The appropriate moment of recommending and implementing corrective actions is known by looking at the reports. Report performance include looking at the future. The different types of performance reports include:

- Status Report; Reports the current performance of the process against performance measurement baseline
- Progress Report; Describes the total work accomplished

- Trend Report; Whether performance has an upward trend or a downward trend is reported by the trend report
- Forecasting Report; Future project status and performance is reported basis current (or historical) data
- Variance Report; Compares actuals to baselines
- Earned Value Report; This report integrates scope, cost, and schedule measures to assess project performance
- Lessons Learned Documentation; Performance reports are used as lessons learned for future projects

This concludes the Communication Management chapter. A project manager should spend time in the early stages of the project to identify ALL stakeholders and take a structured approach to communications by creating a communications management plan.

RISK MANAGEMENT

Risk Management is about anticipating risks and having a plan in place that will resolve it when it occurs. Risk management saves time, money and efforts. It reduces unnecessary stress on project team. Risk management helps prevent many problems and helps make other problems less likely.

Risk Management activities are integral to a project manager's daily work. Through risk management, the project changes from being in control of the project manager to the project manager being in control of the project.

RISK MANAGEMENT

Risk management includes risk management planning, risk identification, the qualitative and quantitative analysis of risks, risk response planning, and monitoring and controlling the risk responses. Risk management helps in increasing the possibility of positive events on the project and effectively reduces the possibility of negative events on the project.

THREATS AND OPPORTUNITIES

Threats are events when occurred can negatively impact the project, whereas opportunities are events when occurred can positively impact the project.

	Threats	Opportunities
Short Term		
Long Term		

Threats and Opportunities

Up to 90% of threats identified and investigated in risk management process can be eliminated.

UNCERTAINTY

Lack of knowledge about an event that may occur and reduce confidence in the conclusions drawn from the data is termed as uncertainty.

RISK FACTORS

Risks can have various factors such as:

- How likely is the probability that the risk event will occur?
- The impact of the risk
- When will the risk occur during the course of this project?
- How many times will this risk occur?

RISK AVERSE

An individual who avoids risk and thus, does not want to take risks is known as Risk Averse.

RISK TOLERANCES AND THRESHOLDS

The degree or level of risk that is acceptable is known as Risk Tolerance. The specific point where risk becomes unacceptable is known as Risk Thresholds.

THE RISK MANAGEMENT PROCESS

In processes where risk management is effectively carried out, we see:

- Risk response planning is very robust. Hence, even if risks occur, they are eliminated.
- An agenda is set to discuss risk items in every meeting.
- There is always a plan to deal with any risk events.

This results in getting additional time for the project manager to perform other critical activities related to his project.

We will be studying six management processes, namely:

- 1 Plan Risk Management
- 2 Identify Risks
- 3 Perform Qualitative Risk
- 4 Perform Quantitative Risk
- 5 Plan Risk Responses
- 6 Monitor and Control Risks

PLAN RISK MANAGEMENT

The individuals involved in Planning Risk Management include:

- Project Manager
- Sponsor
- Team
- Customer
- Other Stakeholders
- And Experts

Risk management process is structured and performed for the process. Risk management efforts are not limited to creating a standardized checklist basis the experience gained from past projects. Risk

management efforts should be based on the size, complexity and the skill levels of the project and project members.

Plan Risk Management process involves planning the total time to be spent on risk management based on the needs of the project. It involves identifying the resources and the process of performing risk management. Organizational process assets are used effectively by the project manager to plan risk management.

OUTPUTS OF RISK MANAGEMENT PLAN

The risk management plan may include:

- Methodology: The process of performing risk management is defined.
- Roles and responsibilities: Individuals involved in performing risk managements are identified.
- Budgeting: Cost of risk management process is determined.
- Timing: The time when risk management process should start is determined.
- Risk categories
- Definitions of probability and impact: The probability and impact of any risk is generally rated on a scale of 1 to 10. 1 being the lowest and 10 being the highest. However, since this is

a subjective assessment of risk, even if different individuals rate the risk as 6, they may have different definitions. Thus, the definitions of probability and impact help in standardizing these interpretations and also help compare risks between projects.

- Stakeholder tolerances: For a successful project, tolerance levels of stakeholders for different risk categories such as cost, quality, etc should be identified during project initiation and clarified regularly.
- Reporting formats: Reporting formats of any reports related to risk management are identified and finalized.
- Tracking: Risk management requires regular traction by those involved in the project. Hence, a tracking mechanism is to be defined for effective risk management.

RISK CATEGORIES

Risk categories can be broad including the sources of risks that the organization has experienced. Some of the categories could be:

- External: Government related, Regulatory, environmental, market related.
- Internal: Service related, Customer Satisfaction related, Cost related, Quality related.

- Technical: any change in technology related.
- Unforeseeable: Some risks about 9-10% can be unforeseeable risks.

TYPES OF RISK

In addition to risk categories, there are more classification of risk types:

- Business Risk: It could be a gain or loss
- Pure (Insurable) Risk: It only results in a loss (example: robbery, fire, etc)

IDENTIFY RISKS

This process involves talking to all stakeholders and non-stakeholders. It also involves reviewing organizational process assets. Project managers generally start risk identification from the onset of the project. High-level risks are identified during the project charter creation phase. Detailed risk identification occurs during planning process. The project scope statement, WBS and WBS dictionary (scope baseline) are critical inputs for risk identification. Some of the risk identification tools and techniques include:

DOCUMENTATION REVIEWS

The standard practice to identify risks is reviewing project related documents such as lessons learned, articles, organizational process assets, etc.

INFORMATION GATHERING TECHNIQUES

The given techniques are similar to the techniques used to collect requirements. Let's look at a few of them.

BRAINSTORMING

Brainstorming is done with a group of people who focus on identification of risk for the project.

BRAINSTORMING	
Attendees:	<input type="text" value="Enter the names of attendees here"/>
Date:	<input type="text" value="Enter the date here"/>
<input type="text" value="Enter the brainstorming points here"/>	<input type="text" value="Enter the brainstorming points here"/>
<input type="text" value="Enter the brainstorming points here"/>	<input type="text" value="Enter the brainstorming points here"/>
<input type="text" value="Enter the brainstorming points here"/>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> Concept, Idea, Event, Topic (Enter the concept, idea, event, topic here) </div>
<input type="text" value="Enter the brainstorming points here"/>	
<input type="text" value="Enter the brainstorming points here"/>	
<input type="text" value="Enter the brainstorming points here"/>	<input type="text" value="Enter the brainstorming points here"/>
<input type="text" value="Enter the brainstorming points here"/>	<input type="text" value="Enter the brainstorming points here"/>

Brainstorming Results

DELPHI TECHNIQUE

A team of experts is consulted anonymously. A list of required information is sent to experts, responses are compiled, and results are sent back to them for further review until a consensus is reached.

INTERVIEWING

An interview is conducted with project participants, stakeholders, experts, etc to identify risks.

ROOT CAUSE ANALYSIS

Root causes are determined for the identified risks. These root causes are further used to identify additional risks.

SWOT ANALYSIS (STRENGTH, WEAKNESS, OPPORTUNITIES AND THREATS)

Strengths and weaknesses are identified for the project and thus, risks are determined.

CHECKLIST ANALYSIS

The checklist of risk categories is used to come up with additional risks for the project.

ASSUMPTION ANALYSIS

Identification of different assumptions of the project and determining their validity, further helps in identifying risks for the project.

Sr. No.	SWOT	Definition	SWOT for your organization
1	STRENGTH (S)	A strength is something that the company is good at doing. The strength can be a skill, expertise, a patent, key resource, technology, market position, or anything that provides an advantage. It is desirable to compete on the basis of strengths.	
2	WEAKNESS (W)	A weakness is something that the firm lacks or is a condition that puts it at a disadvantage.	
3	OPPORTUNITIES (O)	The ability of the organization to capture the opportunity.	
4	THREATS (T)	The threat persisting for the organization.	

SWOT Analysis

DIAGRAMMING TECHNIQUE

Diagramming techniques such as Cause and Effect Diagram, Process Flow Charts, etc can be used for identification of risks.

OUTPUTS TO IDENTIFY RISKS

This process of Risk Identification results in creation of Risk Register.

RISK REGISTER

A Risk Register is a living document that is updated regularly throughout the life cycle of the project. It

becomes a part of project documents and is included in the historical records that are used for future projects.

Risk Register							
Sr. No.	Risk ID	Risk Description	Consequence		Likelihood		Rating
			Current	Target	Current	Target	Level of Risk
1	1.1	Loss of data	Major	Insignificant	Moderate	Unlikely	Extreme
2	1.2	Loss of back-up	Major	Minor	Rare	Rare	High
3							
4							
5							
6							
7							
8							
9							
10							

Risk Register

The risk register includes:

- List of Risks
- List of Potential Responses
- Root Causes of Risks
- Updated Risk Categories

PERFORM QUALITATIVE RISK ANALYSIS

Qualitative risk analysis is a subjective analysis of the identified risks. In this process of Perform Qualitative Risk Analysis, a list of risks is identified by analyzing the process for possibilities of risk that may occur during the project phases. The probability of each risk is identified. Some project managers prefer

using a Low, Medium and High scale and the others rate on a scale of 1 to 10. Likewise, the impact of each risk is also rated using an appropriate scale. Some of the tools that can be used for qualitative risk analysis include:

PROBABILITY AND IMPACT MATRIX

The matrix helps in identifying those risks which require an immediate response. The matrix may be customized according to the needs of the project. Most companies do have a standardized template for this matrix and project managers could leverage those templates as well. Use of standardized matrix makes the matrix list more repeatable between projects.

	High Impact	Medium Impact	Low Impact
High Probability			
Low Probability			

Probability and Impact Matrix

RISK DATA QUALITY ASSESSMENT

Data is collated for the identified risks. The project manager tries to find the precision of the data that must be analyzed for completing the qualitative analysis of risks.

For each risk, in Risk Data Quality Assessment, the project manager needs to determine:

- Extent of the understanding of the risk
- Data available
- Quality and reliability of the data
- Integrity of the data

RISK CATEGORIZATION

Risk categorization means adding a category name to each risk or creating groups of identified risks. It helps in clear identification of the category of work packages, processes, people or other potential causes having most risks.

RISK URGENCY ASSESSMENT

A project manager's should not only identify risks and determine responses to these risks, but also identify which of these risks require urgent attention. Some project managers may look at the urgency of the risk and the probability / impact rating of the project risks.

RISK REGISTER UPDATES

Risk register is updated with:

- Risk ranking for the project compared to other projects
- List of prioritized risks and their probability and impact ratings
- Risks grouped by categories
- List of risks for additional analysis and response
- List of risks requiring additional analysis in the near term
- Watch-list (non-critical risks)
- Trends

PERFORM QUANTITATIVE RISK ANALYSIS

The next step of Qualitative risk analysis is to analyze the probability and impact of risks in Perform Quantitative Risk. The purpose of Quantitative Risk Analysis is:

- Identification of risk response that requires urgent attention
- Identify the exposure of risk on the project
- Identify the impact of risk on the objective of the project
- Determine cost and schedule reserves that could be required if risk occurs
- Identify risks requiring more attention

A few actions are a part of Quantitative risk analysis. They include:

DETERMINING QUANTITATIVE PROBABILITY AND IMPACT

Some of the techniques of quantitatively determining probability and impact of a risk include:

- Interviewing
- Cost and time estimating
- Delphi technique
- Historical Records
- Expert judgment
- Expected monetary value analysis
- Monte Carlo Analysis
- Decision tree

MONTE CARLO ANALYSIS (SIMULATION TECHNIQUE)

The Monte Carlo analysis simulates the cost or schedule results of the project. The primary inputs for this analysis are the “network diagram” and “estimates to perform the project”.

A Monte Carlo analysis:

- Requires a computer based program
- Evaluates the overall risk in the project

- Determines the probability of completing the project on any specific day, or for any specific cost
- Determines the probability of any activity actually being on critical path
- Path convergence is taken into account
- Cost and schedule impacts can be assessed
- Results in a probability distribution

DECISION TREE

Decision tree helps analyze many alternatives at one single point of time. They are models of real situation. A decision tree takes into account future events in making the decision today. It helps calculate Expected Monetary Value in more complex situations. It also involves Mutual Exclusivity.

- Prioritized list of quantified risks
- Amount of contingency time and cost reserves needed
- Possible realistic and achievable completion dates and project costs, with confidence levels, versus the time and cost objectives for the project
- The quantified probability of meeting the project objectives
- Trends in quantitative risk analysis

PLAN RISK RESPONSES

The risk response planning involves determining ways to reduce or eliminate any threats to the project, and also the opportunities to increase their impact.

Project managers should work to eliminate the threats before they occur. Similarly, the project managers should work to ensure that opportunities occur. Likewise, the project manager is also responsible to decrease the probability and impact of threats and increase the probability and impact of opportunities.

For the threats that cannot be mitigated, the project manager needs to have a robust contingency plan and also a response plan if contingencies do not work.

It is not required to eliminate all the risks of the project due to resource and time constraints. A project manager should review risk throughout the project. Planning for risks is iterative. Qualitative risk, quantitative risk and risk response planning do not end ones you begin work on the project.

RISK RESPONSE STRATEGIES

The choices of response strategies for THREATS include:

- **AVOID**; Focus on eliminating the cause and thus, eliminating the threat.
- **MITIGATE**; there are certain risks that cannot be eliminated. However, their impact can be reduced. This is termed as mitigation of risks.
- **TRANSFER**; Transfer the risk to some other party. Insurance purchases, warranties, guarantees, etc are examples of risk transfers.

The choices of response strategies for OPPORTUNITIES include:

- **EXPLOIT**; add work or change the project to make sure the opportunity occurs
- **ENHANCE**; increase the probability and positive impact of risk events
- **SHARE**; allocate ownership of opportunity to a third-party

A response strategy for BOTH threats and opportunities:

- **ACCEPT**; passive acceptance leaves action to be determined as needed, in case of a risk event. Active acceptance may involve contingency plans to be implemented if risk occurs and

allocation of time and cost reserves to the project. A decision to accept risk must be communicated to stakeholders.

Whenever the project manager is responding to threats or opportunities:

- Execution of strategies must be time-bound
- Effort selected must be appropriate to the severity of the risk
- A single response can be an action of multiple risk events
- A strategy can be selected not only by the project manager, but also by the team, the stakeholders and experts

OUTPUTS OF PLAN RISK RESPONSES

Risk register, project management plans and project documents need to be updated as outputs of Plan Risk Responses.

PROJECT MANAGEMENT PLAN UPDATES

Project Management Plan can be updated by new work activities / packages that could be added, removed, or assigned to different resources, thus, making planning an iterative process.

PROJECT DOCUMENTS UPDATES

Other documents that the project manager uses for the projects also need to be changed/updated.

Residual risks; there are risks that remain after completion of risk response planning. Residual risks are those risks that are accepted and contingency plans are developed.

Contingency plans; they describe the specific actions that can be taken if specific opportunity or threats occur. Risk response owners; Risks can be assigned to individuals who can develop risk responses and also who will implement risk responses if those opportunities or threats occur.

Secondary risks; these are those risks which may be created due to implementation of current risk responses.

Risk triggers; the events that trigger the contingency response are risk triggers.

Contracts; the contracts issued to deal with risks should be noted in risk register.

Fall back plans; specific actions that are taken if contingency plans (or risk response plans) are not effective.

Reserves (contingency); reserves are necessary for both time and cost risks.

MONITOR AND CONTROL RISKS

The list of actions involved in monitoring and controlling risks are:

- Determine the occurrences of risk triggers
- Identify and monitor residual risks
- Keep risk identification, analysis and monitoring an iterative process in the project
- Evaluate effectiveness of risk response plan
- Risk status should be collected and communicated
- Monitor risk management procedures
- Identify if additional risk responses need to be determined
- Recommend corrective actions
- Look for unexpected effects or consequences
- Update risk management and risk response plans
- Perform variance and trend analysis
- Use contingency reserves and adjust for approved changes

WORKAROUNDS; these are unplanned responses developed to deal with the occurrence of unanticipated events or problems on a project.

RISK REASSESSMENTS; The process of periodically reviewing the risk management plan and risk register and adjust the documentation as required is termed as risk reassessment.

RISK AUDITS; Risk audits helps the project manager prove that all the risks are identified, a plan of mitigation for each major risk is available and risk response owners are prepared to take action.

RESERVE ANALYSIS; while the work is being done, reserve analysis is simply checking to see how much reserve remains and how much might be needed.

STATUS MEETINGS; Risks should be a major point of discussion in all team (project status) meetings.

CLOSING OF RISKS THAT ARE NO LONGER APPLICABLE; it allows the team to focus on managing the risks that are still open.

OUTPUTS OF MONITOR AND CONTROL RISKS

The outputs are:

- Risk register updates
- Change requests, recommended preventive and corrective actions
- Project management plan updates
- Project document updates
- Organizational process assets updates

PROCUREMENT MANAGEMENT

In Procurement Management, the basic knowledge and skills of a project manager should include being able to help create, read and manage contracts.

AN OVERVIEW OF PROCUREMENT MANAGEMENT PROCESS

A formal process to obtain goods and services is known as Procurement. Procurement Management Plan, Procurement Statement of Work (SOW), procurement documents, change requests, additional procurement documentation and lessons learned are the outputs of a Procurement Management Process.

Procurement department is the most common name for the department that handles and controls procurements. In some companies, these departments are also called contracting, purchasing or legal departments. A few skills required for managing procurements include possessing legal knowledge, negotiation skills and understanding procurement process.

In case of a project requiring to buy goods or services, the procurement department comes into

action. A project manager is expected to understand what procurement experts will need from them, provide the experts with that information, and then work with the procurement department throughout the life of the procurements.

Post the decision of procuring goods or services, the procurement manager:

- Facilitate to create a Procurement Management Plan
- Create Procurement Statement of Work (SOW)
- Determine type of contract
- Determine procurement document: Request for Proposal (RFP), Invitation for Bid (IFB), Request for Quotation (RFQ)
- Send the documents to the seller
- Seller Reviews the documents, seeks additional information (if needed), sends required documents
- Negotiations take place with the seller and contract is signed with right seller
- Procurement administration is the next step
- Monitoring and Control of Procurement administration is done
- Procurement closure involves procurement audit and lessons learned
- Final Payment is made

BUYERS AND SELLERS

Sellers are also called as contractor, sub-contractor, designer, vendor, etc.

IMPORTANT POINTS RELATED TO PROCUREMENT MANAGEMENT

- Contracts cannot be informal. It requires formality.
- All project management requirements should be specifically stated in the contract.
- A Change Management Procedure is the only way to include any activity in the contract, if that activity is not already in the contract.
- Contracts are legally binding, the seller has no choice but to perform as agreed in the contract.
- Contracts help mitigate project risks.
- Most governments back all contracts that fall within their jurisdiction by providing a court system for dispute resolution.

THE PROJECT MANAGER'S ROLE IN PROCUREMENT

- A project manager should be able to read and understand the contracts.
- A project manager should ensure that scope of work and project management requirements should be included in the contract.

- Identify risks and create appropriate risk response plans for risk mitigation.
- Project manager should tailor the contract to the unique needs of the project.
- Project manager should be involved during contract negotiations to maintain the relationship with the seller.
- Project manager should protect the integrity of the contract.
- Project manager should ensure all work such as reporting, inspections and legal deliverables are met. Release of liens and ownership of materials is another critical activity of the project manager.
- Project Manager works with the procurement manager to manage changes to the contract.

CENTRALIZED / DECENTRALIZED CONTRACTS

- In a centralized contracting environment, there is one procurement department, and a procurement manager handles multiple procurements for different projects.
- In a decentralized contracting environment, a procurement manager is assigned to one project full-time and reports directly to the project manager.

PROCUREMENT MANAGEMENT PROCESS

The procurement process is designed to obtain a seller at most reasonable prices. The process involves waiting time for the sellers to look at the needs of the project and to respond. The process can thus, take from one month to three months for this type of procurement.

The project manager needs to be involved in the entire process of procurement management and he also needs to plan for the amount of time procurements take.

The four sequential procurement management processes are:

- 1 Plan Procurements
- 2 Conduct Procurements
- 3 Administer Procurements
- 4 Close Procurements

INPUTS TO PROCUREMENT MANAGEMENT PROCESS

- Procurement Manager Assigned; If the amount of procurement is high, a procurement manager needs to be assigned for the process.
- The Scope Baseline (WBS, WBS dictionary, project scope statement); it helps in making

the project members understand the need of procurement.

- Risk Register; an understanding of risks uncovered to date is termed as risk register.
- Any procurement already in place for the project; the project manager must manage interface between multiple sellers and multiple procurements on one project.
- Identification of resources not available within the performing organization; One of the critical aspects is to determine if services need to be procured. This steps allows us to think about it.
- The project schedule; the project schedule helps determine when the procurements are needed.
- Initial cost estimates for work to be procured; an initial cost estimate is required for each work that is getting procured to compare between the seller's prices.
- Cost baseline for the project; knowing the cost baseline helps to make sure the procurement fits within baseline costs.

PLAN PROCUREMENTS

The buyer has needs and he has criteria using which he will select a seller. The plan procurements process involves creating procurement documents which

describes these details. Additionally, this process also explains the procurement management plan. The Plan Procurements process includes:

- Perform make-or-buy analysis
- Create procurement management process
- Create a procurement statement of work for each procurement
- Select a contract type for each procurement
- Create the procurement documents
- Determine the source selection criteria

MAKE OR BUY ANALYSIS

The organization has several constraints including one constraint, cost. The organization needs to decide about whether to do project work themselves or procure services for some or all the work.

One of the main reasons to buy is to decrease the project constraints. However, organizations should make if:

- The organization has an idle plant or workforce
- Work involves proprietary information or procedures
- The organization wants to retain control

PROCUREMENT MANAGEMENT PLAN

This process involves the planning, execution and controlling of Procurement Management. It is done after the organization has made a decision to procure the services or products from outside sources.

PROCUREMENT STATEMENT OF WORK

The work to be done on each procurement is called “procurement statement of work”. The procurement statement of work must be clear, complete and as concise as possible. It should also describe all work and activities the seller is required to complete. The activities also include meetings, reports and communications.

TYPES OF PROCUREMENT STATEMENTS OF WORK

- Procurement; this conveys what the final product should be able to accomplish.
- Functional; this conveys the end purpose or the results than the specific procedures or approach
- Design; this type conveys precisely what work is to be done.

Design procurements statement of work is most commonly used in construction and equipment

purchasing. Performance and functional procurements statement of work is used in areas that have never been done before such as Information systems, information technology, research and development, etc.

CONTRACT TYPES

The project manager selects the type of contract basis the purchase of a product or a service, the completeness of the statement of work, the level of effort and expertise the buyer can devote to the seller, whether incentives are involved for the seller, the enterprise environmental factors, etc.

The three broad categories of contracts are:

- Fixed price (FP)
- Time and Material (T&M)
- Cost Reimbursable (CR)

FIXED PRICE (FP, or LUMP SUM, or FIRM FIXED PRICE)

The acquiring of goods or services with well-defined specifications or requirements and when there is enough competition to determine a fair and reasonable fixed price, these are the situations where a fixed price contract is used. These are the most common types of contracts. The seller bears

additional costs if the costs are more than agreed upon costs. The buyer has the least cost risk in this type of contract. The seller is duly concerned with the specifications provided in the procurement Statement of Work (SOW).

A fixed price contract is inappropriate when either of the parties (buyer or the seller) do not have expertise or past experience to prepare the procurement statement of work or have detailed accounting records.

There are situations where companies are not having a complete know-how of the tasks to be done and even when the scope is incomplete, they ask the sellers to provide a fixed price. This leads to:

- Forcing the seller to accept high level of risk.
- Seller needs to add huge amount of reserves to cover their risks and the buyer then pays more than otherwise required.
- Smart sellers can easily increase profits by cutting the scope of work and claim that work the buyer wants requires change as it is outside the contract.

In case if the seller realizes that he is not making any profits there is a risk that the seller might try to

remove some work that is described in the contract, take actions to save money, decrease quality, take the best people out of the project, among others.

FIXED PRICE INCENTIVE FEE (FPIF)

In an FPIF contract, profits are adjusted based on the seller meeting performance criteria in a progressive manner such as completing the work in a cheaper way, faster and better. FPIF contract involves successive targets given to the sellers, in which the target for the incentive is changed after the first target is reached.

FIXED PRICE AWARD FEE (FPAF)

In a FPAF contract, the buyer pays a fixed price plus an award amount (a bonus) based on performance. This is very similar to an FPIF contract, except the total possible award amount is determined in advance and apportioned out based on performance.

FIXED PRICE ECONOMIC PRICE ADJUSTMENT (FPEPA)

If there are uncertainties about future economic conditions (future prices) for contracts that exist for a multi-year period, a buyer might choose a fixed price contract with economic price adjustments. Future

costs of supplies and equipment that the seller might be required to provide under contract might not be predictable.

PURCHASE ORDER

The simplest type of fixed price contract is a purchase order. This type of contract is signed by one party instead of two parties i.e. it is unilateral instead of bilateral.

TIME AND MATERIAL (T&M) OR UNIT PRICE

In this type of contracts, the buyer pays on a per-hour basis or per-item basis. Time and material contracts are frequently used for service efforts in which the level of effort cannot be determined when the contract is awarded.

COST REIMBURSABLE (CR)

A cost reimbursable contract is used when the exact scope of work is uncertain and, therefore, costs cannot be estimated accurately enough to effectively use a fixed price contract. This type of contract provides for the buyer to pay the seller allowable incurred costs to the extent prescribed in the contract. Following are common forms of cost reimbursable contracts:

COST CONTRACT

A cost contract is the one in which the seller receives no fee (profit).

COST PLUS FEE (CPF) OR COST PLUS PERCENTAGE OF COST (CPPC)

A CPF or CPPC contract requires the buyer to pay for all costs plus a percentage of costs for a fee.

COST PLUS FIXED FEE (CPFF)

A cost plus fixed fee contract provides for payment to the seller of actual costs plus a negotiated fee that is fixed before the work begins. The fee does not vary with actual costs.

COST PLUS INCENTIVE FEE (CPIF)

A cost plus incentive fee provides for the seller to be paid for actual costs plus a fee that will be adjusted based on whether the specific performance objectives stated in the contract are met. In this type of contract, an original estimate of the total cost is made (the target cost) and a fee for the work is determined (the target fee). The seller then gets a percentage of the savings if the actual costs are less than the target costs or shares the cost overruns with the buyer.

COST PLUS AWARD FEE (CPAF)

In a cost plus award fee contract, the buyer pays all costs and a base fee plus an award amount (a bonus) based on performance. This is similar to CPIF contract, except the incentive is a potential award, rather than a potential award or a penalty. The award amount in CPAF contract is determined in advance and apportioned out depending on performance. This is a type of incentive contract.

INCENTIVES

Incentives are bonus for the sellers. Incentives are designed to motivate the seller's efforts towards things that might have not been emphasized otherwise and to discourage seller inefficiencies and waste in the areas in which the incentives are designated.

WHEN ARE PAYMENTS MADE?

Each contract will state when payments are to be made to the seller. Payments may be made as work is completed, as costs are incurred, according to a payment schedule, or only after the successful completion of the contract.

OTHER TERMS TO KNOW

Profits and costs have a distinct difference. Profit is the amount of money the sellers has left after costs are paid. There are some terms that we would like to know:

- Price; the amount the seller charges the buyer.
- Profit (fee); this is planned into the price the seller provides the buyer.
- Cost; A buyer's cost include a seller's cost plus profit. For a seller, this is the amount charged to the seller to create, develop or purchase the product/service/raw materials.
- Target price; this term is often used to compare the final price with what was expected.
- Sharing ratio; incentives are usually expressed as a ratio, e.g. 90/10. This sharing ratio describes how cost savings or cost overruns will be shared between the buyer and the seller.
- Ceiling price; the highest price the buyer will pay is the ceiling price.
- Point of Total Assumption (PTA); This only refers to fixed price incentive fee contracts and refers to the amount above which the seller bears all the loss of a cost overrun.

PROCUREMENT DOCUMENTS (BID DOCUMENTS)

Once the contract type is selected and the procurement statement of work has been created, the buyer can put together the procurement document, which describes the buyer's needs to the sellers. The different types of procurement documents include:

- Request for proposal (RFP); RFP's request a detailed proposal on how the work will be accomplished, who will do it, etc.
- Invitation for Bid (IFB); IFB usually just requests the total price to do all work.
- Request for Quotation (RFQ); RFQ's request a price quote per item, hour, meter, or other unit of measure.

The objective is to provide the seller a clear picture as much as possible. The procurement documents should include:

- Information for sellers: Background information about the purpose of the buyer wanting to get the work done, Procedure for trying to win the work, Guidelines for preparing the response, The formats for responses, Source selection criteria - the criteria the buyer will use to evaluate responses from the sellers and Pricing forms

- Procurement statement of work
- Proposed terms and conditions of the contract (legal and business)

SOURCE SELECTION CRITERIA

Source selection criteria are included in the procurement documents to give the seller an understanding of the buyer's needs and to help the seller decide whether to bid or make a proposal on the work. Source selection criteria become a basis for the buyer to use in evaluating bids or proposals.

The source selection criteria include:

- Number of years in business
- Financial stability
- Understanding the need
- Price or life cycle cost
- Technical ability
- Quality of past performance
- Ability to complete the work on-time
- Project management ability

The following are additional terms, the project manager must be familiar with:

Nondisclosure Agreement; this is an agreement between the buyer and prospective sellers identifying the information or documents they will hold

confidential and control, and who in the organization will gain access to the confidential information.

Teaming Agreement (Joint Venture); often two sellers believe that their chance of winning work from a buyer will be enhanced if they join forces for one procurement. In this case, they will sign a teaming agreement with each other to address the legal and business aspects of the arrangement.

Standard Contract; the contract terms and conditions are most commonly created by the buyer, who may even put their terms and conditions into the standard format that is used over and over for similar procurements. These types of standard contracts need no further legal review if used as they are.

Special Provisions (Special Conditions); The project manager must be able to read and understand standard terms and conditions and to determine what needs to be added, changed, or removed from the standard provisions. By doing so, the project manager can make sure the resulting contract addresses the particular needs of the customer.

TERMS AND CONDITIONS

The general categories of the terms and conditions that can make up standard and special provisions are:

- Acceptance; description to specifically describe what is acceptable
- Agent; the name of authorized representative from each party
- Arbitration; this method uses private third parties to render a decision on the dispute. Arbitration is paid for by the parties and is used because it is usually faster and cheaper than the courts.
- Assignment; the circumstances under which one party can assign its rights or obligations under the contract to another.
- Authority; the names of individuals and their roles during project life cycle
- Bonds; these are payments or performance bonds, if any, that must be purchased.
- Breach Default; this occurs when obligation of a contract is not met.
- Changes; involves incorporation of change management procedure.
- Confidentiality; information classification that decides which information is to be given to which parties.
- Dispute resolution; the procedure that will be used to settle any disputes, if they occur.
- Force majeure; this is a situation that can be considered as act of God, such as fire or freak electrical storm. If a force majeure occurs it is considered to be neither party's fault.
- Incentives; the benefits the seller receives for aligning with buyer's objectives of time, cost, quality, risks and performance.
- Indemnification (liability); identification of individuals liable for personal injury, damage or accidents.
- Independent contractor; this indicates the seller is not an employee of the buyer.
- Inspection; audit process done during execution of the project.
- Intellectual property; patents, trademarks, copyrights, books, etc.
- Invoicing; which are the invoices, to whom they are sent and what documents are required.
- Liquidated damages; estimated damages for specific defaults mentioned beforehand.
- Management requirements; attendance, meetings, approval of staff assigned to the project, etc.

- Material breach; this breach is so large that it may not be possible to complete the work under the contract.
- Notice; the place or individual to whom the correspondence is to be sent.
- Ownership; owner of tangible items (materials, buildings, equipment, etc) used in connection with or developed as a part of the contract.
- Payments; schedule of payments to be made, provision of late payment charges, reasons for non-payments, etc.
- Procurement statement of work; if it is not a separate document, it is included as a part of the document.
- Reporting; the reports, formats, frequency, stakeholders, are listed.
- Retainage; the amount of money, usually 5% to 10% withheld from each payment. This money is paid when all the final work is completed. It helps ensure completion.
- Risk of loss; this allocates the risk between parties to a contract in the event goods or services are lost or destroyed during the performance of a contract.
- Site access; requirements to access the site where work is to be performed.
- Termination; stopping the work before it's completed.
- Time is of essence; this indicates deliverables are strictly binding.
- Waivers; statements saying that rights under contract may not be waived or modified other than by express agreement of the parties.
- Warranties; promises of quality of the goods or services delivered under the contract, usually restricted to a certain time period.
- Work for hire; work provided under the contract will be owned by the buyer.

LETTER OF INTENT

A letter of intent is simply a letter without legal binding, which indicates that the buyer intends to hire the seller. It gives the seller the confidence that the contract will be signed soon.

PRIVITY

Privity is a contractual relationship.

NONCOMPETITIVE FORMS OF PROCUREMENT

Sometimes, work is awarded to a company without competition. The situations include:

- Project manager is under extreme pressure
- Seller has unique qualifications

- There is only one seller who can provide goods and services
- Seller holds patent for the items you need
- Other mechanisms exist to ensure seller's prices are reasonable

Non-competitive procurements may include:

- Single Source; a contact is established directly with a preferred seller without going through the procurement process.
- Sole Source; in this type of procurement, there is only one source.

CONDUCT PROCUREMENTS

Conduct procurements process involves getting the procurement documents to the sellers, answering seller's queries, having them prepare responses, reviewing the responses to select the seller. To initiate the process, it is important to attract the sellers, it is done using various methods, such as:

ADVERTISING

An advertisement is placed in newspapers, magazines, internet, etc to attract sellers.

QUALIFIED SELLER LIST

If a buyer purchases the same type of services often, the procurement team should find, investigate, and check the credentials of prospective sellers in advance.

BIDDER CONFERENCES

The bidder conference is an opportunity for the buyer to discover anything missing in the procurement documents. A bidder conference can be key to making sure the pricing in the seller's response matches the work that needs to be completed and is, therefore, the lowest price.

SELLER PROPOSAL

A seller proposal is a response to the RFP (Request For Proposal), RFQ (Request For Quotation) or an IFB (Invitation For Bid).

PROPOSAL REVIEW

After receiving the proposal, the buyer uses the source selection criteria identified in the Plan Procurement process to assess the potential seller's ability and willingness to provide requested products or services.

The seller proposals are usually reviewed, compared, or selected by the evaluation committee using one or a combination of the formal, structured processes.

WEIGHTING SYSTEM

This allows the buyer's evaluation committee to select a seller by weighting the source selection criteria according to the evaluation criteria.

INDEPENDENT ESTIMATES

The buyer may compare the seller's proposed cost with an estimated created in-house or with outside assistance.

SCREENING SYSTEMS

A screening system eliminates sellers who do not meet the minimum requirements of the source selection criteria.

PAST PERFORMANCE HISTORY

The buyer may consider their past history with the prospective sellers in determining which seller to award the procurement to.

PRESENTATIONS

Some sellers may be asked to make presentations of their proposals to the buyer so the buyer can select the most appropriate seller.

NEGOTIATIONS

The objective of negotiations is to obtain a fair and reasonable price and develop a good relationship with the seller.

Some of the negotiation tactics are:

- Attacks; "If your organization cannot provide the right details for the bid, perhaps it should have not sent a response to our RFP!"
- Personal insults; "If you cannot perform even after 10 months of being in the organization, you should leave!"
- Good guy/bad guy; one person is helpful to the other side, while the other is difficult to deal with.
- Deadline; "We need the closure of this task by 4:30 pm today."
- Lying; Lying may be hidden. It may also be obvious.
- Limited authority; limited authority statements may or may not be true.

- Missing man; act as if the decision maker is not available and the current options are better.
- Fair and reasonable; being impartial and practical
- Delay; delay the point, discussion or decision to a later date.
- Extreme demands; these demands are not appropriate for the given contract.
- Withdrawal; lessening of interest shown by emotional or physical withdrawal.
- Fait accompli; this is a done deal.

Scope, schedule and price are the main items to negotiate in the contract. Other than these, other items include responsibility, authority, applicable law, project management process, payment schedule, among others.

CONTRACT

The contract defines the roles and responsibilities, make things legally binding and mitigate risks. A contract is the entire agreement between both parties. It also includes terms regarding payments, reporting requirements, marketing literature, proposal, and procurement statement of work, among others. Changes to the contract are made formally in writing.

For a legal contract, we should have an offer, acceptance of that offer, consideration, legal capacity and legal purpose.

ADMINISTER PROCUREMENTS

Managing the relationship between the buyer and the seller and assuring both parties perform as required by the contract is termed as Administer procurements.

The specific actions involved while Administering Procurements are reviewing invoices, completing integrated change control, documenting every record, managing changes, authorizing payments to the seller, interpreting what is and what is not in the contract, resolving disputes, procurement performance reviews, performance reports, monitor cost, schedule and technical performance against the contract, understanding the legal implications of the contract, controlling quality, among others.

CONFLICT

In the event of a conflict, the procurement manager or a contract administrator is the one with authority to change the contract. The project manager may

initiate the change by requesting one, however, it needs the approval for the procurement manager.

CONTRACT CHANGE CONTROL SYSTEM

The system includes change procedures, forms, dispute resolution processes, and tracking systems as specified in the contract.

PROCUREMENT PERFORMANCE REVIEWS

During the Administer Procurements process, the buyer's project manager analyzes all available data to verify that the seller is performing as they should.

CLAIMS ADMINISTRATION

A claim is an assertion that the buyer did something that has hurt the seller and the seller is asking for compensation. The best way to settle them is through negotiation or through the use of the dispute resolution process.

RECORDS MANAGEMENT SYSTEM

Record-keep is of critical importance if actions taken or situations that occurred during the procurement are ever in question after the work is completed. A record management system can be quite extensive and can include indexing systems, archiving systems, and information retrieval systems.

CONTRACT INTERPRETATION

Contract interpretation is important and may require a lawyer's assistance to understand it and interpret it appropriately.

TERMINATION

Termination can be done for cause or convenience. The contract should have provisions for terminations.

CLOSE PROCUREMENTS

Procurements are closed when a contract is completed OR when a contract is terminated before the work is completed. The Close Procurements is a part of Closing Process Group. All procurements must be closed out, no matter the circumstances under which they stop, are terminated, or are completed.

Work that must be performed during Close Procurement phase:

- Product verification; involves checking to see if all the work is done correctly and satisfactorily.
- Negotiated settlement; final settlement of all claims, invoices and other issues.
- Financial closure; involves making final payments and completing cost records.

- Procurement audit; structured review of only the procurements process.
- Updates to records; making sure all of the records of the project are complete and are accessible in the records management system.
- Final contract performance reporting; this is creating a final report.
- Lessons learned; lessons learned from everyone including the seller are documented for the project.
- Procurement file; the file includes contract, changes, submittals from the seller, financial information, inspection results, lessons learnt.

FORMAL ACCEPTANCE AND CLOSURE

Once closure is completed and the seller has received formal sign-off that the products of the procurement are acceptable from the buyer, the procurement is closed.

STAKEHOLDER MANAGEMENT

Stakeholders are individuals who get impacted by the project. Project Stakeholder Management involves identification of stakeholders, analysis of their expectations and influences, development of appropriate strategies to work with the stakeholders and executing the process. Frequent communication is required with the stakeholders. Needs and expectations of the stakeholders require to be understood. Most of the issues are due to lack of communication. Addressing those issues are also important. Managing conflicting interest and involving stakeholders in key project decisions and activities is also crucial. All of this forms a part of stakeholder management process.

Project manager is expected to possess the ability to identify the needs and influences of the stakeholders and to manage them effectively.

IDENTIFY STAKEHOLDERS

The process of identifying individuals who are impacted by the project is known as Identify Stakeholders Process. The project manager is able to

identify the appropriate focus of each stakeholder as an outcome of Identify Stakeholders process.

Stakeholders can include the customers, sponsors, employees, management, government and society as well. These stakeholders have a potential to exert positive or negative influence on the project deliverables.

Stakeholder needs are to be identified at an early stage of the project to ensure all of their requirements and voices are considered. The stakeholders can be classified on the basis of their interest in the project, the level of influence on the project outcome and their involvement. For the success of the project, the project manager needs to have a relationship that is cordial and extremely success oriented.

Identify Stakeholders Process can receive inputs from:

- Project Charter; Internal and external parties related to the project are identified using the project charter.
- Procurement Documents; the parties involved in a procurement contract are key project stakeholders.

STAKEHOLDER ANALYSIS

Qualitative and quantitative analysis is required to systematically determine the interest of stakeholders throughout the project. The benefits of this analysis are identification of stakeholder interests, expectations, and influences. Another benefit includes identification of stakeholder relationships that can be leveraged to build partnerships with stakeholders to increase the probability of project success.

Stakeholders Name	Strongly Against	Moderately Against	Neutral	Moderately Supportive	Strongly Supportive
Mr./Ms. OD	✓				
Mr./Ms. SDL					✓
Mr./Ms. MBB			✓		
Mr./Ms. BB					✓
Team Member 1		✓			
Team Member 2				✓	
Team Member 3			✓		

Stakeholder Analysis Diagram

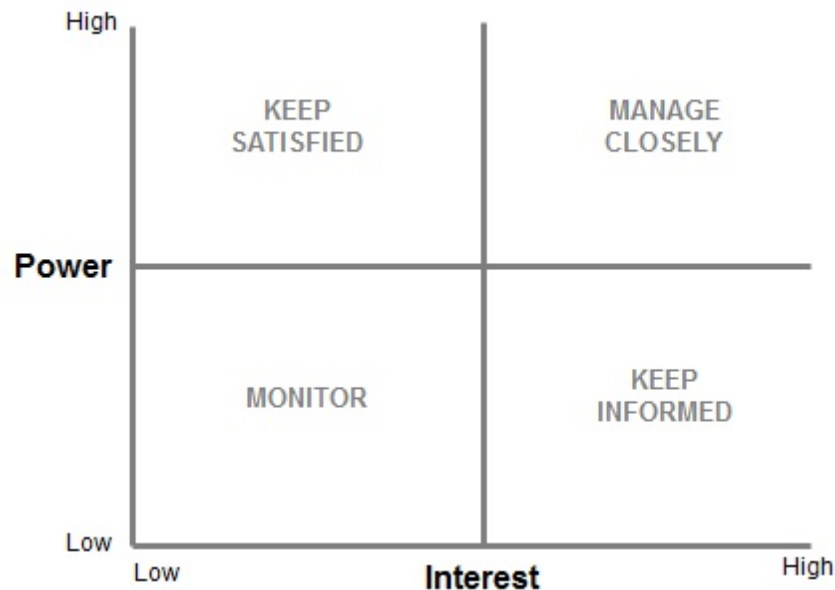
Steps involved in stakeholder analysis process are:

- Identification of potential stakeholders including their roles, departments, interests, knowledge, expectations, and influence levels.
- Identify and analyze potential impact each stakeholder could generate

- Classify the stakeholders basis logical categories of potential impact
- Determine the likely reaction of these stakeholders to respond in various situations
- Plan the approach strategy to enhance their positive support and reduce negative influences

Multiple classification models are used for stakeholder analysis, including but not limited to:

- Power/Interest grid; bifurcation of stakeholders basis their level of authority and their level of concern regarding project outcomes
- Power/Influence grid; bifurcation of stakeholders basis their level of authority and their level of involvement in the project
- Power/Impact grid; bifurcation of stakeholders basis their level of authority and their level of impacting changes on project activities
- Salience model; describes categories of stakeholders basis their power, urgency and legitimacy



Stakeholder Interest Diagram

BRAINSTORMING

Brainstorming technique can be used to identify stakeholders who belong to senior management, other departments of the organization, lessons learned, project managers who have worked on similar projects, subject matter experts, consultants, regulatory bodies, etc.

OUTPUTS OF IDENTIFY STAKEHOLDERS

Stakeholder register is updated with details such as:

- Stakeholder information; their name, organizational position, location, role in the project, business phone number, email address, etc.
- Stakeholder requirements; key expectations, major requirements, involvement in the project, etc is included here.
- Stakeholder classification; a stakeholder could be internal or external. A stakeholder can also be supporter, resistor, neutral, etc.

Updating the stakeholder register is an iterative process and should be updated regularly.

PLAN STAKEHOLDER MANAGEMENT

Plan Stakeholder Management process involves managing stakeholder expectations and influences throughout the lifecycle of the project. This process provides a plan to effectively interact with stakeholders and support project's interest. Project manager's goal is to plan these actions so well that they impact the contribution of stakeholders on projects, manage their expectations and also achieve project objectives.

INPUTS FOR PLAN STAKEHOLDER MANAGEMENT

The inputs required to plan stakeholder management include:

- Project Management Plan; description of processes that will be applied to each stage of the project, description of how work will be executed, planning and execution of human resources, change management procedure, communications management plan are required for planning for stakeholder management.
- Stakeholder Register; it provides the description of the interest, involvement and level of authority of different stakeholders.
- Enterprise Environmental Factors; organizational culture, structure, political climate are critical to manage stakeholders expectations.
- Organizational Process Assets; lessons learned from previous projects and historical information of the organization helps in understanding the behavior of stakeholders and thus planning the actions effectively.

ANALYTICAL TECHNIQUES

The project manager needs to use his expert judgment to decide the level of engagement at each stage of the project from each stakeholder. Meetings and discussions can be held to discuss the engagement level of stakeholders. There are additional analytical techniques that could be used.

Engagement level of stakeholders can be classified as:

- Unaware; stakeholders may be unaware of the project's impact or it's potential.
- Resistant; many stakeholders are generally resistant to any changes to the project.
- Neutral; they will let things happen, they will not resist nor support.
- Supportive; these individuals are supportive to change, they are completely aware of the potential of the project.
- Leading; these stakeholders will not just support but wherever required will also lead the project to success.

A Stakeholder Engagement Assessment Matrix can be used to identify the engagement levels of stakeholders. Here, C indicates current engagement and D indicates the desired level of engagement.

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Stakeholder 1	C			D	
Stakeholder 2			C	D	
Stakeholder 3				C	D

Stakeholder Engagement Assessment Matrix

OUTPUTS OF PLAN STAKEHOLDER MANAGEMENT

One of the several outputs of Plan Stakeholder Management is the Stakeholder Management Plan. It is a component of the project management plan. The plan articulates management strategies to engage stakeholders for the project. Unlike procurement management, the stakeholder management plan can be formal or informal, it can be detailed to the minutest level or it can just be at a high level, it is based on the needs of the project.

When updating the stakeholder management plan, the validity of underlying assumptions be reviewed to ensure accuracy and relevancy.

Another output of Plan Stakeholder Management are the updates to project documents that include project schedule and stakeholder register.

MANAGE STAKEHOLDER ENGAGEMENT

The key benefit of Manage Stakeholder Engagement process involves seeking extended support from stakeholders for project's success. This process of communicating and working with stakeholders to meet their needs / expectations, address issues as they occur, and build appropriate stakeholder engagement in project activities throughout the

lifecycle of the project is termed as Management Stakeholder Engagement process.

Activities involved in Manage Stakeholder Engagement process are:

- Ensure continued commitment of stakeholders at all stages of the project.
- Ensure stakeholder expectations are met. The tools used could be negotiations and communication.
- Anticipate future problems and address potential concerns throughout the lifecycle of the project.

A few critical points of Manage Stakeholder Engagement includes:

- Stakeholder influences are the highest at the start of the project and as project progresses the influences continue to reduce.
- Project sponsor's assistance to be taken by the project manager whenever required.

INPUTS FOR MANAGE STAKEHOLDER ENGAGEMENT

Inputs for Manage Stakeholder Engagement include Stakeholder Management Plan, Communications Management Plan, Change log and Organizational

Process Assets. The communications management plan includes a documentation of stakeholder's needs for communication requirements. Every stakeholder needs information for a specific purpose and thus, the formats, level of detail, content and language might need some alteration from stakeholder to stakeholder. All of this need to be taken into consideration as inputs when Managing Stakeholder Engagement.

Tools and techniques used to Manage Stakeholder Engagement include effective communication methods such as use of email, meetings, process updates through intranet, war rooms, among others. Project manager uses effective interpersonal skills including active listening, building trust, resolving conflict and overcoming resistance to change.

Like interpersonal skills, the project manager also requires Management Skills such as effective facilitation of consensus towards achieving project objectives, influencing people to support project, negotiate agreements to satisfy project needs and help modify organizational behavior to accept project outcomes.

OUTPUTS OF MANAGE STAKEHOLDER ENGAGEMENT

Issue Logs, Change Requests, Project Management Plan Updates and Project Document Updates are common outputs. Organizational Process Assets get updated with additional information:

- Stakeholder notification; it is important to notify stakeholders about project updates, any issue closures, etc.
- Project reports; project reports such as status dashboards, lessons learned, issue logs, etc are to be included.
- Project presentations; presentations made formally or informally also form as outputs of manage stakeholder engagement
- Project records; correspondence, memos, meeting minutes, etc are included in records
- Feedback from stakeholders;
- Lessons learned documentation.

CONTROL STAKEHOLDER ENGAGEMENT

The process of monitoring project stakeholder relationships is Control Stakeholder Engagement. Adjusting strategies and plans for engaging stakeholders is a part of controlling stakeholder engagement. Stakeholder engagement should continuously be monitored.



THANK YOU

I would like to thank you again for taking the time to read Project Management Revealed. We hope that you enjoyed reading this book as much as we had enjoyed while we were writing it. It is our biggest pleasure if we by any means manage to help you build a strong Project Management foundation.

We know that it's a very complex, overwhelming and overcrowded world with all Project Management certifications out there in the market.

And yet we managed to build our Project Management certification programs more concrete, attractive, helpful, useful and simpler than our competition did. This is why we believe our valuable students choose IO4PM™ over bureaucratic, complex, expensive and half-baked solutions of our competitors.

Our one-of-a-kind industry leading registration, examination and certification process is very simple, quick and completely online. Click on this link to find out all details: [**Project Management Certification**](#)

Yeliz Obergfell, [IO4PM™](#)