Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Communication Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Communication Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Communication Management process, tools, techniques and skills.

- Learn to apply a variety of Project Communication Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

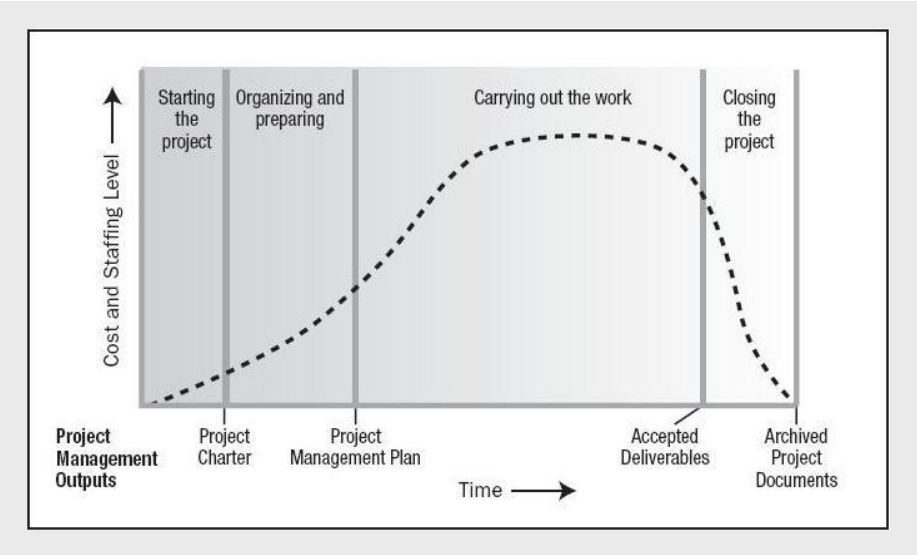
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

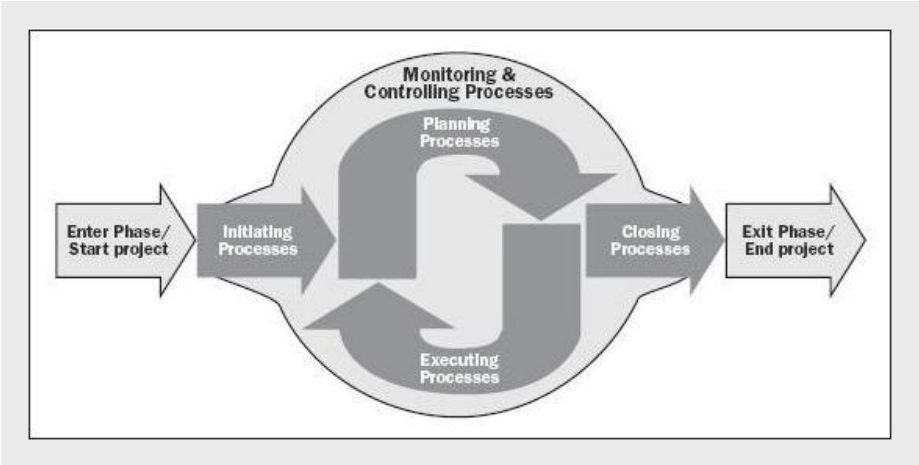
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

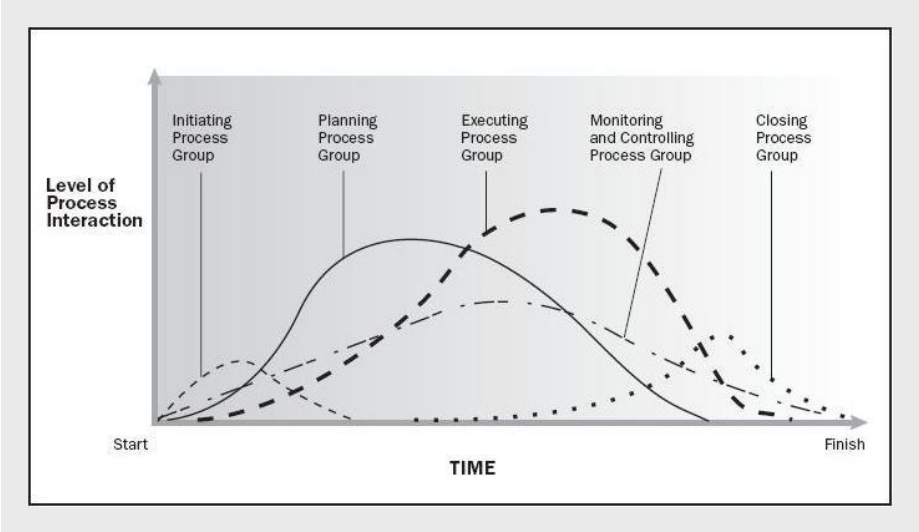
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the

project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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Communication - Initiation: Identify Stakeholders

It is the process of identifying all people or organizations impacted by the project, and documenting relevant information, involvement, and impact on project success. Project stakeholders are persons and regarding their interests organizations such as customers, sponsors, the performing organization, and the public that are actively in the project, or whose interests may be positively or negatively affected by the execution or completion of the project.
It is critical for project success to identify the stakeholders early in the project, and to analyze their levels of interest, expectations, importance and influence. A strategy can then be developed for approaching each stakeholder and determining the level and timing of stakeholders' involvement to maximize positive influences and mitigate potential negative impacts. The assessment and corresponding strategy should be periodically reviewed during project execution to adjust for potential changes.

Inputs:

1. **Project Charter**
   The project charter can provide information about internal and external parties involved in and affected by the project, such as project sponsor(s), customers, team members, groups and departments participating in the project, and other people or organizations affected by the project.

2. **Procurement Documents**
   If a project is the result of a procurement activity or is based on an established contract, the parties in that contract are key project stakeholders. Other relevant parties, such as suppliers, should also be considered as part of the project stakeholders list.

3. **Enterprise Environmental Factors**
   The enterprise environmental factors that can influence the Identify Stakeholders process include:
   - Organizational or company culture and structure
   - Governmental or industry standards

4. **Organizational Process Assets**
   The organizational process assets that can influence the Identify Stakeholder process include:
   - Stakeholder register templates
   - Lessons learned from previous projects
   - Stakeholder registers from previous projects

Tools / Techniques:

1. **Stakeholder Analysis**
   It is a process of systematically gathering and analyzing quantitative and qualitative information to determine whose interests should be taken into account throughout the project. It identifies the interests, expectations, and influence of the stakeholders and relates them to the purpose of the project. It also helps identify stakeholder relationships that can be leveraged to build coalition and potential partnership to enhance the project's change of success. Stakeholder analysis generally follows the steps described below:
   - Step one: identify all project stakeholders and relevant information, such as their roles, departments, interests, knowledge levels, expectations, and influence levels. Key stakeholders are usually easy to identify. They include anyone in a decision-making or management role who is impacted by the project outcome, such as the sponsor, the project manager, and the primary customer.
   - Step two: identify the potential impact or support each stakeholder could generate, and classify them so as to define an approach strategy. In large stakeholder communities, it is important to prioritize the key stakeholders to ensure the efficient use of effort to communicate and manage their expectations. There are multiple classification models available including:
     - Power / interest grid
     - Power / influence grid
     - Influence / impact grid
     - Salience model
   - Step three: assess how key stakeholders are likely to react or respond in various situations, in order to plan how to influence them to enhance their support and mitigate potential negative impacts.

2. **Expert Judgment**
   To ensure comprehensive identification and listing of stakeholders, judgment and expertise should be sought from groups or individuals with specialized training or knowledge on the subject are such as:
   - Senior management
   - Other units within the organization
   - Identified key stakeholders

- Project managers who have worked on projects in the same area
- Subject matter experts in business or project area
- Industry groups and consultants
- Professional and technical association

Outputs:

3. **Stakeholder Register**

   It contains all details related to the identified stakeholders including:

   - Identification information: Names, organizational position, location, role in the project, contact information.
   - Assessment information: Major requirements, main expectations, potential influence in the project, phase in the life cycle with the most interest
   - Stakeholder classification: Internal / external, supporter / neutral / resistor, etc.

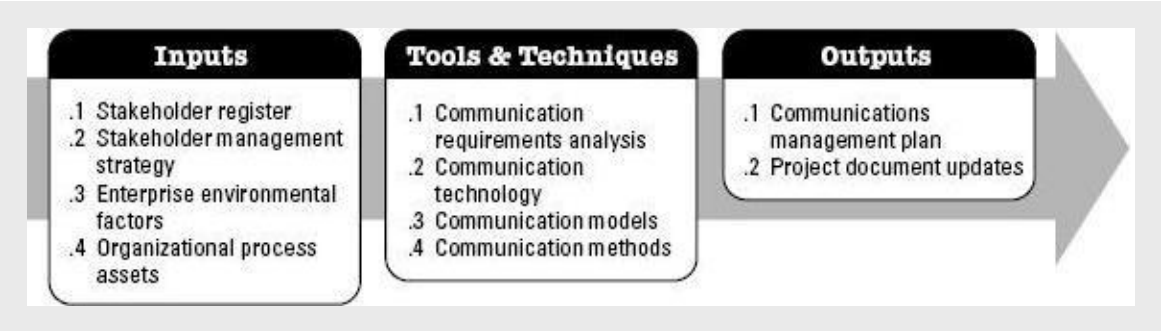
1. **Stakeholder Management Strategy**

   It defines an approach to increase the support and minimize negative impacts of stakeholders throughout the entire project life cycle. It includes elements such as:

   - Key stakeholders who can significantly impact the project.
   - Level of participation in the project desired for each identified stakeholder
   - Stakeholder groups and their management.

   Some of the information related to certain stakeholders management strategies could be too sensitive to be included in a shared document. The project manager must exercise judgment with regard to the type of information and the level of detail to be included in the stakeholder management strategy.

Communication - Planning: Plan Communications



It is the process of determining the project stakeholder information needs and defining a communication approach. The plan communication process responds to the information and communication needs of the stakeholders; for example, who needs what information, when they will need it, how it will be given to them, and by whom. While all projects share the need to communicate project information, the information needs and methods of distribution vary widely.
Identifying information needs of the stakeholders and determining a suitable means of meeting those needs are important factors for project success. Improper communication planning will lead to problems such as delay in message delivery, communication of sensitive information to the wrong audience, or lack of communication to some of the required stakeholders. Effective communication means the information is provided in the right format, at right time, and with the right impact. Efficient communication means providing only the information that is needed. On most projects, the communication planning is done very early, such as during project management plan development. This allows appropriate resources, such as time and budget, to be allocated to communication activities. The Plan Communication process is tightly linked with enterprise environment factors, since the organization's structure will have a major effect on the project's communication requirements.

Inputs:

1. **Stakeholder Register**

2. **Stakeholder Management Strategy**

3. **Enterprise Environmental Factors**
   All enterprise environmental factors are used as inputs for this process since communication must be adapted to the project environment.

4. **Organizational Process Assets**
   All organizational process assets are used as inputs for the Plan Communication process. Of these, lessons learned and historical information

are of particular importance because they can provide insights on both the decisions taken regarding communications issues and the results of those decisions in previous similar projects. These can be used as guiding information to plan the communication activities for the current project.

Tools / Techniques:

1. **Communication Requirements Analysis**
   The analysis of the communication requirements determines the information needs of the project stakeholders. These requirements are defined by combining the type and format of information needed with an analysis of the value of that information. Project resources are expended only on communicating information that contributes to success, or where a lack of communication can lead to failure. Information typically used to determine project communication requirements includes:
   - Organization chart
   - Project organization and stakeholder responsibility relationships.
   - Disciplines, departments, and specialties involved in the project.
   - Logistics of how many persons will be involved with the project and at which locations
   - Internal information needs
   - External information needs
   - Stakeholder information from the stakeholder register and the stakeholder management strategy.

2. **Communication Technology**
   The methods used to transfer information among project stakeholders can vary significantly. For example, a project team may use techniques from brief conversations all the way through to extended meetings or from simple written documents to material. Factors that can affect the project include:
   - Urgency of the need for information
     Is project success dependent upon having frequently updated information available on a moment's notice, or would regularly issued written reports suffice?
   - Available of technology
     Are appropriate systems already in place or do project needs warrant change? For example, do the intended stakeholder(s) have access to a selected communication technology?
   - Expected project staffing
     Are the proposed communication systems compatible with the experience and expertise of the project participants, or is extensive training and learning required?
   - Duration of the project
     Is the available technology likely to change before the project is over?

- Project environment
  Does the team meet and operate on a face-to-face basis or in a virtual environment?

3. **Communication Models**
   A basic model of communication demonstrates how information is sent and received between two parties, defined as the sender and the receiver. The key component of the model includes:
   - Encode
   - Message and feedback-message
   - Medium
   - Decode

   Inherent in the model is an action to acknowledge a message. Acknowledgement means that the receiver signals receipt of the message, but not necessarily agreement with the message. Another action is the response to a message, which means that the receiver has decoded, understands, and is replying to the message. The components in the communications model need to be taken into account when discussing project communications. As part of the communications process, the sender is responsible for making the information clear and complete so that the receiver can receive it correctly, and for confirming that it is properly understood. The receiver is responsible for making sure that the information is received in its entirety, understood correctly, and acknowledged. A failure in communication can negatively impact the project.

4. **Communication Methods**
   There are several communication methods used to share information among project stakeholders. These methods can be broadly classified into:
   - Interactive communication: Between two or more parties performing a multidirectional exchange of information. It is the most efficient way to ensure a common understanding by all participants on specified topics, and include meetings, phone calls, video conferencing, etc.
   - Push communication: Sent to specific recipients who need to know the information. This ensures that the information is distributed but does not certify that is actually reached or was understood by the intended audience. Push communication includes letters, memos, reports, emails, faxes, voice mails, press releases, etc.
   - Pull communication: Used for very large volumes of information, or for very large audiences, that requires the recipients to access the communication content at their own discretion. These methods include intranet site, e-learning, and acknowledge repositories, etc.

Outputs:

1. **Communication management Plan**
   The communications management plan is contained in or is a subsidiary of the project management plan. The communications management plan can be formal or informal, highly detailed or broadly framed, and based on the needs of the project. The communication management plan usually provides:
   - Stakeholders communication requirements
   - Information to be communicated, including language, format, content, and level of detail
   - Reason for the distribution of that information
   - Time frame and frequency for the distribution of required information
   - Person responsible for communicating the information
   - Person responsible for authorizing release of confidential information
   - Person or groups who will receive the information
   - Methods or technologies used to convey the information
   - Resource allocated for communication activities, including time and budget
   - Escalation process identifying time frames and the management chain (names) for escalation of issues that cannot be resolved at a lower staff level.
   - Method for updating and refining the communications management plan as the project progresses and develops
   - Glossary of common terminology
   - Flow charts of the information flow in the project, workflows with possible sequence of authorization, list of reports, and meeting plans, etc.
   - Communication constraints usually derived from specific legislation or regulation, technology, and organizational policies, etc.

The communication management plan can also include guidelines and templates for project status meetings, project team meetings, e-meetings, and e-mail.

2. **Project Document Updates**
   Project documents that may be updated include:
   - Project schedule
   - Stakeholder register
   - Stakeholder management strategy.

3. **Project schedule**

   As a minimum, the project schedule includes a planned start date and planned finish date for each activity. If resource planning is done at an early stage, then the project schedule would remain preliminary until resource assignment have been confirmed and scheduled start and finish dates are established. This process usually happened no later than completion of the project management plan. A project target schedule may also be developed with a define target start and target finish for each activity. The project schedule may be presented in summary form, sometimes referred to as the master schedule or milestone schedule, or presented in detail. Although a project schedule can be presented in tabular form, it is more often presented graphically, using one or more of the following formats:

   - Milestone charts

     These charts are similar to bar charts, but only identify the scheduled start or completion of major deliverables and key external interfaces.

   - Bar charts

     These charts, with bars representing activities, show activity start and end dates, as well as expected durations. Bar charts are relatively easy to read, and are frequently used in management presentations. For control and management communication, the broader, more comprehensive summary activity, sometimes referred to as a hammock activity, is used between milestones or across multiple interdependent work packages, and is displayed in bar chart reports.

   - Project schedule network diagrams

     These diagrams, with activity date information, usually show both the project network logic and the project's critical path schedule activities. These diagrams can be presented in the activity-on-node diagram format, or bar chart.

4. **Schedule baseline**

   It is a specific version of the project schedule developed from the schedule network analysis. It is accepted and approved by the project management team as the schedule baseline with baseline start dates and baseline finish dates. The schedule baseline is a component of the project management plan.

Communication - Execution: Distribute Information

It is the process of making relevant information available to project stakeholders as planned. It is performed throughout the entire project life cycle and in all management processes.
The focus here is mainly in the execution process, which includes implementing the communications management plan, as well as responding to unexpected requests for information. Effective information distribution includes a number of techniques including:

- Sender-receiver models
  Feedback loops and barriers to communication.
- Choice of media
  Situation specifics of when to communicate in writing versus orally, when to write an information memo versus a formal report, and when to communicate face-to-face versus by e-mail.
- Writing style
  Active versus positive voice, sentence structure, and word choice.
- Meeting management techniques
  Preparing an agenda and dealing with conflicts.
- Presentation techniques
  Body language and design of visual aids.
- Facilitation techniques
  Building consensus and overcoming obstacles.

Inputs:

1. **Project Management Plan**
   It contains the communications management plan.

2. **Performance Report**
   Performance reports are used to distribute project performance and status information, should be made available prior to project meetings, and should be as precise and current as possible. Forecasts are updated and reissued based on work performance measurements provided as the project is executed. This information is about the project's past performance that could impact the project in the future.

3. **Organizational Process Assets**
   The organizational process assets that can influence the Distribute Information process include:
   - Policies, procedures, and guidelines regarding information distribution.
   - Templates.
   - Historical information and lessons learned.

Tools / Techniques:

1. **Communication Methods**
   Individual and group meetings, video and audio conferences, computer charts, and other remote communications methods are used to distribute information.

2. **Information Distribution Tools**
   Project information can be distributed using a variety of tools, including:
   - Hard-copy document distribution, manual filling systems, press releases, and shared-access electronic databases.
   - Electronic communication and conferencing tools, such as e-mail, fax, voice mail, telephone, video and web conferencing, websites and web publishing
   - Electronic tools for project management, such as web interfaces to scheduling and project management software, meeting and virtual office support software, portals and collaborative work management tools.

Outputs:

1. **Organizational Process Assets Updates**
   The organizational process assets which may be updated include:
   - Stakeholder notifications
     Information may be provided to stakeholders about resolved issues, approved changes, and general project status.
   - Project reports
     Formal and informal project reports describe project status and include lessons learned logs, project closure reports, and outputs from other knowledge areas.
   - Project presentations
     The project team provides information formally or informally to any or all of the project stakeholders. The information and presentation method should be relevant to the needs of the audience.
   - Project records

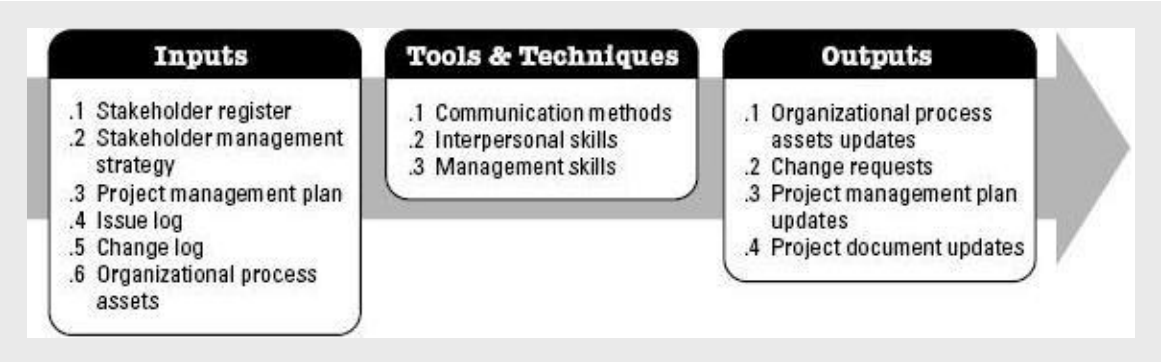
Project records can include correspondence, memos, meeting minutes, and other documents describing the project. This information should, to the extent possible and appropriate, be maintained in an organized manner. Project team members can also maintain records in a project notebook or register, which could be physical or electronic.

- Feedback from stakeholders

  Information received from stakeholders concerning project operations can be distributed and used to modify or improve future performance of the project.
- Lessons learned documentation

  Documentation includes the causes of issues, reasoning behind the corrective action chosen, and other types of lessons learned about information distribution. Lessons learned are documented and distributed so that become part of the historical database for both the project and performing organization.

Communication - Execution: Manage Stakeholders Expectations



It is the process of communicating and working with stakeholders to meet their needs and addressing issues as they occur.
Manage Stakeholder Expectations involves communication activities directed toward project stakeholders to influence their expectations, address concerns, and resolve issue, such as:

- Actively managing the expectations of stakeholders to increase the likelihood of project acceptance by negotiating and influencing their desires to achieve and maintain the project goals.
- Addressing concerns that have not become issues yet, usually related to the anticipation of future problem, these concerns need to be uncovered and discussed, and the risks need to be assessed.
- Clarifying and resolving issues that have been identified, the resolution may result in a change request or may be addressed outside of the project.

The project manager is responsible for stakeholder expectations management. Actively managing stakeholder expectations decreases the risk that the project will fail to meet its goal and objectives due to unresolved stakeholder issues, and limits disruptions during the project.

Inputs:

1. **Stakeholder Register**
   It is a list of the relevant stakeholders for the project. It is used to ensure that all stakeholders are included in project communications.

2. **Stakeholder Management Strategy**
   An understanding of stakeholder goals and objectives is used to determine a strategy to manage stakeholder expectations. The strategy is documented in the stakeholder management strategy document.

3. **Project management Plan**

It contains the communication management plan. Stakeholder requirements and expectations provide an understanding of stakeholder goals, objectives, and level of communication required during the project. The needs and expectations are identified, analyzed, and documented in the communication management plan, which is a subsidiary of the project management plan.

4. **Issue Log**
   It can be used to document and monitor the resolution of issues. It can be used to facilitate communication and ensure a common understanding of issues. Issues do not usually rise to the importance of becoming a project or activity but are usually addressed in order to maintain good, constructive working relationships among various stakeholders, including team members. The issues are clearly stated and categorized based on urgency potential impact. An owner is assigned an action item for resolution, and a target date is usually established for closure. Unresolved issues can be a major source of conflict and project delays.

5. **Change Log**
   It is used to document changes that occur during a project. These changes and their impact to the project in terms of time, cost, and risk, must be communicated to the appropriate stakeholders.

6. **Organizational Process Assets**
   The organizational process assets that can influence the Manage Stakeholder Expectation process include:
   - Organizational communication requirements.
   - Issue management procedures.
   - Change control procedures.
   - Historical information about previous projects.

Tools / Techniques

1. **Communication Methods**
   The methods of communication identified for each stakeholder in the communications management plan are utilized during stakeholder management.

2. **Interpersonal Skills**
   The project manager applies appropriate interpersonal skills to manage stakeholder expectations. For example:
   - Building trust.
   - Resolving conflict.
   - Active listening.
   - Overcoming resistance to change.

3 **Management Skills**

- Management is the act of directing and controlling a group of people for the purpose of coordinating and harmonizing the group towards accomplishing a goal beyond the scope of individual effort. Management skills used by the project manager include:
- Presentation skills.
- Negotiating.
- Writing skills.
- Public speaking.

Outputs:

1. **Organizational Process Assets Updates**

   Organizational process assets that may be updated include:

   - Causes of issues.
   - Reasoning behind corrective actions chosen.
   - Lessons learned from managing stakeholder expectations.

2. **Change Requests**

   Managing stakeholder expectations may result in a change request to the product or the project. It may also include corrective or preventative actions as appropriate.

3. **Project Management Plan Updates**

   Elements of project management plan that may be updated include:

   - Communication management plan
   - This is updated when new or changed communication requirements are identified.

4. **Project Document Updates**

   Project documents that may be updated include:

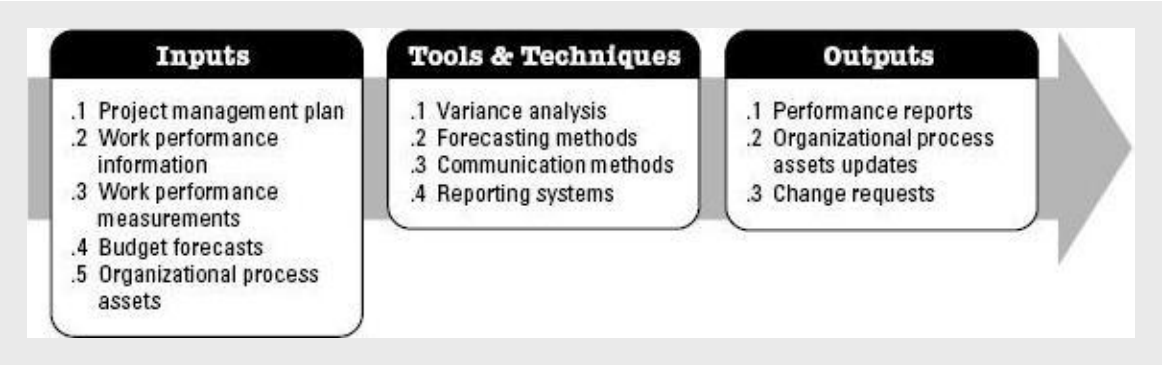
   - Stakeholder management strategy

     This is updated as a result of addressing concerns and resolving issues.
   - Stakeholder register

     This is updated as a information on stakeholders change, when new stakeholders are identified or if registered stakeholders are no longer involved in or impacted by the project, or other updates for specific stakeholders are required.
   - Issue log

     This is updated as new issues are identified and current issues are resolved.

Communication - Monitor & Control: Report Performance:



It is the process of collecting and distributing performance information, including status reports, progress measurements, and forecasts.
The performance reporting process involves the periodic collection and analysis of baseline versus actual data to understand and communicate the project progress and performance as well as to forecast the project results. A simple status report might show performance information, such as percent complete, or status dashboards for each area. More elaborate reports may include:

- Analysis of past performance.
- Current status of risks and issues.
- Work completed during the period
- Work to be completed next.
- Summary of changes approved in the period.
- Other relevant information which must be reviewed and discussed.

Inputs:

1. **Project management Plan**
   It provides information on project baseline. The performance measurement baseline is an approved plan for the project work to which the project execution is compared, and deviations are measured for management control. The performance measurement baseline typically integrates scope, schedule, and cost parameters of a project, but may also include technical and quality parameters.

2. **Work Performance Information**
   Information from project activities is collected on performance results such as:
   - Deliverables status.
   - Schedule progress
   - Cost incurred.

3. **Work Performance Measurements**
   Work performance information is used to generate project activity metrics to evaluate actual progress compared to planned progress. These metrics include:
   - Planned versus actual schedule performance.
   - Planned versus actual cost performance.
   - Planned versus actual technical performance.

4. **Budget Forecasts**
   Budget forecast information from the Control Cost provide information on the additional funds that are expected to be required for the remaining work, as well as estimates for the completion of the total project work.

5. **Organizational Process Assets**
   The organizational process assets that can influence the Report Performance process include:
   - Report Templates.
   - Policies and procedures that define the measures and indicators to be used.
   - Organizationally defined variance limits.

Tools / Techniques:

1. **Variance Analysis**
   It is an after-the-fact look at what caused a difference between the baseline and the actual performance. The process for performing variance analysis may vary depending on the application area, the standard used, and the industry. Common steps are:
   - Verify the quality of the information collected to ensure that it is complete, consistent with past data, and credible when comparing with other project or status information.
   - Determine variances, comparing the actual information with the project baseline and noting all differences both favorable and unfavorable to the project outcome. Earned value management uses specific equations to quantify variances.
   - Determine the impact of the variances in the project cost and schedule as well as in other areas of the project.

2 **Forecasting Methods**
   Forecasting is the process of predicting future project performance based on the actual performance to date. Forecasting methods may be classified in different categories:
   - Time series methods
     Time series methods use historical data as the basis for estimating future outcomes.

- Casual/econometric methods
  Some forecasting methods use the assumption that it is possible to identify the underlying factors that might influence the variable that is being forecasted.
- Judgmental methods
  Judgmental forecasting methods incorporate intuitive judgments, opinions, and probability estimates.
- Other methods
  Other methods may include simulation, probabilistic forecasting, and ensemble forecasting.

3 **Communication Methods**
Status review meetings can be used to exchange and analyze information about the project progress and performance. The project manager generally uses a push communication technique to distribute performance reports.

4 **Reporting Systems**
It provides a standard tool for the project manager to capture, store, and distribute information to stakeholders about the project cost, schedule, progress, and performance. Software packages allow the project manager to consolidate reports from several systems and facilitate report distribution to the project stakeholders.

Outputs:

1. **Performance Reports**
   Performance reports organize and summarize the information gathered, and present the results of any analysis as compared to the performance measurement baseline. Reports should provide the status and progress information, at the level of detail required by various stakeholders, as documented in the communications management plan. Common formats for performance reports include bar chart, S-curves, and tables. Various analysis, earned value analysis, and forecast data is often included as part of performance reporting. Performance reports are issued periodically and their format may range fro ma simple status report to more elaborate reports. A simple status report might show only performance information such as percent complete, or status dashboards for each area. More elaborate reports may include:
   - Analysis of past performance.
   - Current status of risks and issues
   - Work completed during the reporting period
   - Work to be completed during the next reporting period
   - Summary of changes approved in the period
   - Results of variance analysis
   - Forecasted project completion

- Other relevant information to be reviewed and discussed

2. **Organizational Process Assets Updates**
   Organizational process assets that can updated include report formats and lessons learned documentation, including the causes of issues, reasoning behind the corrective action chosen, and other types of lessons learned about performance reporting. Lessons learned are documented so that they become part of the historical database for both this project and performing organization.

3. **Change Requests**
   Analysis of project performance often generates change requests. These change requests are processed through the Perform Integrated Change Control process, as following:
   - Recommended corrective actions include changes that bring the expected future performance of the project in line with the project management plan.
   - Recommended preventive actions can reduce probability of incurring future negative project performance

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Cost Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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مشروع الإصلاح
الإداري العراقي

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Cost Management
2. **Course Level:** Competency
3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.
4. **Contact Hours**: 6 Hours (1 day)
5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.
6. **Course Dates**: TBD
7. **Class Times**: From 9:00 am to 4:00 pm.
8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Cost Management process, tools, techniques and skills.
    - Learn to apply a variety of Project Cost Management practices and planning tools as means of administering, directing and coordinating projects.

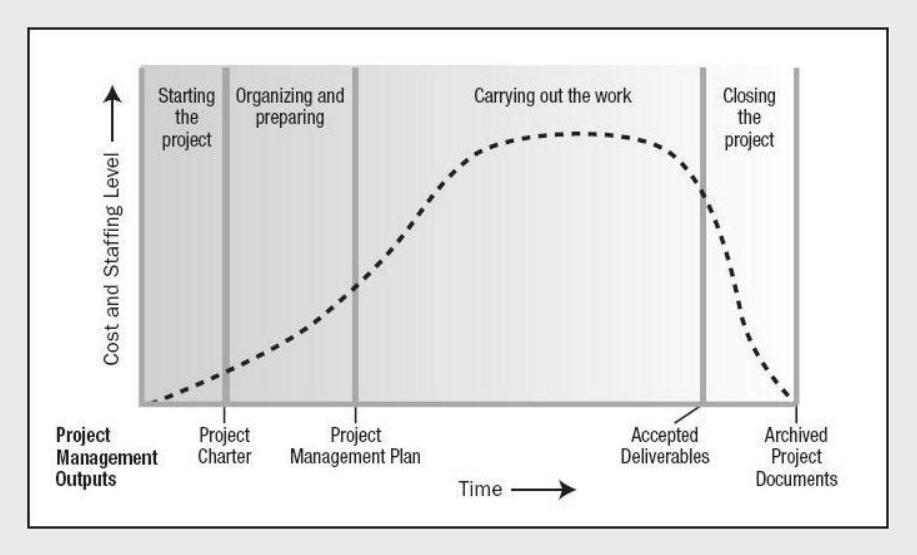
13. **Course Policies:**
    - Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
    - All assignments are due as specified by the instructor.
    - Student can miss a maximum of one day of training.

14. **Methodology:** The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.
- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

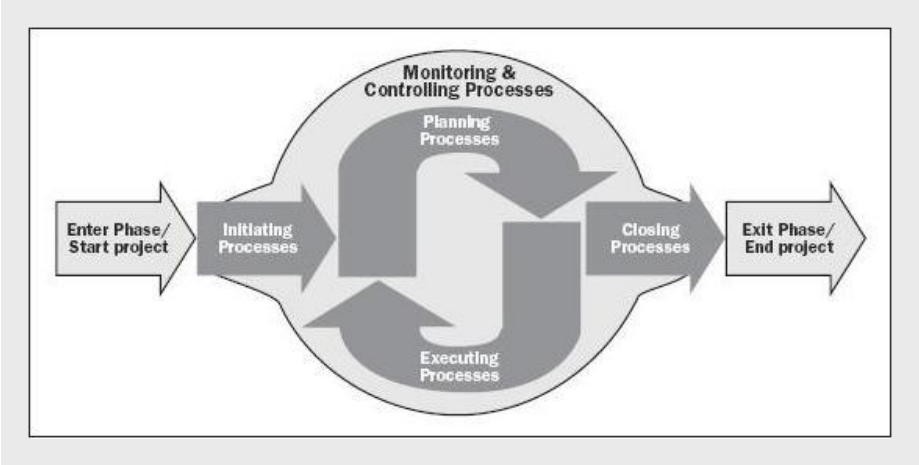
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.

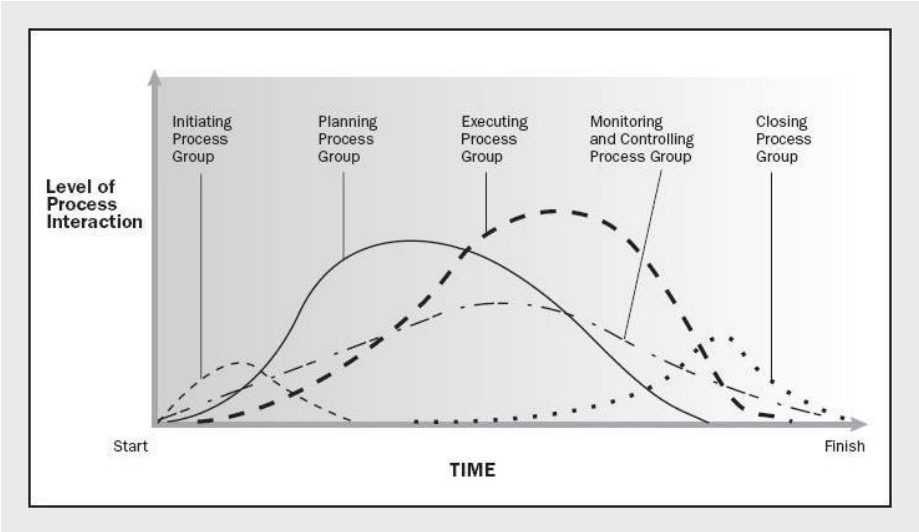
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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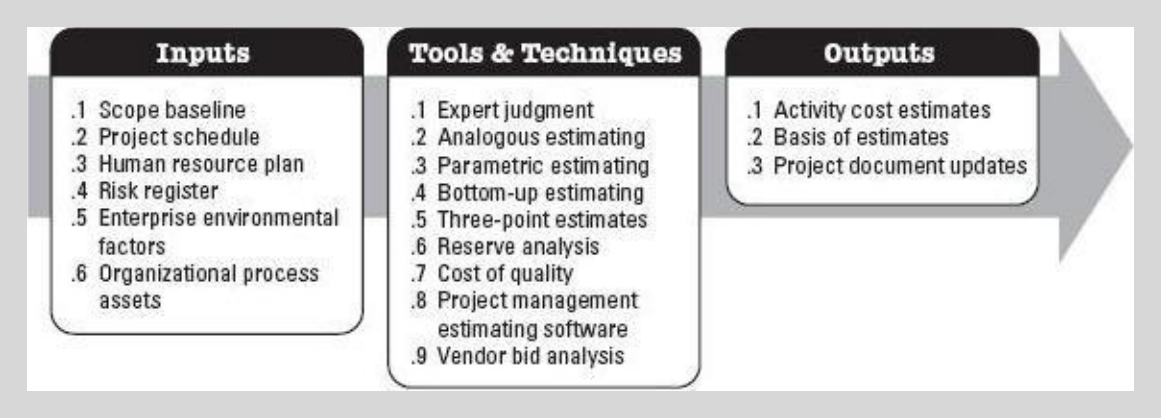
Cost - Planning: <u>Estimate Costs</u>



It is the process of developing an approximation of the monetary resources needed to complete project activities. Cost estimation are a prediction that is based on the information known at a given point in time. It includes the identification and consideration of costing alternatives to initiate and complete the project. Cost trade-offs and risks must be considered, such as make versus buy, buy versus lease, and the sharing of resources in order to achieve optimal costs for the project.

Cost estimates are generally expressed in units of some currency, although in some instances other units of measure, such as staff hours or staff days, are used to facilitate comparisons by eliminating the effects of currency fluctuations.

Cost estimates should be refined during the course of the project to reflect additional detail as it becomes available. The accuracy of a project estimate will increase as the project progresses through the project life cycle. Hence cost estimating is an iterative process from phase to phase. Source of input information are derived from the outputs of project processes in other knowledge areas. Once received, all of this information will remain available as inputs to all three of the cost management processes.

Costs are estimated for all resources that will be charged to the project. This includes, but is not limited to, labor, materials, equipment, services, and facilities, as well as special categories such as an inflation allowance or contingency costs. A cost estimate is quantitative assessment of the likely costs for resources required to complete the activity.

Inputs:

1. **Scope Baseline**
   - Scope statement

     The scope statement provides the product description, acceptance criteria, key deliverables, project boundaries, assumptions, and constraints about the project. One basic assumption that needs to be made when estimating project cost is whether the estimates will

be limited to direct project cost only or whether the estimates will also include indirect costs. Indirect costs are those costs that cannot be directly traced to a specific project and therefore will be accumulated and allocated equitably over multiple projects by some approved and documented accounting procedure. One of the most common constraints for many projects is a limited project budget. Examples of other constraints are required delivery dates, available skilled resources, and organizational policies.

- Work breakdown structure

  The project WBS provides the relationships among all the component of the project and the project deliverables.

- WBS dictionary

  The WBS dictionary and related detailed statements of work provide an identification of the deliverables and a description of the work in each WBS component required to produce each deliverable.

Additional information that may be found in the scope baseline that includes requirements with contractual and legal implications are health, safety, security, performance, environmental, insurance, intellectual property rights, licenses, and permits. All of this information should be considered when developing the cost estimates.

2. **Project Schedule**

   The type and quality of resources and the amount of the time which those resources are applied to complete the work of the project are major factors in determining the project cost. Schedule activity resources are their respective durations are used as key inputs to this process. Estimate Activity Resources involves determining the availability and quantities required of staff and material needed to perform schedule activities. It is closely coordinated with cost estimating. Activity duration estimates will affect cost estimates on any project where the project budget includes an allowance for the cost of financing and where resources are applied per unit of time for the duration of the activity. Activity duration estimates can also affect cost estimates that have time-sensitive costs included in them, such as union labor with regularly expiring collective bargaining agreements or materials with seasonal cost variations.

3. **Human Resource Plan**

   Project staffing attributes, personal rates, and related rewards / recognition are necessary components for developing the project cost estimates.

4. **Risk Register**

The risk register should be reviewed to consider risk mitigation costs. Risks, when can be both threats or opportunities, typically have an impact on both activity and overall project costs. As a general rule, when the project experiences a negative risk event, the near term cost of the project will usually increase, and there will sometimes be a delay in the project schedule.

5. **Enterprise Environmental Factors**

   The enterprise environmental factors that influence the Estimate Costs process include:

   - Market conditions

     Market conditions describe what products, services, and results are available in the market, from whom, and under what terms and conditions. Regional and / or global supply and demand conditions greatly influence resource costs.
   - Published commercial information

     Resource cost rate information is often available from commercial databases that track skills and human resource costs, and provide standard costs for material and equipment. Published seller price lists are another source of information.

6. **Organizational Process Assets**

   The organizational process assets that influence the Estimate Costs process include:

   - Cost estimating policies
   - Cost estimating templates
   - Historical information
   - Lessons learned

Tools / Techniques:

1. **Expert Judgment**

   Cost estimates are influenced by numerous variables such as labor rates, material costs, inflation, risk factors, and other variables. Expert judgment, guided by historical information, provides valuable insight about the environment and information from prior similar projects. Expert judgment can also be used to determine whether to combine methods of estimating and hoe to reconcile differences between them.

2. **Analogous Estimating**

   Analogous cost estimating uses the values of parameters, such as scope, cost, budget, and duration or measures of scale such as size, weight, and

complexity, from a pervious, similar project as the basis for estimating the same parameter or measure for a current project. When estimating costs, this technique relies on the actual cost of previous, similar projects as the basis for estimating the cost of the current project. It is a gross value estimating approach, sometimes adjusted for known differences in project complexity. Analogous cost estimating is frequently used to estimate a parameter when there is a limited amount of detailed information about the project, for example, in the early phases of a project. Analogous cost estimating uses historical information and expert judgment.

3. **Parametric Estimating**

   It uses a statistical relationship between historical data and other variables to calculate an estimate for activity parameters, such as cost, budget, and duration. This technique can produce higher levels of accuracy depending upon the sophistication and underlying data built into the model. Parametric cost estimates can be applied to a total project or to segments of a project, in conjunction with other estimating methods.

4. **Bottom-Up Estimating**

   It is a method of estimating a component of work. The cost of individual work packages or activities is estimated with the greatest level of specified detail. The detailed cost is then summarized or "rolled up" to higher levels for subsequent reporting and tracking purposes. The cost and accuracy of bottom-up cost estimating is typically influenced by the size and complexity of the individual activity or work package.

5. **Three-Point Estimates**

   The accuracy of single-point activity cost estimates can be improved by considering estimation uncertainty and risk. This concept originated with the program evaluation and review technique (PERT). PERT uses three estimates to define an approximate range for an activity's cost:

   - Most likely
   - Optimistic
   - Pessimistic

   PERT analysis calculated an expected (Ce) activity cost using a weighted average of these three estimates.

6. **Reserve Analysis**

   Cost estimates may include contingency reverses (sometimes called contingency allowances) to account for cost uncertainty. The contingency reserve may be a percentage of the estimated cost, a fixed number, or may be developed by using quantitative analysis methods. As more precise information about the project becomes available, the contingency reserve

may be used, reduced or eliminated. Contingency should be clearly identified in schedule documentation. Contingency reserves are part of the funding requirements.

7. **Cost of Quality (COQ)**

8. **Project Management Estimating Software**
   Project management cost estimating software applications, computerized spreadsheets, simulation, and statistical tools are becoming more widely accepted to assist with cost estimating. Such tools can simplify the use of some cost estimating techniques and thereby facilitate rapid consideration of cost estimate alternative.

9. **Vendor Bid Analysis**
   Cost estimating methods may include analysis of what the project should cost, based on the positive bids from qualified vendors. Where projects are awarded to a vendor under competitive processes, additional cost estimating work can be required of the project team to examine the price of individual deliverables and to derive a cost that supports the final total project cost.

Outputs:

1. **Activity Cost Estimates**
   Activity cost estimates are quantitative assessments of the probable costs required to complete project work. Cost estimates can be presented in summary form or in detail. Costs are estimates for all resources that are applied to the activity cost estimate. This include, but is not limited to, direct labor, materials, equipment, services, facilities, information technology, and special categories such as an inflation allowance or a cost contingency reserve. Indirect costs, if they are included in the project estimate, can be included at the activity level or at higher levels.

2. **Basis of Estimates**
   The amount and type of additional details supporting the cost estimate vary by application area. Regardless of the level of detail, the supporting documentation should provide a clear and complete understanding of how the cost estimate was derived. Supporting detail for activity cost estimates may include:

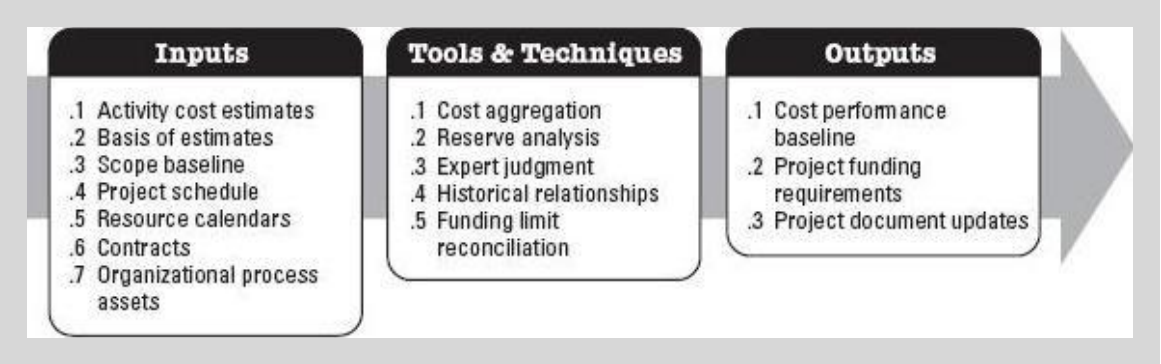
   - Documentation of the basis of the estimate.
   - Documentation of all assumptions made.
   - Documentation of any known constraints.

- Indication of the range of possible estimates.
- Indication of the confidence level of the final estimate.

3. Project Document Updates

Project documents that may be updated during this process include Risk Register.

Cost - Planning: Determine Budget



It is the process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline. This baseline includes all authorized budgets, but excludes management reserves. Project budgets constitute the funds authorized to execute the project. Project cost performance will be measured against the authorized budget.

Inputs:

1. **Activity Cost Estimates**
   Cost estimates for each activity within a work package are aggregated to obtain a cost estimate for each cost package.

2. **Basis of Estimates**
   Any basic assumptions dealing with the inclusion or exclusion of indirect costs in the project budget are specified in the basis of estimates.

3. **Scope Baseline**
   - Scope Statement
   - Work breakdown structure
   - WBS dictionary

4. **Project Schedule**
   It includes start and finish dates for the project's activities, milestones, work packages, planning packages, and control accounts. This information can be used to aggregate costs to the calendar periods in which the costs are planned to be incurred.

5. **Resource Calendars**
   Resource calendars provide information on which resources are assigned to the project and when they are assigned. This information can be used to indicate resource costs over the duration of the project.
6. **Contacts**
   Applicable contract information and costs relating to products, services, or results that have been purchased are included when determining the budget.

7. **Organizational Process Assets**
   The organizational process assets that influence the Determining Budget process include:
   - Existing formal and informal cost budgeting related policies, procedures, and guidelines.
   - Cost budgeting tolls
   - Reporting methods

Tools / Techniques:

1. **Cost Aggregation**
   Cost estimates are aggregated by work package in accordance with the WBS. The work package cost estimates are then aggregated for the higher component levels of the WBS (such as control accounts) and ultimately for the entire project.

2. **Reserve Analysis**
   Budget reserve analysis can establish both the contingency reserves and the management reserves for the project. Contingency reserves are allowance for unplanned but potentially required changes that can result from realized risks identified in the risk register. Management reserves are budgets reserved for unplanned changes to project scope and cost. The project manager may be required to obtain approval before obligating or spending management reserve. Reserves are not a part of the project baseline, but may be included in the total budget for the project. They are not included as a part of the earned value measurement calculations.

3. **Expert Judgment**
   Judgment provided based upon expertise in an application area. Knowledge area, discipline, industry, etc. as appropriate for the activity being performed should be used in determining the budget. Such expertise may be provided by any group or person with specialized education, knowledge, skill, experience, or training. Expert judgment is available from many resources including:
   - Other units within the performing organization.
   - Consultants
   - Stakeholders including customers
   - Professional and technical associations
   - Industry groups

4. **Historical Relationships**
   Any historical relationships that result in parametric estimates or analogous estimates involve the use of project characteristics (parameters) to develop mathematical models to predict total project costs. Such models can be simple

or complex. Both the cost and accuracy of analogous and parametric models can vary widely. They are most likely to be reliable when:

- Historical information used to develop the model is accurate.
- Parameters used in the model are readily quantifiable.
- Models are scalable, such that they work for a large project, a small project, and phases of a project.

5. **Funding Limit Reconciliation**
   The expenditure of funds should be reconciled with any funding limits on the commitment of funds for the project. A variance between the funding limits and the planned expenditure will sometimes necessitate the rescheduling of work to level out the rate of expenditures. This can be accomplished by placing imposed date constraints for work into the project schedule.

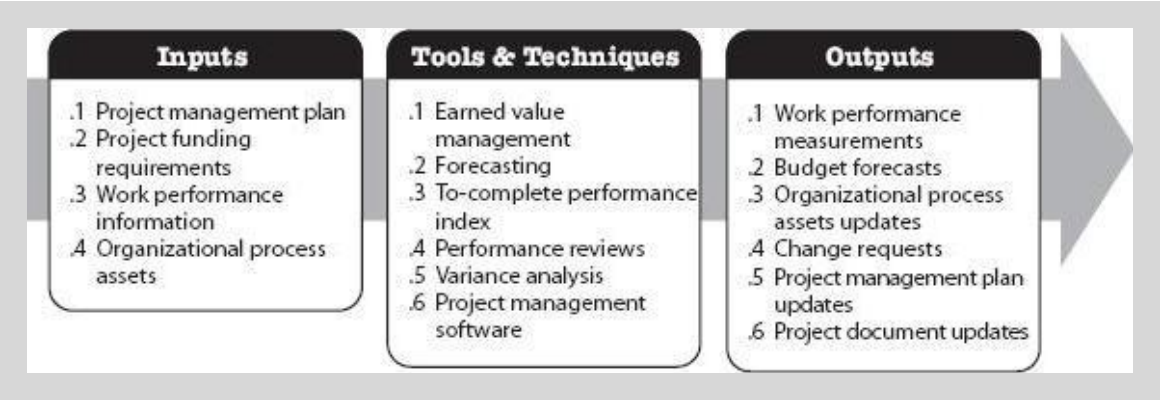
Outputs:

1. **Cost Performance Baseline**
   The cost performance baseline is an authorized time-phased budget at completion (BAC) used to measure, monitor, and control overall cost performance on the project. It is developed as a summation of the approved budgets by time period and is typically displayed in the form of an S-curve. In the earned value management technique the cost performance baseline is referred to as the performance measurement baseline (PMB).

2. **Project Funding Requirements**
   Total funding requirements, and periodic funding requirements are derived from the cost baseline. The cost baseline will include projected expenditures plus anticipated liabilities. Funding often occurs in incremental amounts that are not continuous, which appear as steps. The total funds required are those included in the cost baseline, plus management reserves, if any.

3. **Project Document Updates**
   Project documents that may be updated include:
   - Risk register
   - Cost estimates
   - Project schedule

Cost - Monitor & Control: Control Costs



It is the process of monitoring the status of the project to update the project budget and managing changes to the cost baseline.
Updating the budget involves recording actual cost spent to date. Any increase to the authorized budget can only be approved through the Perform Integrated Change Control Process.
Monitoring the expenditure of funds without regard to the value of work being accomplished for such expenditure has little value to the project other than to allow the project team to stay within the authorized funding. Thus much of the effort of cost control involves analyzing the relationship between the consumption of project funds to the physical work being accomplished for such expenditures.
The key to effective cost control is the management of the approved cost performance baseline and the changes to that baseline. Project cost control includes:

- Influencing the factors that create changes to the authorized cost baseline.
- Ensuring that all change requests are acted on in a timely manner.
- Managing the actual changes when and as they occur.
- Ensuring that cost expenditures do not exceed the authorized funding, by period and in total for the project.
- Monitoring cost performance to isolate and understand variances from the approved cost baseline.
- Monitoring work performance against funds expended.
- Preventing unapproved changes from being included in the reported cost or resource usage.
- Informing appropriate stakeholders of all approved changes and associated cost
- Acting to bring expected cost overruns within acceptable limits.

Project cost control seeks out the causes of positive and negative variances and is part of the Perform Integrated Change Control process.

Inputs:

1. **Project Management Plan**
   It contains the following information that is used to control cost:
   - Cost performance baseline
     It is compared with actual results to determine if a change, corrective action or preventive action is necessary.
   - Cost management plan
     It describes how the project costs will be managed and controlled.

2. **Project Funding Requirements**

3. **Work Performance Information**
   It includes information about project progress, such as which deliverables have started, their progress and which deliverables have finished, information also includes costs that have been authorized and incurred, and estimated for completing project work.

4. **Organizational Process Assets**
   The organizational process assets that can influence the Control Cost process include:
   - Existing formal and informal cost control-related policies, procedures and guidelines.
   - Cost control tools.
   - Monitoring and reporting methods to be used.

Tools & Techniques:

1. **Earned Value Management**
   Earned value management (EVM) in its various forms is a commonly used method of performance management. It integrates project scope, cost and schedule measures to help the project management team assess and measure project performance and progress. it is a project management technique that requires the formation of an integrated baseline against which performance can be measured for the duration of the project. The principles of EVM can be applied to all projects, in any industry. EVM develops and monitors three key dimensions for each work package and control account:
   - Planned Value (PV)
   - Earned Value (EV)
   - Actual Cost (AC)

   Variance from the approved baseline will also be monitored:
   - Schedule Variance (SV)
   - Cost Variance (CV)

The SV & CV values can be converted to efficiency indicators to reflect the cost and schedule performance of any project for comparison against all other projects or within a portfolio of projects. The variance and indices are useful for determining project status and providing a basis for estimating project cost and schedule outcome

- Schedule Performance Index (SPI)
- Cost Performance Index (CPI)

The three parameters of planned value, earned value, and actual cost can be monitored and reported on both a period-by-period basis and on a cumulative basis.

2. **Forecasting**

As the project progresses, the project team can develop a forecast for the estimate at completion (EAC) that may differ from the budget at completion (BAC) based on the project performance. If it becomes obvious that the BAC is no longer viable, the project manager should develop a forecasted EAC. Forecasting the EAC involves making estimates or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecasting. Forecasting is generated, updated, and reissued based on work performance information provided as the project is executed. The work performance information covers the project's past performance and any information that could impact the project in the future. The project manager's manual EAC can be quickly compared with a range of calculated EACs representing various risk scenarios. While EVM data can quickly provide many statistical EACs, only three of the more common methods are mentioned below:

- EAC forecast for ETC work performed at the budget rate.
- EAC forecast for ETC work performed at the present CPI
- EAC forecast for ETC work considering both SPI and CPI factors.

Each of these approaches can be correct for any given project and will provide the project management team with an "early warning" signal if the EAC forecasts are not within acceptable tolerances.

3. **To-Complete Performance Index (TCPI)**

It is the calculated projection of cost performance that must be achieved on the remaining work to meet a specified management goal, such as the BAC or the EAC. If it becomes obvious that the BAC is no longer viable, the project manager develops a forecasted estimate at completion (EAC). Once approved, the EAC effectively supersedes the BAC as the cost performance goal. If the cumulative CPI falls below the baseline plan, all future work of the project will need to immediately be performed in the range of the TCPI (BAC) to stay within the authorized BAC. Whether this level of performance is achievable is a judgment call based on a number of considerations, including risks, schedule, and technical performance. Once management acknowledges that the BAC is no longer attainable, the project manager will prepare a new estimate at

completion (EAC) for the work, and once approved, the project will work to the new EAC value. This level of performance is displayed as the TCPI (EAC) line.

4. **Performance Reviews**
   Performance reviews compare cost performance over time, schedule activities or work packages overrunning and under running the budget, and estimated funds needed to complete work in progress. If EVM is being used, the following information is determined:
   - **Variance analysis**
     Variance analysis as used in EVM compares actual project performance to planned or expected performance. Cost and schedule variances are the most frequently analyzed.
   - **Trend Analysis**
     Trend analysis examines project performance over time to determine if performance is improving or deteriorating. Graphical analysis techniques are valuable for understanding performance to date and comparison to future performance goals in the form of BAC versus EAC and completion dates.
   - **Earned value performance**
     Earned value management compares the baseline plan to actual schedule and cost performance.

5. **Variance Analysis**
   Cost performance measurements (CV & CPI) are used to assess the magnitude of variation to the original cost baseline. Important aspects of project cost control include determining the cause and degree of variance relative to the cost performance baseline and deciding whether corrective or preventive action is required. The percentage range of acceptable variances will tend to decrease as more work is accomplished. The larger percentage variances allowed at the start of the project can decrease as the project nears completion.

6. **Project Management Software**
   Project management software is often used to monitor the three EVM dimensions (PV, EV, and AC), to display graphical trends, and to forecast a range of possible final project results.

Outputs:

1. **Work Performance Measurements**
   The calculated CV, SV, CPI and SPI values for WBS components, in particular the work packages and control accounts, are documented and communicated to stakeholders.

2. **Budget Forecasts**
   Either a calculated EAC value or a bottom-up EAC value is documented and communicated to stakeholders.

3. **Organizational Process Assets Updates**

   Organizational process assets that may be updated include:
   - Causes of variances.
   - Corrective action chosen and the reason.
   - Other types of lessons learned from project cost control.

4. **Change Requests**
   Analysis of project performance can result in a change request to the cost performance baseline or other components of the project management plan. Change requests can include preventive or corrective actions and are processed for review and disposition through the Perform Integrated Change Control process.

5. **Project Management Plan Updates**
   Elements of the project management plan that may be updated include:
   - Cost performance baseline
   - Cost management plan

6. **Project Document Updates**
   Project documents that may be updated include:
   - Cost estimates
   - Basis of estimates.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Human Recourse Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Human Resources Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
13. Learn Project Human Resource Management process, tools, techniques and skills.

14. Learn to apply a variety of Project Human Resource Management practices and planning tools as means of administering, directing and coordinating projects.

15. Course Policies:

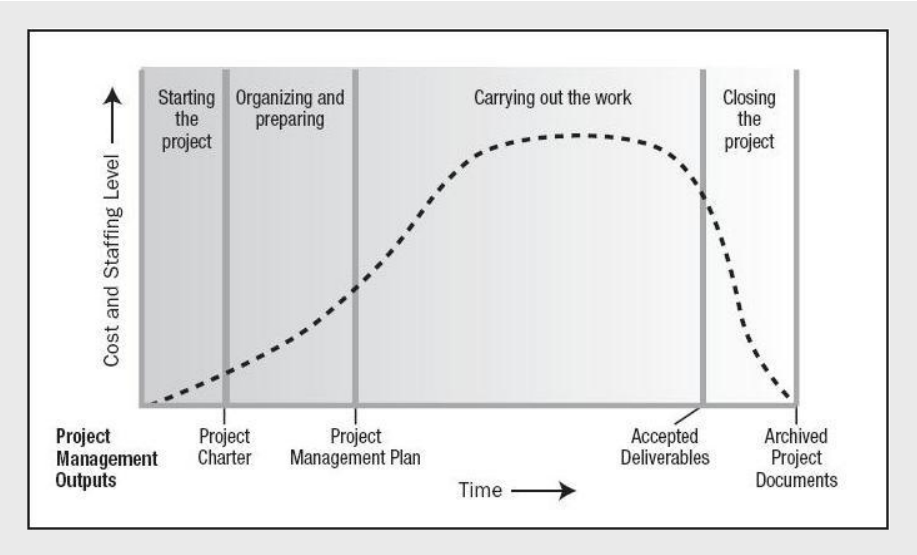
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

16. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

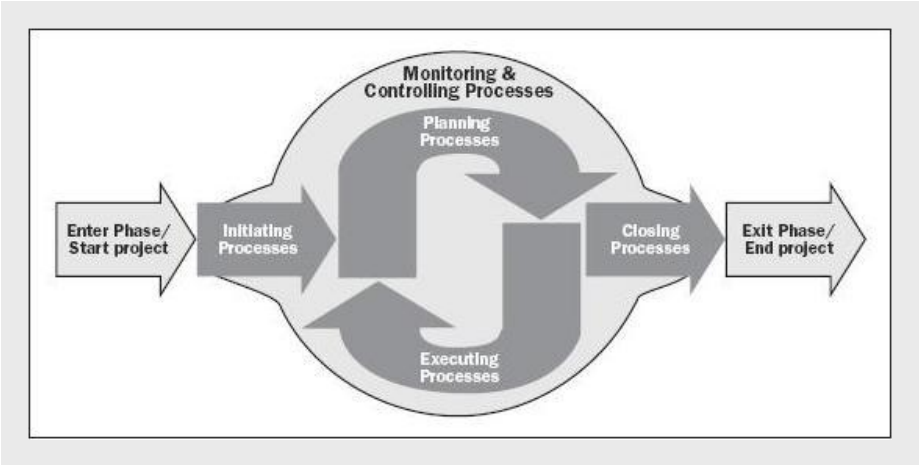
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

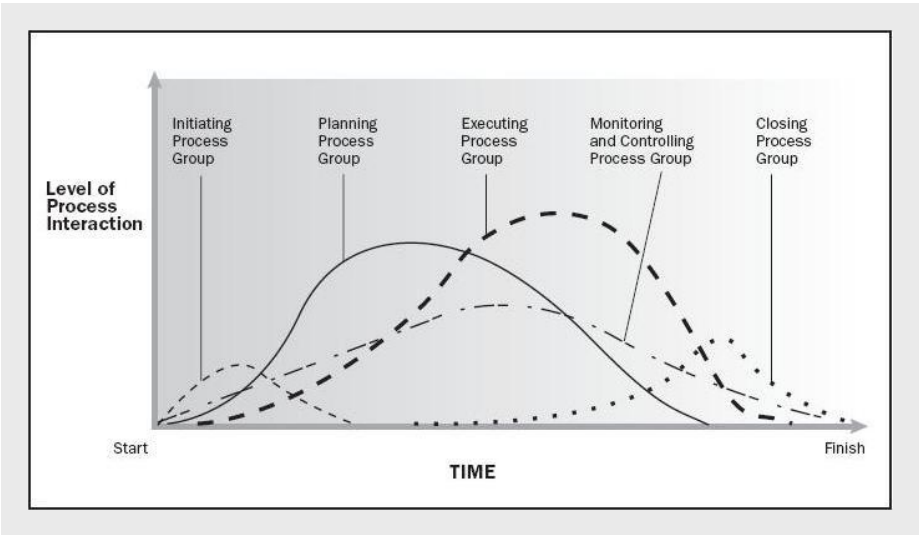
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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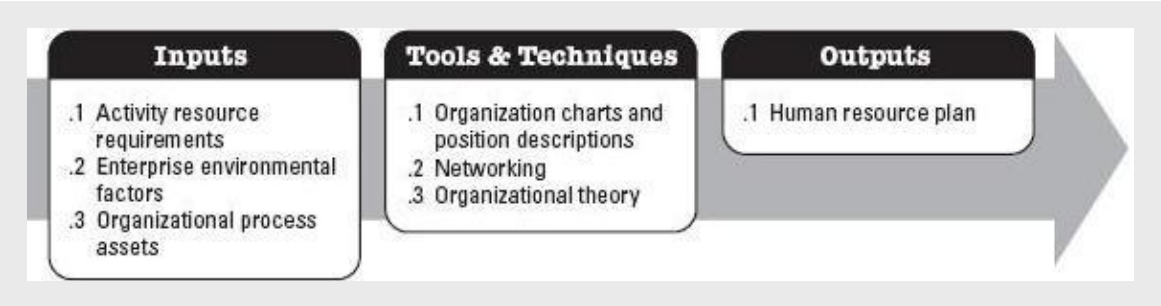
Human Resources - Planning: Develop Human Resource Plan



It is the process of identifying and documenting project roles, responsibilities, and required skills, reporting relationships, and creating a staffing management plan. Human resource planning is used to determine and identify human resources with the necessary skills required for project success.
The human resource plan documents project roles and responsibilities, project organization charts, and the staffing management plan including the timetable for staff acquisition and release. It may also include identification of training needs, team-building strategies, plans for recognition, and rewards programs, compliance considerations, safety issues, and the impact of the staffing management plan on the organization. Important consideration should be given to the availability of, or competition for, scarce or limited human resources. Project roles can be designated for persons or groups. Those persons or groups can be from inside or outside the organization performing the project. Other projects may be competing fro resources with the same competencies or skill sets. Given these factors, project costs, schedules, risks, quality, and other areas may be significantly affected. Effective human resource planning should consider and plan for these factors and develop human resource options.

Inputs:

1. **Activity Resource Requirements**
   Human resource planning uses activity resource requirements to determine the human resource needs for the project. The preliminary requirements regarding the required people and competencies for the project team members are progressively elaborated as part of the human resource planning process.

2. **Enterprise Environmental Factors**
   The enterprise environmental factors that can influence the Development Human Resource Plan process include:
   - Organizational culture and structure
   - Existing human resources
   - Personnel administration policies
   - Marketplace conditions

3. **Organizational Process Assets**
   The organizational process assets that can influence the project team with the Develop Human Resource Plan process include:
   - Organizational standard processes and policies and standardized role descriptions
   - Templates for organizational charts and position descriptions
   - Historical information on organizational structures that have worked in previous projects.

Tools / Techniques:

1. **Organization Charts and Position Descriptions**
   Various formats exist to document team member roles and responsibilities. Most of the formats fall into one of three types: hierarchical, matrix, and text-oriented. Additionally, some project assignments are listed in subsidiary project management plans such as the risk, quality, or communication plans. Regardless of the method utilized, the objective is to ensure that each work package has an unambiguous owner and that all team members have a clear understanding of their roles and responsibilities.
   - Hierarchical-type charts
     The traditional organization chart structure can be used to show positions and relationships in a graphic, top-down format. While the (WBS) shows a breakdown of project deliverables, the organizational breakdown structure (OBS) is arranged according to an organization's existing department. The resource breakdown structure is helpful in tracking project costs and can be aligned with the organization's accounting system. It can contain resource categories other than human resources.
   - Matrix-based charts
     A responsibility assignment matrix (RAM) is used to illustrate the connections between work packages or activities and project team members. On larger projects, RAMs can be developed at various levels. The matrix format shows all activities associated with one person and all people associated with one activity. This ensures that there is only one person accountable for any one task to avoid confusion. The assigned resources can be shown as individuals or groups. The RACI is just one type of RAM; the project manager can select other options such as "lead" and "resource" designations or others as appropriate for the project. The RACI is particularly important when the team consists of internal and external resources to ensure clear divisions of roles and expectations.
   - Text-oriented formats
     Team member responsibilities that require detailed descriptions can be specified in text-oriented formats. Usually in outline form, the

documents provide information such as responsibilities, authority, competencies, and qualifications. The documents are known by various names including position descriptions and role-responsibility-authority forms. These documents can be used as templates for future projects.

- Other sections of the project management plan
  Some responsibilities related to managing the project are listed in other sections of the project management plan. For example, the risk register lists risk owners; the communication plan lists team members responsible for communication activities, and the quality plan designates those responsible for carrying out quality assurance and quality control activities.

2. **Networking**
   It is the formal and informal interaction with others in an organization, industry, or professional environment. It is a constructive way to understand political and interpersonal factors that will impact the effectiveness of various staffing management options. Human resources networking activities include proactive correspondence, luncheon meetings, informal conversations including meetings and events, trade conferences, and symposia. Networking can be useful technique at the beginning of a project. It can also be an effective way to enhance project management professional development during the project and after the project ends.

3. **Organizational Theory**
   Organizational theory provides information regarding the way in which people, teams and organizational unit behave. Effective use of this information can shorten the amount of time, cost, and effort needed to create the human resource planning outputs and improve the likelihood that the planning will be effective. It is important to recognize that different organizational structures have different individual response, individual performance, and personal relationship characteristics.

Outputs:

Human Resource Plan

The human resource plan, a part of project management plan, provides guidance on how project human resources should be defined, staffed, managed, controlled, and eventually released. The human resource plan should include:

- Roles and responsibilities

The following should be addressed when listing the role and responsibilities needed to complete a project:

- Role: the label describing the portion of project for which a person is accountable.
- Authority: the right to apply project resources, makes decisions, and sign approvals.
- Responsibility: the work that a project team member is expected to perform in order to complete the project's activities.
- Competency: the skill and capacity required to complete project activities. If project team members do not possess required competencies, performance can be jeopardized. When such mismatches are identified, proactive responses such as training, hiring, schedule changes, or scope changes are initiated.

- Project organization charts

  It is a graphic display of project team members and their reporting Relationships can be formal or informal, highly detailed or broadly framed, based on the needs of the project.

- Staffing management plan

  It is a part of human resources plan within the project management plan, describes when and how human resource requirements will be met. The staffing management plan can be formal or informal, highly detailed or broadly framed, depending upon the needs of the project. The plan updated continually during the project to direct outgoing team member acquisition and development actions. Information in the staffing management plan varies by application area and project size, but items to consider include:

  - Staff acquisition: a number of questions arise when planning the acquisition of the project team members. For example. Will the human resources come from within the organization or from external, contracted resources? Will team members need to work in a central location or can they work from distant locations? What are the costs associated with each level of expertise needed for the project? How much assistance can the organization's human resource department and functional managers provide to the project management team?
  - Resource calendar: the staffing management plan describes necessary time frames for project team members, either individually or collectively, as well as when acquisition activities such as recruiting should start. One tool for charting human resources is a resource histogram. This bar chart illustrates the number of hours a person, department,

or entire project team will be needed each week or month over the course of the project.

- Staff release plan: determining the method and timing of releasing project team members benefits both the project and team members. When team members are released from a project, the costs associated with those resources are no longer charged to the project, thus reducing project costs. Morale is improved when smooth transitions to upcoming projects are already planned.
- Training needs: if the team members to be assigned are not expected to have the required competencies, a training plan can be developed as part of the project. The plan can also include ways to help team members obtain certifications that would support their ability to benefit the project.
- Recognition and rewards: clear criteria for rewards and a planned system for their use helps promote and reinforce desired behaviors. To be effective, recognition and rewards should be based on activities and performance under a person's control.
- Compliance: the staffing management plan can include strategies for complying with applicable government regulations, union contracts, and other established human resource policies.
- Safety: policies and procedures that protect team members from safety hazards can be included in the staffing management plan as well as the risk register.

Human Resources - Execution: Acquire Project Team

It is the process of confirming human resource availability and obtaining the team necessary to complete project assignments.
The project management team may or may not have direct control over team member selection because of collective bargaining agreements, use of subcontractor personnel, matrix project environment, internal or external reporting relationships, or other various reasons. It is important that the following factors are considered during the process of acquiring the project team:

- The project manager or the project management team should effectively negotiate and influence others who are in a position to provide the required human resources for the project.

- Failure to acquire the necessary human resources for the project may affect project schedules, budgets, customer satisfaction, quality, and risks. It could decrease the probability of success and ultimately result in project cancellation.

- If the human resources are not available due to constraints, economic factors, or previous assignments to other projects, the project manager or project team may be required to assign alternative resources, perhaps with lower competencies, provided there is no violation of legal, regulatory, mandatory, or other specific criteria.

Inputs:

1. **Project Management Plan**
   It contains the human resource plan which has the following information that is used to provide guidance on how project human resources should be identified, staffed, managed, controlled, and eventually released. It includes:
   - Role and responsibilities defining the positions, skills, and competencies that the project demands.
   - Project organization charts indicating the number of people needed for the project.

- Staffing management plan delineating the time periods each project team member will be needed and other information important to acquiring the project team.

2. **Enterprise Environmental Factors**
   The enterprise environmental factors that can influence the Acquire Project Team include:
   - Existing information for human resources including who is available, their competency levels, their prior experience, their interest in working on the project and their cost rate.
   - Personnel administration policies such as those that affect outsourcing.
   - Organizational structure
   - Location or multiple locations

3. **Organizational Process Assets**
   The organizational process assets that can influence this process include:
   - Organization standard policies
   - Processes
   - procedures

Tools / Techniques

1. **Pre-Assignment**
   When project team are selected in advance they are considered pre-assigned. This situation can occur if the project is the result of specific people being promised as part of a competitive proposal, if the project is dependent upon the expertise of particular person, or if some staff assignments are defined within the project charter.

2. **Negotiation**
   Staff assignments are negotiated on many projects. For example, the project management team may need to negotiate with:
   - Functional managers to ensure that the project receives appropriately competent staff in the required time frame and that the project team members will be able, willing, and authorized to work on the project until their responsibilities are completed.
   - Other project management team within the performing organization to appropriately assign scare or specialized human resources.
   - External organizations, vendors, suppliers, contractors, etc. for appropriate, scare, specialized, qualified, certified, or other specified human resources special consideration should be given to external negotiation policies, practices, processes, guidelines, legal, and other such criteria.

3. **Acquisition**

   When the performing organization lacks the in-house staff needed to complete a project, the required services may be acquired from outside source. This can involve hiring individual consultants or subcontracting work to another organization.

4. **Virtual Team**

   The use of virtual teams creates new possibilities when acquiring project team members. Virtual teams can be defined as groups of people with a shared goal who fulfill their roles with little or no time spent meeting face to face. The availability of electronic communication such as email, audio conferencing, web-based meetings and video conferencing has made such teams feasible.

Outputs:

1. **Project Staff Assignments**

   The project is staffed when appropriate people have been assigned through the previously described methods. The documentation of these assignments can include a project team directory, memos to team members, and names inserted into other parts of the project management plan, such as project organization charts and schedules.

2. **Resource Calendars**

   Resource calendars document the time periods that each project team member can work on the project. Creating a reliable schedule depends on having a good understanding of each person's schedule conflicts, including vacation time and commitments to other projects, to accurately document team member availability.

3. **Project Management Plan Update**

   Elements of project management plan that may be updated include:

   - The human resource plan

     When specific people are assigned to project roles and responsibilities, there may not be an exact fit between the staffing requirements indicated in the human resource plan and the individual.

Human Resources – Execution: Develop Project Team

It is the process of improving the competencies, team interaction, and the overall team environment to enhance project performance. Project managers should acquire skills to identify, build, maintain, motivate, lead, and inspire project teams to achieve high team performance and to meet the project's objectives.
Teamwork is critical factor for project success, and developing effective project teams is one of the primary responsibilities of the project manager. High team performance can be achieved by using open and effective communication, developing trust among team members, managing conflicts in a constructive manner, and encouraging collaborative problem-solving and decision-making. The project manager should request management support and/or influence the appropriate stakeholders to acquire the resources needed to develop effective project teams.

Inputs:

1. **Project Staff Assignments**
   Team development starts with a list of the project team members. Project staff assignment documents identify the people who are on the team.

2. **Project Management Plan**
   It contains the human resource plan which identifies training strategies and plans for developing the project team. Items such as rewards, feedback, additional training, and disciplinary actions can be added to the plan as a result of ongoing team performance assessments and other forms of project team management.

3. **Resource Calendars**
   Resource calendars identify times when the project team members can participate in team development activities.

Tools / Techniques:

1. **Interpersonal Skills**

These are sometimes known as "soft skills" and are particularly important to team development. The project management team can greatly reduce problems and increase cooperation by understanding the sentiments of project team members, anticipating their actions, acknowledging their concerns, and following up on their issues. Skills such as empathy, influence, creativity, and group facilitation are valuable assets when managing the project team.

2. **Training**
   Training includes activities designed to enhance the competencies of the project team members. Training can be formal or informal examples of training methods include classroom, online computer-based, on-the-job, training from another project team member, mentoring, and coaching. If project team members lack necessary management for technical skills, such skills can be developed as part of project work. Scheduled training takes place as stated in the human resource plan. Unplanned training takes place as a result of observation, conversation, and project performance appraisals conducted during the controlling process of managing the project team.

3. **Team-Building Activities**
   Team building activities can be vary from a five-minute agenda item in a status review meeting to an off-site, professionally facilitated experience designed to improve interpersonal relationship. The objective of team-building activities is to help individual team members work together effectively. One of the most important skills in developing a team environmental involves handling project team problems and discussing these as team issues. The entire team should be encouraged to work collaboratively to resolve these issues. Changes in a project environment are inevitable, and to manage them effectively, a continued or a renewed team-building effort should be applied. The project manager should continually monitor team functioning and performance to determine if any actions are needed to prevent or correct various team problems. One theory states that there are five stages of development that teams may go through:
   - Forming: This phase is where the team meets and learns about the project and what their formal roles and responsibilities are. Team members tend to be independent and not as open in this phase. For more information, refer to the Tuckman ladder of team development.
   - Storming: During this phase, the team begins to address the project work, technical decisions, and the project management approach. If team members are not collaborative and open to differing ideas and perspectives the environment can become destructive.
   - Norming: In this phase, team members begin to work together and adjust work habits and behaviors that support the team. The team begins to trust each other.

- Performing: Teams that reach the performing stage function as a well-organized unit. They are interdependent and work through issues smoothly and effectively.
- Adjourning: The team completes the work and moves on from the project.

Duration of a particular stage depends upon team dynamics, team size, and team leadership. Project managers should have a good understanding of team dynamics in order to move their team members through all stages in a effective manner.

4. **Ground Rules**
   Ground rules establish clear expectations regarding acceptable behavior by project team members. Early commitment to clear guidelines decreases misunderstandings and increases productivity. Discussing ground rules allows team members to discover values that are important to one another. All project team members share responsibility for enforcing the rules once they are established.

5. **Co-location**
   It involves placing many or all of the most active project team members in the same physical location to enhance their ability to perform as a team.

6. **Recognition and Rewards**
   Part of the team development process involves recognizing and rewarding desirable behavior. The original plans concerning ways in which to reward people are developed during the Develop Human Resource Plan Process. It is important to recognize that a particular reward given to any individual will only be effective if it satisfies a need which is valued by that individual.

Outputs:

1. **Team Performance Assessments**
   As project team development efforts such as training, team building, and co-location are implemented, the project management team makes formal or informal assessments of the project team's effectiveness. Effective team development strategies and activities are expected to increase the team's performance, which increases the likelihood of meeting project objectives. Team performance assessment criteria should be determined by all appropriate parties and incorporated in the Develop Project Team inputs. The evaluation of a team's effectiveness may include indicators such as:
   - Improvements in skills that allow individuals to perform assignments more effectively.
   - Improvements in competencies that help the team perform better as a team.

- Reduced staff turnover rate.
- Increased team cohesiveness where team members share information and experiences openly and help each other to improve the overall project performance.

As a result of conducting an evaluation of the team's overall performance, the project management team can identify the specific training, coaching, mentoring, assistance, or changes required to improve the team's performance. This should also include identification of the proper or required resources necessary to achieve and implement the improvements identified in the assessment.

2. **Enterprise Environmental Factors Updates**
   The enterprise environmental factors that mat be updated as a result of the Develop Project Team process includes:
   - Personnel Administration
     Including updates for employee training records and skill assessments.

Human Resources – Execution: Manage Project Team

It is the process of tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance. The project management team observes team behavior, manages conflict, resolves issues, and appraises team member performance. As a result of managing the project team, change requests are submitted, the human resource plan is updated, issues are resolved, input is provided for performance appraisals, and lessons learned are added to the organization's database.
Managing the project team requires a variety of management skills for fostering teamwork and integrating the efforts of team members to create high-performance teams. Team management involves a combination of skills with special emphasis on communication, conflict management, negotiation, and leadership. Project managers should provide challenging assignments to team members and provide recognition for high performance.

Input:

1. **Project Staff Assignments**
   Project staff assignments provide documentation which includes the list of project team members.

2. **Project Management Plan**
   The project management plan contains the human resource plan which includes:
   - Roles and responsibilities
   - Project organization
   - The staffing management plan

3. **Team Performance Assessments**
   The project management team makes ongoing formal or informal assessments of the project team's performance. By continually assessing the project's team performance, actions can be taken to resolve issues, modify communication, address conflict, and improve team interaction.

4. **Performance Reports**
   Performance reports provide documentation about the current project status compared to project forecasts. Performance areas that can help with project team management include results from schedule control, cost control, quality control, and scope verification. The information from performance reports and related forecasts assists in determining future human resource requirements, recognition and rewards, and updates to the staffing management plan.

5. **Organization Process Assets**
   The organizational process assets that can influence the Manage Project Team process include:
   - Certificates of appreciation
   - Newsletters
   - Websites
   - Bonus structure
   - Corporate apparel
   - Other organizational perquisites

Tools / Techniques:

1. **Observation and Conversation**
   These are used to stay in touch with the work and attitudes of project team members. The project management team monitors progress toward project deliverables, accomplishments that are a source of pride for team members, and interpersonal issues.

2. **Project Performance Appraisals**
   Objectives for conducting performance appraisals during the course of a project can include clarification of roles and responsibilities, constructive feedback to team members, discovery of unknown or unsolved issues, development of individual training plans, and the establishment of specific goals for future time periods. The need for formal or informal project performance appraisals depend on the length of the project, complexity of the project, organizational policy, labor contract requirements, and the amount and quality of regular communication.

4. **Conflict Management**
   Conflict is inevitable in project environment. Source of conflict include scarce resources, scheduling priorities, and personal work styles. Team ground rules, group norms, and solid project management practices like communication planning and role definition, reduce the amount of conflict. Successful conflict management results in greater productivity and positive working relationships. When managed properly, difference of opinion can lead to increased creativity

and better decision making. If conflict escalated, the project manager should help facilitate a satisfactory resolution. When handling conflict in a team environment, project managers should recognize the following characteristics of conflict and the conflict management process:

- Conflict is natural and forces a search for alternatives
- Conflict is a team issue
- Openness resolves conflict
- Conflict resolution should focus on issues, not personalities
- Conflict resolution should focus on the present, not the past.

There are six general techniques for resolving conflict. As each one has its place and use, these are not given in any particular order:

- Withdrawing / Avoiding: Retreating from an actual or potential conflict situation.
- Smoothing / Accommodating: Emphasizing areas of agreement rather than areas of differences.
- Compromising: Searching for solutions that bring some degree of satisfaction to all parties.
- Forcing: Pushing one's viewpoint at the expense of others; offers only win-lose solution.
- Collaborating: Incorporating multiple viewpoints and insights from differing perspectives; leads to consensus and commitment.
- Confronting / Problem Solving: Treating conflict as a problem to be solved by examining alternatives; requires a give-and-take attitude and open dialogue.

5. **Issue Log**

Issues arise in the course of managing the project team. A written log documents and helps monitor who is responsible for resolving specific issues by a target date. Issue resolution addresses obstacles that can block the team from achieving its goals.

6. **Interpersonal Skills**

Project managers use a combination of technical, human, and conceptual skills to analyze situations and interact appropriately with team members. Using appropriate interpersonal skills aids project managers in capitalizing on the strength of all team members. Some of the interpersonal skills the project managers use most often are briefly covered below:

- Leadership
- Influencing
- Effective decision making

Outputs:

1. **Enterprise Environmental Factors Updates**
   Enterprise environmental factors that may require updates as a result of the Manage Project Team process include:
   - Input to organizational performance appraisals
   - Personnel skill updates

2. **Organizational Process Assets Updates**
   Organizational process assets that may require updates as a result of the Manage Project Team process include:
   - Historical information and lessons learned documentation
   - Templates
   - Organizational standard processes

3. **Change Requests**
   Staffing changes, whether by choice or by uncontrollable events, can affect the rest of the project management plan. When staffing issues disrupt the project management plan, such as causing the schedule to be extended or the budget to be exceeded, a change request can be processed through the Perform Integrated Change Control process. Staffing change can include moving people to different assignments, outsourcing some of the work, and replacing team members who leave. Preventive actions are these can be developed to reduce the probability and / or impact of problems before they occur. These actions may include cross-training to reduce problems during project team member absences and additional role clarification to ensure all responsibilities are fulfilled.

4. **Project Management Plan Updates**
   Elements of the project management plan that may be updated include: The Staffing Management Plan.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Human Recourse Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Human Resources Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
13. Learn Project Human Resource Management process, tools, techniques and skills.

14. Learn to apply a variety of Project Human Resource Management practices and planning tools as means of administering, directing and coordinating projects.

15. Course Policies:

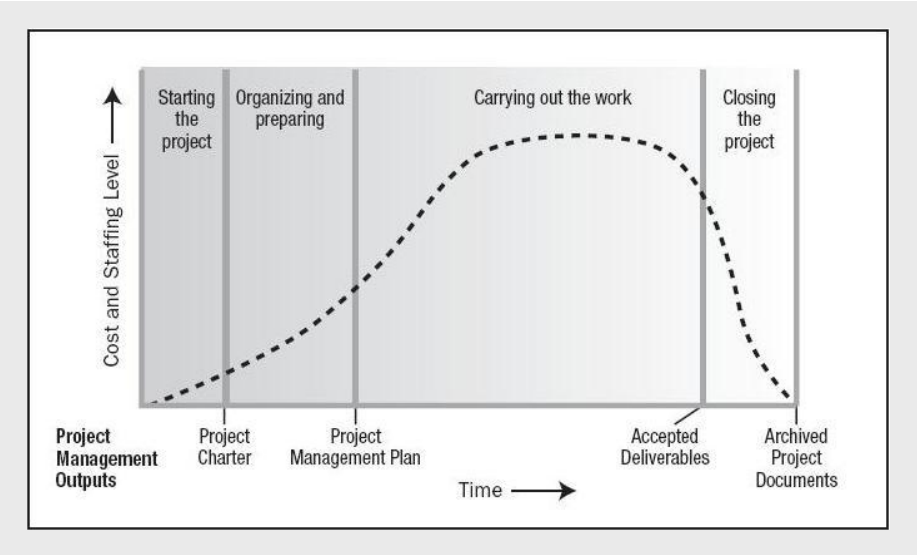
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

16. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

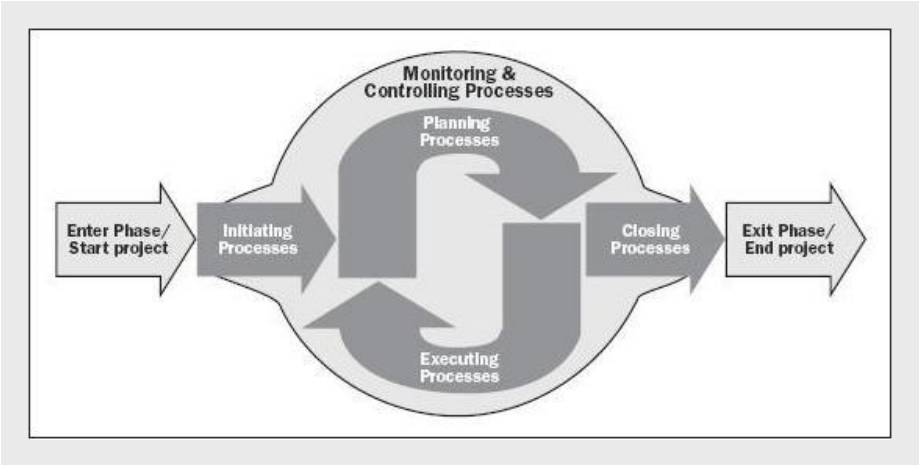
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

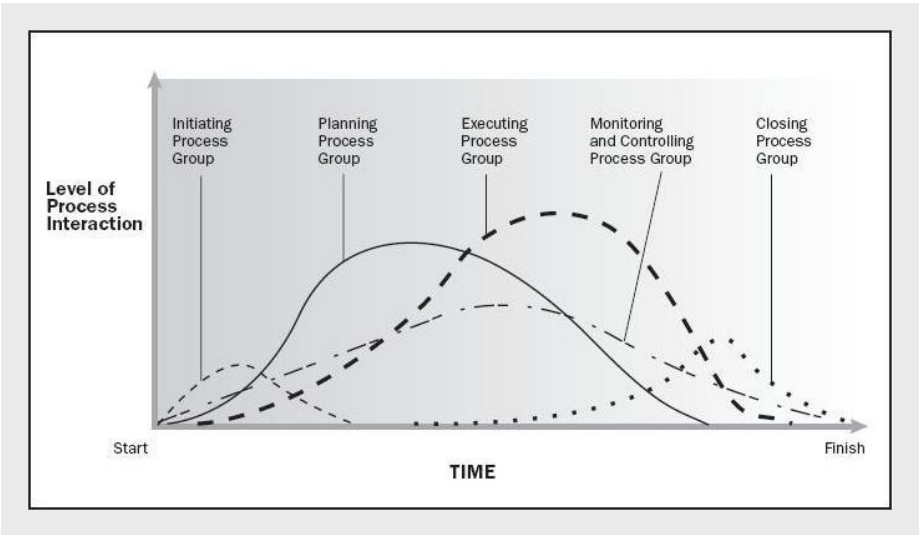
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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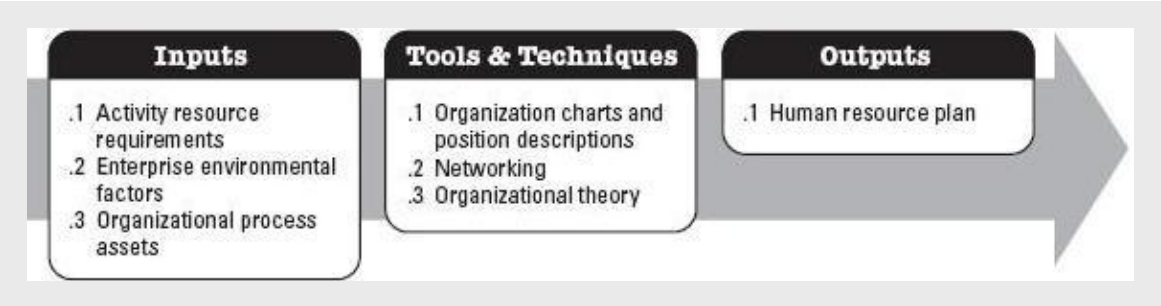
Human Resources - Planning: Develop Human Resource Plan



It is the process of identifying and documenting project roles, responsibilities, and required skills, reporting relationships, and creating a staffing management plan. Human resource planning is used to determine and identify human resources with the necessary skills required for project success.
The human resource plan documents project roles and responsibilities, project organization charts, and the staffing management plan including the timetable for staff acquisition and release. It may also include identification of training needs, team-building strategies, plans for recognition, and rewards programs, compliance considerations, safety issues, and the impact of the staffing management plan on the organization. Important consideration should be given to the availability of, or competition for, scarce or limited human resources. Project roles can be designated for persons or groups. Those persons or groups can be from inside or outside the organization performing the project. Other projects may be competing fro resources with the same competencies or skill sets. Given these factors, project costs, schedules, risks, quality, and other areas may be significantly affected. Effective human resource planning should consider and plan for these factors and develop human resource options.

Inputs:

1. **Activity Resource Requirements**
   Human resource planning uses activity resource requirements to determine the human resource needs for the project. The preliminary requirements regarding the required people and competencies for the project team members are progressively elaborated as part of the human resource planning process.

2. **Enterprise Environmental Factors**
   The enterprise environmental factors that can influence the Development Human Resource Plan process include:
   - Organizational culture and structure
   - Existing human resources
   - Personnel administration policies
   - Marketplace conditions

3. **Organizational Process Assets**
   The organizational process assets that can influence the project team with the Develop Human Resource Plan process include:
   - Organizational standard processes and policies and standardized role descriptions
   - Templates for organizational charts and position descriptions
   - Historical information on organizational structures that have worked in previous projects.

Tools / Techniques:

1. **Organization Charts and Position Descriptions**
   Various formats exist to document team member roles and responsibilities. Most of the formats fall into one of three types: hierarchical, matrix, and text-oriented. Additionally, some project assignments are listed in subsidiary project management plans such as the risk, quality, or communication plans. Regardless of the method utilized, the objective is to ensure that each work package has an unambiguous owner and that all team members have a clear understanding of their roles and responsibilities.
   - Hierarchical-type charts
     The traditional organization chart structure can be used to show positions and relationships in a graphic, top-down format. While the (WBS) shows a breakdown of project deliverables, the organizational breakdown structure (OBS) is arranged according to an organization's existing department. The resource breakdown structure is helpful in tracking project costs and can be aligned with the organization's accounting system. It can contain resource categories other than human resources.
   - Matrix-based charts
     A responsibility assignment matrix (RAM) is used to illustrate the connections between work packages or activities and project team members. On larger projects, RAMs can be developed at various levels. The matrix format shows all activities associated with one person and all people associated with one activity. This ensures that there is only one person accountable for any one task to avoid confusion. The assigned resources can be shown as individuals or groups. The RACI is just one type of RAM; the project manager can select other options such as "lead" and "resource" designations or others as appropriate for the project. The RACI is particularly important when the team consists of internal and external resources to ensure clear divisions of roles and expectations.
   - Text-oriented formats
     Team member responsibilities that require detailed descriptions can be specified in text-oriented formats. Usually in outline form, the

documents provide information such as responsibilities, authority, competencies, and qualifications. The documents are known by various names including position descriptions and role-responsibility-authority forms. These documents can be used as templates for future projects.

- Other sections of the project management plan
  Some responsibilities related to managing the project are listed in other sections of the project management plan. For example, the risk register lists risk owners; the communication plan lists team members responsible for communication activities, and the quality plan designates those responsible for carrying out quality assurance and quality control activities.

2. **Networking**
   It is the formal and informal interaction with others in an organization, industry, or professional environment. It is a constructive way to understand political and interpersonal factors that will impact the effectiveness of various staffing management options. Human resources networking activities include proactive correspondence, luncheon meetings, informal conversations including meetings and events, trade conferences, and symposia. Networking can be useful technique at the beginning of a project. It can also be an effective way to enhance project management professional development during the project and after the project ends.

3. **Organizational Theory**
   Organizational theory provides information regarding the way in which people, teams and organizational unit behave. Effective use of this information can shorten the amount of time, cost, and effort needed to create the human resource planning outputs and improve the likelihood that the planning will be effective. It is important to recognize that different organizational structures have different individual response, individual performance, and personal relationship characteristics.

Outputs:

Human Resource Plan

The human resource plan, a part of project management plan, provides guidance on how project human resources should be defined, staffed, managed, controlled, and eventually released. The human resource plan should include:

- Roles and responsibilities

The following should be addressed when listing the role and responsibilities needed to complete a project:

- Role: the label describing the portion of project for which a person is accountable.
- Authority: the right to apply project resources, makes decisions, and sign approvals.
- Responsibility: the work that a project team member is expected to perform in order to complete the project's activities.
- Competency: the skill and capacity required to complete project activities. If project team members do not possess required competencies, performance can be jeopardized. When such mismatches are identified, proactive responses such as training, hiring, schedule changes, or scope changes are initiated.

- Project organization charts

  It is a graphic display of project team members and their reporting Relationships can be formal or informal, highly detailed or broadly framed, based on the needs of the project.

- Staffing management plan

  It is a part of human resources plan within the project management plan, describes when and how human resource requirements will be met. The staffing management plan can be formal or informal, highly detailed or broadly framed, depending upon the needs of the project. The plan updated continually during the project to direct outgoing team member acquisition and development actions. Information in the staffing management plan varies by application area and project size, but items to consider include:

  - Staff acquisition: a number of questions arise when planning the acquisition of the project team members. For example. Will the human resources come from within the organization or from external, contracted resources? Will team members need to work in a central location or can they work from distant locations? What are the costs associated with each level of expertise needed for the project? How much assistance can the organization's human resource department and functional managers provide to the project management team?
  - Resource calendar: the staffing management plan describes necessary time frames for project team members, either individually or collectively, as well as when acquisition activities such as recruiting should start. One tool for charting human resources is a resource histogram. This bar chart illustrates the number of hours a person, department,

or entire project team will be needed each week or month over the course of the project.

- Staff release plan: determining the method and timing of releasing project team members benefits both the project and team members. When team members are released from a project, the costs associated with those resources are no longer charged to the project, thus reducing project costs. Morale is improved when smooth transitions to upcoming projects are already planned.
- Training needs: if the team members to be assigned are not expected to have the required competencies, a training plan can be developed as part of the project. The plan can also include ways to help team members obtain certifications that would support their ability to benefit the project.
- Recognition and rewards: clear criteria for rewards and a planned system for their use helps promote and reinforce desired behaviors. To be effective, recognition and rewards should be based on activities and performance under a person's control.
- Compliance: the staffing management plan can include strategies for complying with applicable government regulations, union contracts, and other established human resource policies.
- Safety: policies and procedures that protect team members from safety hazards can be included in the staffing management plan as well as the risk register.

Human Resources - Execution: Acquire Project Team

It is the process of confirming human resource availability and obtaining the team necessary to complete project assignments.
The project management team may or may not have direct control over team member selection because of collective bargaining agreements, use of subcontractor personnel, matrix project environment, internal or external reporting relationships, or other various reasons. It is important that the following factors are considered during the process of acquiring the project team:

- The project manager or the project management team should effectively negotiate and influence others who are in a position to provide the required human resources for the project.

- Failure to acquire the necessary human resources for the project may affect project schedules, budgets, customer satisfaction, quality, and risks. It could decrease the probability of success and ultimately result in project cancellation.

- If the human resources are not available due to constraints, economic factors, or previous assignments to other projects, the project manager or project team may be required to assign alternative resources, perhaps with lower competencies, provided there is no violation of legal, regulatory, mandatory, or other specific criteria.

Inputs:

1. **Project Management Plan**
   It contains the human resource plan which has the following information that is used to provide guidance on how project human resources should be identified, staffed, managed, controlled, and eventually released. It includes:
   - Role and responsibilities defining the positions, skills, and competencies that the project demands.
   - Project organization charts indicating the number of people needed for the project.

- Staffing management plan delineating the time periods each project team member will be needed and other information important to acquiring the project team.

2. **Enterprise Environmental Factors**
   The enterprise environmental factors that can influence the Acquire Project Team include:
   - Existing information for human resources including who is available, their competency levels, their prior experience, their interest in working on the project and their cost rate.
   - Personnel administration policies such as those that affect outsourcing.
   - Organizational structure
   - Location or multiple locations

3. **Organizational Process Assets**
   The organizational process assets that can influence this process include:
   - Organization standard policies
   - Processes
   - procedures

Tools / Techniques

1. **Pre-Assignment**
   When project team are selected in advance they are considered pre-assigned. This situation can occur if the project is the result of specific people being promised as part of a competitive proposal, if the project is dependent upon the expertise of particular person, or if some staff assignments are defined within the project charter.

2. **Negotiation**
   Staff assignments are negotiated on many projects. For example, the project management team may need to negotiate with:
   - Functional managers to ensure that the project receives appropriately competent staff in the required time frame and that the project team members will be able, willing, and authorized to work on the project until their responsibilities are completed.
   - Other project management team within the performing organization to appropriately assign scare or specialized human resources.
   - External organizations, vendors, suppliers, contractors, etc. for appropriate, scare, specialized, qualified, certified, or other specified human resources special consideration should be given to external negotiation policies, practices, processes, guidelines, legal, and other such criteria.

3. **Acquisition**

   When the performing organization lacks the in-house staff needed to complete a project, the required services may be acquired from outside source. This can involve hiring individual consultants or subcontracting work to another organization.

4. **Virtual Team**

   The use of virtual teams creates new possibilities when acquiring project team members. Virtual teams can be defined as groups of people with a shared goal who fulfill their roles with little or no time spent meeting face to face. The availability of electronic communication such as email, audio conferencing, web-based meetings and video conferencing has made such teams feasible.

Outputs:

1. **Project Staff Assignments**

   The project is staffed when appropriate people have been assigned through the previously described methods. The documentation of these assignments can include a project team directory, memos to team members, and names inserted into other parts of the project management plan, such as project organization charts and schedules.

2. **Resource Calendars**

   Resource calendars document the time periods that each project team member can work on the project. Creating a reliable schedule depends on having a good understanding of each person's schedule conflicts, including vacation time and commitments to other projects, to accurately document team member availability.

3. **Project Management Plan Update**

   Elements of project management plan that may be updated include:

   - The human resource plan

     When specific people are assigned to project roles and responsibilities, there may not be an exact fit between the staffing requirements indicated in the human resource plan and the individual.

Human Resources – Execution: Develop Project Team

It is the process of improving the competencies, team interaction, and the overall team environment to enhance project performance. Project managers should acquire skills to identify, build, maintain, motivate, lead, and inspire project teams to achieve high team performance and to meet the project's objectives.
Teamwork is critical factor for project success, and developing effective project teams is one of the primary responsibilities of the project manager. High team performance can be achieved by using open and effective communication, developing trust among team members, managing conflicts in a constructive manner, and encouraging collaborative problem-solving and decision-making. The project manager should request management support and/or influence the appropriate stakeholders to acquire the resources needed to develop effective project teams.

Inputs:

1. **Project Staff Assignments**
   Team development starts with a list of the project team members. Project staff assignment documents identify the people who are on the team.

2. **Project Management Plan**
   It contains the human resource plan which identifies training strategies and plans for developing the project team. Items such as rewards, feedback, additional training, and disciplinary actions can be added to the plan as a result of ongoing team performance assessments and other forms of project team management.

3. **Resource Calendars**
   Resource calendars identify times when the project team members can participate in team development activities.

Tools / Techniques:

1. **Interpersonal Skills**

These are sometimes known as "soft skills" and are particularly important to team development. The project management team can greatly reduce problems and increase cooperation by understanding the sentiments of project team members, anticipating their actions, acknowledging their concerns, and following up on their issues. Skills such as empathy, influence, creativity, and group facilitation are valuable assets when managing the project team.

2. **Training**
   Training includes activities designed to enhance the competencies of the project team members. Training can be formal or informal examples of training methods include classroom, online computer-based, on-the-job, training from another project team member, mentoring, and coaching. If project team members lack necessary management for technical skills, such skills can be developed as part of project work. Scheduled training takes place as stated in the human resource plan. Unplanned training takes place as a result of observation, conversation, and project performance appraisals conducted during the controlling process of managing the project team.

3. **Team-Building Activities**
   Team building activities can be vary from a five-minute agenda item in a status review meeting to an off-site, professionally facilitated experience designed to improve interpersonal relationship. The objective of team-building activities is to help individual team members work together effectively. One of the most important skills in developing a team environmental involves handling project team problems and discussing these as team issues. The entire team should be encouraged to work collaboratively to resolve these issues. Changes in a project environment are inevitable, and to manage them effectively, a continued or a renewed team-building effort should be applied. The project manager should continually monitor team functioning and performance to determine if any actions are needed to prevent or correct various team problems. One theory states that there are five stages of development that teams may go through:
   - Forming: This phase is where the team meets and learns about the project and what their formal roles and responsibilities are. Team members tend to be independent and not as open in this phase. For more information, refer to the Tuckman ladder of team development.
   - Storming: During this phase, the team begins to address the project work, technical decisions, and the project management approach. If team members are not collaborative and open to differing ideas and perspectives the environment can become destructive.
   - Norming: In this phase, team members begin to work together and adjust work habits and behaviors that support the team. The team begins to trust each other.

- Performing: Teams that reach the performing stage function as a well-organized unit. They are interdependent and work through issues smoothly and effectively.
- Adjourning: The team completes the work and moves on from the project.

Duration of a particular stage depends upon team dynamics, team size, and team leadership. Project managers should have a good understanding of team dynamics in order to move their team members through all stages in a effective manner.

4. **Ground Rules**
   Ground rules establish clear expectations regarding acceptable behavior by project team members. Early commitment to clear guidelines decreases misunderstandings and increases productivity. Discussing ground rules allows team members to discover values that are important to one another. All project team members share responsibility for enforcing the rules once they are established.

5. **Co-location**
   It involves placing many or all of the most active project team members in the same physical location to enhance their ability to perform as a team.

6. **Recognition and Rewards**
   Part of the team development process involves recognizing and rewarding desirable behavior. The original plans concerning ways in which to reward people are developed during the Develop Human Resource Plan Process. It is important to recognize that a particular reward given to any individual will only be effective if it satisfies a need which is valued by that individual.

Outputs:

1. **Team Performance Assessments**
   As project team development efforts such as training, team building, and co-location are implemented, the project management team makes formal or informal assessments of the project team's effectiveness. Effective team development strategies and activities are expected to increase the team's performance, which increases the likelihood of meeting project objectives. Team performance assessment criteria should be determined by all appropriate parties and incorporated in the Develop Project Team inputs. The evaluation of a team's effectiveness may include indicators such as:
   - Improvements in skills that allow individuals to perform assignments more effectively.
   - Improvements in competencies that help the team perform better as a team.

- Reduced staff turnover rate.
- Increased team cohesiveness where team members share information and experiences openly and help each other to improve the overall project performance.

As a result of conducting an evaluation of the team's overall performance, the project management team can identify the specific training, coaching, mentoring, assistance, or changes required to improve the team's performance. This should also include identification of the proper or required resources necessary to achieve and implement the improvements identified in the assessment.

2. **Enterprise Environmental Factors Updates**
   The enterprise environmental factors that mat be updated as a result of the Develop Project Team process includes:
   - Personnel Administration
     Including updates for employee training records and skill assessments.

Human Resources – Execution: Manage Project Team

It is the process of tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance. The project management team observes team behavior, manages conflict, resolves issues, and appraises team member performance. As a result of managing the project team, change requests are submitted, the human resource plan is updated, issues are resolved, input is provided for performance appraisals, and lessons learned are added to the organization's database.
Managing the project team requires a variety of management skills for fostering teamwork and integrating the efforts of team members to create high-performance teams. Team management involves a combination of skills with special emphasis on communication, conflict management, negotiation, and leadership. Project managers should provide challenging assignments to team members and provide recognition for high performance.

Input:

1. **Project Staff Assignments**
   Project staff assignments provide documentation which includes the list of project team members.

2. **Project Management Plan**
   The project management plan contains the human resource plan which includes:
   - Roles and responsibilities
   - Project organization
   - The staffing management plan

3. **Team Performance Assessments**
   The project management team makes ongoing formal or informal assessments of the project team's performance. By continually assessing the project's team performance, actions can be taken to resolve issues, modify communication, address conflict, and improve team interaction.

4. **Performance Reports**
   Performance reports provide documentation about the current project status compared to project forecasts. Performance areas that can help with project team management include results from schedule control, cost control, quality control, and scope verification. The information from performance reports and related forecasts assists in determining future human resource requirements, recognition and rewards, and updates to the staffing management plan.

5. **Organization Process Assets**
   The organizational process assets that can influence the Manage Project Team process include:
   - Certificates of appreciation
   - Newsletters
   - Websites
   - Bonus structure
   - Corporate apparel
   - Other organizational perquisites

Tools / Techniques:

1. **Observation and Conversation**
   These are used to stay in touch with the work and attitudes of project team members. The project management team monitors progress toward project deliverables, accomplishments that are a source of pride for team members, and interpersonal issues.

2. **Project Performance Appraisals**
   Objectives for conducting performance appraisals during the course of a project can include clarification of roles and responsibilities, constructive feedback to team members, discovery of unknown or unsolved issues, development of individual training plans, and the establishment of specific goals for future time periods. The need for formal or informal project performance appraisals depend on the length of the project, complexity of the project, organizational policy, labor contract requirements, and the amount and quality of regular communication.

4. **Conflict Management**
   Conflict is inevitable in project environment. Source of conflict include scarce resources, scheduling priorities, and personal work styles. Team ground rules, group norms, and solid project management practices like communication planning and role definition, reduce the amount of conflict. Successful conflict management results in greater productivity and positive working relationships. When managed properly, difference of opinion can lead to increased creativity

and better decision making. If conflict escalated, the project manager should help facilitate a satisfactory resolution. When handling conflict in a team environment, project managers should recognize the following characteristics of conflict and the conflict management process:

- Conflict is natural and forces a search for alternatives
- Conflict is a team issue
- Openness resolves conflict
- Conflict resolution should focus on issues, not personalities
- Conflict resolution should focus on the present, not the past.

There are six general techniques for resolving conflict. As each one has its place and use, these are not given in any particular order:

- Withdrawing / Avoiding: Retreating from an actual or potential conflict situation.
- Smoothing / Accommodating: Emphasizing areas of agreement rather than areas of differences.
- Compromising: Searching for solutions that bring some degree of satisfaction to all parties.
- Forcing: Pushing one's viewpoint at the expense of others; offers only win-lose solution.
- Collaborating: Incorporating multiple viewpoints and insights from differing perspectives; leads to consensus and commitment.
- Confronting / Problem Solving: Treating conflict as a problem to be solved by examining alternatives; requires a give-and-take attitude and open dialogue.

5. **Issue Log**

Issues arise in the course of managing the project team. A written log documents and helps monitor who is responsible for resolving specific issues by a target date. Issue resolution addresses obstacles that can block the team from achieving its goals.

6. **Interpersonal Skills**

Project managers use a combination of technical, human, and conceptual skills to analyze situations and interact appropriately with team members. Using appropriate interpersonal skills aids project managers in capitalizing on the strength of all team members. Some of the interpersonal skills the project managers use most often are briefly covered below:

- Leadership
- Influencing
- Effective decision making

Outputs:

1. **Enterprise Environmental Factors Updates**
   Enterprise environmental factors that may require updates as a result of the Manage Project Team process include:
   - Input to organizational performance appraisals
   - Personnel skill updates

2. **Organizational Process Assets Updates**
   Organizational process assets that may require updates as a result of the Manage Project Team process include:
   - Historical information and lessons learned documentation
   - Templates
   - Organizational standard processes

3. **Change Requests**
   Staffing changes, whether by choice or by uncontrollable events, can affect the rest of the project management plan. When staffing issues disrupt the project management plan, such as causing the schedule to be extended or the budget to be exceeded, a change request can be processed through the Perform Integrated Change Control process. Staffing change can include moving people to different assignments, outsourcing some of the work, and replacing team members who leave. Preventive actions are these can be developed to reduce the probability and / or impact of problems before they occur. These actions may include cross-training to reduce problems during project team member absences and additional role clarification to ensure all responsibilities are fulfilled.

4. **Project Management Plan Updates**
   Elements of the project management plan that may be updated include: The Staffing Management Plan.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Integration Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Integration Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Integration Management process, tools, techniques and skills.

- Learn to apply a variety of Project Integration Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

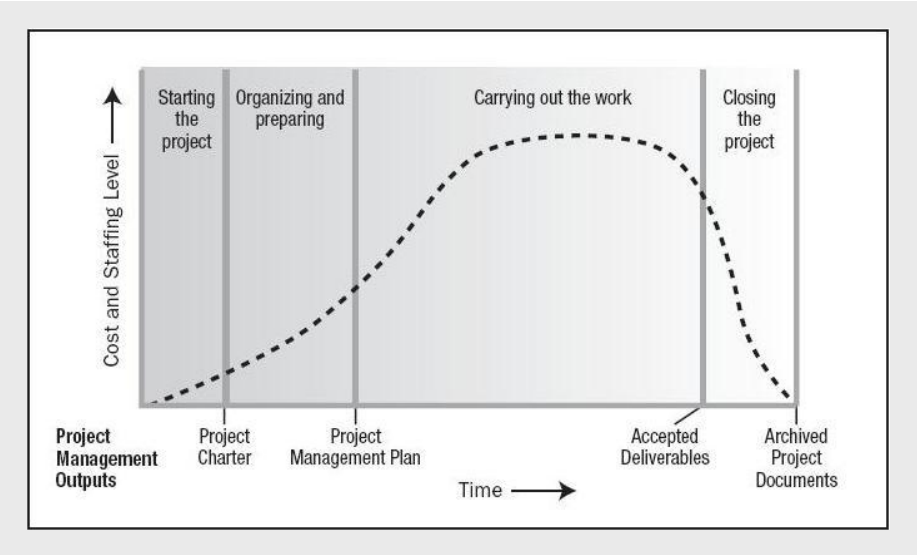
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

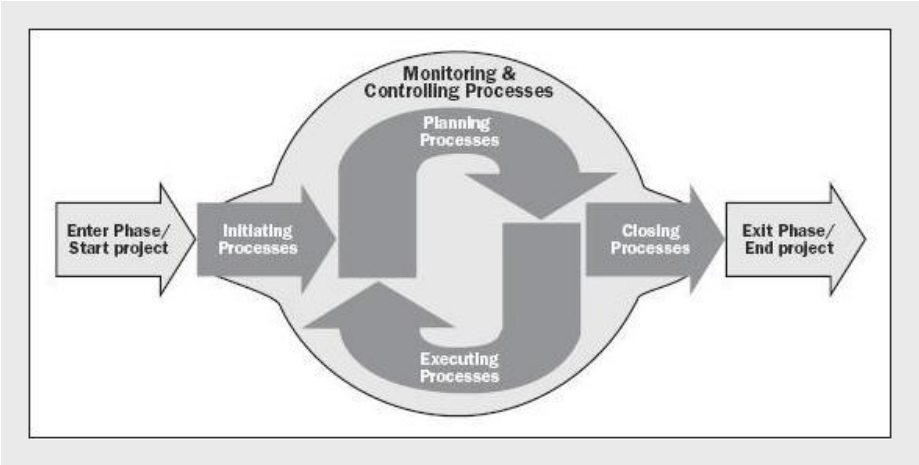
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

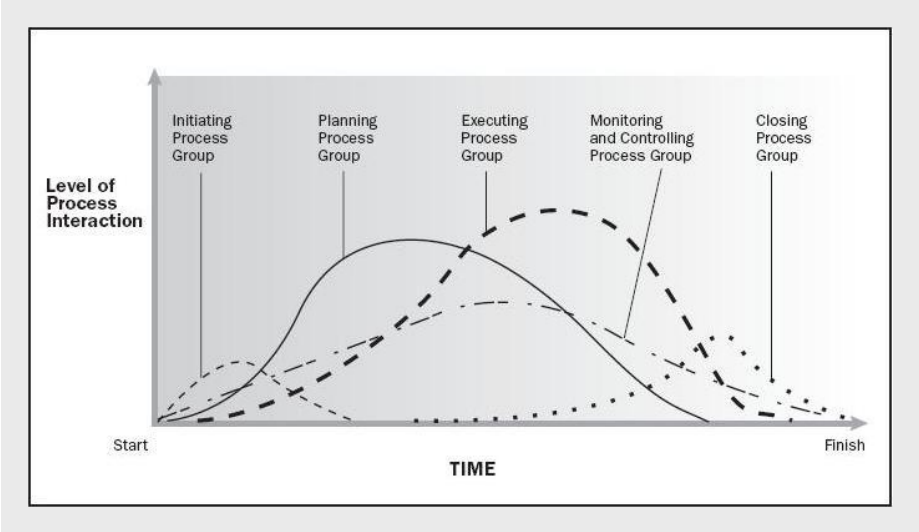
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
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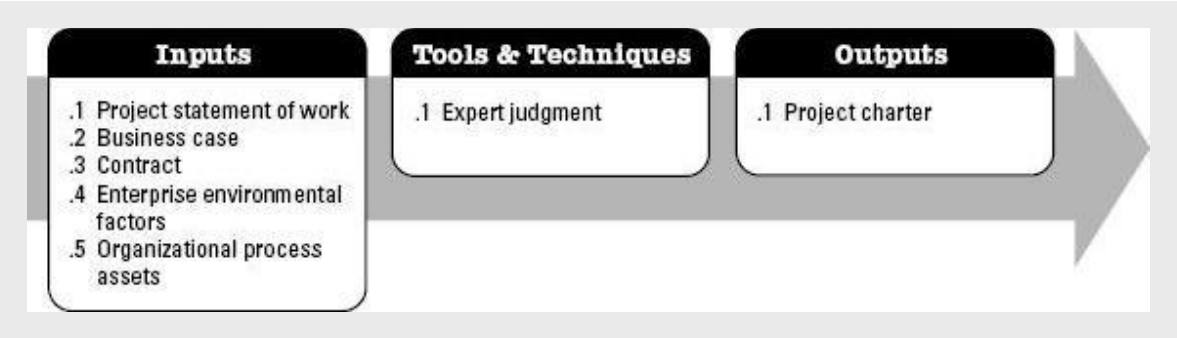
Integration - Initiation: Define and Develop project charter



Project team at this point may include: Customer, Sponsor, Project Manager, and Technical Units within the organization, Consultants, Professional / Technical associations, Industry group and PMO.

Inputs:

1. At the beginning of each project, the team should document **"Project Statement of Work" which** is a narrative description of products or services to be delivered by the project. SOW has to cover the following points:

    - **Business need**: Market demand, technological advance, legal requirements or government regulation.
    - **Product Scope description:** the characteristics of the product that the project will be undertaken to create; the relationship between the products or services being created and the business need that the project will address.
    - **Strategic plan:** the project should support the organization's strategic goals. The strategic plan should be considered as a factor when making project selection decision and prioritization.

2. After the above, the team should work on **"The Business Case** "which is documenting the project business information and then analyze it to determine whether or not the project is worth the required investment. The business need and the cost – benefit analysis are contained in the business case to justify the project. The business case is created as a result of one or more of the following:

    - Market demand
    - Organizational need
    - Customer request
    - Technological advance
    - Legal requirement
    - Ecological impact

- Social need

In case of multi-phase projects, the business case may be periodically reviewed to ensure that the project is on track to deliver the business benefits.
In early stages of the project life cycle, the business case should be reviewed by the sponsoring organization to confirm that the project is still required.

3. **Contract:** if the project is being done for an external customer.

4. **Enterprise Environmental Factors**:

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

5. **Organization Process Assets**:

   - Organizational standard processes and policies
   - Templates
   - Historical information and lessons learned.

Tools and Techniques:

There is one tool / technique to formalize The Project Charter using the above documents is **"Expert Judgment "**. Such judgment and expertise is applied to any technical and management details during this process. Such expertise is provided by any group or individual with specialized knowledge or training, and is available from many sources, including:

- Other units within the organization.
- Consultants
- Stakeholders, including customers or sponsors.
- Professional and technical associations.
- Industry groups
- Subject matter experts
- Project Management Office "PMO".

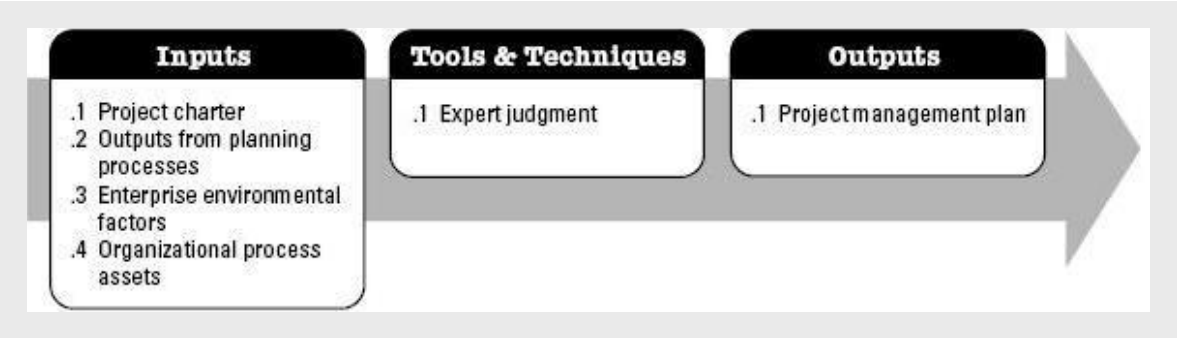
Outputs:

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

- Project purpose or justification
- Measurable project objectives and related success criteria
- High level requirements
- High level project description
- High level risks

- Summary milestone schedule
- Summery budget
- Project approval requirements
- Assigned project manager, responsibility and authority level
- Name and authority of the sponsor or other sponsor(s) authorizing the project charter.

Integration - Planning: Develop Project management Plan



It is a process of the documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans. PM Plan defines how the project is executed, monitored and controlled, and closed. PM Plan content will vary depending upon application area and complexity of the project. PM Plan is developed through a series of integrated processes until project closure.
Once the project management plan is **baseline**, it may only be change when **a change request is generated and approved** through perform integrated change control process. Project baselines include:

- Schedule baseline
- Cost performance baseline
- Scope baseline

Subsidiary plans include:

- Scope management plan
- Requirements management plan
- Schedule management plan
- Cost management plan
- Quality management plan
- Process improvement plan
- Human resource plan
- Communication management plan
- Risk management plan
- Procurement management plan

Often the scope, schedule and cost baseline will be combined into a performance measurement baseline that is used an overall project baseline against which integrated performance can be measured. The performance measurement baseline is used for **earned value measurement.**

Input:

1. **Project Charter** is one of the inputs to establish The Project Management Plan.

2. **Outputs from Planning Processes:** All baselines and subsidiary management plans that are outputs from other planning processes are inputs to this process.
3. **Enterprise Environmental Factors**:

    - Governmental or industry standards.
    - Project management information systems
    - Organizational structure and culture.
    - Infrastructure (e.g., existing facilities and capital equipment).
    - Personnel administration

4. **Organizational Process Assets**:

    - Standardized guidelines, work instructions, proposal evaluation criteria and performance measurement criteria.
    - Project management plan template:
        - Guidelines and criteria for tailoring the organization's set of standard processes to satisfy the specific needs of the project.
        - Project closure guidelines or requirements like the product validation and acceptance criteria.
    - Change control procedures including the steps by which official company standards, policies plans and procedures, or any project documents will be modified and how any changes will be approved and validated.
    - Project files from past projects.
    - Historical information and lessons learned knowledge base.
    - Configuration management knowledge base containing the versions and baselines of all official company standards, policies, procedures, and any project documents.

Tools and Techniques:

The tool / technique to developing the project management plan is the **expert judgment**. The expert Judgment is utilized to:

- Tailor the process to meet the project needs.
- Develop technical and management details to be included in the project management plan.
- Determine resources and skill levels needed to perform project work.

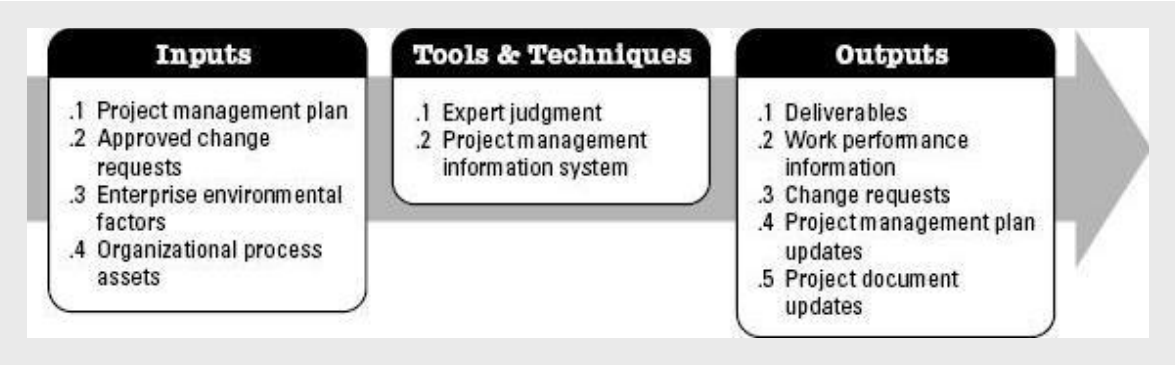
- Define the level of configuration management to apply on the project.
- Determine which project documents will be subject to the formal change control process.

Output:

The Project Management Plan integrates and consolidates all the subsidiary management plans and baselines from the planning processes and includes but is not limited to:

- The life cycle selected for the project and the processes that will be applied to each phase
- Results of the tailoring by the project management team:
    - Project management processes selected by the project management team.
    - Level of implementation of each selected process.
    - Description of the tools and techniques to be used for accomplishing those processes.
    - How the selected processes will be used to manage the specific project, including the dependencies and interactions among those processes, and the essential inputs and outputs.
- How work will be executed to accomplish the project objectives
- A change management plan that documents how changes will be monitored and controlled
- A configuration management that documents how configuration management be performed
- How integrity of the performance measurement baselines will be maintained
- Need and techniques for communication among stakeholders
- Key management reviews for content, extent and timing to facilitate addressing open issues and pending decisions.

Integration - Execution: Direct and Manage Project Execution



It is a process of performing the work defined in the project management plan to achieve the project adjectives. The project manager along with the project management team, direct the performance of the planned project activities, and manage the various technical and organizational interfaces that exist within the project. These activities include:

- Perform activities to accomplish project requirements
- Create project deliverables
- Staff, train and manage the team members assigned to the project
- Obtain, manage and use resources including materials, tools, equipment and facilities
- Implement the planned methods and standards
- Establish and manage project communication channels, both external and internal to the project team
- Generate project data, such as cost, schedule, technical and quality progress, and status to facilitate forecasting
- Issue change requests and adapt approved changes into the project's scope, plans and environment
- Manage risks and implement risk response activities
- Manage sellers and suppliers
- Collect and document lessons learned, and implement approved process improvement activities.

Work performance information about the completion status of the deliverables and what has been accomplished, is collected as part of project execution and is fed into the performance reporting process. The work performance information will also used as an input to the monitoring and controlling process group.

Inputs:

The inputs of this process are:

1. **Project Management Plan**

2. **Approved Change Requests** are the documented, authorized changes to expand or reduce project scope. The approved change requests can also modify policies, the project management plan, procedures, costs or budgets, or revise schedules. Approved change requests may require implementation of preventive or corrective actions.

3. **Enterprise Environmental Factors**
    - Organizational, company or customer culture and structure.
    - Infrastructure
    - Personnel administration
    - Stakeholder risk tolerances
    - Project management information systems

4. **Organizational Process Assets**

    - Standardized guidelines and work instructions
    - Communication requirements defining allowed communication media, record retention, and security requirements
    - Issue and defect management procedures defining issue and defect controls, issue and defect identification and resolution, and action item tracking.
    - Process measurement database used to collect and make available measurement data on processes and products
    - Project files from prior projects
    - Issue and defect management database containing historical issue and defect status, control information, issue and defect resolution, and action item results.

Tools and Techniques:

The tools / techniques of this process are:

1. **Expert Judgment**
   Used to assess the inputs needed to direct and manage execution of the project management plan. Such judgment and expertise is applied to all technical and management details during this process. This expertise is provided by the project manager and the project management team using specialized knowledge or training. Additional expertise is available from many sources like:
    - Other units within the organization
    - Consultants
    - Stakeholders including customers or sponsors
    - Professional and technical associations

2. **Project management Information System:**
   This system provides access to an automated tool, such as a scheduling software tool, a configuration management system, an information collection and distribution system, or web interfaces to other online automated systems used during this process.

Outputs:

The outputs of this process are:

1. **Deliverables**: An approved deliverable is any unique and verifiable product, result or capability to perform a service that must be produced to complete a process, phase or project.

2. **Work Performance Information**:
   Information from project activities is routinely collected as the project progresses. This information can be related to various performance results including:

   - Deliverable status
   - Schedule progress
   - Cost incurred

3. **Change Requests**:
   When issues are found while project work is being performed, change requests are issued which may modify project policies or procedures, project scope, project cost or budget, project schedule, or project quality. Other change requests cover needed preventive or corrective actions to forestall negative impact later in the project. Requests for a change can be direct or indirect, externally or internally initiated, and can be optional or legally / contractually mandated and can include:
   - Corrective action
   - Preventive action
   - Defect repair
   - Updates

4. **Project management Plan Updates**:
   Elements of the project management plan that may be updated include:

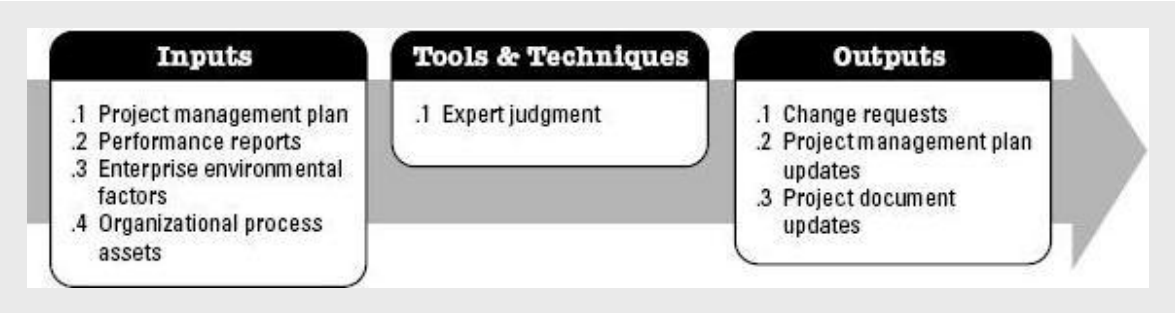
   - Requirements management plan
   - Schedule management plan
   - Cost management plan
   - Quality management plan
   - Human resource plan
   - Communication management plan
   - Risk management plan

- Procurement management plan
- Project baseline

5. **Project Document Updates:**
   Project documents that may be updated include:

   - Requirements documents
   - Project logs (issue, assumption, etc.)
   - Risk register
   - Stakeholder register

Integration - Monitoring and Control: Monitor & Control Project Work



It is the process of tracking, reviewing, and regulating the progress to meet the performance objectives defined in the project management plan. Monitoring is an aspect of project management performed throughout the project. Monitoring includes collecting, measuring and distributing performance information, and assessing measurements and trends to affect process improvements.

Continuous monitoring gives the project management team insight into the health of the project, and identifies any areas that may require special attention. Control includes determining corrective or preventive actions or re-planning and following up on action plans to determine if the actions taken resolved the performance issue.

This process is concerned with:

- Comparing actual project performance against the project management plan.
- Assessing performance to determine whether any corrective or preventive actions are indicated, and then recommending those actions as necessary.
- Identify new risks and analyzing, tracking, and monitoring existing project risks to make sure the risks are identified, their status is reported, and that appropriate risk response plans are being executed.
- Maintaining an accurate, timely information base concerning the project's product(s) and their associated documentation through project completion.
- Providing information to support status reporting, progress measurement, and forecasting
- Providing forecasts to update current cost and current schedule information
- Monitoring implementation of approved changes as they occur.

Inputs:

1. **Project Management Plan**
2. **Performance Reports:** reports should be prepared by the project team detailing activities, accomplishments, milestones, identified issues, and problems. Performance reports can be used to report the key information including:

    - Current status
    - Significant accomplishments for the period
    - Scheduled activities
    - Forecasts
    - Issues

3. **Enterprise Environmental Factors**

    - Governmental or industry standards
    - Company work authorization system
    - Stakeholder risk tolerance
    - Project management information system

4. **Organizational Process Assets**

    - Organization communication requirements
    - Financial control procedures
    - Issue and defect management procedures
    - Risk control procedures including risk categories, probability definition and impact, and probability and impact matrix
    - Process measurement database used to make available measurement data on processes and products
    - Lessons learned database.

Tools / Techniques:

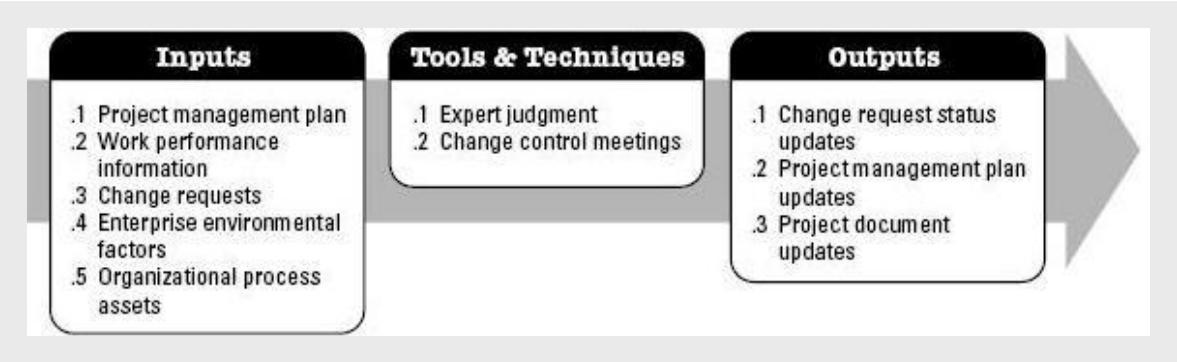
Expert Judgment
Used by the project management team to interpret the information provided by the monitor and control processes. The project manager, in collaboration with the team, determines the actions required to ensure project performance matches expectations.

Outputs:

1. **Change Requests:**
   As a result of comparing planned results to actual results, change requests may be issued which may expand, adjust, or reduce project or product scope. Changes can impact the project management plan, project documents, or product deliverables. Changes may include:
   - Corrective action
   - Preventive action
   - Defect repair
2. **Project management Plan Update**
   Project management plan elements that may be updated:
   - Schedule management plan
   - Cost management plan
   - Quality management plan
   - Scope baseline
   - Schedule baseline
   - Cost performance baseline

3. **Project Document Update**
   Project documents that may be updated:
   - Forecasts
   - Performance
   - Reports
   - Issue log.

Integration - Monitoring and Control: Perform Integrated Change Control



It's the process of reviewing all change requests, approving changes and managing changes to the deliverables, organizational process assets, project documents and the project management plan.
The Perform Integrated Change Control process is conducted from project inception through completion. The project management plan, the project scope statement, and other deliverables are maintained by carefully and continuously managing changes, either by rejecting changes or by approving changes thereby assuring that only approved changes are incorporated into a revised baseline. The Perform Integrated Change Control process includes the following change management activities in differing levels of details, based upon the progress of project execution:

- Influencing the factors that circumvent integrated change control so that only approved changes are implemented.
- Reviewing, analyzing, and approving change requests promptly, which is essential, as a slow decision may negatively affect time, cost, or the feasibility of a change.
- Managing the approved changes
- Managing the integrity of baselines by releasing only approved changes for incorporation into the project management plan and project documents.
- Reviewing, approving, or denying all recommended corrective and preventive actions
- Coordinating changes across the entire project
- Documenting the complete impact of change requests.

Changes may be requested by any stakeholder involved with the project. Change requests are subject to the process specified in the change control and configuration control systems. Those change request processes may requires information on estimated time impacts and estimated cost impacts. On many projects, the project manager is given the authority to approve certain types of change requests. Whenever required, the Perform Integrated Change Control process includes a change control board (CCB) responsible for approving or rejecting change requests.

Approved change request can require new or revised cost estimates, activity sequences, schedule dates, resource requirements, and analysis of risk response alternatives. These changes can require adjustment to the project management plan or other project management plans / documents. A configuration management system with integrated change control provides a standardized, effective, and efficient way to centrally manage approved changes and baselines within a project. Configuration control is focused on identifying, documenting and controlling changes to the project and the product baselines. Project –wide application of the configuration management system, including change control processes, accomplishes three main objectives:

- Establishes an evolutionary method to consistently identify and request changes to established baselines, and to assess the value and effectiveness of those changes.
- Provides opportunities to continuously validate and improve the project by considering the impact of each change.
- Provides the mechanism for the project management team to consistently communicate all approved and rejected changes to the stakeholders.

Some of the configuration management activities included in the integrated change control process is as follows:

- **Configuration identification:**
  Selection and identification of a configuration item provides the basis for which product configuration is defined and verified, products and documents are labeled, changes are managed, and accountability is maintained.
- **Configuration status accounting:**
  Information is recorded and reported as to when appropriate data about the configuration item should be provided. This information includes a listing of approved configuration identification, status of proposed changes to the configuration, and the implementation status of approved changes.
- **Configuration verification and audit:**
  It is to ensure the composition of a project's configuration items is correct and that corresponding changes are registered, assessed, approved, tracked, and correctly implemented. This ensures the functional requirements defined in the configuration documentation have been met.

Inputs:

1. **Project Management Plan**

2. **Work Performance Information**

3. **Change Requests**
   All of the monitoring and control processes and many of the executing processes produce change requests as an output. Change requests can include corrective action, preventive action, and defect repairs. However, corrective and preventive actions do not normally affect the project baselines, only the performance against the baselines.

4. **Enterprise Environmental Factors**

   - Project Management Information System

5. **Organizational Process Assets**

   - Change control procedures, including the steps by which official company standards, policies, plans, and other project documents will be modified, and how any changes will be approved, validated, and implemented.
   - Procedures for approving and issuing change authorizations
   - Process measurement database used to collect and make available measurement data on processes and products
   - Project files
   - Configuration management knowledge base containing the versions and baselines of all official company standards, policies, procedures, and any project documents

Tools / Techniques:

1. **Expert Judgment**
   - Consultants
   - Stakeholders, including customers or sponsors
   - Professional and technical associations
   - Industry group
   - Subject matter expert
   - Project Management Office (PMO)

2. **Change Control Meetings:**
   A change control board is responsible for meeting and reviewing the change requests and approving or rejecting those change requests. The roles and responsibilities of these boards are clearly defined and are agreed upon by appropriate stakeholders. All change control board decision are documented and communicated to the stakeholders for information and follow-up actions.

Outputs:

1. **Change Request Status Updates**
   Change requests are processed according to the change control system by the project manager or by an assigned team member. Approved change requests will be implemented by the Direct and Manage Project Execution process. The status of all changes approved or not, will be updated in the change request log as part of the project document updates.

2. **Project Management Plan Updates**
   Elements of the project management plan that may be updated:
   - Any subsidiary management plan
   - Baselines that are subject to the formal change control process.

Changes to baselines should only show the changes from the current time forward. Past performance may not be changed. This protects the integrity of the baselines and the historical data of past performance.

3. **Project Document Updates**
   Project documents that may be updated as a result of the Perform Integrated Change Control process include the change request log and any documents that are subject to the formal change control process.

Integration - Close out: Close Project or Phase

It is the process of finalizing all activities across all of the project management process groups to formally complete the project or phase.
When closing the project, the project manager will review all prior information from the previous phase closures to ensure that all project work is complete and that the project has met its objectives. Since project scope is measured against the project management plan, the project manager will review that document to ensure completion before considering the project closed. The close project or phase also establishes the procedures to investigate and document the reasons for actions taken if a project is terminated before completion. This includes all of the activities necessary for administrative closure of the project or phase, including step-by-step methodologies that address:

- Actions and activities necessary to satisfy completion or exit criteria for the phase or project.
- Actions and activities necessary to transfer the project's products, services, or results to the next phase or to production and/or operations
- Activities needed to collect project or phase records, audit project success or failure, gather lessons learned and archive project information for future use by the organization.

Inputs:

1. **Project Management Plan**

2. **Accepted Deliverables:**
   Those deliverables that have been accepted through the Verify Scope Process.

3. **Organizational Process Assets:**
   The Organizational Process Assets that can influence the Close Project or Phase process:
   - Project or phase closure guidelines or requirements
   - Historical information and lessons learned knowledge base

Tools / Techniques:

Expert Judgment:
Expert judgment is applied when performing administrative closure activities. These experts ensure the project or phase closure is performed to the appropriate standards.

Outputs:

1. **Final Product, Service, or Result Transition:**
   This output refers to the transition of the final product, service, or result that the project was authorized to produce.

2. **Organizational Process Assets Updates:**
   The organizational process assets that are updated as a result of the Close Project or Phase process include:

   - Project files:
     Documentation resulting from the project's activities, for example, project management plan, scope, cost, schedule and project calendars, risk registers, change management documentation, planned risk response actions, and risk impact.

   - Project or Phase closure documents:
     It is consisting of formal documentation that indicates completion of the project or phase and the transfer of the completed project or phase deliverables to others, such as an operations group or to the next phase. During project closure the project manager reviews prior phase documentation, customer acceptance documentation from Scope Verification and the contract (if applicable) to ensure that all project requirements are complete prior to finalizing the closure of the project.

   - Historical Information:
     Historical information and lessons learned information are transferred to the lessons learned knowledge base for use by future projects or phases. This can include information on issues and risks as well as techniques that worked well that can be applied to future projects.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Procurements Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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مشروع الإصلاح
الإداري العراقي

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Procurement Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Procurement Management process, tools, techniques and skills.

- Learn to apply a variety of Project Procurement Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

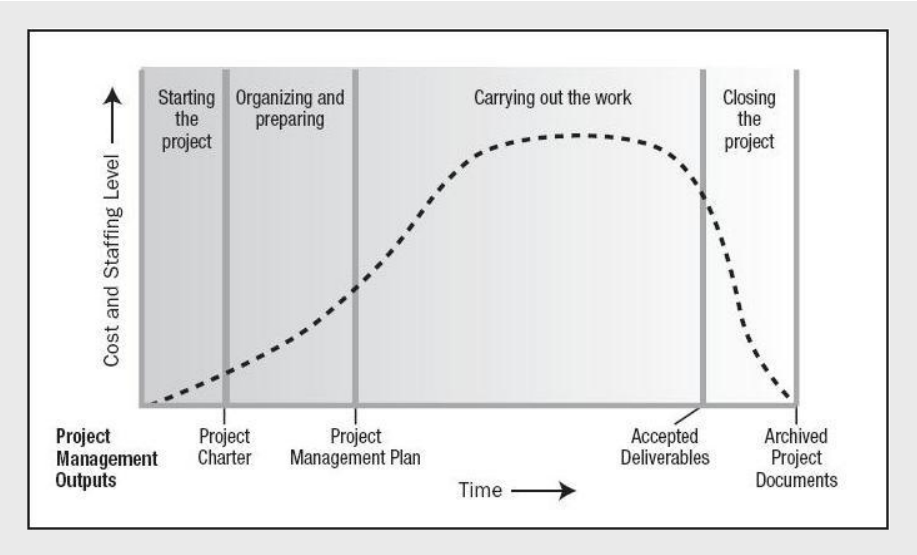
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

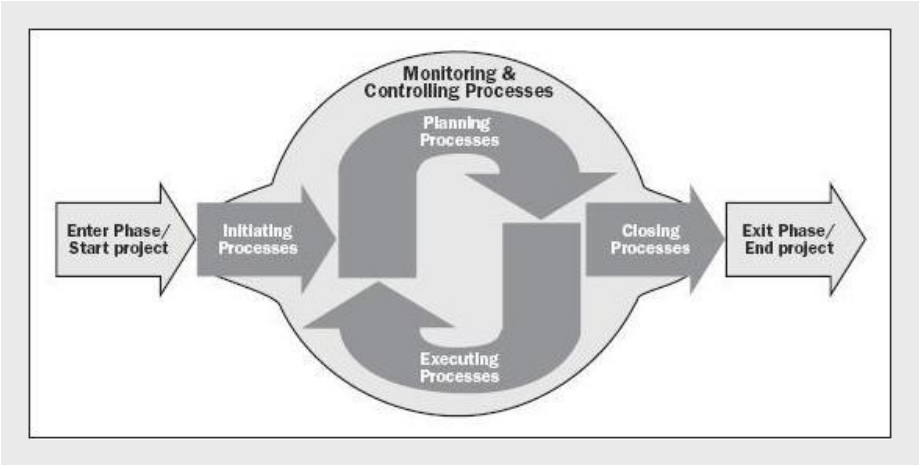
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

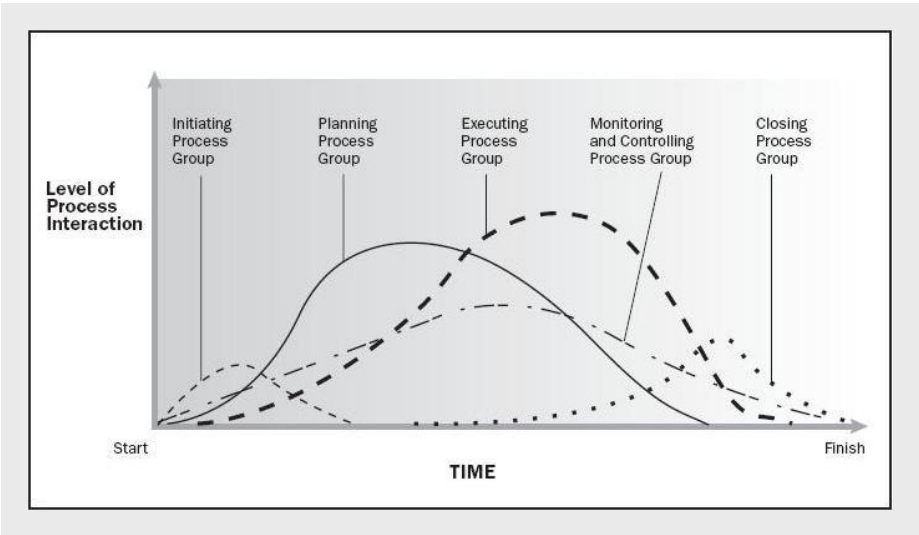
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



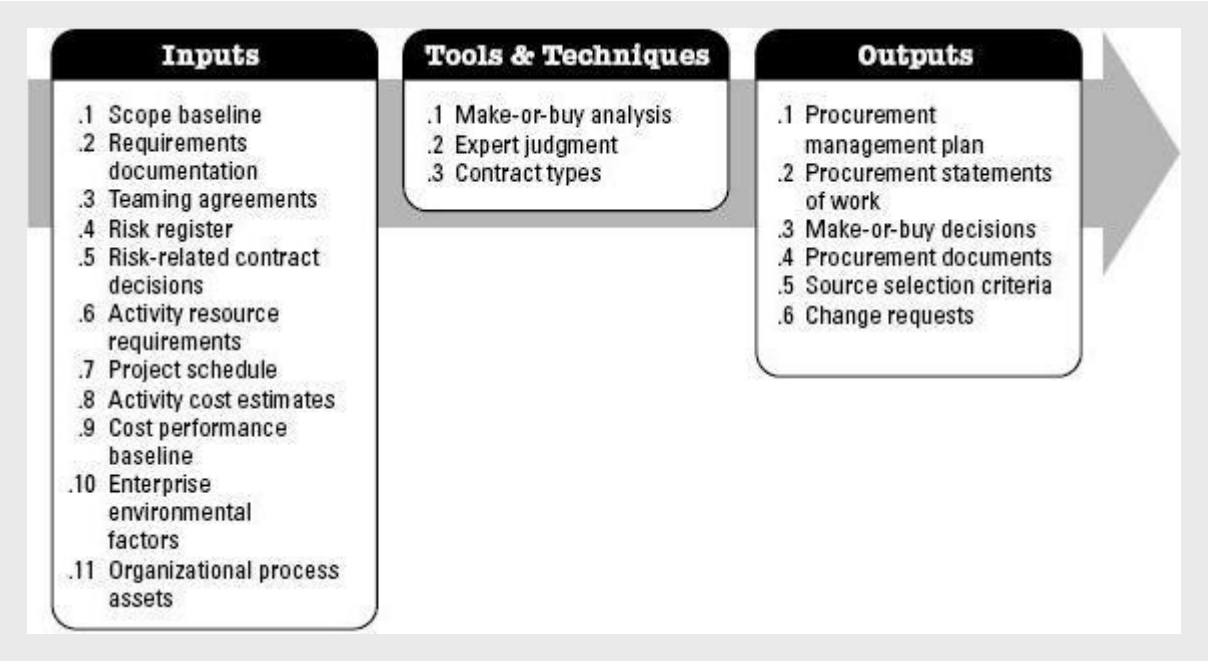
In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

Procurement - Planning: Plan Procurements



It is the process of documenting project purchasing decisions, specifying the approach, and identifying potential sellers. It identifies those project needs which can best be, or must be, met by acquiring products, services, or results outside of the project organization, versus those project needs which can be accomplished by the project team.

This process involves determining whether to acquire outside support and, if so what to acquire, how to acquire it, how much is needed, and when to acquire it. The Plan Procurements process also includes consideration of potential seller, particularly if the buyer wishes to exercise some degree of influence or control over acquisition decisions. Consideration should also be given to who is responsible for obtaining or holding any relevant permits and professional licenses that may be required by legislation, regulation, or organizational policy in executing the project. The requirements of the project schedule can significantly influence the strategy during the Plan Procurements process. Decisions made in developing the procurements management plan can also influence the project schedule and are integrated with Develop Schedule, Estimate Activity Resources, and Make-or-buy decisions. The Plan Procurements process includes consideration of the risks involved with each make-or-buy decision. It also includes reviewing the type of contract planned to be used with respect to mitigating risks, sometimes transferring risks to the seller.

Inputs:

1. **Scope Baseline**
   The scope baseline describes the need, justification, requirements, and current boundaries for the project. It consists of the following components:
   - Scope Statement
   - WBS
   - WBS Dictionary

2. **Requirements Documentation**
   It may include:
   - Important information about project requirements that is considered during planning for procurements
   - Requirements with contractual and legal implications that may include health, safety, security, performance, environmental, insurance, intellectual property rights, equal employment opportunity, license, and permits-all of which are considered when planning for procurements.

3. **Teaming Agreements**
   Team agreements are legal contractual agreements between two or more entities to form a partnership or join venture, or some other arrangement as defined by the parties. The agreement defines buyer-seller roles for each party. Whenever the new business opportunity ends, the teaming agreement also ends. Whenever a teaming agreement is in effect, the planning process for the project is significantly impacted.

4. **Risk Register**
   It includes risk-related information such as the identified risks, risk owners, and risk responses.

5. **Risk-Related Contract Decisions**
   Include agreements including insurance, bonding, services, and other items as appropriate, that are prepared to specify each party's responsibility for specific risks.

6. **Activity Resource Requirements**
   Contain information on specific needs such as people, equipment, or location.

7. **Project Schedule**
   It contains information on required timelines or mandated deliverable dates.

8. **Activity Cost Estimates**
   Cost estimates developed by the procuring activity are used to evaluate the reasonableness of the bid or proposals received from potential sellers.

9. **Cost Performance Baseline**
   It provides detail on the planned budget overtime.

10. **Enterprise Environmental Factors**
    The enterprise environmental factors that can influence the Plan Procurements process include:
    - Marketplace conditions
    - Products, services, and results that is available in the marketplace.
    - Suppliers, including past performance or reputation
    - Typical terms and conditions for products, services, and results or for the specific industry
    - Unique local requirements

11. **Organizational Process Assets**
    The organizational process assets that influence the Plan Procurement process include:
    - Formal procurement policies, procedures, and guidelines.
    - Management systems that are considered in developing the procurement management plan and selecting the contract types to be used.
    - An established multi-tier supplier system of pre-qualified seller based on prior experience.

Tools / Techniques:

1. **Make-or-Buy Analysis**
   It is a general management technique used to determine whether particular work can best be accomplished by the project team or must be purchased from outside source. Sometimes a capability may exist within the project organization, but may be committed to working on other projects, in which case the project may need to source such effort from outside the organization in order to meet its schedule commitments. Budget constraints may influence make-or-buy decisions. If a buy decision is to be made, then a further decision of whether to purchase or lease is also made.

2. **Expert Judgment**

3. **Contract Types**
   The risk shared between the buyer and seller is determined by the contract type. Although the firm-fixed-price type of contractual arrangement is typically the preferred type which is encouraged and often demanded by

most organizations, there are times when another contact form may be in the best interests of the project. All legal contractual relationships generally fall into one of two board families, either fixed-price or cost reimbursable. Also, there is a third hybrid-type commonly in use called the time and materials contract.

- Fixed-price contracts
  This category of contracts involves setting a fixed total price for a defined product or service to be provided. Fixed-price contracts may also incorporate financial incentive for achieving or exceeding selected project objectives, such as schedule delivery dates, cost and technical performance, or anything that can be quantified and subsequently measured. Seller under fixed-price contracts are legally obligated to complete such contracts, with possible financial damages if they do not.
    - Firm Fixed Price Contracts (FFP)
    - Fixed Price Incentive Fee Contracts (FPIF)
    - Fixed Price with Economic Price Adjustment Contracts (FPEPA)
- Cost-reimbursable contracts
  This category of contact involves payments to the seller for all legitimate actual costs incurred for completed work, plus a fee representing seller profit. Cost-reimbursable contracts may also include financial incentive clauses whenever the seller exceeds, or falls below, defined objectives such as costs, schedule, or technical performance targets.
    - Cost Plus Fixed Contracts (CPFF)
    - Cost Plus Incentive Fee Contracts (CPIF)
    - Cost Plus Award Fee Contracts (CPAF)
- Time and material contracts (T&M)
  Time and material contracts are a hybrid type of contractual arrangement that contain aspects of both cost-reimbursable and fixed-price contracts. There are often used for staff augmentation, acquisition of experts, and any outside support when a precise statement of work.

Outputs:

1. Procurement Management Plan

It describes how the procurement processes will be managed from developing procurement documents through closure. The procurement management plan can include guidance for:

- Types of contracts to be used.
- Risk management issues.
- Whether independent estimates will be used and if they are needed as evaluation criteria.

- Those actions the project management team can take unilaterally, if the performing organization has a prescribed procurement, contracting, purchasing department.
- Standardized procurement documents, if they are needed.
- Managing multiple suppliers
- Coordinating procurement with other project aspects, such as scheduling and performance reporting.
- Any constraints and assumptions that could affect planned procurement.
- Handling the required lead times to purchase items from sellers and coordinating them with the project schedule development.
- Handling the make-or-buy decisions and linking them into the Estimate Activity Resource and Develop Schedule processes.
- Setting the scheduled dates in each contract for the contract deliverables and coordinating with the schedule development and control processes.
- Identifying requirements for performance bonds or insurance contracts to mitigate some forms of project risk.
- Establishing the direction to be provided to the sellers on developing and maintaining a work breakdown structure (WBS).
- Establishing the form and format to be used for the procurement/contract statements of work.
- Identifying pre-qualified seller, if any, to be used.
- Procurement metrics to be used to manage contracts and evaluate sellers.

2 Procurement statement of Work

The statement of work (SOW) for each procurement is developed from the project scope baseline and defines only that portion of the project scope that is to be included within the related contract. The procurement SOW describes the procurement item in sufficient detail to allow prospective sellers to determine if they are capable of providing the products, services, or results. Information included in SOW can include specifications, quantity desired, quality levels, performance data, period of performance, work location, and other requirements.

3 Make-or-Buy Decisions

Make-or-buy decisions document the conclusions reached regarding what project products, services, or results will be acquired from outside the project organization, or will be performed internally by project team.

4 Procurement Documents

Procurement documents are used to solicit proposals from prospective sellers. Terms such as bid, tender, or quotation are generally used when the seller selection decision will be based on price (as when buying commercial or

standard items), while a term such as proposal is generally used when other considerations, such as technical capability or technical approach are paramount.

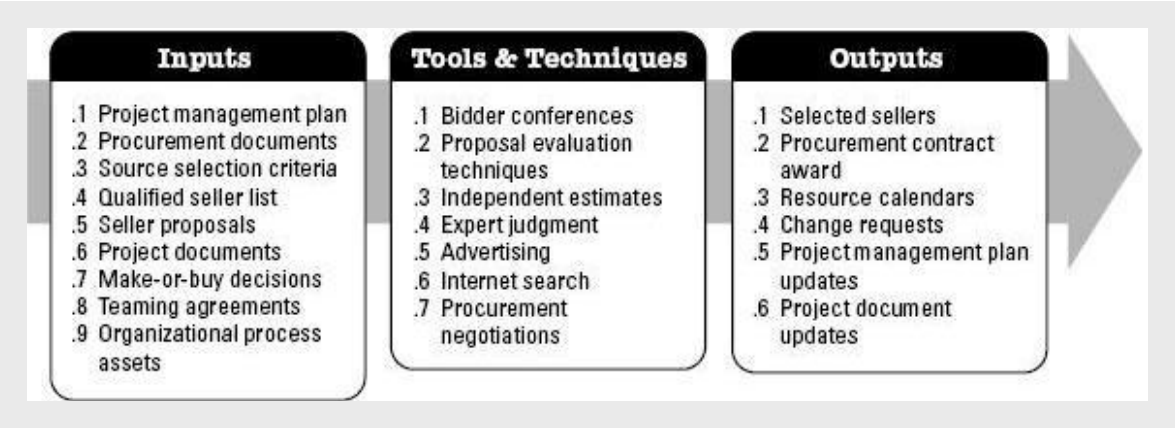
5 Source Selection Criteria

Selection criteria are often included as a part of the procurement solicitation documents. Such criteria are developed and used to rate or score seller proposals, and can be objective or subjective. Selection criteria can be limited to purchase price if the procurement item is readily available from a number of acceptable sellers. Purchase price in this context includes both the cost of the item and all ancillary expenses such as delivery.

6 Change Requests

Change requests to the project management plan, its subsidiary plans and other components may result from the Plan Procurements process. Change requests are processed for review and disposition through the Perform Integrated Change Control process.

Procurement - Execution: Conduct Procurement



It is the process of obtaining seller responses, selecting a seller, and awarding a contract. In this process, the team will receive bids or proposals and will apply previously defined selection criteria to select one or more sellers who are qualified to perform the work and acceptable as a seller.
One major procurement items, the overall process of requesting responses from sellers and evaluating those responses can be repeated. A short list of qualified sellers can be established based on a preliminary proposal. A more detailed evaluation can then be conducted based on a more specific and comprehensive requirements document requested from the sellers on the short list.

Inputs:

1. **Project Management Plan**
   The procurement management plan, part of the project management plan is an input to Conduct Procurement and describes how the procurement processes will be managed from developing procurement documentation through contract closure.

2. **Procurement Documents**

3. **Source Selection Criteria**
   Source selection criteria can include information on the supplier's required capabilities, capacity, delivery dates, product cost, life-cycle cost, technical expertise, and the approach to the contract.

4. **Qualified Seller List**
   A listing of sellers who have been pre-screened for their qualifications and past experience, so that procurements are directed to only those sellers who can perform on any resulting contracts.

5. **Seller Proposals**
   Seller proposals prepared in response to a procurement document package from the basic set of information that will be used by an evaluation body to select one or more successful bidders.

6. **Project Documents**
   Project documents that are often considered include:
   - Risk register.
   - Risk-related contract decisions.

7. **Make-or-buy Decisions**

8. **Teaming Agreements**
   Whenever a teaming agreement is in place, the buyer and seller roles will have already been decided by executive management, in some cases the seller may already be working under some form of interim contract funded by the buyer or jointly by both parties. The efforts of buyer and seller in this process are to collectively prepare a procurement statement of work that will satisfy the requirements of the project.

9. **Organizational Process Assets**
   Elements of the organizational process assets that can influence the Conduct Procurements process include:
   - Listings of prospective and previously qualified sellers
   - Information on relevant past experience with sellers, both good and bad.

Tools / Techniques:

1. **Bidder Conferences**
   It sometimes called Contractor Conferences, Vendor Conferences, and Pre-bid Conferences. All these terms are meetings with all prospective sellers and buyers prior to submittal of a bid or proposal. They are used to ensure that all prospective sellers have a clear and common understanding of the procurement (both technical and contractual requirements), and that no bidders receive preferential treatment.

2. **Proposal Evaluation Techniques**
   On complex procurements, where source selection will be made based on seller responses to previously defined weighted criteria, a formal evaluation review process will be defined by the buyer's procurement policies. The evaluation committee will make their selection for approval by management prior to the award.

3. **Independent Estimates**

For many procurement items, the procuring organization may elect to either prepare its own independent estimates, or have an estimate of cost prepared by an outside professional estimator, to serve as a benchmark on proposed responses. Significant differences in cost estimates can be an indication that the procurement statement of work was deficient, ambiguous, and/or that the prospective sellers either misunderstood or failed to response fully to the procurement statement of work.

4. **Expert Judgment**
   Expert judgment may be used in evaluating seller proposal. The evaluation of proposal may be accomplished by a multi-discipline review team with expertise in each of the areas covered by the procurement documents and proposed contract. This can include expertise from functional disciplines such as contracting, legal, finance, accounting, engineering, design, research, development, sales, and manufacturing.

5. **Advertising**
   Existing list of potential sellers can often be expanded by placing advertisements in general circulation publications such as selected newspapers or in specialty trade publications. Some government jurisdictions require public advertising of certain types of procurement items, and most government jurisdictions require public advertising of pending government contracts.

6. **Internet Search**
   The internet has a major influence on most project procurement and supply chain acquisitions in organizations. While many commodities, components, and off-the-shelf-items can be quickly located and secured at a fix-price on the internet, the high-risk, highly complex, procurement efforts that must be closely monitored cannot be obtained by this means.

7. **Procurement Negotiations**
   Negotiations clarify the structure, requirements and other terms of the purchases so that mutual agreement can be reached prior to signing the contract. Final contract language reflects all agreements reached.

Outputs:

1. **Selected Sellers**
   The sellers selected are those sellers who have been judged to be in a competitive range based upon the outcome of the proposal or bid evaluation, and who have negotiated a draft contract that will become that actual contract when an award is made. Final approval of all complex, high-value, high-risk procurements will generally require organizational senior management approval prior to award.

2. **Procurement Contract Award**
   A procurement contract is awarded to each selected seller. The contract can be in the form of simple purchase order or a complex document. Regardless of document's complexity, a contract is a mutually binding legal agreement that obligates the seller to provide the specified products, services, or results, and obligates the buyer to compensate the seller. A contract is a legal relationship subject to remedy in the courts. The major components in a contract document will vary, but will sometimes include the following:
   - Statement of work or deliverables.
   - Schedule baseline.
   - Performance reporting
   - Period of performance.
   - Seller's place of performance.
   - Pricing and Payment terms
   - Place of delivery
   - Inspection and acceptance criteria
   - Warranty, Product support, and Limitation of liability
   - Fees and retainage, Penalties, Incentives
   - Insurance and performance bonds.
   - Subordinate subcontractor approvals
   - Termination and alternative dispute resolution (ADR) mechanisms.

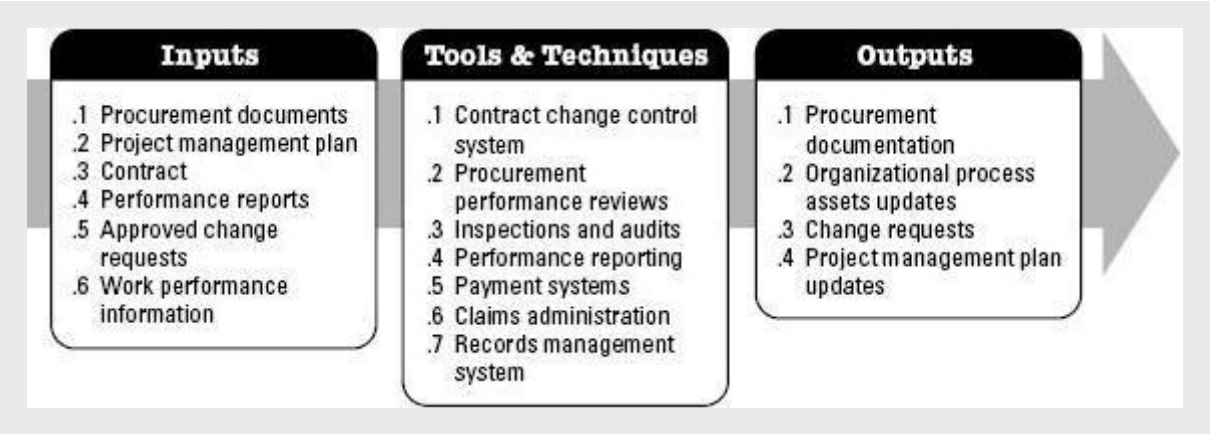
3. **Resource Calendars**
   The quantity and availability of contracted resources and those dates on which each specific resource can be active or idle are documented.

4. **Change Requests**
   Change requests to the project management plan, its subsidiary plans, and other components are processed for review and disposition through the Perform Integrated Change Control process.

5. **Project management Plan Updates**
   Elements of the project management plan that may be updated include:
   - Cost baseline
   - Scope baseline
   - Schedule baseline
   - Procurement management plan

6. **Project Document Updates**
   Project document that may be updated include:
   - Requirements documentation
   - Requirements traceability documentation
   - Risk register.

Procurement - Monitor & Control: Administer Procurements



It is the process of managing procurement relationships, monitor contract performance, and making changes and corrections as needed. Both the buyer and the seller will administer the procurement contract for similar purposes. Each must ensure that both parties meet their contractual obligations and that their own legal rights are protected.

The Administer Procurements process ensures that the seller's performance meets procurement requirements and that the buyer performs according to the term of the legal contract. On large projects with multiple providers, a key aspect of contract administration is managing interfaces among the various providers. Due to varying organizational structures, many organizations treat contract administration as an administrative function separate from the project organization. While procurement administrator may be on the project team, this individual typically reports to a supervisor from different department. Administer procurement includes application of the appropriate project management process to the contractual relationship(s) and integration of the outputs from these processes into the overall management of the project. The project management processes that are applied may include:

- Direct and Manage Project Execution
- Report Performance
- Perform Quality Control
- Perform Integrated Change Control
- Monitor and Control Risks

Administer Procurement also has a financial management component that involves monitoring payments to the seller. Contracts can be amended at any time prior to contract closure by mutual consent, in accordance with the change control terms of the contract.

Inputs:

1. **Procurement Documents**
   Procurement documents contain complete supporting records for administration of the procurement processes. This includes procurement contract awards and the statement of work.

2. **Project Management Plan**
   The procurement management plan, part of the project management plan, is an input to Conduct Procurement and describes how the procurement processes will be managed from developing procurement documentation through contract closure.

3. **Contract**

4. **Performance Reports**
   Seller performance-related documentation includes:
   - Seller-developed technical documentation and other deliverable information provided in accordance with the terms of the contract.
   - Seller performance reports. The seller's performances reports indicate with deliverables have been completed and which have not.

5. **Approved change requests**
   Approved change requests can include modifications to the terms and conditions of the contract including the procurement statement of work, pricing, and description of the products =, services, or results to be provided. All changes are formally documented in writing and approved before being implemented.

6. **Work Performance Information**
   It including the extent to which quality standards are being satisfied, what costs have been incurred or committed, and which seller invoices have been paid, are all collected as part of project execution.

Tools / Techniques:

1. **Contract Change Control System**
   It defines the process by which the procurement can be modified. It includes paperwork, tracking systems, dispute resolution procedures, and approval levels necessary for authorizing changes. The contract change control system is integrated with the integrated change control system.

2. **Procurement Performance Review**
   A procurement performance review is a structured review of the seller's progress to deliver project scope and quality, within cost and on schedule, as

compared to the contract. It can include a review of seller-prepared documentation and buyer inspections, as well as quality audits conducted during seller's execution of the work.

3. **Inspections and Audits**
   It required by the buyer and supported by the seller as specified in the procurement contract can be conducted during execution of the project to verify compliance in the seller's work processes or deliverables. If authorized by contract, some inspection and audits teams can be include buyer procurement personnel.

4. **Performance Reporting**
   It provides management with information about how effectively the seller is achieving the contractual objectives.

5. **Payment Systems**
   Payments to the seller are typically processed by the accounts payable system of the buyer after certification of satisfactory work by an authorized person on the project team. All payments should be made and documented in strict accordance with the terms of the contract.

6. **Claims Administration**
   Contested changes and potential constructive changes are those requested changes where the buyer and seller cannot reach an agreement on compensation for the change, or cannot agree that a change has occurred. These contested changes are variously called claims, disputes, or appeals. Claims are documented, processed, monitored, and managed throughout the contract life cycle, usually in accordance with the terms of the contract. If the parties themselves do not resolve a claim, it may have to be handled in accordance with alternative dispute resolution (ADR) typically following procedures established in the contract. Settlement of all claims and disputes through negotiation is preferred method.

7. **Records Management System**
   It is used by project manager to manage contract and procurement documentation and records. It consists of a specific set of processes, related contract functions, and automation tools that are consolidated and combined as part of the project management information system (PMIS). The system contains a retrievable archive of contract documents and correspondence.

Outputs:

1. **Procurement Documentation**

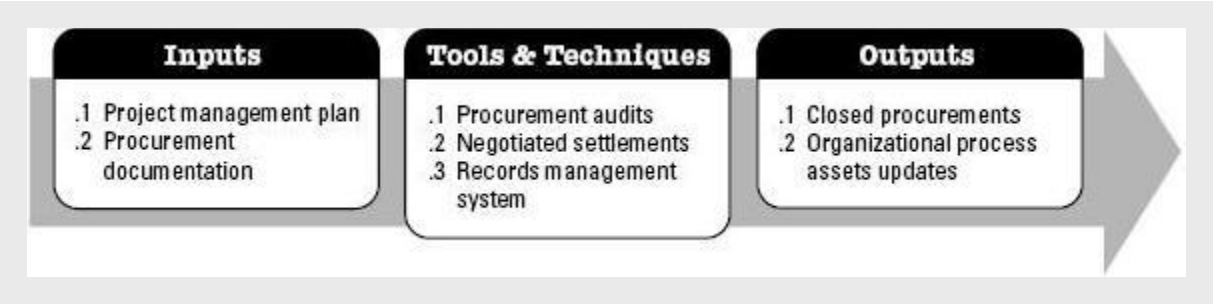
Procurement documentation includes, but is not limited to, the procurement contract with all supporting schedules, requested unapproved contract changes, and approved change requests. Procurement documentation also includes any seller-developed technical documentation and other work performance information such as deliverables, seller performance reports, warranties, financial documents including invoices and payment records, and the results of contract-related inspections.

2. **Organizational Process Assets Updates**
   Elements of the organizational process assets that may be updated include:
   - Correspondence
     Contract terms and conditions often require written documentation of certain aspects of buyer/seller communications, such as the need for warnings of unsatisfactory performance and requests for contract changes or clarification. This can include the reported results of buyer audits and inspection that indicate weaknesses the seller needs to correct.
   - Payment schedule and requests
     All payments should be made in accordance with the procurement contract terms and conditions.
   - Seller performance evaluation documentation
     It is prepared by the buyer. Such performance evaluation document the seller ability to continue perform work on the current contract, indicate if the seller can be allowed perform work on the future projects, or rate how well the seller is performing the project work.

3. **Change Requests**
   Requested but unsolved changes can include direction provided by the buyer, or actions taken by the seller, that the other party considers a constructive change to the contract. Since any of these constructive changes may be disputed by one party and can lead to a claim against the other party, such changes are uniquely identified and documented by project correspondence.

4. **Project Management Plan Updates**
   Elements of the project management plan that may be updated include:
   - Procurement management plan
     It is updated to reflect any approved change requests that affect procurement management, including impacts to cost or schedules.
   - Baseline schedule
     If there are slippages that impact overall project performance, the baseline schedule may need to be updated to reflect the current expectations.

Procurement - Closing: Close Procurements



It is the process of completing each project procurement. It supports the Close Project or Phase process, since it involves verification that all work and deliverables were acceptable.
The Close Procurements process also involves administrative activities such as finalizing open claims, updating records to reflect final results and archiving such information for future use. In multi-phase projects, the term of a contract may only be applicable to a given phase of the project. In these cases, the Close Procurement process closes the procurement(s) applicable to that phase of the project. Unresolved claims may be subject to litigation after closure. The contract terms and conditions can prescribe specific procedures for contract closure. Early termination of a contract is a special case of procurement closure that can result from a mutual agreement of both parties.

Inputs:

1. **Project Management Plan**

2. **Procurement Documentation**
   To close a contract, all procurement documentation is collected, indexed, and filed. Information on contract schedule, scope, quality, and cost performance along with all contract change documentation, payment records, and inspection results are cataloged. This information can be used for lessons learned information and as a basis for evaluating contractors for future contracts.

Tools / Techniques:

1. **Procurement Audits**
   It is a structured review of the procurement process originating from the Plan Procurements process through Administer Procurements. The objective of a procurement audit is to identify successes and failures that warrant recognition in the preparation or administration of other

procurement contracts on the project, or on other projects within the performing organization.

2. **Negotiated Settlements**
   In all procurement relationships the final equitable settlement of all outstanding issues, claims, and disputes by negotiation is primary goal. Whenever settlement cannot be achieved through direct negotiation, some from of alternative dispute resolution (ADR) including mediation or arbitration may be explored. When all else fails, litigation in the courts is the least desirable option.

3. **Records Management System**

Outputs:

1. **Closed Procurements**
   The buyer, usually through its authorized procurement administrator, provides the seller with formal written notice that the contract has been completed. Requirements for formal procurement closure are usually defined in the terms and conditions of the contract and are included in the procurement management plan.

2. **Organizational Process Assets Updates**
   Elements of the organizational process assets that may be updated include:
   - Procurement file
     A complete set of indexed contract documentation, including the closed contract, is prepared for inclusion with the final project files.
   - Deliverable acceptance
     The buyer, usually through its authorized procurement administrator, provides the seller with formal written notice that the deliverables have been accepted or rejected. Requirements for formal deliverables acceptance, and how to address non-conforming deliverables, are usually defined in the contract.
   - Lessons learned documentation
     Lessons learned, what has been experienced, and process improvement recommendation should be developed for the project file to improve future procurements.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Quality Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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مشروع الإصلاح
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Course Syllabus

1. **Course Title**: Project Management Processes / Project Quality Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Quality Management process, tools, techniques and skills.

- Learn to apply a variety of Project Quality Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

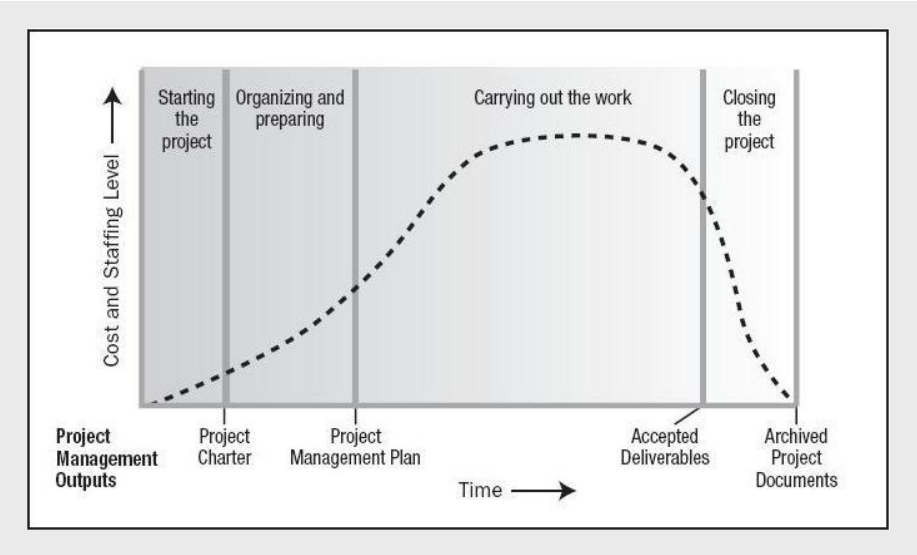
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

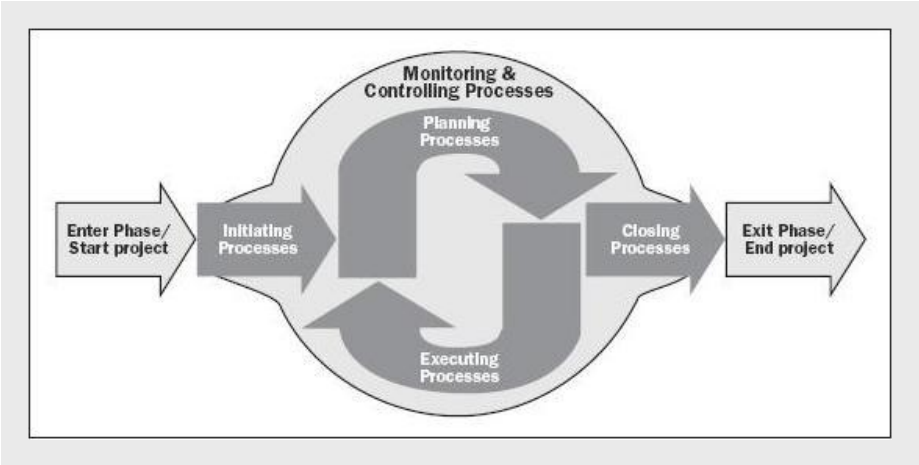
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

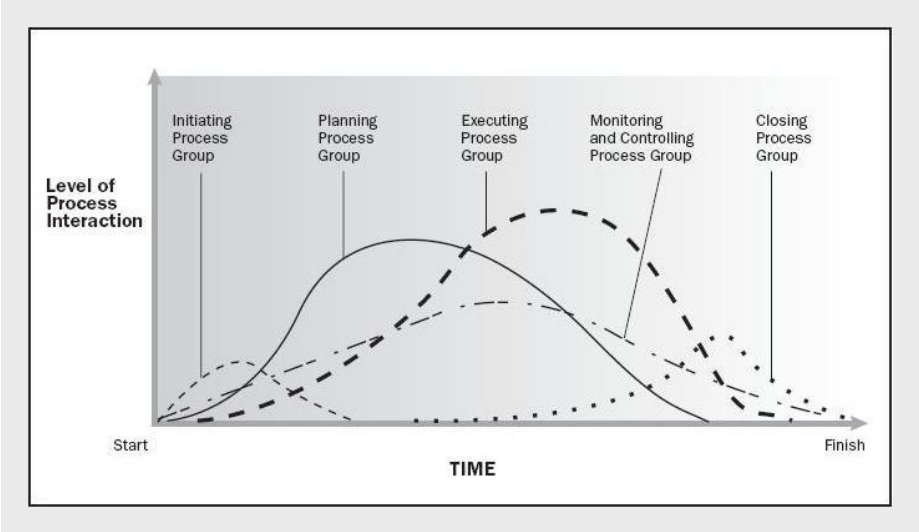
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
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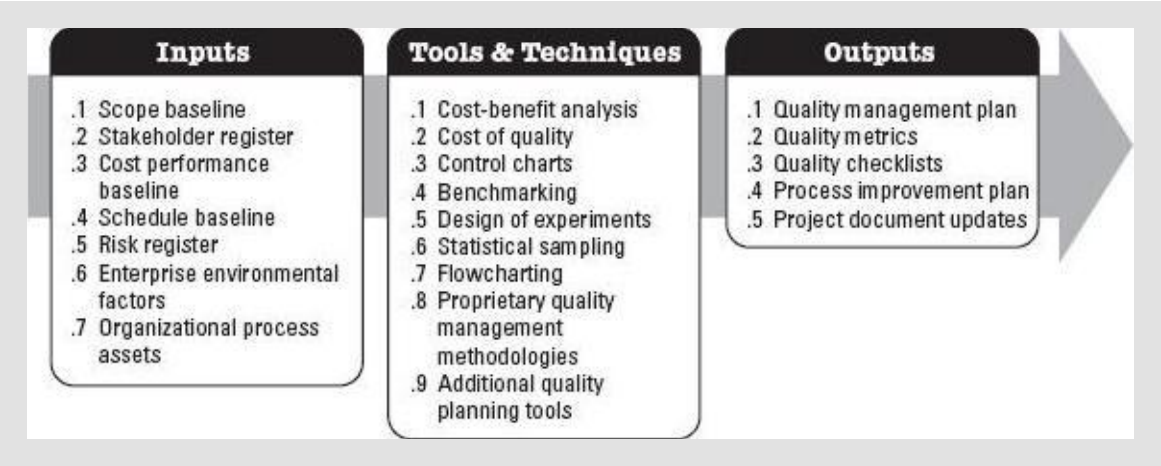
Quality - Planning: Plan Quality



It is the process of identifying quality requirements and / or standards for the project and product, and documenting how the project will demonstrate compliance.
Quality planning should be performed in parallel with the other project planning processes. For example, proposed changes in the product to meet identified quality standards may require cost or schedule adjustments and a detailed risk analysis of the impact to plans. The quality planning techniques discussed here are those most frequently used on projects. There are may others that may be useful on certain projects or in some application areas.

Inputs:

1. **Scope Baseline**
   - Scope statement
     It contains the project description, major project deliverables, and acceptance criteria. The project scope description will often contains details of technical issues and other concerns that can affect quality planning. The definition of acceptance criteria can significantly increase or decrease project quality costs. Satisfying all acceptance criteria implies the needs of the customer have been met.
   - WBS
   - WBS Dictionary

2. **Stakeholder Register**
   It identifies stakeholders with a particular interest in, or impact on, quality.

3. **Cost Performance Baseline**
   It documents the accepted time phase used to measure cost performance.

4. **Schedule Baseline**
   It documents the accepted schedule performance measures including start and finish dates.

5. **Risk Register**
   It contains information on threats and opportunities that may impact quality requirements.

6. **Enterprise Environmental Factors**
   The enterprise environmental factors that influence the Plan Quality process include:
   - Governmental agency regulation
   - Rules, standards, and guidelines specific to the application area.
   - Work / operating conditions of the project / product which may affect project quality.

7. **Organizational Process Assets**
   The organizational process assets that influence the Plan Quality process include:
   - Organizational quality policies, procedures and guidelines.
   - Historical databases.
   - Lessons learned from previous projects.
   - Quality policy, as endorsed by senior management, which sets the intended direction of a performing organization with regard to quality. The quality policy of the performing organization of their products often can be adopted "as is" for use by the project. If the performing organization lacks a formal quality policy, or if the project involves multiple performing organizations (as with a joint venture), the project management team will need to develop a quality policy for the project. Regardless of the origin of the quality policy, the project management team must ensure that the project stakeholders are fully aware of the policy used for the project through the appropriate distribution of information.

Tools / Techniques:

1. **Cost-Benefit Analysis**
   The primary benefits of meeting quality requirements can include less rework, higher productivity, lower costs, and increased stakeholder satisfaction. A business case for each quality activity compares the cost of the quality step to the expected benefit.

2. **Cost of Quality (COQ)**
   Cost of quality includes all costs incurred over the life of the product by investment in preventing nonconformance to requirements, appraising the product or service for conformance to requirements, and failing to meet requirements (rework). Failure costs are often categorized into internal (found by the project) and external (found by the customer). Failure costs are also called also cost of poor quality.

3. **Control Charts**
   Control charts are used to determine whether or not a process is stable or has predictable performance upper and lower specification limits are based on requirements of the contract. They reflect the maximum and minimum values allowed. There may be penalties associated with exceeding the specification limits. Upper and lower control limits are set by the project manger and appropriate stakeholders to reflect the points at which corrective action will be taken to prevent exceeding specification limits. Control charts can be used to monitor various types of outputs variables. Although used mast frequently to track repetitive activities required for producing manufactured lots, control charts may also be used to monitor cost and schedule variances, volume, and frequency of scope changes, or other management results to help determine if the project management processes are in control.

4. **Benchmarking**
   It involves comparing actual or planned project practices to those of comparable projects to identify best practices, generate ideas for improvement, and provide a basis for measuring performance. These other projects can be within the performing organization or outside of it and can be within the same or in another application area.

5. **Design of Experiments**
   DOE is statistical method for identifying which factors may influence specific valuables of a product or process under development or in production. DOE should be used during the Plan Quality process to determine the number and type of tests and their impact on cost of quality. DOE also plays a role in the optimization of products or processes. DOE can be used to reduce the sensitivity of product performance to sources of variations caused by environmental or manufacturing differences. One important aspect of this technique is that it provides a statistical framework for systematically changing all of the important factors. Rather than changing the factors one at a time. Analysis of the experimental data should provide the optimal conditions for the product or process highlight the factors that influence the results, and reveal the presence of interactions and synergy among the factors.

6. **Statistical Sampling**
   It involves choosing part of a population of interest for inspection. Sample frequency and sizes should be determined during the Plan Quality process so the cost of quality will include the number of tests, expected scrap, etc. there is a substantial body of knowledge on statistical sampling. In some application areas it may be necessary for the project management team to be familiar with a variety of sampling techniques to assure the sample selected actually represents the population of interest.

7. **Flowcharting**
   It is a graphical representation of a process showing the relationships among process steps. There are many styles, but all process flowcharts show activities, decision points, and the order of processing. During quality planning, flowcharting can help the project team anticipate quality problems that might occur. An awareness of potential problems can result in the development of test procedures or approaches for dealing with them.

8. **Proprietary Quality Management Methodologies**
   These include Six Sigma, Lean Six Sigma, Quality Function Deployment, CMMI, etc. many other methodologies exist-this is not intended to be recommended or complete list of examples.

9. **Additional Quality Planning Tools**
   Other quality planning tools are often used to better define the quality requirements and plan effective quality management activities. These include:
   - Brainstorming
   - Affinity diagrams
   - Force field analysis
   - Nominal group techniques
   - Matrix diagrams
   - Prioritization matrices

Outputs:

1. **Quality Management Plan**
   It describes how the project management team will implement the performing organization's quality policy. It is a component or a subsidiary plan of the project management plan. The quality management plan provides input to the overall project management plan and includes quality control, quality assurance, and continuous process improvement approaches for the project. The quality management plan may be formal or informal, highly detailed, or broadly framed. The style and detail is determined by the requirements of the project. The quality management plan should be

reviewed early in the project to ensure that decisions are based on accurate information. The benefits of this review can include reduction of cost and schedule overruns caused by rework.

2. **Quality Metrics**
   It is an operational definition that describes, in very specific terms, a project or product attribute and how the quality control process will measure it. A measurement is an actual value. The tolerance defines the allowable variations on the metrics. Quality metrics are used in the quality assurance and quality control process. Some examples of quality metrics include on-time performance, budget control, defect frequency, failure rate, availability, reliability, and test coverage.

3. **Quality Checklists**
   It is a structured tool; usually component-specific, used to verify that asset of required steps has been performed. Checklists range from simple to complex based on project requirements and practices. Many organizations have standardized checklists available to ensure consistency in frequently performed tasks. In some application areas, checklists are also available from professional associations or commercial service providers. Quality checklists are used in the quality control process.

4. **Process Improvement Plan**
   It is a subsidiary of the project management plan. The process improvement plan details the steps for analyzing processes to identify activities which enhance their value. Areas to consider include:
   - Process boundaries
   - Process configuration
   - Process metrics
   - Targets for improved performance

5. **Project Document Updates**
   Project documents that may be updated include:
   - Stakeholder register
   - Responsibility Assignment Matrix

Quality - Executing: Perform Quality Assurance

It is the process of auditing the quality requirements and the results from quality control measurements to ensure appropriate quality standards and operational definitions are used.

A quality assurance department, or similar organization, often oversees quality assurance activities. Quality assurance support, regardless of the unit's title, may be provided to the project team, the management of the performing organization, the customer or sponsor, as well as other stakeholders not actively involved in the work of the project. Perform Quality Assurance also provides an umbrella for continuous process improvement, which is an iterative means for improving the quality of all processes. Continuous process improvement reduces waste and eliminates activities that do not ass value. This allows processes to operate at increased levels of efficiency and effectiveness.

Inputs:

1. **Project Management Plan**

   The project management plan contains the following that is used to assure quality:

   - Quality management plan

     It describes how quality assurance will be performed with the project.
   - Process improvement plan

     It details the steps for analyzing processes to identify activities which enhance their value.

2. **Quality Metrics**

3. **Work Performance Information**

   Performance information from project activities is routinely collected as the project processes. Performance results which may support the audit process include:

   - Technical performance measure
   - Project deliverable status

- Schedule progress
- Costs incurred

4. **Quality Control Measurements**
   Quality control measurements are the results of quality control activities. They are used to analyze and evaluate the quality standards and processes of the performing organization.

Tools / Techniques:

1. **Plan Quality and Perform Quality Control Tool and Techniques**

2. **Quality Audits**
   It is a structured, independent review to determine whether project activities comply with organizational and project policies, processes, and procedures. The objectives of a quality audit are:
   - Identify all the good / best practices being implemented
   - Identify all the gaps / shortcomings
   - Share the good practices introduced or implemented in similar projects in the organization and / or industry.
   - Proactively offer assistance in a positive manner to improve implementation of processes to help the team rise productivity.
   - Highlight contributions of each audit in the lessons learned repository of the organization.

   The subsequent effort to correct any deficiencies should result in a reduced cost of quality and an increase in sponsor or customer acceptance of the project's product. Quality audit may be scheduled or random and may be conducted by internal or external auditors. Quality audits can confirm the implementation of approved change requests including corrective actions, defect repairs, and preventive actions.

3. **Process Analysis**
   It follows the steps outlined in the process improvement plan to identify needed improvements. This analysis also examines problems experienced, constraints experienced, and no-value-added activities identified during process operation. Process analysis includes root cause analysis-a specific technique to identify a problem, discover the underlying causes that lead to it, and develop preventive actions.

Outputs:

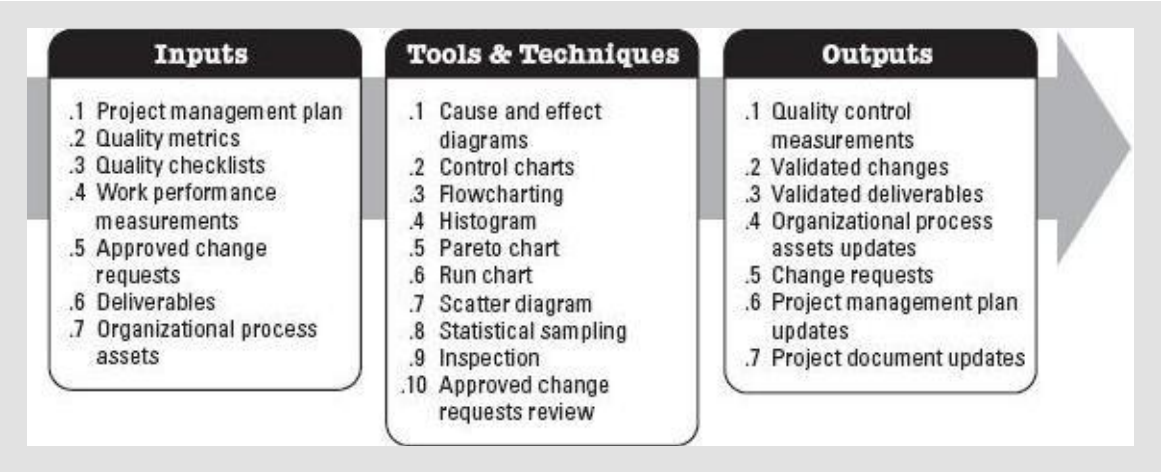
1. **Organizational Process Assets Updates**
   The element that may be updated through this process is: the quality standards.

2. **Change Requests**
   Quality improvement includes taking action to increase the effectiveness and / or efficiency of the policies, processes, and procedures of the performing organization. Change requests are created and used as input into the Perform Integrated Change Control process to allow full consideration of the recommended improvements. Change requests can be used to take corrective action or preventive action or to perform defect repair.

3. **Project Management Plan Updates**
   Elements of the project management plan that may be updated include:
   - Quality management plan
   - Schedule management plan
   - Cost management plan

4. **Project Document Updates**
   Project documents that may be updated include:
   - Quality audit reports
   - Training plans
   - Process documentation

Quality - Monitor & Control: Perform Quality Control



It is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes. Quality control is performed throughout the project. Quality standards include project processes and product goals. Project results include deliverables and project management results, such as cost and schedule performance. Quality control is often performed by a quality control department or similar titled organizational unit. Quality control activities identify causes of poor process or product quality and recommend and / or take action to eliminate them.

The project management team should have a working knowledge of statistical quality control, especially sampling and probability, to help evaluate quality control outputs. Among other subjects, the team may find it useful to know the differences between the following pairs of terms:

- Prevention (keeping errors out of process) and inspection (keeping error out of the hands of the customer).
- Attribute sampling (the result either conforms or does not conform) and variable sampling (the result is rated on a continuous scale that measure the degree of conformity)
- Tolerance (specified range of acceptable results) and control limits (thresholds, which can indicate whether the process is out of control).

Inputs:

1. **Project Management Plan**

   It contains the quality management plan, which is used to control quality. The quality management plan describes how quality control will be performed within the project.

2. **Quality Metrics**

3. **Quality Checklists**

4. **Work Performance Measurements**
   Work performance measurements are used to produce activity metrics to evaluate actual progress as compared to planned progress. These metrics include:
   - Planned vs. actual technical performance
   - Planned vs. actual schedule performance
   - Planned vs. actual cost performance.

5. **Approved Change Requests**
   As a part of the Performed Integrated Change Control process a change control status update will indicate that some changes are approved and some not. Approved change requests can include modifications such as defect repairs, revised work methods and revised schedule. The timely implementation of approved changes needs to be verified.

6. **Deliverables**

7. **Organizational Process Assets**
   The organizational process assets that can influence the Perform Quality Control process include:
   - Quality standards and policies
   - Standard work guidelines
   - Issue and defect reporting procedures and communication policies

Tools / Techniques

The first seven of these tools and techniques are known as Ishikawa's seven tools of quality.

1. **Cause and Effect Diagrams:** It also called Ishikawa diagrams or fishbone diagrams, illustrate how various factors might be linked to potential problems or effects. A possible root cause can be uncovered by continuing to ask "why" or "how" along one of the lines. "Why-why" and "how-how" diagrams may be used in root cause analysis. Cause and effect diagrams are also used in risk analysis.

2. **Control Charts:** In this process, the appropriate data is collected and analyzed to indicate the quality status of project processes and products.

3. **Flowcharting:** It is used during Perform Quality Control to determine a failing process step(s) and identify potential process improvement opportunities. Flowcharting is also used in risk analysis.

4. **Histogram:** It is a vertical bar chart showing how often a particular variable state occurred. Each column represents an attribute or characteristic of a problem / situation.

5. **Pareto Chart:** It is also referred to as a Pareto Diagram, is a specific type of histogram, ordered by frequency of occurrence. It shows how many defects were generated by type or category of identified cause. Rank ordering is used to focus corrective action. The project team should address the causes creating the greatest number of defects first. Pareto diagrams are conceptually related to Pareto's Law, which holds that a relatively small number of causes will typically produce a majority of the problems or defects. This is commonly referred to as the 80/20 principle, where 80% of the problems are due to 20% of the causes.

6. **Run Chart:** Similar to a control chart without displayed limits, a run chart shows the history and pattern of variation. A run chart is a line graph that shows data points plotted in the order in which they occur. Run charts show trend in process over time, variation over time, or declines or improvements in a process over time.

7. **Scatter Diagram:** It shows the relationship between two variables. This tool allows the quality team to study and identify the possible relationship between changes observed in two variables. Dependent variables versus independent variables are plotted. The closer points are to a diagonal line, the more closely they are related.

8. **Statistical Sampling:** Samples are selected and tested as defined in the quality plan.

9. **Inspection:** It is the examination of a work product to determine whether it conforms to documented standards. The results of an inspection generally include measurements and may be conducted at nay level. For example, the results of a single activity can be inspected, or the final product of the project can be inspected. Inspections may be called reviews, peer reviews, audits, or walkthroughs.

10. **Approved Change Requests Review:** All approved change requests should be reviewed to verify that they were implemented as approved.

Outputs:

1. **Quality Control Measurements**
   Quality control measurements are the documented results of quality control activities in the format specified during quality planning.

2. **Validated Changes**
   Any changed or repaired items are inspected and will be either accepted or rejected before notification of the decision is provided. Rejected items may require rework.

3. **Validated Deliverables**
   A goal of quality control is to determine the correctness of deliverables. The result of the execution quality control processes are validated deliverables. Validated deliverables are an input to Verify Scope for formalized acceptance.

4. **Organizational Process Assets Updates**
   Elements of the organizational process assets that may be updated include:
   - **Completed Checklists**
     When checklists are used, the completed checklists become part of the project's records.
   - **Lessons Learned Documentation**
     The causes of variances, the reasoning behind the corrective action chosen, and other types of lessons learned from quality control are documented so they become part of the historical database for both the project and the performing organization. Lessons learned are documented throughout the project life cycle, but at a minimum, during project closure.

5. **Change Requests**
   If recommended corrective or preventive actions or a defect repair requires a change to the project management plan, a change request should be initiated in accordance with the defined Perform Integrated Change Control process.

6. **Project Management Plan Updates**
   Elements of the project management plan that may be updated include:
   - Quality management plan
   - Process improvement plan

7. **Project Document Updates**

Quality Standards is the project document that may be updated during this process.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Risk Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Risk Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Risk Management process, tools, techniques and skills.
    - Learn to apply a variety of Project Risk Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

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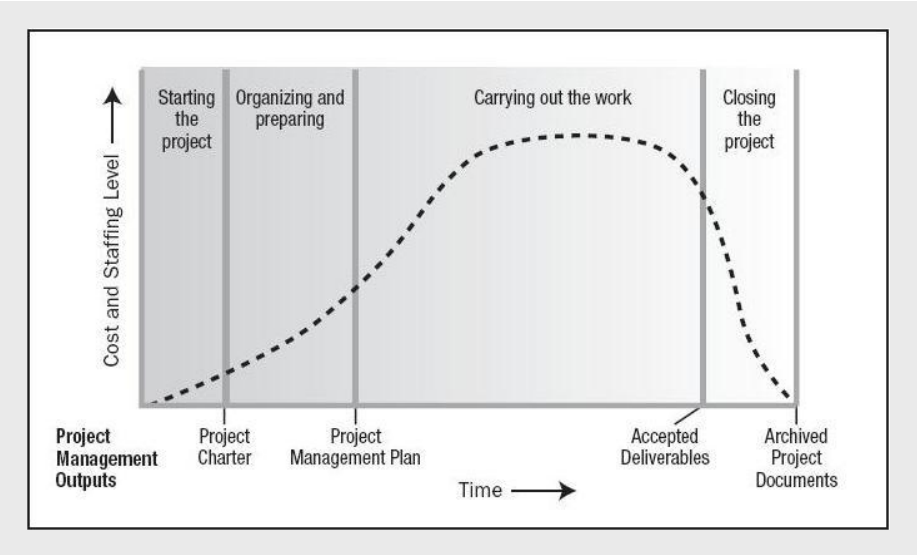
The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

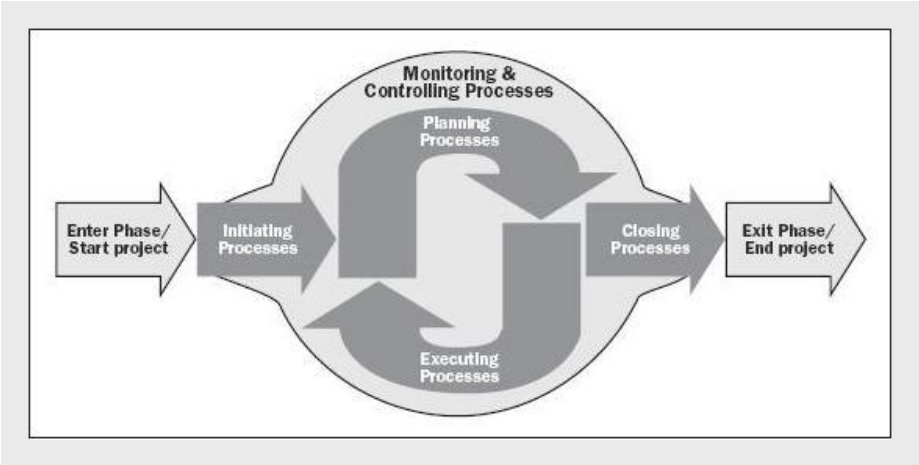
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

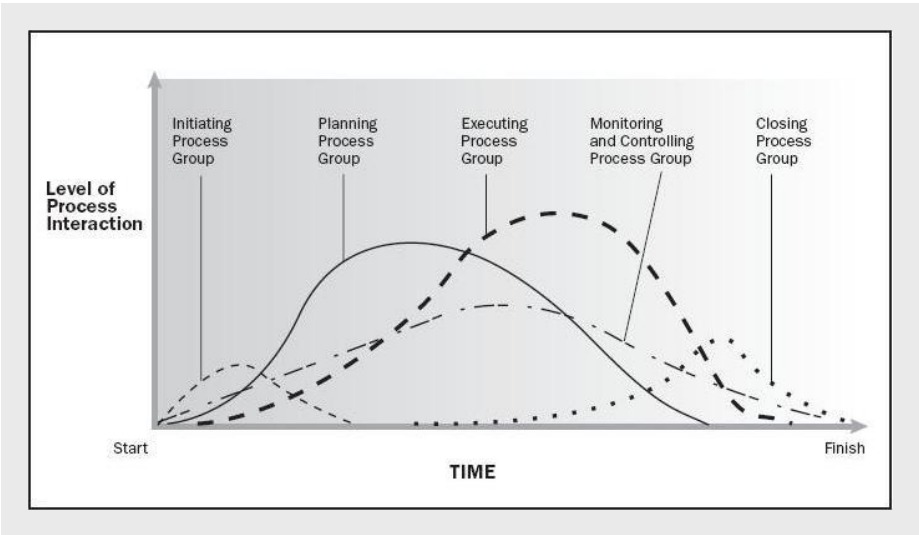
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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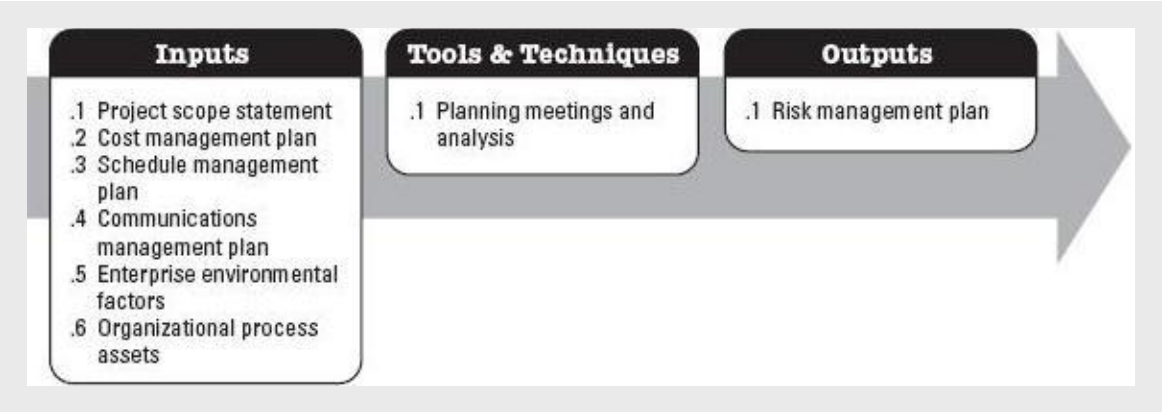
Risk - Planning: Plan Risk Management



It is the process of defining how to conduct risk activities for a project. Careful and explicit planning enhance the probability of success for the five other risk management process.
Planning risk management processes is important to ensure the degree, type, and visibility of risk management are commensurate with both the risks and the importance of the project to the organization. Planning is also important to provide sufficient resources and time for risk management activities, and to establish an agreed-upon basis for evaluating risks. The Plan Risk Management process should begin as a project is conceived and should be completed early during project planning.

Inputs:

1. **Project Scope Statement**
   It provides a clear sense of the range of possibilities associated with the project and its deliverables and establishes the framework for how significant the risk management effort may ultimately become.

2. **Cost Management Plan**
   It defines how risk budgets, contingencies, and management reserves will be reported and accessed.
3. **Schedule Management Plan**
   It defines how schedule contingencies will be reported and assessed.

4. **Communication Management Plan**
   It defines the interactions that will occur on the project, and determines who will be available to share information on various risks and responses at different times.

5. **Enterprise Environmental Factors**

The enterprise environmental factors that can influence the Plan Risk Management process include, risk attitude and tolerance that describe the degree of risk that an organization will withstand.

6. **Organizational process Assets**
   The organizational process assets that can influence the Plan Risk Management process include:
   - Risk categories
   - Common definitions of concepts and terms
   - Risk statement formats
   - Standard templates
   - Roles and responsibilities
   - Authority levels for decision-making
   - Lessons learned
   - Stakeholder registers, which are also critical assets to be reviewed as components of establishing effective risk management plan.

Tools / Techniques:

1. **Planning Meetings and Analysis**
   Project teams hold planning meetings to develop the risk management plan. Attendees at these meetings may include the project manager, selected project team members and stakeholders, anyone in the organization with responsibility to manage the risk planning and execution activities and others as needed.

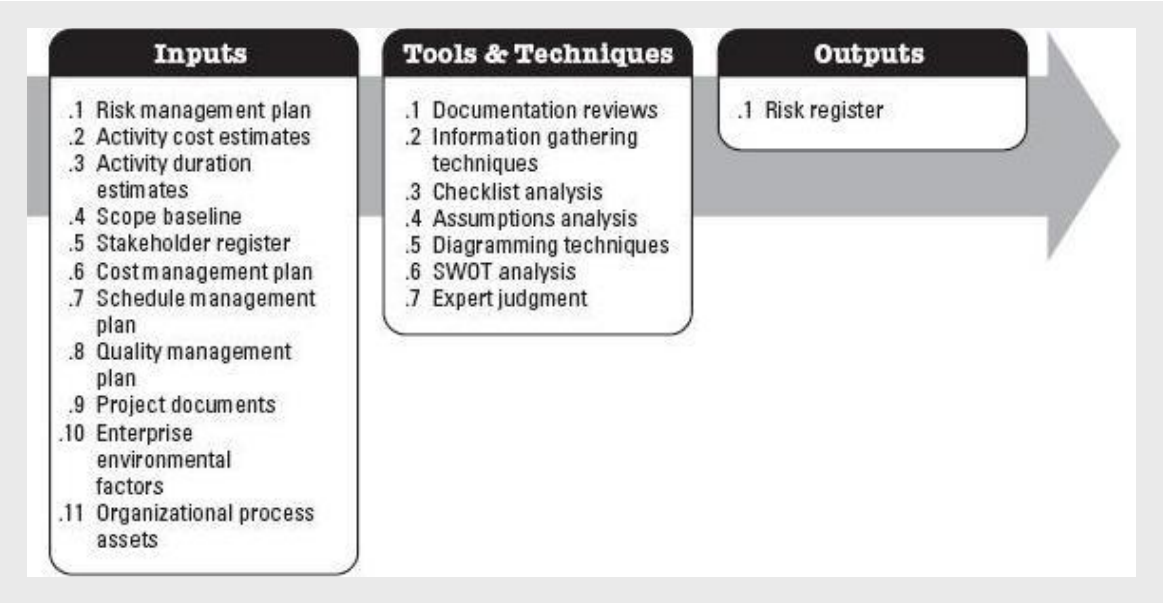
Outputs:

1. **Risk Management Plan**
   It describes how risk management will be structured and performed on the project. It becomes a subset of the project management plan. The risk management plan includes the following:
   - Methodology
     It defines the approaches, tools, and data sources that may be used to perform risk management on the project.
   - Roles and responsibilities
     It defines the lead, support, and risk management team members for each type of activity in the risk management plan, and clarifies their responsibilities.
   - Budgeting
     Assigns resources, estimates funds needed for risk management for inclusion in the cost performance baseline, and establishes protocols for application of contingency reserve.
   - Timing

It defines when and how often the risk management process will perform throughout the project life cycle, establishes protocols for application of schedule contingency reserves, and establishes risk management activities to be included in the project schedule.

- Risk categories
  It provides a structure that ensures a comprehensive process of systematically identifying risks to a consistent level of detail and contributes to the effectiveness and quality of the identify risk process. An organization can use a previously prepared categorization framework which might take the form of a simple list of categories or might be structured (RBS). The RBS is a hierarchically organized depiction of the identified project risks arranged by risk category and subcategory that identifies the various areas and causes of potential risks.
- Definitions of risk probability and impact
  The quality and credibility of the Perform Qualitative Risk Analysis process requires that different levels of the risks' probabilities and impacts be defined. General definitions of probability levels and impact levels are tailored to the individual project during the Plan Risk Management process for use in the Perform Qualitative Risk Analysis Process.
- Probability and impact matrix
  Risks are prioritized according to their potential implications for having an effect on the project's objectives. A typical approach to prioritizing risks is to use a look-up table or a Probability and Impact Matrix. The specific combinations or probability and impact that lead to a risk being rated as "high," "moderate," or "low" importance, with the corresponding importance for planning responses to the risk, are usually set by the organization.
- Revised stakeholders' tolerances
  As they applied to the specific project, may be revised in the Plan Risk Management process.
- Reporting formats
  It defines the outcomes of the risk management processes will be documented, analyzed, and communicated. It describes the content and format of the risk register as well as any other risk reports required.
- Tracking
  It documents how risk activities will be recorded for the benefit of the current project, as well as for future needs and lessons learned, as well as whether and how risk management processes will be audited.

Risk – Planning: Identify Risks



It is the process of determining which risks may affect the project and documenting their characteristics. Participants in risk identification activities can include the following:

- Project manager
- Project team members
- Risk management team
- Customers
- Subject matter expert from outside the project team
- End users
- Other project managers
- Stakeholders
- Risk management experts

Identify risks is an iterative process because new risks may evolve or become known as the project progresses through its life cycle. The frequency of iteration and who participates in each cycle will vary by situation.

Inputs:

1. **Risk Management Plan**
   Key inputs from the risk management plan to the Identify Risks process are the assignments of roles and responsibilities, provision for risk management activities in the budget and schedule, and categories of risk, which are sometimes expresses in a risk breakdown structure.

2. **Activity Cost Estimates**

Activity cost estimates reviews are useful in identifying risks as they provide a quantitative assessment of the likely cost to complete scheduled activities and ideally are expressed as a range, with the width of the range indicating the degree(s) of risk. The review may result in projections indicating the estimate is either sufficient or insufficient to complete the activity.

3. **Activity Duration Estimates**
   Activity duration estimate reviews are useful in identifying risks related to the time allowances for the activities or project as a whole, again with the width of the range of such estimates indicating the relative degree(s) of risk.

4. **Scope Baseline**
   Project assumptions are found in the project scope statement. Uncertainty in project assumptions should be evaluated as potential causes of project risk.

5. **Stakeholder Register**
   Information about stakeholders will be useful in soliciting inputs for identifying risks as this will ensure that key stakeholders, especially the customer, are interviewed or otherwise participate during the "Identify Risks" process.

6. **Cost Management Plan**
   The risk identification process requires an understanding of the cost management plans found in the project management plan. The project-specific approach to cost management may generate or alleviate risk by its nature or structure.

7. **Schedule Management Plan**
   The risk identification process also requires an understanding of the schedule management plan found in the project management plan. The project-specific approach to schedule management may generate or alleviate risk by its nature or structure.

8. **Quality Management Plan**
   The risk identification process also requires an understanding of the quality management plan found in the project management plan. The project-specific approach to quality management may generate or alleviate risk by its nature or structure.

9. **Project Documents**
   Project documents include:
   - Assumptions log
   - Work performance reports
   - Earned value reports

- Network diagrams
- Baselines

10. Enterprise Environmental Factors

The enterprise environmental factors that can influence the Identify Risks process include:

- Published information, including commercial database.
- Academic studies
- Published checklists
- Benchmarking
- Industry studies
- Risk attitudes

11. Organizational Process Assets

The organizational process assets that can influence the Identify Risks process include:

- Project files, including actual data
- Organizational and project process controls
- Risk statement templates
- Lessons learned

Tools / Techniques:

1. Documentation Reviews

A structured review may be performed of project documentation, including plans, assumptions, previous project files, contracts, and other information. The quality of the plans, as well as consistency between those plans and the project requirements and assumptions, can be indicators of risk in the project.

2. Information Gathering Techniques

Examples of information gathering techniques used in identifying risk can include:

- Brainstorming
- Delphi technique
- Interviewing
- Root cause analysis

3. Checklist Analysis

Risk identification checklists can be developed based on historical information and knowledge that has been accumulated from previous similar projects and from other sources of information. The lowest level of the RBS can also be used as a risk checklist. While a checklist can be quick and simple, it is impossible to build an exhaustive one.

4. **Assumption Analysis**
   Every project and every identified project risk is conceived and developed based on a set of hypotheses, scenarios, or assumptions. Assumptions analysis explores the validity of assumptions as they apply to the project. It identifies risks to the project from inaccuracy, instability, inconsistency, or incompleteness of assumptions.

5. **Diagramming Techniques**
   Risk diagramming techniques may include:
   - Cause and effect diagrams
   - System or process flow charts
   - Influence diagrams

6. **SWOT analysis**

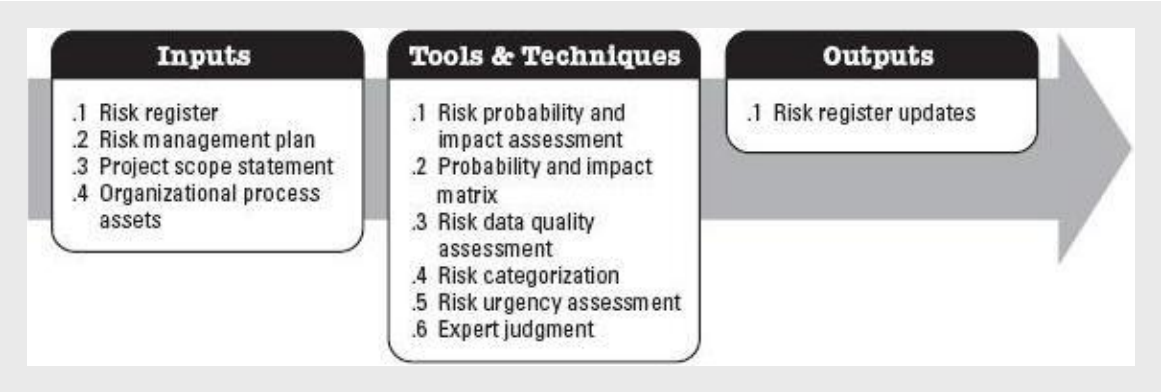
7. **Expert Judgment**

Outputs:

The main outputs from Identify Risks are typically contained in the risk register.

1. **Risk Register**
   The primary outputs from Identify Risks are the initial entries into the risk register. The risk register ultimately contains the outcomes of the other risk management processes as they are conducted, resulting in an increase in the level and type of information contained in the risk register over time. The preparation of the risk register begins in the Identify Risks process with the following information, and then becomes available to other project management and Project Risk Management processes.
   - List of identified risks
     The identified risks are described in as much detail as is reasonable. A simple structure for risks in the list may be applied, such as EVENT may occur, causing IMPACT, or IF CAUSE, EVENT may occur, leading to EFFECT.
   - List of potential responses
     Potential responses to a risk may sometimes be identified during the Identify Risks process. These responses, if identified in this process, may be useful as input to the Plan Risk Responses process.

Risk – Planning: Perform Qualitative Risk Analysis



It is the process of prioritizing for further analysis or action by assessing and combining their probability of occurrence and impact. Organizations can improve the project's performance by focusing on high-priority risks.
Perform Qualitative Risk Analysis assesses the priority of identified risks using their relative probability or likelihood of occurrence, the corresponding impact on project objectives if the risks occur, as well as other factors such as the time frame for response and the organization's risk tolerance associated with the project constraints of cost, schedule, scope, and quality. Establishing definitions of the levels of probability and impact can reduce the influence of bias. The time criticality of risk-related actions may magnify the importance of a risk. An evaluation of the quality of the available information on project risks also helps clarify the assessment of the risk's importance to the project. The Perform Qualitative Risk Analysis process should be revisited during the project's life cycle to stay current with changes in the project risks

Inputs:

1. **Risk Register**

2. **Risk Management Plan**
   Key elements of the risk management plan for Perform Qualitative Risk Analysis include roles and responsibilities for conducting risk management, budgets, schedule activities for risk management, risk categories, definitions of probability and impact, the probability and impact matrix, and revised stakeholders' risk tolerances. These inputs are usually tailored to the project during the Plan Risk Management process. If they are not available they can be developed during the Perform Qualitative Risk Analysis process.

3. **Project Scope Statement**
   Projects of a common or recurrent type tend to have more well-understood risks. Projects using state-of-the-art or first-of-its-kind technology, and

highly complex projects, tend to have more uncertainty. This can be evaluated by examining the project scope statement.

4. **Organizational Process Assets**
   The organizational process assets that can influence the Perform Qualitative Risk Analysis process include:
   - Information on prior, similar completed projects.
   - Studies of similar projects by risk specialists.
   - Risk databases that may be available from industry or proprietary sources

Tools / Techniques:

1. **Risk Probability and Impact Assessment**
   It investigates the likelihood that each specific risk will occur. Risk impact assessment investigates the potential effect on a project objective such as schedule, cost, quality, or performance, including both negative effects for threats and positive effects for opportunities.

2. **Probability and Impact Matrix**
   Risks can be prioritized for further quantitative analysis and response based on their risk rating. Usually, these risk-rating rules are specified by the organization in advance of the project and included in organizational process assets. Risk-rating rules can be tailored to the specific project in the Plan Risk Management process. Evaluation of each risk's importance and, hence, priority for attention, is typically conducted using a look-up table or a probability and impact matrix. Such a matrix specifies combinations of probability and impact that lead to rating high risks as low, moderate, or high priority. The risk rating helps guide risk responses.

3. **Risk Data Quality Assessment**
   A qualitative risk analysis requires accurate and unbiased data if it is to be credible. Analysis of the quality of risk data is a technique to evaluate the degree to which the data about risks are useful for risk management. It involves examining the degree to which the risk is understood and the accuracy, quality, reliability, and integrity of the regarding the risk. If data quality is unacceptable, it may be necessary to gather higher-quality data.

4. **Risk Categorization**
   Risks to the project can be categorized by sources of risk, the area of the project affected, or other useful category to determine areas of the project most exposed to the effected of uncertainty. Grouping risks by common root causes can lead to developing effective risk responses.

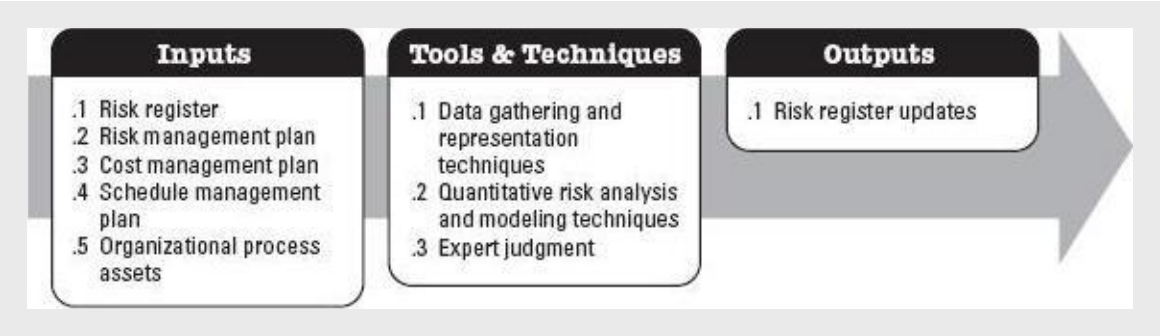
5. **Risk Urgency Assessment**
   Risks requiring near-term responses may be considered more urgent to address. Indicators of priority can include time to affect a risk response, symptoms and warning signs, and the risk rating. In some qualitative analyses the assessment of risk urgency can be combined with the risk ranking determined from the probability and impact matrix to give a final risk severity rating.

6. **Expert Judgment**

Outputs:

1. **Risk Register Updates**
   The risk register is started during the Identify Risks process. The risk register is updated with information from Perform Qualitative Risk Analysis and the updated risk register is included in the project documents. The risk register updates from Perform Qualitative Risk Analysis include:
   - Relative ranking or priority list of project risks
   - Risks grouped by categories
   - Causes of risk or project areas requiring particular attention
   - List of risks requiring response in the near-term
   - List of risks for additional analysis and response
   - Watchlists of low-priority risks
   - Trends in qualitative risk analysis results

Risk – Planning: Perform Quantitative Risk Analysis



It is the process of numerically analyzing the effect of identified risks on overall project objectives. Perform Quantitative Risk Analysis is performed on risks that have been prioritized by Perform Qualitative Risk Analysis process as potentially and substantially impacting the project's competing demands.
The Perform Quantitative Risk Analysis process analyzes the effect of those risk events. It may be used to assign numerical rating to those risks individually or to evaluate the aggregate effect of all risks affecting the project. It also presents a quantitative approach to making decisions in the presence of uncertainty. In some cases, Perform Quantitative Risk Analysis may not be required to develop effective risk responses. Availability of time and budget, and the need for qualitative or quantitative statements about risk and impact, will determine which method(S) to use on any particular project.

Inputs:

1. **Risk Register**

2. **Risk Management Plan**

3. **Cost Management Plan**
   It sets the format and establishes criteria for planning, structuring, estimating, budgeting, and controlling project cost. Those controls may help determine the structure and/or application approach for quantitative analysis of the budget or cost plan.

4. **Schedule Management Plan**
   It sets the format and establishes criteria for developing and controlling the project schedule. Those controls and the nature of the schedule itself may help determine the structure and/or application approach for quantitative analysis of the schedule.

5. **Organizational Process Assets**
   The organizational process assets that can influence the Perform Quantitative Analysis process include:
   - Information on prior, similar completed projects.
   - Studies of similar projects by risk specialists.
   - Risk database that may be available from industry or proprietary sources.

Tools / Techniques:

1. **Data Gathering and Representation Techniques**
   - Interviewing
     This technique draws on experience and historical data to quantify the probability and impact of risks on project objectives.
   - Probability distributions
     Continuous probability distributions used extensively in modeling and simulation represent the uncertainty in values such as durations of schedule activities and costs of project components.

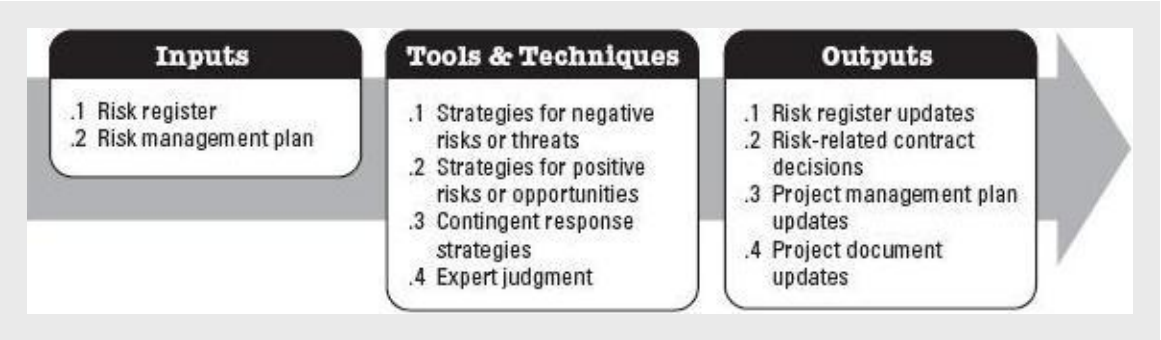
2 **Quantitative Risk Analysis and Modeling Techniques**
   - Sensitivity analysis
     It helps to determine which risks have the most potential impact on the project. It examines the extent to which the uncertainty of each project element affects the objective being examined when all other uncertain elements are held at their baseline value. One typical display of sensitivity analysis is the tornado diagram, which is useful for comparing relative importance and impact of variables that have a high degree of uncertainty to those that are more stable.
   - Expected monetary value analysis
     Expected monetary value (EMV) analysis is a statistical concept that calculates the average outcome when the future includes scenarios that may or may not happen. The EMV of opportunities will generally be expressed as positive values, while those of risk will be negative. EMV requires a risk-natural assumption, neither risk averse, nor risk seeking. EMV for a project is calculated by multiplying the value of each possible outcome by its probability of occurrence and adding the products together.
   - Modeling and simulation
     A project simulation uses a model that translates the specified detailed uncertainties of the project into their potential impact on project objectives. Iterative simulations are typically performed using the Monte Carlo technique.

3 **Expert Judgment**

Outputs:

1. **Risk Register Updates**
   The risk register is further updated to include a quantitative risk report detailing quantitative approaches, outputs, and recommendations. Updates include the following main components:
   - Probabilistic analysis of the project
     Estimates are made of potential project schedule and cost outcomes listing the possible completion dates and costs with their associated confidence levels. This output, often expressed as a cumulative distribution, can be used with stakeholder risk tolerances to permit quantification of the cost and time contingency reserves.
   - Probability of achieving cost and time objectives
     With the risks facing the project, the probability of achieving project objectives under the current plan can be estimated using quantitative risk analysis results.
   - Prioritizing list of quantified risks
     This list of risks includes those that pose the greatest threat or present the greatest opportunity to the project. These include the risks that may have the greatest effect on cost contingency and those that are most likely to influence the critical path. These risks may be identified, in some cases, through a tornado diagram generated as a result of the simulation analyses.
   - Trends in quantitative risk analysis results
     As the analysis is repeated a trend may become apparent that leads to conclusions affecting risk responses. Organizational historical information on project schedule, cost, quality, and performance should reflect new insights gained through the Perform Quantitative Risk Analysis process. Such history may take the form of a quantitative risk analysis report. This report may be separate from, or linked to, the risk register.

Risk – Planning: Plan Risk Responses



It is the process of developing options and actions to enhance opportunities and to reduce threats to project objectives. It follows the Perform Qualitative Risk Analysis process and Perform Quantitative Risk Analysis process (if used).
It includes the identification and assignment of one person (the "risk response owner") to take responsibility for each agreed-to and funded risk response. Plan Risk Responses addresses the risks by their priority, inserting resources and activities into the budget, schedule and project management plan as needed. Selecting the best risk response from several options is often required.

Inputs:

1. **Risk Register**
   The risk register refers to identified risks, root causes of risks, lists of potential responses, risk owners, symptoms and warning signs, the relative rating or priority list of project risks, a list of risks requiring response in the near term, a list of risks for additional analysis and response, trends in qualitative analysis results, and a watchlist of low-priority risks.

2. **Risk Management Plan**
   Important components of the risk management plan include roles and responsibilities, risk analysis definitions, timing for reviews, and risk thresholds for low, moderate, and high risks. Risks thresholds help identify those risks for which specific responses are needed.

Tools / Techniques

1. **Strategies for Negative Risks or Threats**
   Three of the following strategies typically deal with threats or risks that may have negative impacts on project objectives if they occur. The fourth strategy, Accept, can be used for negative risks or threats as well as positive risks or opportunities.
   - Avoid
   - Transfer

- Mitigate
- Accept

2. **Strategies for positive Risks or Opportunities**
   Three of the four responses are suggested to deal with risks with potentially positive impacts on project objectives. The fourth strategy, Accept, can be used for negative risks or threats as well as positive risks or opportunities
   - Exploit
   - Share
   - Enhance
   - Accept

3. **Contingent Response Strategies**
   Some responses are designed for use only if certain events occur. For some risks, it is appropriate for the project team to make a response plan that will only be executed under certain predefined conditions, if it is believed that there will be sufficient warning to implement the plan. Events that trigger the contingency response, such as missing intermediate milestone or gaining higher priority with a supplier, should be defined and tracked.

4. **Expert Judgment**

Outputs:

1. **Risk Register Updates**

   In the Plan Risk Responses process, appropriate responses are chosen, agreed upon, and included in the risk register. The risk register should be written to a level of detail that corresponds with the priority ranking and the planned response. Often, the high and moderate risks are addressed in detail. Risks judged to be of low priority are included in a "watchlist" for periodic monitoring. Components of the risk register at this point can include:
   - Identified risks, their descriptions area(s) of the project affected, their causes, and how they may affect project objectives.
   - Risk owners and assigned responsibilities.
   - Outputs from the Perform Qualitative Analysis process, including prioritizing lists of project risks.
   - Agreed-upon response strategies.
   - Specific actions to implement the chosen response strategy.
   - Budget and schedule activities required to implement the chosen responses.
   - Contingency plans and triggers that call for their execution

- Fallback plans for use as a reaction to a risk that has occurred and the primary response proves to be inadequate.
- Residual risks that are expected to remain after planned responses have been taken, as well as those that have been deliberately accepted.
- Secondary risks that arise as a direct outcome of implementing a risk response
- Contingency reserves that are calculated based on the quantitative risk analysis of the project and the organization's risk thresholds.

2. Risk-Related Contract Decisions

Decisions to transfer risk, such as agreements for insurance, services, and other items as appropriate are selected in this process. This may happen as a result of mitigating or transferring part or all of the threat or enhancing or sharing part or all of the opportunity. The contract type selected also provides a mechanism for sharing the risks. These decisions are inputs to the Plan Procurements process.

3. Project Management Plan Updates

Elements of the project management plan that may be updated include:

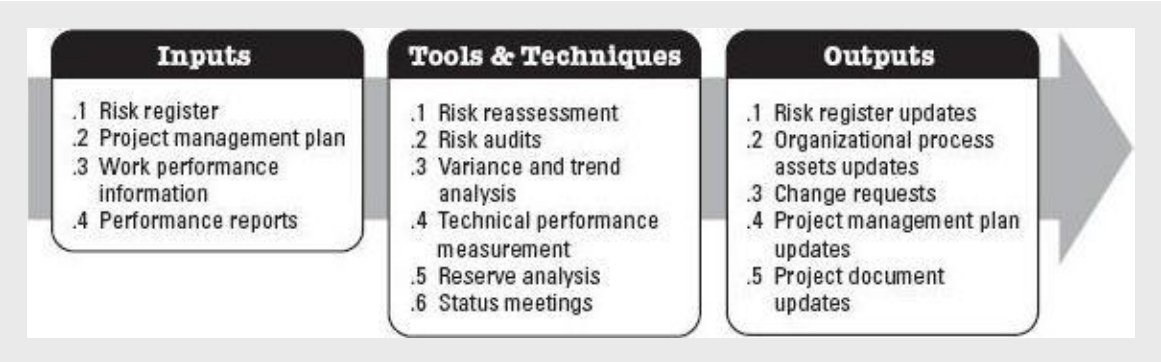
- Schedule management plan
- Cost management plan
- Quality management plan
- Procurement management plan
- Human resource management plan
- Work breakdown structure
- Schedule baseline
- Cost performance baseline

4. Project Document Updates

Project documents that may be updated include:

- Assumptions log updates
  As new information becomes available through the application of risk responses, assumptions will inherently change. The assumptions log must be revisited to accommodate this new information. Assumptions may be incorporated in the scope statement or in a separate assumptions log.
- Technical documentation updates
  As new information becomes available through the application of risk responses, technical approaches and physical deliverables may change. Any supporting documentation must be revisited to accommodate this new information.

Risk – Planning: Risks: Monitor and Control



It is the process of implementing risk response plans, tracking identified risks, monitor residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project

Planned risk responses that are included in the project management plan are executed during the life cycle of the project, but the project work should be continuously monitored for new, changing, and outdated risks. Other purposes of the Monitor and Control Risks process are to determine if:

- Project assumptions are still valid
- Analysis shows an assessed risk has changed or can be retired
- Risk management policies and procedures are being followed
- Contingency reserves of cost or schedule should be modified in alignment with the current risk assessment.

Monitor and Control Risks can involve choosing alternative strategies, executing a contingency or fallback plan, taking corrective action, and modifying the project management plan. Monitor and Control Risks also includes updating the organizational process assets, including project lessons learned databases and risk management templates, for the benefit of future projects

Inputs:

1. **Risk Register**
   It has key inputs that include identified risks and risk owners, agreed-upon risk responses, specific implementation actions, symptoms and warning signs of risk, residual and secondary risks, a watchlist of low-priority risks, and the time and cost contingency reserves.

2. **Project Management Plan**
   It contains the risk management plan, which includes risk tolerance, protocols and the assignment of people, time, and other resources to project risk management.

3. **Work Performance Information**

   Work performance information related to various performance results includes:

   - Deliverables status
   - Schedule progress
   - Cost incurred

4. **Performance Reports**

   Performance reports take information from performance measurements and analyze it to provide project work performance information including variance analysis, earned value data, and forecasting data.

Tools / Techniques:

1. **Risk Reassessment**

   Monitor and Control Risks often results in identification of new risks, reassessment of current risks, and the closing of risks that are outdated. Project risk reassessments should be regularly scheduled. The amount and detail of repetition that is appropriate depends on how the project progress relative to its objectives.

2. **Risk Audits**

   Risks audits examine and document the effectiveness of risk responses in dealing with identified risks and their root causes, as well as the effectiveness of the risk management process. The project manager is responsible for ensuring that risk audits are performed at an appropriate frequency, as defined in the project's risk management plan. Risk audits may be included during routine project review meetings, or separate risk audit meetings may be held. The format for the audit and its objectives should be clearly defined before the audit is conducted.

3. **Variance and Trend Analysis**

   Many control processes employ variance analysis to compare the planned results to the actual results. For the purpose of monitoring and controlling risk events, trends in the project's execution should be reviewed using performance information. Earned value analysis and other methods of project variance and trend analysis may be used for monitoring overall project performance. Deviation from the baseline plan may indicate the potential impact of threats or opportunities.

4. **Technical Performance Measurement**

   It compares technical accomplishments during project execution to the project management plan's schedule of technical achievement. It requires definition of objective quantifiable measure of technical performance which can be used to compare actual results against targets. Such technical

performance measures might include weight, transaction time, number of delivered defects, storage capacity, etc.

5. **Reserve Analysis**
   Throughout execution of the project some risks may occur, with positive or negative impacts on budget or schedule contingency reserves. Reserve analysis compares the amount of the contingency reserve remaining to the amount of risk remaining at any time in the project in order to determine if the remaining reserve is adequate.

6. **Status Meetings**
   Project risk management should be an agenda item at periodic status meetings. The amount of time required for that item will vary, depending upon the risks that have been identified, their priority, and difficulty of response. Risk management becomes easier the more often it is practiced. Frequent discussions about risk makes it more likely that people will identify risks and opportunities.

Outputs:

1. **Risk Register Updates**
   An updated risk register includes:
   - Outcomes of risk reassessment, risk audits, and periodic risk reviews. These outcomes may include identification of new risk events, updates to probability, impact, priority, response plans, ownership, and other elements of the risk register.
   - Actual outcomes of the project's risks and of the risk responses. This information can help project managers to plan for risk throughout their organizations, as well as on future projects.

2. **Organizational Process Assets Updates**
   The six Project Risk Management processes produce information that can be used for future projects, and should be captured in the organizational process assets. The organizational process assets that may be updated include:
   - Templates for the risk management plan, including the probability and impact matrix, and risk register.
   - Risk breakdown structure
   - Lessons learned from the project risk management activities.

3. **Change Requests**
   Implementing contingency plans or workarounds sometimes results in a change request. Change requests are prepared and submitted to the Perform Integrated Change Control process. Change requests can include recommended corrective and preventive actions as well.

4. **Project Management Plan Updates**
   If the approved change requests have an effect on the risk management processes, the corresponding component documents of the project management plan are revised and reissued to reflect the approved changes. The elements of the project management plan that may be updated are the same as those in the Plan Risk Responses process.

5. **Project Document Updates**
   Project documents that may be updated as a result of the Monitor and Control Risks process are the same as those in the Risk Responses process.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Scope Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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الإداري العراقي

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Course Syllabus

1. **Course Title**: Project Management Processes / Project Scope Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Scope Management process, tools, techniques and skills.
    - Learn to apply a variety of Project Scope Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

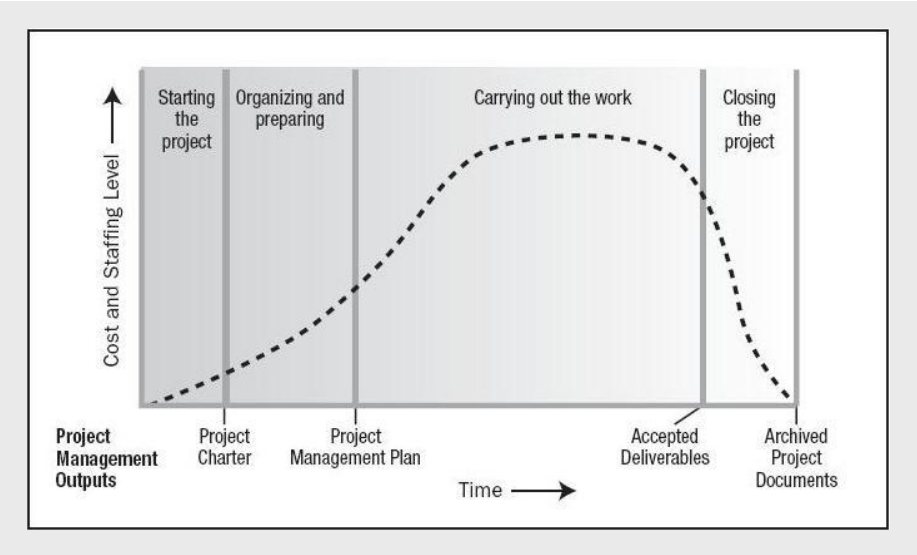
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.
- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

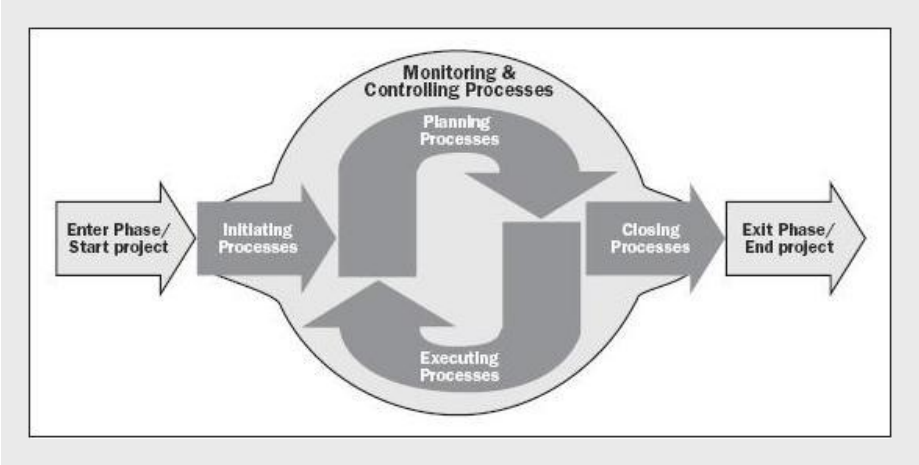
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.

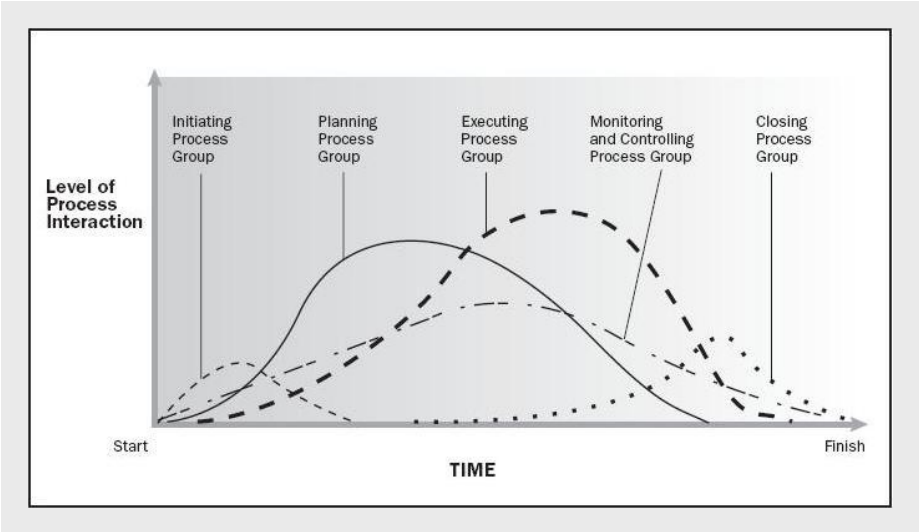
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas Mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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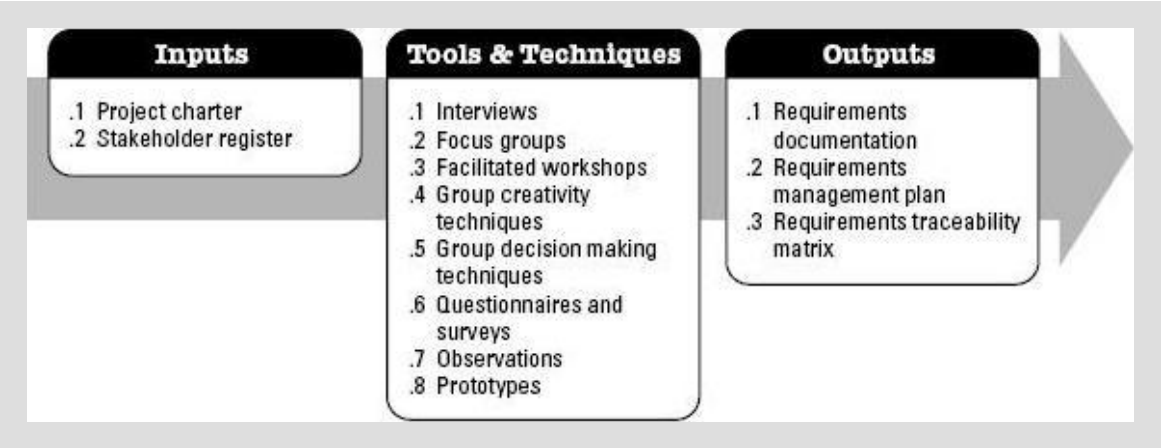
Scope - Planning: Collect Requirements



Collect requirements is the process of defining and documenting stakeholders' needs to meet the project objectives. The project success is directly influenced by the care taken in capturing and managing project and product requirements.
Requirements include the quantified and documented needs and expectations of the sponsor, customer, and other stakeholders. These requirements need to be elicited, analyzed, and recorded in enough detail to be measured once project execution begins. Collecting requirements is defining and managing customer expectations. Requirements become the foundation of the WBS. Cost, Schedule, and quality planning are all built upon these requirements. The development of the requirements begins with an analysis of the information contained in the project charter and the stakeholder register. Many organizations categorize requirements into project requirements and product requirements. Project requirements can include business requirements, project management requirements, delivery requirements, etc. Product requirements can include information on technical requirements, security requirements, performance requirements, etc.

Inputs:

1. **Project Charter:**
   The project charter is used to provide the high – level project requirements and high – level product description of the project so that detailed product requirements can be developed.

2. **Stakeholder Register:**
   The stakeholder register is used to identify stakeholders that can provide information on detailed project and product requirements.

Tools / Techniques:

1. **Interviews**:
   An interview is formal or informal approach to discover information from stakeholders by talking to them directly. It is typically performed by asking prepared and spontaneous questions and recording the responses. Interviews are often conducted "one-on-one" but may involve multiple interviews and / or multiple interviewees. Interviewing experienced project participants, stakeholders, and subject matter experts can aid in identifying and defining the features and functions of the desired project deliverables.

2. **Focus groups**:
   Bring together pre-qualified stakeholders and subject matter experts to learn about their expectations and attitudes about a proposed product, service, or result. A trained moderator guides the group through an interactive discussion, designed to be more conversational than a one-on-one interview.

3. **Facilitate Workshops**:
   Requirement workshops are focused sessions that bring key cross-functional stakeholders together to define product requirements. Workshops are considered as a primary technique for quickly defining cross-functional requirements and reconciling stakeholder differences. Because of their interactive group nature, well-facilitated sessions can build trust, foster relationships, and improve communication among the participants which can lead to increased stakeholder consensus. Another benefit of this technique is that issues can be discovered and resolved more quickly than in individual session

4. **Group Creativity Techniques**:
   Several group activities can be organized to identify project and product requirements, some of the group creativity techniques that can be used are:
   - Brainstorming: A technique used to generate and collect multiple ideas related to project and product requirements.
   - Nominal group technique: enhances brainstorming with a voting process used to rank the most useful ideas for further brainstorming or prioritization.
   - The Delphi technique: A selected group of experts answers questionnaires and provides feedback regarding the responses from each round of requirements gathering. The responses are only available to the facilitator to maintain anonymity.
   - Idea/mind mapping: Ideas created through individual brainstorming are consolidated into a single map to reflect commonality and differences in understanding, and generate new ideas.
   - Affinity diagram: The technique allows large numbers of ideas to be sorted into groups for review and analysis.

5. **Group Decision Making Techniques**:
   Group decision making is an assessment process of multiple alternatives with an expected outcome in the form of future actions resolution. These techniques can be used to generate, classify, and prioritize product requirements. There are multiple methods of reaching a group decision:

   - Unanimity: everyone agrees on a single course of action
   - Majority: support from more than 50% of the members of the group.
   - Plurality: the large block in a group decides even if a majority is not achieved.
   - Dictatorship: one individual makes the decision for the group.

6. **Questionnaires and Surveys**:
   Written sets of questions to quickly accumulate information from a wide number of respondents. Questionnaires and / or surveys are most appropriate with board audiences, when quick turnaround is needed, and where statistical analysis is appropriate.

7. **Observations**:
   Provide a direct way of viewing individuals in their environment and how they perform their jobs or tasks and carry out processes. It is particularly helpful for detailed processes when the people that use the product have difficulty or are reluctant to articulate their requirements. Observation also called "job shadowing" is usually done externally by the observer viewing the user performing his or her job. It can also be done by a "participant observer" who actually performs a process or procedure to experience how it is done to uncover hidden requirements.

8. **Prototypes**:
   It is a method of obtaining early feedback on requirements by providing a working model of the expected product before actually building it. Since prototypes are tangible, it allows stakeholders to experiment with a model of their final product rather than only discussing abstract representations of their requirements. Prototypes support the concept of progressive elaboration because they are used in iterative cycles of mock-up creation, user experimentation, feedback generation, and prototype revision.

Outputs:

1. **Requirements Documentation**:
   It describes how individual requirements meet the business need for the project. Requirements may start out at a high level and become progressively more detailed as more is known. Before being baselined, requirements must be unambiguous (measurable and testable), traceable,

complete, consistent, and acceptable to key stakeholders. Components of requirements documentation can include:

- Business need or opportunity to be seized.
- Business and project objectives for traceability.
- Functional requirements
- Non-functional requirements
- Quality requirements
- Acceptance criteria
- Business rules stating the guiding principles of the organization
- Impacts to other organizational areas
- Impacts to other entities inside or outside the performing organization
- Support and training requirements
- Requirements assumptions and constraints.

2. **Requirements Management Plan**:
   It documents how requirements will be analyzed, documented and managed throughout the project. The project manager must choose the most effective relationship for the project and document this approach in the requirements management plan. It includes:
   - How requirements activities will be planned, tracked, and reported.
   - Configuration management activities such as how changes to the product, service, or result requirements will be initiated, how impacts will be analyzed, how they will be traced, tracked, and reported, as well as the authorization levels required to approve these changes.
   - Requirements prioritization process.
   - Product metrics that will be used and the rationale for using them.
   - Traceability structure, that is, which requirements attributes will be captured on the traceability matrix and to which other project documents requirements will be traced.

3. **Requirements Traceability Matrix: is a table that links requirements to their origin and** traces them throughout the project life cycle. The implementation of a requirements traceability matrix helps ensure that each requirement adds business value by linking it to the business and project objectives. Finally, it provides a structure for managing changes to the product scope. This process includes:
   - Requirements to business needs, opportunities, goals, and objectives.
   - Requirements to project objectives.
   - Requirements to project scope / WBS deliverables.
   - Requirements to product design.
   - Requirements to product development.
   - Requirements to test strategy and test scenarios
   - High-level requirements to more detailed requirements.

Scope - Planning: Define Scope

It is the process of developing a detailed description of the project and product. The preparation of a detailed project scope statement is critical to project success and builds upon the major deliverables, assumptions and constraints that are documented during project initiation. During planning, the project scope is defined and described with greater specificity as more information about the project is known. Existing risks, assumption, and constraints are analyzed for completeness; additional risks, assumption, and constraints are added as necessary.

Inputs:

1. **Project Charter:**
   The project charter provides the high-level project description and product characteristics. It also contains project approval requirements. If a project charter is not used in the performing organization, then comparable information needs to be acquired or developed, and used as a basis for the detailed project scope statement.

2. **Requirements Documentation**

3. **Organizational Process Assets:**

   - Policies, procedures, and templates for a project scope statement.
   - Project files from previous projects.
   - Lessons learned from previous phases or projects.

Tools / Techniques:

1. **Expert Judgment:**
   Expert judgment is often used to analyze the information needed to develop the project, scope statement. Such judgment and expertise is applied to any technical details. Such expertise is provided by any group or individual with specialized knowledge or training, and is available from many sources, including:
   - Other units within the organization.

- Consultants.
- Stakeholders, including customers or sponsors.
- Professional and technical associations.
- Industry groups
- Subject matter experts

2. **Product Analysis:**
   For projects that have a product as deliverable, as opposed to a service or result, product analysis can be an effective tool. Each application area has one or more generally accepted methods for translating high-level product descriptions into tangible deliverables. Product analysis includes techniques such as product breakdown, systems analysis, requirements analysis, system engineering, value engineering, and value engineering.

3. **Alternatives Identification:**
   Identifying alternatives is a technique used to generate different approaches to execute and perform the work of the project. A variety of general management techniques can be used such as brainstorming lateral thinking, pair wise comparison, etc.

4. **Facilitated Workshops.**

Outputs:

1. **Project Scope Statement:**
   The project scope statement describes, in details, the project's deliverables and the work required to create those deliverables. The project scope statement also provides a common understanding of the project scope among project stakeholder expectations. It enables the project team to perform more detailed planning, guides the project team's work during execution, and provides the baseline for evaluation whether requests for changes or additional work are contained within or outside the project's boundaries.
   The degree and level of detail to which the project scope statement defines the work that will be performed and the work that excluded can determine how well the project management team can control the overall project scope. The detailed project scope statement includes, either directly, or by reference to other documents, the following:
   - Product scope description: Progressively elaborates the characteristics of the product, service, or result described in the project charter and requirements documentation.
   - Product acceptance criteria: Define the process and criteria for accepting completed products, services, or results.
   - Project deliverables
   - Deliverables include both the outputs that comprise the product or service of the project, as well as ancillary results, such as project

management reports and documentation. The deliverables may be described at a summary level or in great detail.

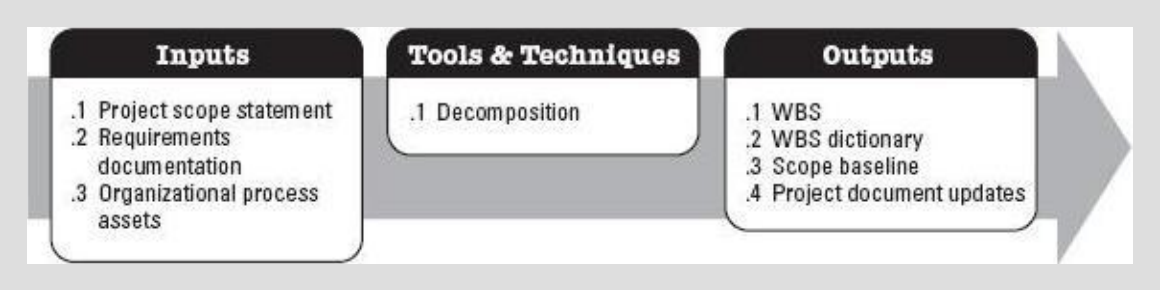
- Project exclusions: generally identifies what is excluded as from the project. Explicitly stating what is out of scope for the project helps to manage stakeholders' expectations.
- Project constraints: lists and describes the specific project constraints associated with the project scope that limits the team's options. When a project is performed under contract, contractual provisions will generally be constraints. Information constraints may be listed in the project scope statement or in a separate log.
- Project assumptions: lists and describes the specific project assumptions associated with the project scope and the potential impact of those assumptions if they prove to be false. Project teams frequently identify, document, and validate assumptions as part of their planning process. Information on assumptions may be listed in the project scope statement or in a separate log.

2. Project Document Updates:

Project documents that may be updated include:

- Stakeholder register.
- Requirements documentation
- Requirements traceability matrix.

Scope - Planning: Create Work Breakdown Structure (WBS)



It is the process of subdividing project deliverables and project work into smaller, more manageable component.
The work breakdown structure (WBS) is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables, with each descending level of the WBS representing an increasing by detailed definition of the project work. The WBS organizes and defines the total scope of the project, and represents the work specified in the current approved project scope statement. The planned work is contained within the lowest level WBS components, which are called work packages. A work package can scheduled, cost estimated, monitored, and controlled. In the context of the WBS, work refers to work products or deliverables that are the result of efforts and not to the effort itself.

Inputs:

1. **Project Scope Statement**

2. **Requirements Documentation**

3. **Organizational Process Assets:**
   The organizational process assets that can influence the create WBS include:
   - Policies, procedures, and templates for the WBS
   - Project files from previous projects.
   - Lessons learned from previous projects.

Tools / Techniques:

Decomposition:
It is the subdivision of project deliverables into smaller, more manageable components until the work and deliverables are defined to the work package level. The work package level is lowest level in the WBS, and is the point at which the cost and activity durations for the work can be reliably estimated and managed. The level of detail for work packages will vary with the size and complexity of the project.
Decomposition of the total project work into work packages generally involves the following activities:

- Identifying and analyzing the deliverables and related work
- Structuring and organizing the WBS
- Decomposing the upper WBS level into lower level detailed component
- Developing and assigning identification codes to the WBS components
- Verifying that the degree of decomposition of the work is necessary and sufficient.

The WBS structure can be created in a number of forms, such as:

- Using phases of the project life cycle as the first level of decomposition, with the product and project deliverables inserted at the second level.
- Using major deliverables as the fist level of decomposition.
- Using subprojects which may be developed by organizations outside the project team, such as contracted work. The seller then develops the supporting contract work breakdown structure as part of the contracted work.

The WBS can be structured as an outline, and organizational chart, a fishbone diagram, or other method. Verifying the correctness of the decomposition requires determining that the lower-level WBS components are those that are necessary and sufficient for completion of the corresponding higher level deliverables. As the work is decomposed to greater level of details, the ability to plan, manage, and control the work is enhanced. However, excessive decomposition can lead to non-productive management efforts, inefficient use of resources, and decreased efficiency in performing the work.
Decomposition may not be possible for a deliverable or subproject that will be accomplished far into future. The project management team usually waits until the deliverable or subproject is clarified so the details of the WBS can be developed. This technique is sometimes referred to as rolling wave planning.

Outputs:

1. **WBS:**
   It is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team, to accomplish the project objectives and create the required deliverables with each descending level of the WBS representing an increasingly detailed definition of the project work. The WBS is finalized by establishing control accounts for the work packages and a unique identifier from a code of accounts. These identifiers provide a structure of hierarchical summation of costs, schedule, and resource information. A control account is a management control point where scope, cost, and schedule are integrated and compared to the earned value for

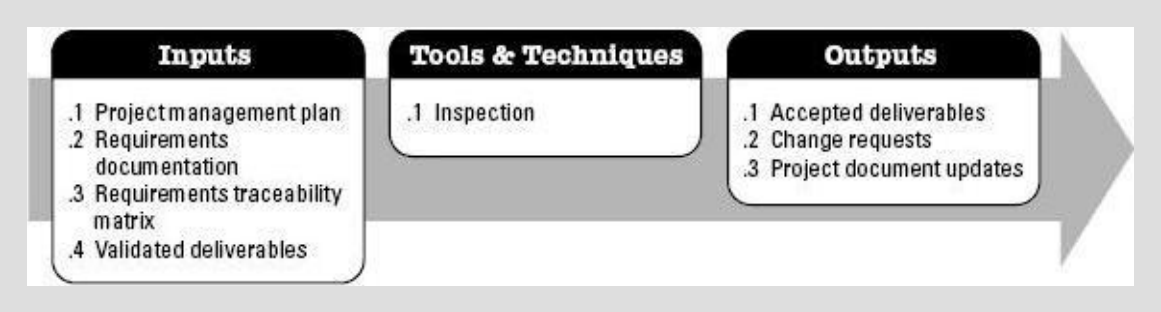
performance measurement. Control accounts are placed at selected management points in the WBS.

2. **WBS Dictionary:**
   It is a document generated by the Create WBS process that supports the WBS. The WBS dictionary provides more detailed descriptions of the components in the WBS, including work packages and control accounts. Information in the WBS dictionary includes:
   - Code of account identifier
   - Description of work
   - Responsible organization
   - List of schedule milestones
   - Associated schedule activities
   - Resources required
   - Cost estimates
   - Quality requirements
   - Acceptance criteria
   - Technical references
   - Contract information

3. **Scope Baseline:**
   It is a component of the project management plan, and it includes:
   - Project scope statement: it includes the product scope description, the project deliverables and defines the product user acceptance criteria.
   - WBS
   - WBS dictionary

4. **Project Document Updates:**
   Project document that may be updated: Requirements Documentation. If approved change requests result from the Create WBS process, then the requirements documentation may need to be updated to include approved changes.

Scope - Monitor & Control: <u>Verify Scope:</u>



It is the process of formalizing acceptance of the completed project deliverables. Verifying scope includes reviewing deliverables with the customer or sponsor to ensure that they are competed satisfactorily and obtaining formal acceptance of deliverables by customer or sponsor.

Scope verification differs from quality control in that scope verification is primarily concerned with acceptance of the deliverables, while quality control is primarily concerned with correctness of the deliverables and meeting the quality requirements specified for the deliverables. Quality control is generally performed before scope verification, but these two processes can be performed in parallel.

Inputs:

1. **Project Management Plan**
   The project management plan contains the scope baseline. Components of the scope baseline include:
   - Project scope statement
   - WBS
   - WBS dictionary

2. **Requirements Documentation**
   The requirements documentation lists all the project, product, technical, and other types of requirements that must be present for the project and product, along with their acceptance criteria.

3. **Requirements Traceability Matrix**
   It links requirements to their origin and tracks them throughout the project life cycle.

4. **Validated Deliverables**
   Validated deliverables have been completed and checked for correctness by the Perform Quality Control process.

Tools / Techniques:

Inspection:
It includes activities such as measuring, examining, and verifying to determine whether work and deliverables meet requirements and product acceptance criteria. Inspections are sometimes called reviews, product reviews, audits, and walkthroughs. In some application areas, these different terms have narrow and specific meaning.

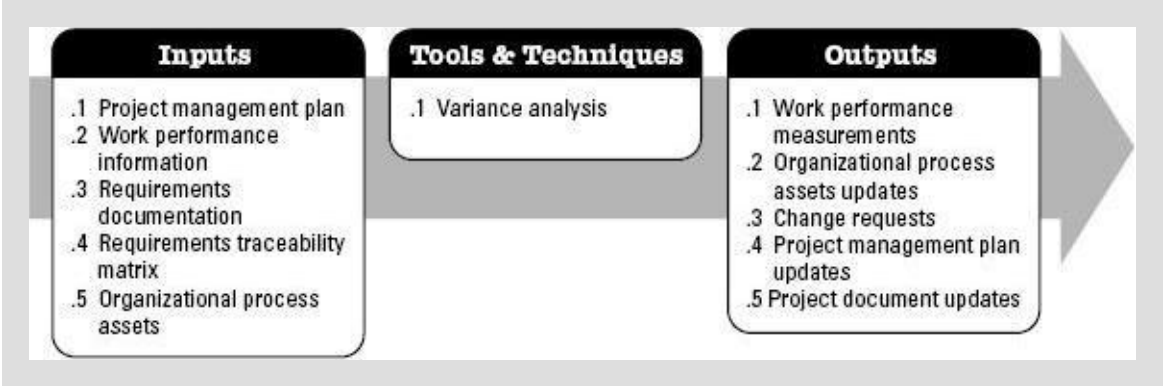
Outputs:

1. **Accepted Deliverables**
   Deliverables that meet the acceptance criteria are formally signed off and approved by the customer or sponsor. Formally documentation received from the customer or sponsor acknowledging formal stakeholder acceptance of the project's deliverables is forwarded for the Close Project or Phase process.

2. **Change Requests**
   Those completed deliverables that have not been formally accepted are documented, along with the reasons for non-acceptance. Those deliverables may require a change request for defect repair. The change request are processed fro review and disposition through the Perform Integrated Change Control process.

3. **Project Document Updates**
   Project documents that may be updated as a result of the Verify Scope process include any documents that define the product or report status on product completion.

Scope - Monitor & Control: Control Scope



It is the process of monitoring the status of the project and product scope and managing changes to the scope baseline. Controlling the project scope ensures all requested changes and recommended corrective or preventive actions are processed through the Perform Integrated Change Control process.
Project scope control is also used to manage the actual changes when they occur and is integrated with the other control processes. Uncontrolled changes are often referred to as project scope creep. Change is inevitable, thereby mandating some type of change control process.

Inputs:

1. **Project Management Plan:**
   It contains the following information that is used to control scope:
   - Scope baseline
     It is compared to actual results to determine if a change, corrective action, preventive action is necessary.
   - Scope management plan
     It describes how the project scope will be managed and controlled.
   - Change management plan
     It defines the process for managing change on the project.
   - Configuration management plan
     It defines those items that are configurable, those items that require formal change control, and the process for controlling changes to such items.
   - Requirements management plan
     It can include how requirements activities will be planned, tracked, and reported and how changes to the product, service, or result requirements will be initiated. It also describes how impacts will be analyzed and the authority levels required approving those changes.

2. **Work Performance Information**

Information about project progress, such as which deliverables have started, their progress and which deliverables have finished.

3. **Requirements Documentation**

4. **Requirements Traceability Matrix**

5. **Organizational Process Assets**
   The organizational process assets that can influence the Control Scope process include:
   - Existing formal and informal scope control-related policies, procedures, and guidelines.
   - Monitoring and reporting methods to be used.

Tools / Techniques:

Variance Analysis
Project performance measurements are used to assess the magnitude of variation from the original scope baseline. Important aspects of project scope control include determining the cause and degree of variance relative to the scope baseline and deciding whether corrective or preventive action is required.

Outputs:

1. **Work Performance Measurements**
   Measurements can include planned vs. actual technical performance or other scope performance measurements. This information is documented and communicated to stakeholders.

2. **Organizational Process Assets Updates**
   Organizational process assets that may be updated include:
   - Causes of variances
   - Corrective action chosen and the reasons
   - Other types of lessons learned from project scope control.

3. **Change Requests**
   Analysis of scope performance can result in a change request to the scope baseline or other components of the project management plan. Change requests can include preventive or corrective actions or defect repairs. Change requests are processed for review and disposition according to the Perform Integrated Change Control process.

4. **Project Management Plan Updates**

- Scope Baseline Updates
- If the approved change requests have an effect upon the project scope, then the scope statement, the WBS dictionary are revised and reissued to reflect the approved changes.
- Other Baseline Updates
- If the approved change requests have an effect on the project scope, then the corresponding cost baseline and schedule baselines are revised and reissued to reflect the approved changes.

5. Project Document Updates

Project documents that may be updated include:

- Requirements documentation
- Requirements traceability matrix

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Project Time Management

January 2012

TARABOT
Iraq Administrative
Reform Project

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Time - Monitor & Control: Control Schedule 30

Course Syllabus

1. **Course Title**: Project Management Processes / Project Time Management

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 6 Hours (1 day)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in Project Management and to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics in Project Management.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    - Learn Project Time Management process, tools, techniques and skills.
    - Learn to apply a variety of Project Time Management practices and planning tools as means of administering, directing and coordinating projects.

13. Course Policies:

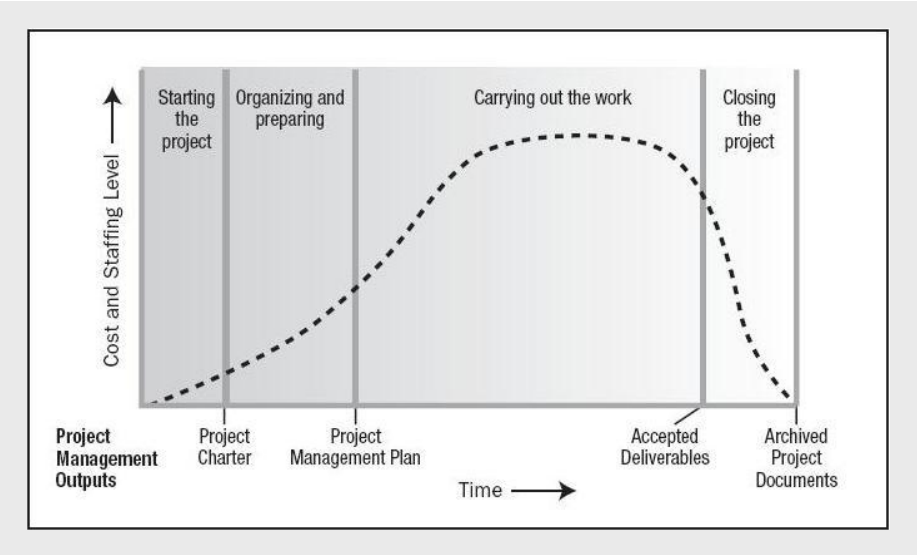
- Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.
- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. Methodology: The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Introduction

The project life cycle

A project life cycle is collection of general sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. A life cycle can be documented with a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.



Project Management Processes for a Project

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. This application of knowledge requires the effective management of appropriate processes.

In this framework, the five Project Management Process Groups that required for any project are clearly identified and described. These five process groups have clear dependencies and are typically performed in the same sequence on each project. They are independent of application areas or industry focus. Individual process groups' individual constituent processes are often iterated prior to completing the project. The constituent processes can have interactions within a

process group and among process group. The nature of these interaction various from project to project and may or may not be performed in a particular order.

A process group includes the constituent project management processes that are linked by the respective inputs and outputs where the result or outcome of one process becomes the input to another.

A process is a set of interrelated actions and activities performed to achieve a pre-specific product, result, or service. Each process is characterized by its inputs, the tools and techniques that can applied, and the resulting outputs. The project manager must consider organizational process assets and enterprise environmental factors. These must be taken into account for every process, even if they are not explicitly listed as inputs in the process specification. Organizational process assets provide guidelines and criteria for tailoring the organization's processes to the specific needs of the project. Enterprise environmental factors may constrain the project management options.

In order for a project to be successful, the project team must:

- Select appropriate processes required to meet the project deliverables.
- Use a defined approach that can be adopted to meet requirements
- Comply with requirements to meet stakeholder needs and expectations
- Balance the competing demands of scope, cost, quality, resources, and risk to produce the specific product, service, or result.

Project management processes apply globally and across industry groups. Good practice means there is general agreement that the application of project management processes has been shown to enhance the chances of success over a wide range of products.

This framework describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve. Project management processes are grouped into five categories known as Project Management Process Groups:

- **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specification.
- **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify

any areas in which changes to the plan are required; and initiate the corresponding changes.

- **Closing Process Group:** Those Processes performed to finalize all activities across all Process Groups to formally close the project or phase.

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
Project Scope Management		4- Collect Requirements 5- Define Scope 6- Create WBS		33- Verifty Scope 34- Control Scope	
Project Time Management		7- Define Activities 8- Sequence Activities 9- Estimate Activity Resou 10- Estimate Activity Durati 11-Develop Schedule		35- Control Schedule	
Project Cost Management		12- Estimate Cost 13- Determine Budget		36- Control Cost	
Project Quality Management		14- Plan Quality	24- Perform Quality Assurance	37- Perform Qualtiy Control	
Project Human Resources Management		15- Develop Human Resource plan	25- Acquire Project Team 26- Develop Project Team 27- Manage Project Team		
Project Communication Management	2- Identify Stakeholder	16- Plan Communication	28- Distribute Information 29- Manage Stakeholder Expectations	38- Report Performance	
Project Risk Management		17-Plan Risk Management 18- Identify Risks 19- Perform Qualitative Risk Analysis 20- Perform Quantitative Risk Analysis 21-Plan Risk Responses		39- Monitor & Control Risk	
Project Procurement Management		22- Plan Procurement	30- Conduct Procurement	40- Administer Procurements	42- Clost Procurements

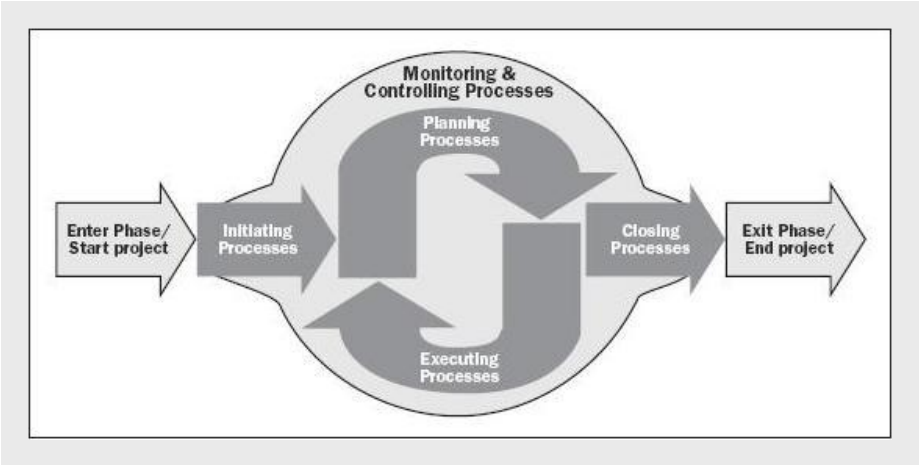
The above table reflects the mapping of the 42 project management process into five Project Management Process Groups and the nine Project Management Knowledge Areas:

- **Project Integration Management:** It includes the processes and activities needed to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Group.
- **Project Scope Management:** It includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
- **Project Time Management:** It includes the processes required to manage timely completion of the project.
- **Project Cost Management:** It includes the processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management:** It includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate.
- **Project Human Resource Management:** It includes the processes that organize, manage, and lead the project team. The project team is comprised of the people with assigned roles and responsibilities for completing the project.
- **Project Communication Management:** It includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.
- **Project Risk Management:** It includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring & control on a project. The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project.
- **Project Procurement Management:** It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

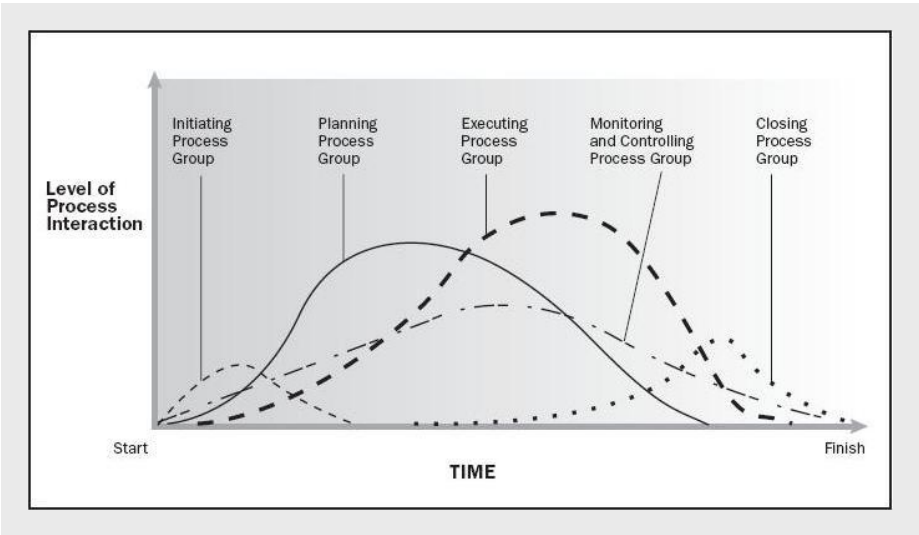
Common Project Management Process Interactions

The project management processes are presented as discrete elements with well-defined interfaces. However, in practice they overlap and interact in ways that are not completely detailed here. Most experienced project management practitioners recognize there is more than one way to manage a project. The required Process Group and their constituent processes are guides for applying appropriate project

management knowledge and skills during the project. The application of the project management processes is iterative, and many processes are repeated during the project. The interactive nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups.



In addition, since management of a project is a finite effort, the Initiating Process Group begins the project, and the Closing Process Group ends it. Project Management Process Groups are linked by the outputs they produce. The Process Groups are seldom either discrete or on-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project. The Planning Process Group provides the Execution Process Group with the Project Management plan and project documents, and, as the project progresses, it often entails updates to the project management plan and the project documents.



Project Management Process Groups and Knowledge Areas mapping

Knowledge Area	Initiating Process Group	Planning Process Group	Execution Process Group	Monitoring & Controling Process Group	Closing Process Group
Project Integration Management	1- Develop Project Charter	3- Develop Project Management Plan	23- Direct & Manage Project Execution	31- Monitor & Control Project Work 32- Perform Intergarated Change Control	41- Clost Project or Phase
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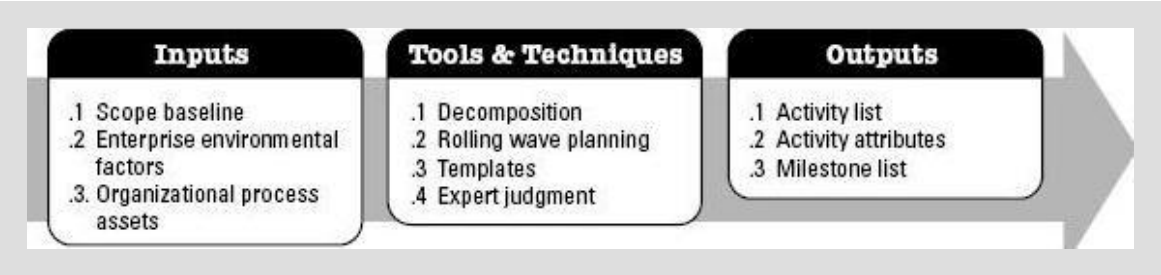
Time - Planning: Define Activities



It is the process of identifying the specific actions to be performed to produce the project deliverables. The create WBS process identifies the deliverables at the lowest level in the Work Breakdown Structure, the work packages. Project work packages are typically decomposed into smaller components called **activities** that present the work necessary to complete the work package. Activities provide a basis for estimating, scheduling, execution, and monitoring and controlling the project work. Implicit in this process is defining and planning the schedule activities such that the project objectives will be met.

Inputs:

1. **Scope Baseline:**
   The project deliverables, constraints, and assumptions documented in the project scope baseline are considered explicitly while defining activities.

2. **Enterprise Environmental Factors:**
   The enterprise environmental factors that can influence the define activities process include the **Project Management Information System (PMIS).**

3. **Organizational Process Assets**
   The organizational process assets that can influence the define activities process includes:
   - Existing formal and informal activity planning-related policies, procedures, and guidelines, such as the scheduling, methodology, that are considered in developing the activity definitions.
   - Lessons learned knowledge base containing historical information regarding activities lists used to previous similar projects

Tools / Techniques:

1. **Decomposition**
   The technique of decomposition, as applied to defining activities, involves subdividing the project work packages into smaller, more manageable component called activities. Activities represent the effort needed to complete a work package. The define activities process defines the final outputs as activities rather than deliverables, as done in the create WBS process.
   The activity list, WBS, and WBS dictionary can be developed either sequentially or concurrently, with the WBS and WBS dictionary as the basis for development of the final activity list. Each work package within the WBS is decomposed into the activities required to produce the work package deliverables. Involving team members in the decomposition can lead to better and more accurate results.

2. **Rolling Wave Planning**
   It is a form of progressive elaboration planning where the work to be accomplished in the near term is planned in detail and future work is planned at a higher level of the WBS. Therefore, work can be exist at various levels of details depending on where it is in the project life cycle.

3. **Templates**
   A standard activity list or a portion of an activity list from a previous project is often usable as a template for a new project. The related activity attributes information in the templates can also contain other descriptive information useful in defining activities. Templates can also be used to identify typical schedule milestones.

4. **Expert Judgment**
   Project team members or other experts, who are experienced and skilled in developing detailed project scope statements, the WBS, and project schedules, can provide expertise in defining activities.

Outputs:

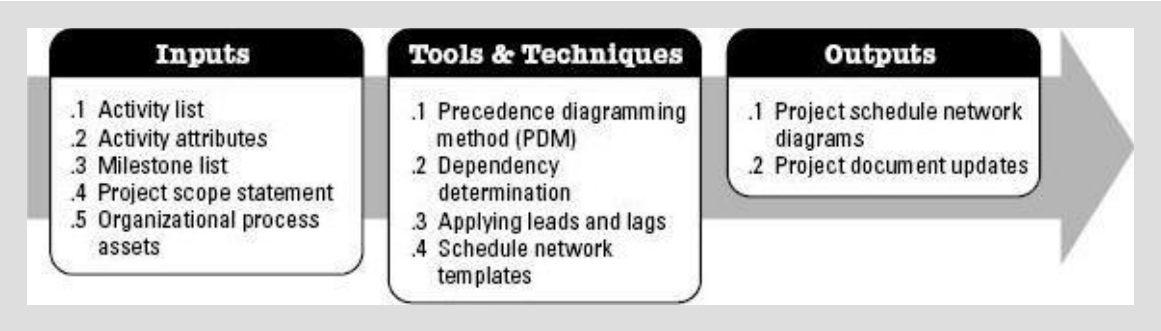
1. **Activity List**
   It is a comprehensive list including all schedule activities required on the project. The activity list includes the activity identifier and a scope of work description for each activity in sufficient detail to ensure that project team members understand what work is required to be completed.

2. **Activity Attributes**
   Activity attributes extend the description of the activity by identifying the multiple components associated with each activity. The components for

each activity evolve over time. During the initial stages of the project they include the activity ID, WBS ID, and Activity Name, and when completed may include activity codes, activity description, predecessor activities, successor activities, logical relationships, leads and lags, resource requirements, imposed dates, constraints, and assumptions. Activity attributes can be used to identify the person responsible for executing the work, geographic area, or place where the work has to be performed, and activity type such as level of efforts (LOE), discrete effort, and apportioned effort (AE). Activity attributes are used for schedule development and for selecting ordering, and sorting the planned schedule activities in various ways within reports. The number of attributes varies by application area.

3. **Milestone List**
   A milestone is a significant point or event in the project. A milestone list identifies all milestones and indicates whether the milestone is mandatory, such as those required by contract, or optional, such as those based upon historical information.

Time – Planning: Sequence Activities



It is the process of identifying and documenting relationships among the project activities. Activities are sequenced using logical relationships. Every activity and milestone except the first and last are connected to at least one predecessor and one successor. It may be necessary to use lead or lag time between activities to support a realistic and achievable project schedule. Sequencing can be performed by using project management software or by using manual or automated technique.

Inputs:

1. **Activity List**

2. **Activity Attributes**

3. **Milestone List**

4. **Project Scope Statement**

5. **Organizational Process Assets**
   The organizational process assets that can influence the Sequence Activities process include: project files from the corporate knowledge base used for scheduling methodology.

Tools / Techniques:

1. **Precedence Diagramming Method (PDM)**
   It is a method used in Critical Path Methodology (CPM) for constructing a project schedule network diagram that uses boxes or rectangles, referred to as nodes, to represent activities, and connects them with arrows that show the logical relationships that exist between them. This technique is also called activity-on-node (AON), and is the method used by most project management software packages.
   PDM includes four types of dependencies or logical relationships:

- Finish-to-start (FS)
- Finish-to-finish (FF)
- Start-to-start (SS)
- Start-to-finish (SF)

2. Dependency Determination

Three types of dependencies are used to define the sequence among the activities:

- Mandatory dependencies
  Mandatory dependencies are those that are contractually required or inherent in the nature of the work. The project team determines which dependencies are mandatory during the process of sequencing the activities. Mandatory dependencies often involve physical limitations, such as on a construction project where it is impossible to erect the superstructure until after the foundation has been built, or on an electronics project, where a prototype must be built before it can be tested. Mandatory dependencies are also sometimes referred to as hard logic.
- Discretionary dependencies
  The project team determines which dependencies are discretionary during the process of sequencing the activities. Discretionary dependencies are sometimes referred to as preferred logic, preferential logic, or soft logic. Discretionary dependencies are established based on knowledge of best practices within a particular application area or some unusual aspect of the project where a specific sequence is desired, even though there may be other acceptable sequences. Discretionary dependencies should be fully documented since they can create arbitrary total float values and can limit later scheduling options. When fast tracking techniques are employed, these discretionary dependencies should be reviewed and considered for modification or removal.
- External dependencies
  The project management team determines which dependencies are external during the process of sequencing the activities. External dependencies involve a relationship between project activities and non-project activities. These dependencies are usually outside the project team's control.

3. Applying Leads and Lags

The project management team determines the dependencies that may require a lead or a lag to accurately define the logical relationship. The use of leads and lags should not replace schedule logic. Activities and their related assumptions should be documented.

A lead allows an acceleration of the successor activity. A lag directs a delay in the successor activity.

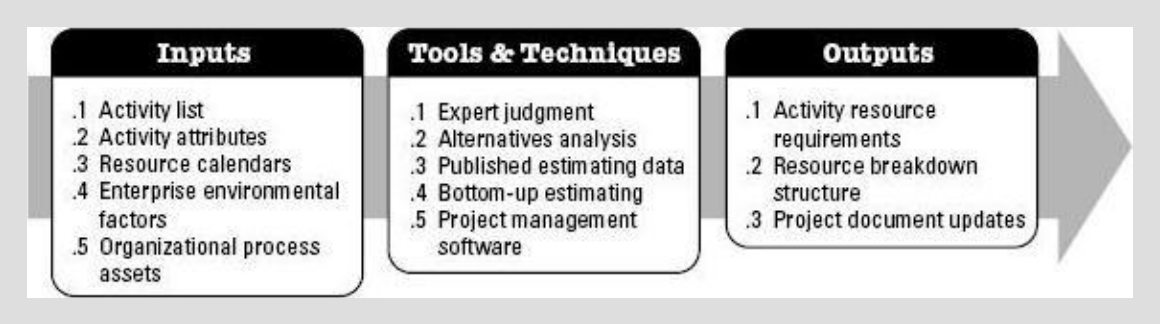
4. **Schedule Network Templates**
   Standardized schedule network diagram templates can be used to expedite the preparation of networks of project activities. They can include an entire project or only a portion of it. Portions of a project schedule network diagram are often referred to as a sub-network or a fragment network. Sub-network templates are especially useful when a project includes several identical or nearly identical deliverables, such as floors on a high-rise office building, clinical trials on a pharmaceutical research project, coding program modules on a software project, or the start-up phase of a development project.

Outputs:

1. **Project Schedule Network Diagrams**
   These are schematic displays of the project's schedule activities and logical relationships among them, also referred to as dependencies. A project schedule network diagram can be produced manually or by using project management software. It can include full project details, or have one or more summary activities. A summary narrative can accompany the diagram and describe the basis approach used to sequence the activities. Any unusual activities sequences within the network should be fully described within the narrative.

2. **Project Document Updates**
   Project documents that may be updated include:
   - Activity lists
   - Activity attributes
   - Risk register

Time – Planning: Estimate Activity Resources



It is the process of estimating the type and quantities of material, people, equipment, or supplies required to perform each activity.

Inputs:

1. **Activity List**
   It identifies the activities which will need resources.

2. **Activity Attributes**
   It is developed during the define activities and sequence activities processes provide the primary data input for use in estimating those resources required for each activity in the activity list.

3. **Resource Calendars**
   Information on which resources are potentially available during planned activity period, and is used for estimating resource utilization. Resource calendars specify when and how long identified project resources will be available during the project. This information may be at the activity or project level. This knowledge includes consideration of attributes such as resource experience and / or skill level, as well as various geographical locations from which the resources originate and when they may be available.
   The composite resource calendar includes the availability, capabilities, and skills of human resources.

4. **Enterprise Environmental Factors**
   The enterprise environmental factors that can influence the estimate activity resources process include but are not limited to resource availability and skills.

5. **Organizational Process Assets**
   The organizational process assets that can influence the Estimate Activity Resources process include:
   - Policies and procedures regarding staffing
   - Policies and procedures relating to rental and purchase of supplies and equipment.
   - Historical information regarding types of resources used for similar work on previous projects.

Tools / Techniques:

1. **Expert Judgment**
   It is often required to assess the resource-related inputs to this process. Any group or person with specialized knowledge in resource planning and estimating can provide such expertise.

2. **Alternatives Analysis**
   Many schedule activities have alternative methods of accomplishment. They include using various levels of resource capacity or skills, different size or type of machines, different tools, and make-or-buy decisions regarding the resource.

3. **Published Estimating Data**
   Several companies routinely publish updated production rates and unit costs of resources for an extensive array of labor trades, material, and equipment for different countries and geographical locations within countries.

4. **Bottom-Up Estimating**
   When an activity cannot be estimated with a reasonable degree of confidence, the work within the activity is decomposed into more details. The resource needs are estimated. These estimates are then aggregated into a total quantity for each of the activity's resources. Activities may or may not have dependencies between them that can affect the application and use of resources. If there are dependencies, this pattern of resources usage is reflected and documented in the estimated requirements of the activity.

5. **Project Management Software**
   Project management software has the capability to help plan, organize, and manage resource pools and develop resource estimates. Depending on the sophistication of the software, resource breakdown structure, resource availability, resource rates and various resource calendars can be defined to assist in optimizing resource utilization.

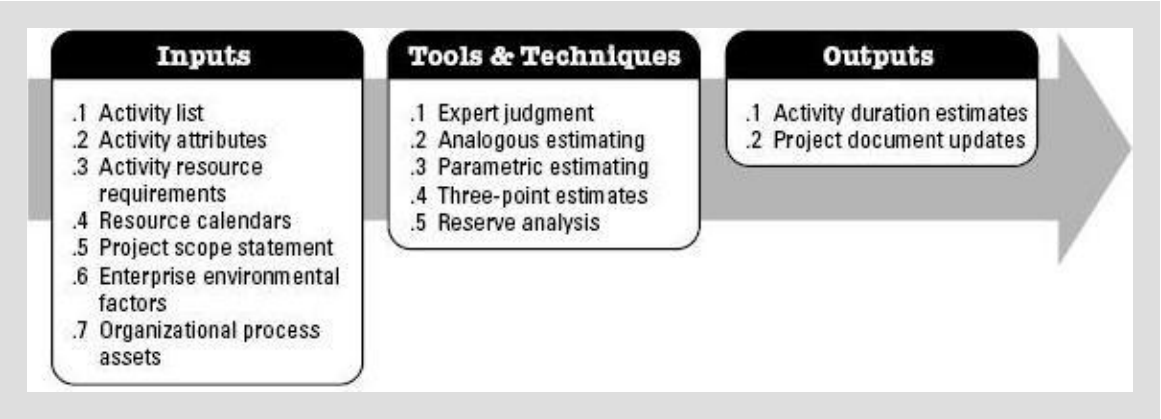
Outputs:

1. **Activity Resource Requirements**
   The output of the Estimate Activity Resources process identifies the types and quantities of resources required for each activity in a work package. These requirements can then be aggregated to determine the estimated resources for each work package. The amount of detail and the level of specificity of the resource requirement descriptions can vary by application area. The resource requirements documentation for each activity can include the basis of estimate for each resource, as well as the assumptions that were made in determining which types of resources are applied, their availability, and what quantities are used.

2. **Resource Breakdown Structure**
   It is a hierarchical structure of the identified resources by resource category and resource type. Examples of resource categories include labor, material, equipment, and supplies. Resource types can include the skill level, grade level or other information as appropriate to the project. The resource breakdown structure is useful for organizing and reporting project schedule data with resource utilization information.

3. **Project Document Updates**
   Project documents that may be updated include:
   - Activity List
   - Activity Attributes
   - Resource Calendar

Time – Planning: Estimate Activity Duration



It is the process of approximating the number of work period needed to complete individual activities with estimated resources. Estimating activity durations uses information on activity scope of work, required resource types, estimated resource quantities, and resource calendars.
The inputs for estimates of activity duration originate from the person or group on the project team who is most familiar with the nature of the work in the specific activity. The duration estimate is progressively elaborated and the process considers the quality and availability of the input data.
The Estimate Activity Durations process requires that the amount of work effort required to complete the activity is estimated and the amount of resources to be applied to complete the activity is estimated; these are used to approximate the number of work periods (activity duration) needed to complete the activity. All data and assumptions that support duration estimating are documented for each estimate of activity duration.
Most project management software for scheduling will handle this situation by using a project calendar and alternative work-period resource calendars that are usually identified by the resources that require specific work periods. In addition to this sequencing logic, the activities will be performed according to the project calendar and the appropriate resource calendars.

Inputs:

1. **Activity List**

2. **Activity Attributes.**

3. **Activity Resource Requirements**
   The estimated activity resource requirements will have an effect on the duration of the activity, since the resources assigned to the activity and the availability of those resources will significantly influence the duration of most activities.

4. **Resource Calendars**
   The resource calendar developed as part of the Estimating Activity Resources process can include the type, availability, and capabilities of human resources. The type, quantity, availability, and capability, when applicable, of both equipment and material resources, which could significantly influence the duration of schedule activities, are also considered.

5. **Project Scope Statement**
   The constraints and assumptions from the project scope statement are considered when estimating the activity durations. Examples of assumption include:
   - Existing conditions
   - Availability of information
   - Length of the reporting periods

   Examples of constraints include:
   - Available skilled resources
   - Contract terms and requirements

6. **Enterprise Environmental Factors**
   The factors that can influence the Estimating Activity Durations process include:
   - Duration estimating databases and other reference data..
   - Productivity metrics
   - Published commercial information

7. **Organizational Process Assets**
   The organizational process assets that can influence the Estimate Activity Durations process include:
   - Historical duration information
   - Project calendars
   - Scheduling methodology
   - Lessons learned

Tools / Techniques:

1. **Expert Judgment**
   Expert judgment, guided by historical information, can provide duration estimate information or recommended maximum activity durations from period similar projects. Expert judgment can also be used to determine whether to combine methods of estimating and how to reconcile differences between them.

2. Analogous Estimating

Analogues estimating use parameters such as duration, budget, size, weight, and complexity, from a previous, similar project, as the basis for estimating the same parameter or measure for a future project. When estimating durations, this technique relies on the actual duration of previous, similar projects as the basis for estimating the duration of current project. It is a gross value estimating approach, sometimes adjusted for known differences in project complexity. Analogous duration estimating is frequently used to estimate project duration when there is a limited amount of detailed information about the project. Analogous estimating is generally less costly and time consuming than other techniques, but it is also generally less accurate. Analogous cost estimates can be applied to a total project or to segments of a project and may be used in conjunction with other estimating methods. Analogous estimating is most reliable when the previous activities are similar in fact and not just in appearance, and the project team members preparing the estimates have the needed expertise.

3. Parametric Estimating

Parametric estimating uses a statistical relationship between historical data and other variables to calculate an estimate for activity parameters, such as cost, budget, and duration. Activity durations can be quantitatively determined by multiplying the quantity of work to be performed by labor hours per unit of work. This technique can produce higher levels of accuracy depending upon the sophistication and underlying data built into the model. Parametric time estimates can be applied to a total project or to segments of a project, in conjunction with other estimating methods.

4. Three-point Estimates :

The accuracy of activity duration estimates can be improved by considering estimation uncertainty and risk. This concept originated with the Program Evaluation and Review Technique (PERT). PERT uses three estimates to define an approximate range for an activity's duration:

- Most likely (tm)
- Optimistic (to)
- Pessimistic (tp)
- PERT analysis calculates an Expected (tE) activity duration using a weighted average of these three estimates:

$$tE = (to + 4\ tm + tp) / 6$$

Duration estimates based on this equation may provide more accuracy, and the three points clarify the range of uncertainty of the duration estimates.

5. Reserve Analysis

Duration estimates may include contingency reserves into the overall project schedule to account for schedule uncertainty. The contingency reserve may be a percentage of the estimated activity duration, a fixed number of work periods, or may be developed by using quantitative analysis methods. As more precise information about the project becomes available, the contingency reserve may be used, reduced, or eliminated. Contingency should be clearly identified in schedule documentation.

Outputs:

1. **Activity Duration Estimates**

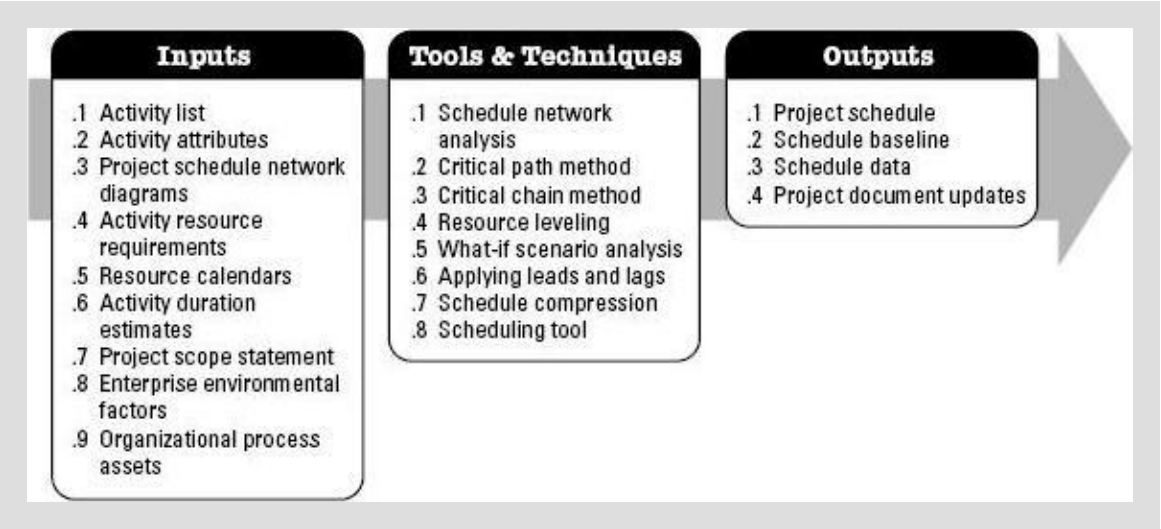
   Activity duration estimates are quantitative assessments of the likely number of work periods that will be required to complete an activity. Duration estimates do not include any lags. Activity duration estimates may include some indication of the rang of possible results

2. **Project Document Updates**

   Project documents that may be updated include:

   - Activity attributes
   - Assumptions made in developing the activity duration estimate such as skill levels and availability.

Time – Planning: Develop Schedule



It is the process of analyzing activity sequences, duration, resource requirements and schedule constraints to create the project schedule. Entering the activities, durations, and resources into the schedule tool generates a schedule with planned dates for completing project activities. Developing an acceptable project schedule is often an iterative process. It determines the planned start and finish dates for project activities and milestones. Schedule development can require the review and revision of duration estimates and resource estimates to create an approved project schedule that can serve as a baseline to track progress. Revising and maintaining a realistic schedule continues throughout the project as work progresses, the project management plan changes, and the nature of risk events evolves.

Inputs:

1. **Activity List**

2. **Activity Attributes**

3. **Project Schedule Network Diagrams**

4. **Activity Resource Requirements**

5. **Resource Calendars**

6. **Activity Duration Estimates**

7. **Project Scope Statement**
   The project statement of work contains assumptions and constraints that can impact the development of the project schedule.

8. **Enterprise Environmental Factors**

   The factors that can influence the Develop Schedule process include a scheduling tool that can be used in developing the schedule.

9. **Organizational Process Assets**

   The organizational process assets that can influence the Develop Schedule process include:

   - Scheduling methodology

Tools / Techniques:

1. **Schedule Network Analysis**

   It is a technique that generates the project schedule. It employs various analytical techniques, such as critical path method, critical chain method, what-if analysis, and resource leveling to calculate the early and late start and finish dates for the uncompleted portions of project activities. Some network paths may have points of path convergence or path divergence that can be identified and used in schedule compression or other analyses.

2. **Critical Path Method**

   It calculates the theoretical early start and finish dates, and late start and finish dates, for all activities without regard for any resource limitations, by performing a forward and backward pass analysis through the schedule network. The resulting early and late start and finish dates are not necessarily the project schedule; rather, they indicate the time periods within which the activity could be scheduled, given activity durations, logical relationships, leads, lags, and other known constraints. Calculated early start and finish dates, and late start and finish dates, may be affected by activity total float, which provides schedule flexibility and, may be positive, negative, or zero. On any network path, the schedule flexibility is measured by the positive difference between early and late dates, and is termed "total float." Critical paths have either a zero or negative total float, and schedule activities on a critical path are called "critical activities." A critical path is normally characterized by zero total float on the critical path. Networks can have multiple near critical paths. Adjustments to activity durations, logical relationships, leads and lags, or other schedule constraints may be necessary to produce network paths with a zero or positive total float. Once the total float for a network path has been calculated then the free float, the amount of time that an activity can be delayed without delaying the early start date of any immediate successor activity within the network path, can also be determined.

3. **Critical Chain Method**
   It is a schedule network analysis technique that modifies the project schedule to account for limited resources. Initially, the project schedule network diagram is built using duration estimates with required dependencies and defines constraints as inputs. The critical path is then calculated. After the critical path is identified, resource availability is entered and the resource-limited schedule result is determined. The resulting schedule often has an altered critical path. The resource-constrained critical path is known as the critical chain. The critical chain method adds duration buffers that are non-work schedule activities to manage uncertainty. One buffer, placed at the end of the critical chain, is known as the project buffer and protects the target finish date from slippage along the critical chain. Additional buffers, known as feeding buffers, are placed at each point that a chain of dependent tasks not on the critical feeds into the critical chain. Feeding buffers thus protect the critical chain from slippage along the feeding chains. The size of each buffer should account for the uncertainty in the duration of the chain of dependent tasks leading up to that buffer. Once the buffer schedule activities are determined, the planned activities are scheduled to their latest possible planned start and finish dates. Consequently, in lieu of managing the total float of network paths, the critical chain method focuses on managing remaining buffer durations against the remaining durations of task chains.

4. **Resource Leveling**
   It is a schedule network analysis technique applied to a schedule that has already been analyzed by the critical path method. Resource leveling can be used when shared or critical required resources are only available at certain times, are only available in limited quantities, or to keep resource usage at a constant level. Resource leveling is necessary when resources have been over-allocated, such as when a resource has been assigned to two or more activities during the same time period, when shared or critical required resources are only available at certain times or are only available in limited quantities. Resource leving can often cause the original critical path to change.

5. **What-If Scenario Analysis**
   This is an analysis of the question "What if the situation represented by scenario 'X' happens?" A schedule network analysis is performed using the schedule to compute the different scenarios, such as delaying a major component delivery, extending specific engineering durations, or introducing external factors, such as a strike or a change in the permitting process. The outcome of the what-if scenario analysis can be used to assess the feasibility of the project schedule under adverse conditions, and in preparing contingency and response plans to overcome or mitigate the impact of unexpected situations. Simulation involves calculating multiple project

durations with different sets of activity assumptions. The most common technique is Monte Carlo Analysis, in which a distribution of possible activity durations is defined for each activity and used to calculate a distribution of possible outcomes for the total project.

6. **Applying Leads and Lags**
   Leads and lags are refinements applied during network analysis to develop a viable schedule.

7. **Schedule Compression**
   Schedule compression shortens the project schedule without changing the project scope, to meet schedule constraints, imposed dates, or other schedule objectives. Schedule compression techniques include:

   a. **Crashing**
      A scheduling compression technique in which cost and schedule tradeoffs are analyzed to determine how to obtain the greatest amount of compression for the least incremental cost. Examples of crashing could include approving overtime, bringing in additional resources, or paying to expedite delivery to activities on the critical path. Crashing only works for activities where additional resources will shorten the duration. Crashing does not always produce a viable alternative and may result in increased risk and / or cost.

   b. **Fast tracking**
      A schedule compression technique in which phases or activities normally performed in sequence are performed in parallel. Fast tracking may result in rework and increased risk. Fast tracking only works if activities can be overlapped to shorten the duration.

8. **Scheduling Tool**
   Automated scheduling tools expedite the scheduling process by generating start and finish dates based on the inputs of activities, network diagrams, resources and activity durations. A scheduling tool can be used in conjunction with other project management software applications as well as manual methods.

Outputs:

1. **Project schedule**
   As a minimum, the project schedule includes a planned start date and planned finish date for each activity. If resource planning is done at an early stage, then the project schedule would remain preliminary until resource assignment have been confirmed and scheduled start and finish dates are established. This process usually happened no later than completion of the

project management plan. A project target schedule may also be developed with a define target start and target finish for each activity. The project schedule may be presented in summary form, sometimes referred to as the master schedule or milestone schedule, or presented in detail. Although a project schedule can be presented in tabular form, it is more often presented graphically, using one or more of the following formats:

a. Milestone charts
   These charts are similar to bar charts, but only identify the scheduled start or completion of major deliverables and key external interfaces.
b. Bar charts
   These charts, with bars representing activities, show activity start and end dates, as well as expected durations. Bar charts are relatively easy to read, and are frequently used in management presentations. For control and management communication, the broader, more comprehensive summary activity, sometimes referred to as a hammock activity, is used between milestones or across multiple interdependent work packages, and is displayed in bar chart reports.
c. Project schedule network diagrams
   These diagrams, with activity date information, usually show both the project network logic and the project's critical path schedule activities. These diagrams can be presented in the activity-on-node diagram format, or bar chart.

2. Schedule baseline

It is a specific version of the project schedule developed from the schedule network analysis. It is accepted and approved by the project management team as the schedule baseline with baseline start dates and baseline finish dates. The schedule baseline is a component of the project manage

3. Schedule Data

The schedule data for the project schedule includes at least the schedule milestone, schedule activities, activities attributes, and documentation of all identified assumptions and constraints. The amount of additional data varies by application area. Information frequently supplied as supporting detail includes:

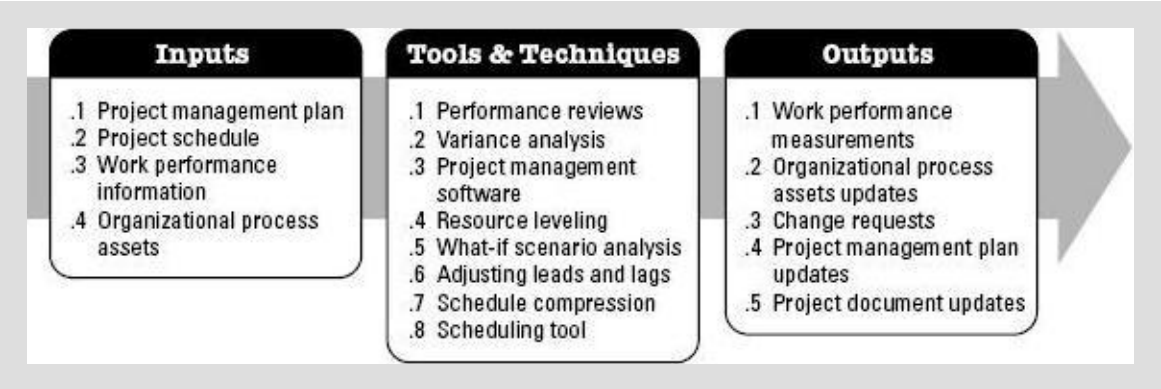
A. Resource requirements by time period, often in the form of a resource histogram.
B. Alternative schedules, such as best-case or worst-case, not resource-leveled, or resource-leveled, with or without imposed dates.
C. Scheduling of contingency reserves
   Schedule data could include such items as resource histograms, cash-flow projections, and order and delivery schedules.

4. Project Document Updates

5. Project document that may be updated include:

- Activity resource requirements
  Resource leveling can have a significant effect on preliminary estimates of the types and quantities of resources required. If the resource-leveling analysis changes the project resource requirements, then the project resource requirements are updated.
- Activity attributes
  Activity attributes are updated to include any revised resource requirements and any other revisions generated by the Develop Schedule process.
- Calendar
  The calendar for each project may use different calendar units as the basis for scheduling the project.
- Risk register
  The risk register may need to be updated to reflect opportunities or threats perceived through scheduling assumptions

Time - Monitor & Control: Control Schedule



It is the process of monitoring the status of the project to update project progress and manage changes to the schedule baseline. Schedule control is concerned with:

- Determining the current status of the project schedule.
- Influencing the factors that create schedule changes.
- Determining that the project schedule has changed.
- Managing the actual changes as they occur.

Inputs:

1. **Project Management Plan**
   It contains the schedule management plan and the schedule baseline. The schedule management plan describes how the schedule will be managed and controlled. The schedule baseline is used to compare with actual results to determine if a change, corrective action, or preventive action is necessary.

2. **Project Schedule**
   The most recent version of the project schedule with notations to indicate updates, completed activities, and started activities as of the indicated data date.

3. **Work Performance Information**
   Information about project progress, such as which activities have started, their progress, and which activities have finished.

4. **Organization Process Assets**
   The organizational process assets that influence the Control Schedule process include:
   - Existing formal and informal schedule control-related policies, procedure, and guidelines
   - Schedule control tools
   - Monitoring and reporting methods to be used.

Tools / Techniques:

1. **Performance Reviews**

   Performance reviews measure, compare, and analyze schedule performance such as actual start and finish dates, percent complete, and remaining duration for work in progress. if earned value management (EVM) is utilized the schedule variance (SV) and schedule performance index (SPI) are used to assess the magnitude of schedule variations. An important part of schedule control is to decide if the schedule variation requires corrective action. If using the critical chain scheduling method, comparing the amount of buffer remaining to the amount of buffer needed to protect the delivery data can help determine schedule status. The difference between the buffer needed and the buffer remaining can determine whether corrective action is appropriate.

2. **Variance Analysis**

   Schedule performance measurements (SV, SPI) are used to assess the magnitude of variation to the original schedule baseline. The total float variance is also an essential planning component to evaluate project time performance. Important aspects of project schedule control include determining the cause and degree of variance relative to the schedule baseline and deciding whether corrective or preventive action is required.

3. **Project Management Software**

   Project management software for scheduling provides the ability to track planned dates versus actual dates, and to forecast the effects of changes to the project schedule.

4. **Resource Leveling**

   Resource leveling is used to optimize the distribution of work among resources.

5. **What-If Scenario Analysis**

   What-if scenario analysis is used to review various scenarios to bring the schedule into alignment with the plan.

6. **Adjusting Leads and Lags**

   Adjusting leads and lags is used to find ways to bring project activities that are behind into alignment with the plan.

7. **Schedule Compression**

   Schedule compression techniques are used to find ways to bring project activities that are behind into alignment with the plan.

8. **Scheduling Tool**
   Schedule data is updated and complied into the schedule to reflect the actual progress of the project and remaining work to be completed. The scheduling tool and the supporting schedule data are used in conjunction with manual methods or other project management software to perform schedule network analysis to generate an updated project schedule.

Outputs:

1. **Work Performance Measurement**
   The calculated SV and SPI values for WBS components, in particular the work packages and control accounts, are documented and communicated to stakeholders.

2. **Organizational Process Assets Update**
   Organizational process assets that may be updated include:
   - Causes of variances
   - Corrective action chosen and the reasons
   - Other types of lessons learned from project schedule control.

3. **Change Requests**
   Schedule variance analysis, along with review of progress reports, results of performance measures, and modifications to the project schedule can result in change requests to the schedule baseline and / or to the other components of the project management plan. Change requests are processed for review and disposition through the Perform Integrated Change Control process. Preventive actions may include recommended changes to reduce the probability of negative schedule variances.

4. **Project Management Plan Updates**
   Elements of project management plan that may be updated include:
   - Schedule baseline
     Changes to the schedule baseline are incorporated in response to approved change requests related to the project scope changes, activity resources, or activity duration estimates.
   - Schedule management plan
     The schedule management plan may be updated to reflect a change in the way the schedule is managed
   - Cost baseline
     The cost baseline may be updated to reflect changes causes by compression or crashing techniques.

5. **Project Document Updates**
   Project documents that may be updated include:
   - Schedule Data

New project schedule network diagrams may be developed to display approved remaining durations and modifications to the work plan. In some cases, project schedule delays can be so severe that development of a new target schedule with forecasted start and finish dates is needed to provide realistic data for directing the work, and for measuring performance and progress.

- Project Schedule
  An updated project schedule will be generated from the updated schedule data to reflect the schedule changes and manage the project.

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Iraq Administrative Reform Project

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Iraq Administrative Reform Project

TARABOT

Project Management Consulting Unit

Microsoft Project

Estimating & Scheduling

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Course Syllabus

1. **Course Title**: Microsoft Project, Estimating & Scheduling

2. **Course Level:** Competency

3. **Course Description:** This course requires all participants to be familiar with basic Project Management theory and methodologies. This course is designed to provide participants with skills, knowledge, tools and techniques that are utilized in the Project Management. It focuses on practical skills and methodologies.

4. **Contact Hours**: 18 Hours (3 days)

5. **Course Prerequisites**: Participants' should be members in project management departments / units or their work is relevant to project management applications.

6. **Course Dates**: TBD

7. **Class Times**: From 9:00 am to 4:00 pm.

8. **Course Location:** TBD

9. **Instructor**: Tarabot / PM Unit trainers

10. **Required Text and Other Learning Resources**:

    - Class handouts

11. **Course Overview**:
    - Provide participants the opportunity to improve and/or acquire the necessary knowledge and skill-set in estimating and scheduling; to transform this knowledge to actions that would benefit public services.
    - Provide a set of learning materials covering range of topics of Project Management techniques in estimation and schedule.
    - Provide the participants with selected advanced level material in Project Management, standards and best practices.

12. **Course Objectives**: Upon completion of this course, students should be able to:
    -

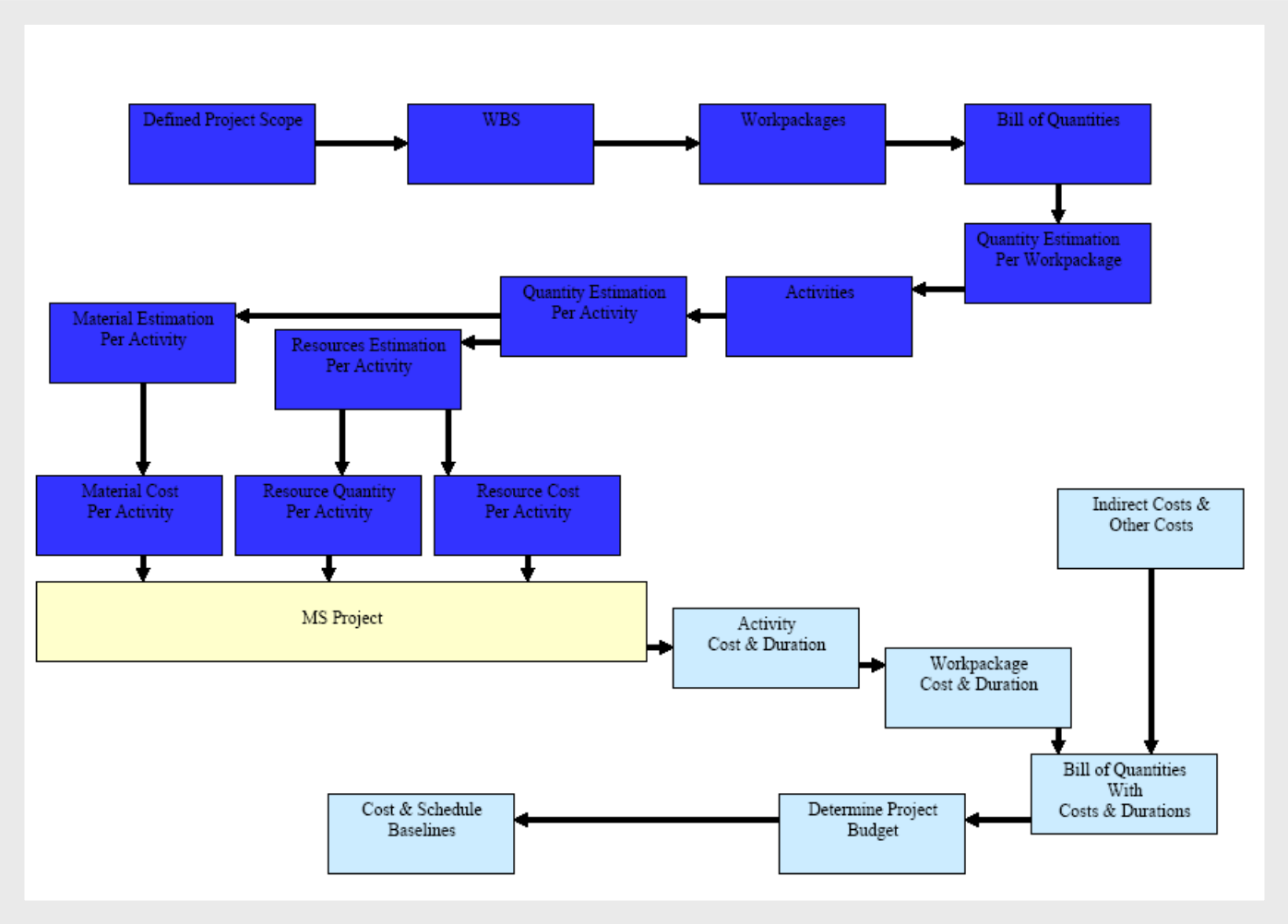
13. **Course Policies:**
    - Students are expected to attend the full course period and must be present for all activities and exams to receive credit. If a student has a special circumstance that will prevent him/her from attending a

schedule exam, a make-up exam can be rescheduled at the convenience of the instructor.

- All assignments are due as specified by the instructor.
- Student can miss a maximum of one day of training.

14. **Methodology:** The trainer will provide a comprehensive manual to the participants. Lecturing will be conducted using power point presentations. A participatory approach will be used to facilitate learning of the participants. Examples, case studies and practical questions/activities will be used.

Estimation & Scheduling Concept

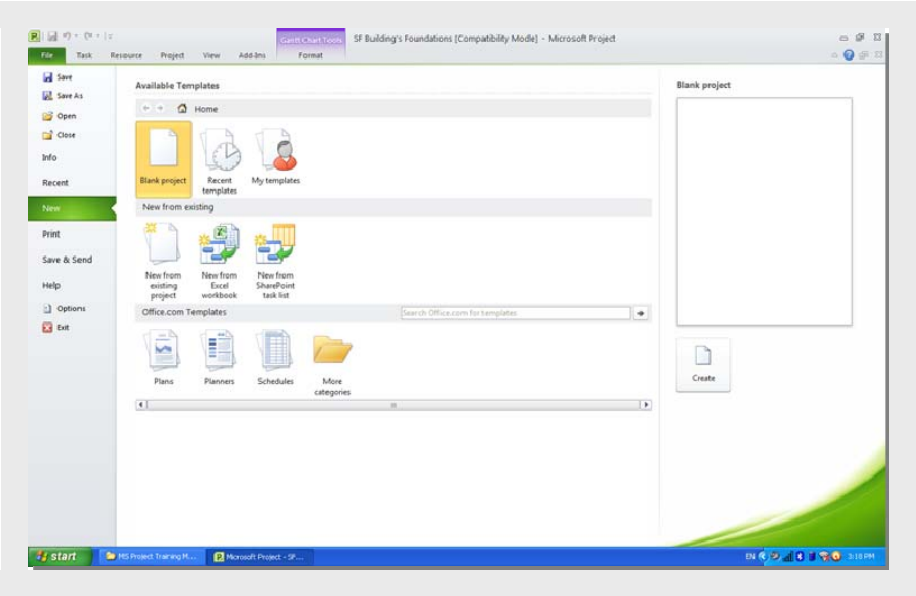


Chapter One
Start a New Project

Chapter One: Start New Project

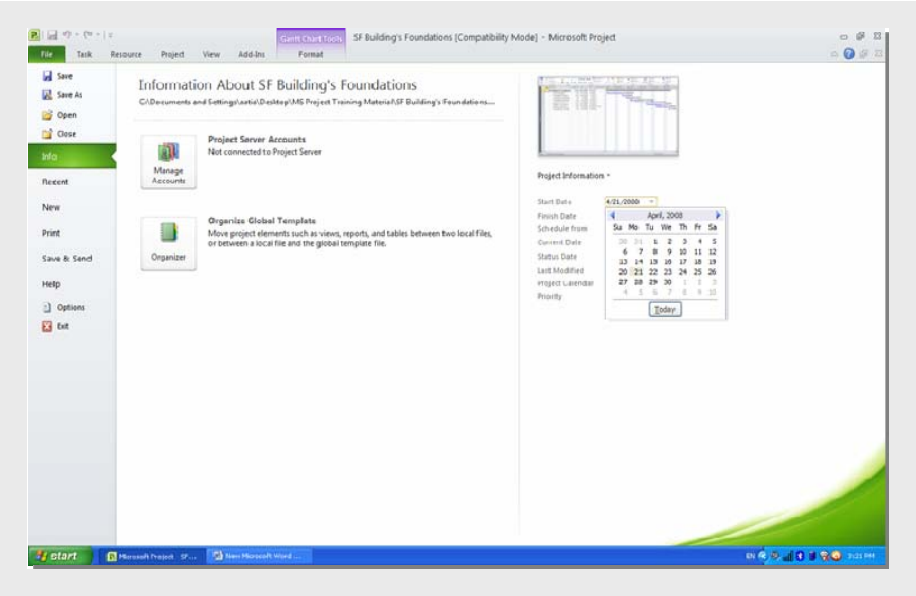
1- Create a new project file

- **Click** the **File** tab
- **Click** **New**, and then
- **Click** **Blank Project.**



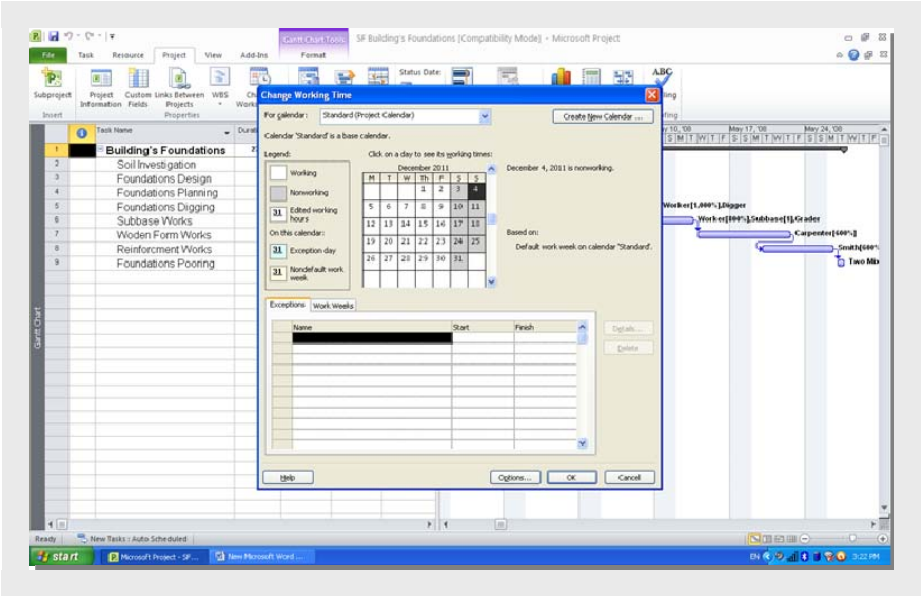
2- Set the project start or finish date

- **Click** the **File** tab and then
- **Click** **Info**. On the right side of Information page, select a date in the **Start date** box.



3- Define the project calendar

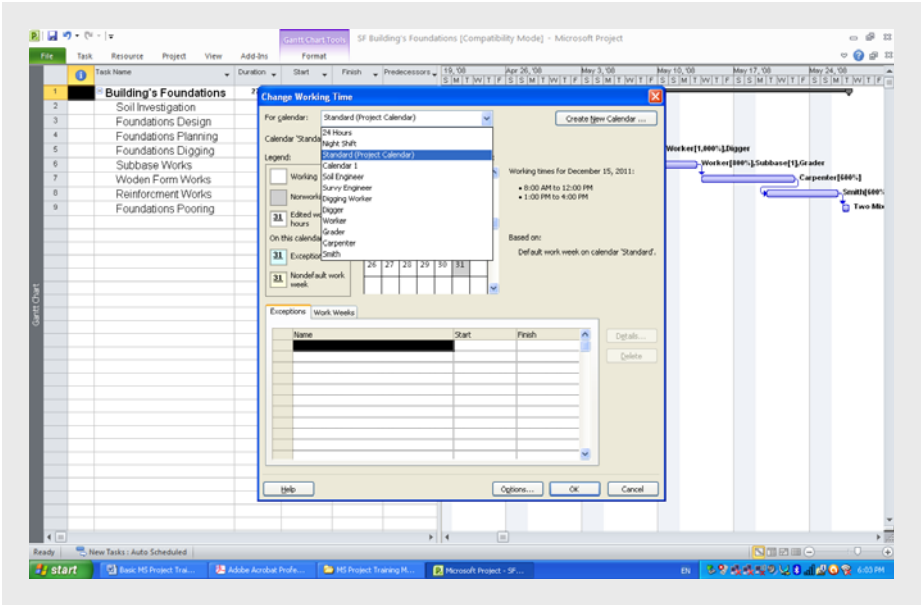
- **Click** the **Project** tab.
- In the **Properties** group, **Click** **Change Working Time**.
- Identify working and nonworking days, and times for project.



<u>For calendar :</u>

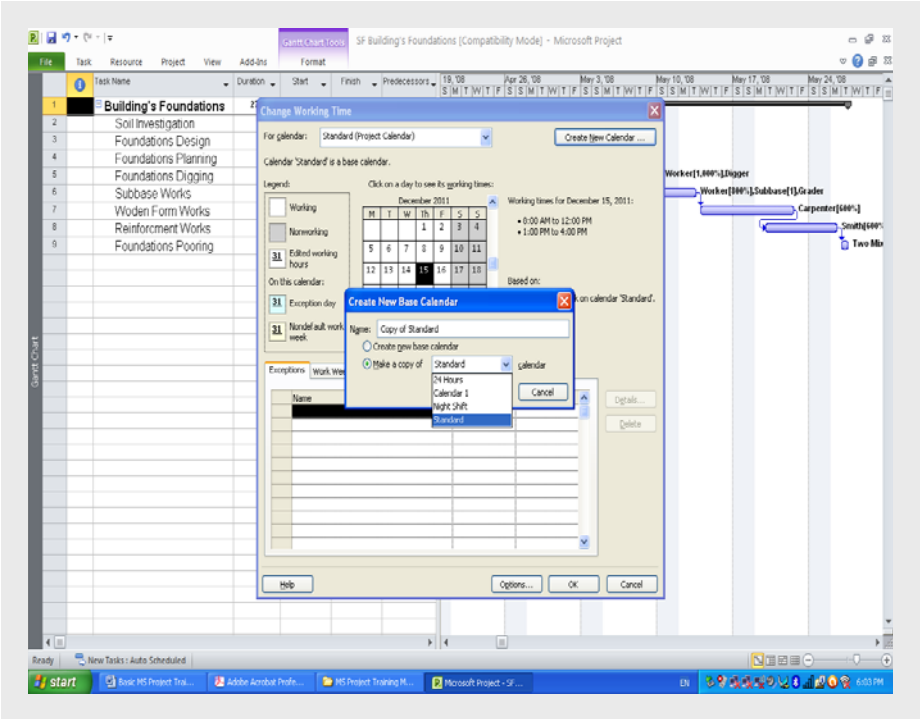
The list that appears contains the three base calendars included with Project. These calendars are:-

- **24 Hours:** Has no nonworking time.
- **Night Shift:** covers a "graveyard" shift schedule of Monday night through Saturday morning, 11 P.M. to 8 A.M., with a one-hour break each day.
- **Standard:** The traditional working day, Monday through Friday from 8 A.M. to 5 P.M., with a one-hour break each day.



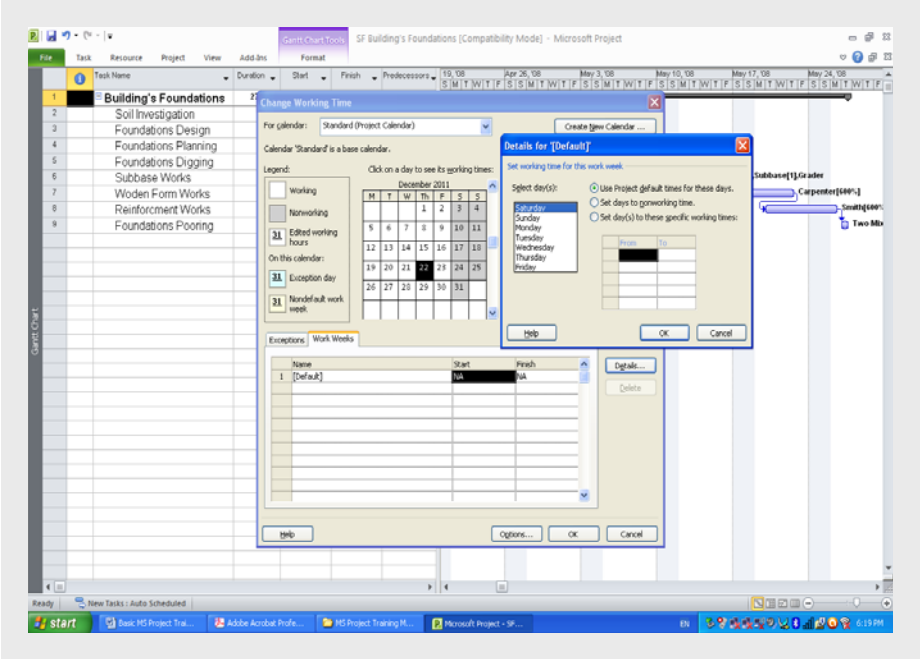
<u>Create a new calendar :</u>

Used to Modify any of the three calendars (24 Hours, night shift, and standard) according to your week days or exceptions if differs from mentioned in above calendars.



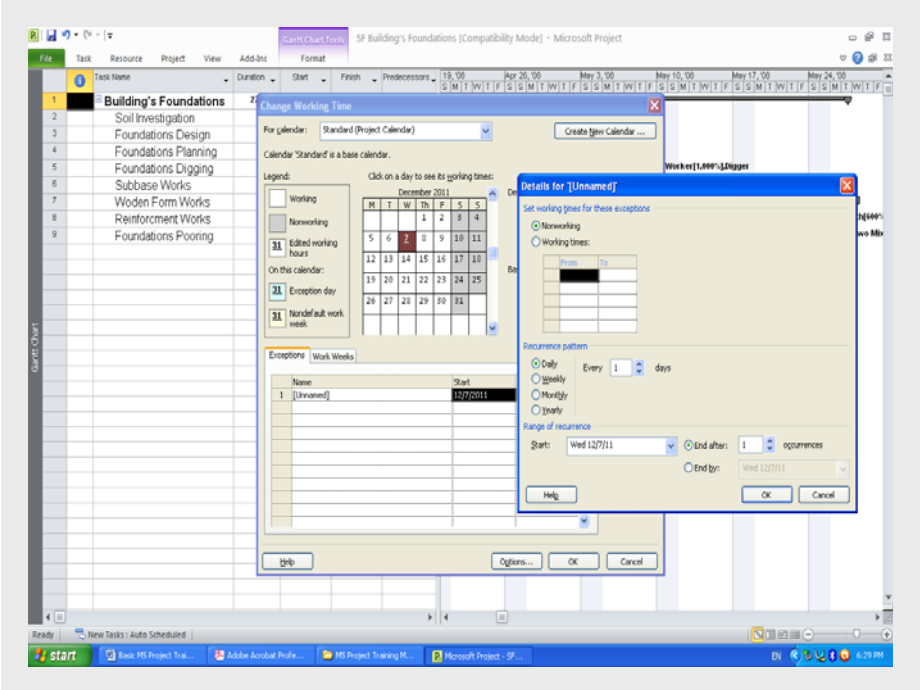
Set working times for work week:

- **Click** Week days tab.
- **Click** details button on right(or double **Click** on start or finish field) to show details window to choose use project default times for these days, set days to nonworking times or set days to these specific working times for selected day or days.



Set exceptional working or nonworking times:

- **Click** Exception tab.
- **Click** details button on right (or double **Click** on start or finish field) to make selected day or days working or nonworking times. you can use reoccurrence pattern to determine how often to repeat this setting or range of reoccurrence to set start day and end day for this setting.

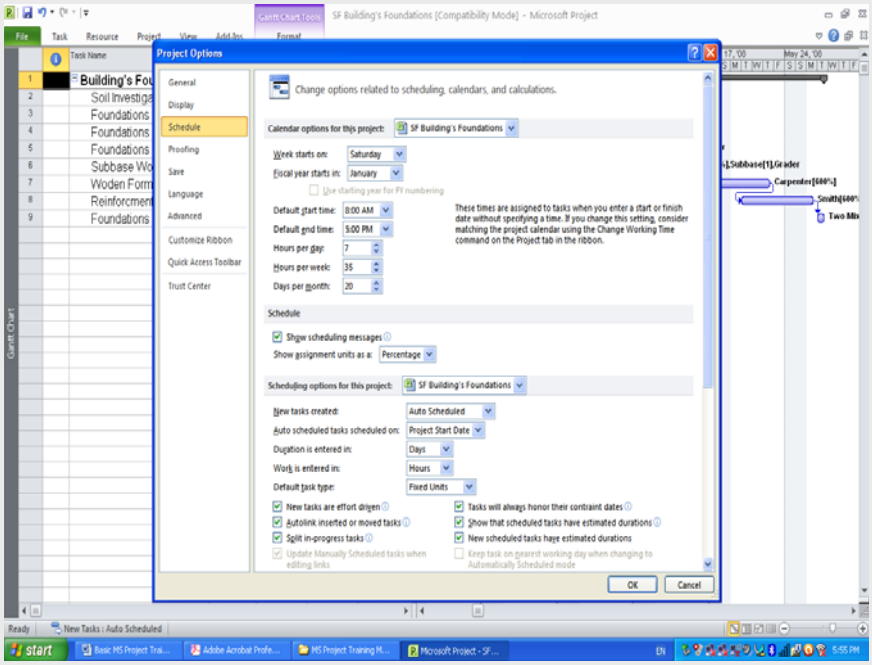


Options:

Used to change options related to calendar, contains: week start, fiscal year start, default start time, default end time, hours per day, hours per week, and days per month.

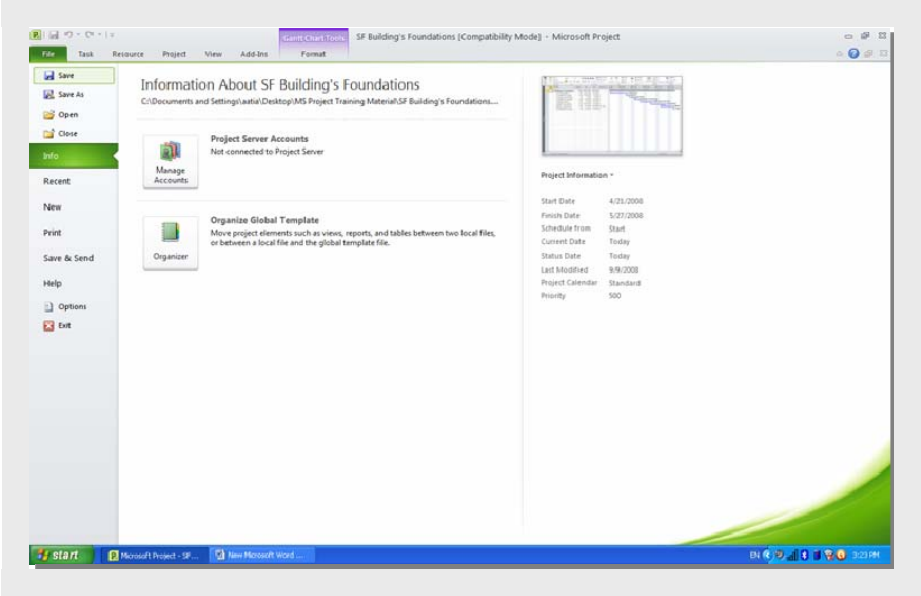
To use options :

- **Click** the **Project** tab.
- In the **Properties** group, **Click Change Working Time**.
- **Click** options button to see **calendar options for this project.**



4- Save the project file

- **Click** the File tab.
- **Click** Save. In the **File** name box, type the project name.


SF Building's Foundations [Compatibility Mode] - Microsoft Project
Gantt Chart Tools
File
Task
Resource
Project
View
Add-Ins
Format
Save
Save As
Open
Close
Info
Recent
New
Print
Save & Send
Help
Options
Exit
Information About SF Building's Foundations
C:\Documents and Settings\aatia\Desktop\MS Project Training Material\SF Building's Foundations...
Manage Accounts
Project Server Accounts
Not connected to Project Server
Organizer
Organize Global Template
Move project elements such as views, reports, and tables between two local files, or between a local file and the global template file.
Project Information
Start Date 4/21/2008
Finish Date 5/27/2008
Schedule from Start
Current Date Today
Status Date Today
Last Modified 9/9/2008
Project Calendar Standard
Priority 500
start
Microsoft Project - SF...
New Microsoft Word ...
3:23 PM

Chapter Two
Enter Tasks

Chapter Two: Enter Tasks

- **Create WBS**
- **Define Activities (activities & milestones lists).**
- **Sequence Activities (project schedule network diagram)**
- **Estimate Activities Durations.**

1- Decide how you want to schedule tasks
In **Microsoft Project** 2010, new tasks are **manually scheduled** by default.

Auto scheduled: means that Microsoft Project is to schedule the task based on dependencies, constraints, calendars, and other factors.

To make new tasks automatically scheduled by default simply:

- **Click new tasks** at lower left corner of screen OR
- **Click** the **Tasks tab**. In the Schedule group, point to Task Mode, and in the list.
- **Click Auto Schedule.**

2- Enter tasks:

- **Click** the **View Tab**.
- In the **Task Views** group, **Click Gantt Chart**.
- In the **Task Name** field, enter task.

Tasks can also include summary tasks, milestones, and WBS items.

3- Outline tasks

Create your task hierarchy, including tasks and milestones under summary tasks, which can represent phases or other work divisions:

- **Click View Tab**.
- In the **Task Views** group, **Click Gantt Chart**.
- Select a task (or several tasks),
- Then in the **Tasks group**, **Click** the **Indent** or **Outdent** button.

Tip:

If you created a summary task with a duration, start date, or finish date, then the tasks that fall under the summary task will not be rolled up to this summary task. They'll be independent of it. This is known as top-down scheduling.

4-Entering a Milestone

In addition to entering tasks to be completed, you might want to account for an important event for your project, such as when a major phase of the project will end. To do this, you will create A Milestone Task.

Milestones: are significant events that are either reached within the project (such as completion of a phase of work) or imposed upon the project (such as a deadline by which to apply for funding). Because the milestone itself doesn't normally include any work, milestones are represented as tasks with zero duration.

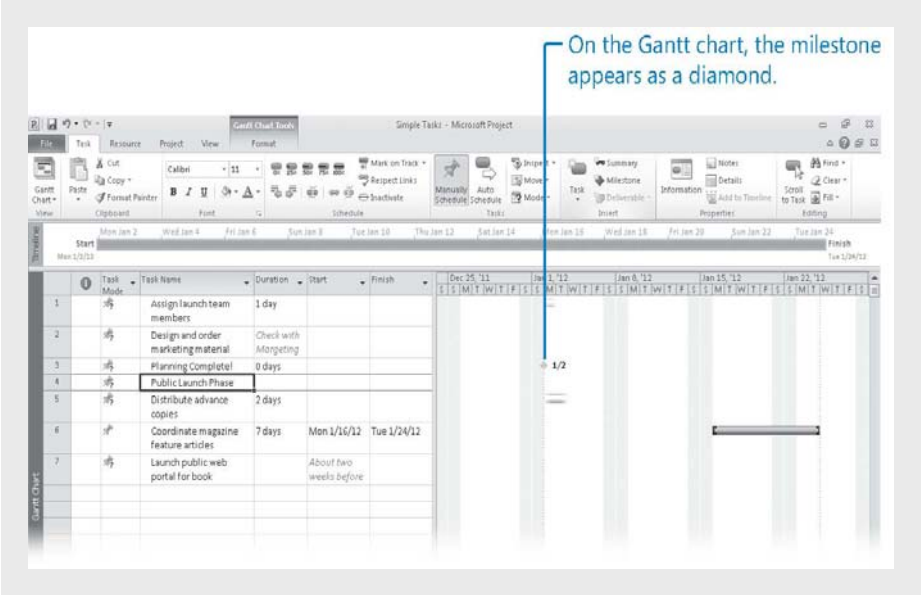
Create a milestone task:

- **Click** the name of a task.
- On the **Task tab**, in the **Insert** group, **Click Milestone.**

Microsoft Project inserts a row for a new task and renumbers the subsequent tasks.

Microsoft Project names the new task **"<New Milestone>"** and gives it zero-day duration.

- Type a name for the milestone and **Click** enter. The milestone task is added to your plan.



Tip:

You can mark a task of any duration as a milestone.

- Double-Click the task name to display the **Task Information** dialog box,
- Then Click the Advanced tab and select the "Mark task as milestone" option.

5- Enter durations

- Click the **Duration** field for a task
- Enter duration.

For **Microsoft Project** 2010, you can enter duration in two different ways, depending on the scheduling method that is being used for the task.

Manually scheduled task:
Enter duration as either a **number or as text**.
For example, you can enter "Sometime after June," or "Two days after ship."

Auto scheduled task:
Enter duration as a **number**.
For example

- Type 4d to indicate 4 days.
- To specify a milestone without duration, type 0d to indicate that duration is an estimate.
- Add a question mark, type 6d? As shown in table below:

If you enter this abbreviation	It appears like this	And it means
m	min	minute
h	hr	hour
d	day	day
w	wk	week
mo	mon	month

- Click **File**
- Click **Option**
- Click **Advance** in **Advance Option** working with the project menu
- Then choose **Display Option** for the project to change abbreviations.

Task Information:
To show the **Task Information** dialog box for the selected task:

- **Click Task View**
- **Click Properties** tab
- Choose **Task Information** OR
- Simply **Right Click** on **Task Name** field to choose **Task Information**

You can enter and /or update various aspects for the task as below:-

General:

- **Click General tab** in **Task Information** window to enter and/or update all or one of **task name, duration, priority, and tracking** by editing percent complete.

Predecessors:

- **Click Predecessors** tab in **Task Information** window to enter and/or update **Predecessors, dependency type, and Lag or Lead**.

Recourses:

- **Click Recourses** tab in **Task Information** window to enter and/or update **Recourse Name, and unites**.

Advanced:

- **Click Advanced Tab** in **Task Information** window to enter and/or update **deadline, constrain type, constrain date, task type, WBS code, milestone and earned value.**

Note:

When using automatic scheduling, avoid entering start and finish dates for tasks. Instead, enter duration and let **Microsoft Project** 2010 automatically set these dates, which might change anyway as resources are assigned to tasks.

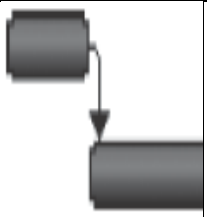
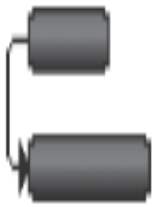
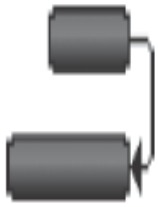
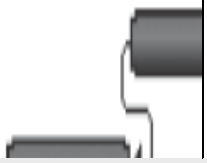
6- Link tasks to show dependencies
Most projects require tasks to be performed in a specific order.
For example, the **task investigating soil** must be completed before the task of **foundation deign** can occur. These two tasks have a **finish-to-start** dependency which has two aspects:

- The second task must occur after the first task; this is a sequence.
- The second task can occur only if the first task is completed; this is a dependency.

In **Microsoft Project**, the first task is called the **Predecessor** because it pre-cedes tasks that depend on it.

The second task is called the **Successor** because it succeeds, or follows tasks on which it is dependent.

Any task can be a **Predecessor** for one or more **Successor** tasks. Likewise, any task can be a **Successor** to one or more **Predecessor** tasks. Tasks can have one of only four types of task dependencies.

This task dependency	Means	Looks like this in the Gantt Chart	Example
Finish-to-start (FS)	The finish date of the **Predecessor** task determines the starts date of the **Successor** task.		Task (A) must be completed before the task (B) can occur.
Start-to-start (SS)	The start date of the **Predecessor** task determines the start date of the **Successor** task.		Tasks (A) and (B) closely related, and they should occur simultaneously.
Finish-to-finish (FF)	The finish date of the **Predecessor** task determines the finish date of the **Successor** task.		Task (A) must end when task (B) ends.
Start-to-finish (SF)	The start date of the **Predecessor** task determines the finish date of the **Successor** task.		The time when task (A) is scheduled determines when task (B) must end.

Task dependencies should reflect the sequence in which work should be performed. After you have established the correct task dependencies, you can fine-tune your schedule by entering overlap (called **Lead** time) or delay (called **Lag** time) between the finish or start dates of **Predecessor** and **Successor** tasks.

Assuming that two tasks have a finish-to-start dependency:

- **Lead** time causes the **Successor** task to begin before its **Predecessor** task concludes.
- **Lag** time causes the **Successor** task to begin some time after its **Predecessor** task concludes.

You can enter **Lead** and **Lag** time as units of time, such as two days, or as a percentage of the duration of the **Predecessor** task, such as 50 percent. **Lag** time is entered in positive units and **Lead** time in negative units (for example, –2d or –50%). You can apply **Lead** or **Lag** time to any type of task relationship: finish-to-start, start-to-start, and so on.

Places in which you can enter **Lead** or **Lag** time include the **Task Information** dialog box (Task tab), the **Predecessor**s column in the **Entry** table, and the **Task Dependency** dialog box (viewable by **Double-Click** a link line between **Gantt Bars**).

- **Click** the **View Tab**. In the **Task Views** group
- **Click Gantt Chart**
- Select the tasks that you want to link,
- Then **Click** the **Link Task** button in the Task group which is found under the Tasks tab to change the default finish to start dependency type
- **Double Click** the line between the tasks that you want to change,
- Then select a task link from the **Type** list.

Chapter Three
Assign & Level Resources

Chapter Three: Assign & Level Resources

Microsoft Project 2010 supports three types of resources: **Work Resources**, **Cost** and **Material**.
Briefly, here is how to think about the three resource types:-

- **Work Resources** include the people and equipment needed to complete the tasks in a project.
- **Cost Resources** represent a financial cost associated with a task that you need to account for. Examples include categories of expenses like travel, entertainment, and so on.
- **Material** resources are consumables that you use up as the project proceeds. **For Example**, a construction project might need to track steel or concrete as it is used throughout the project.
- You do not need to track every piece of equipment that will be used in your project, but you might want to set up equipment resources when:
    - Multiple teams or people might need a piece of equipment to accomplish different tasks simultaneously, and the equipment might be overbooked.
    - You want to plan and track **Cost**s associated with the equipment. Consider these issues if your projects involve equipment resources.

Tip:
A resource might refer to somebody who is already on staff or to a position to be filled later. If you have not yet filled all the resource positions required, you might not have real people's names to enter. In that case, use descriptive placeholder names or job titles when setting up resources in Project.

- **Click** the **View Tab**. In the Resource Views group
- **Click** resources sheet. In **Resource Sheet** you will find below Indicators: it displays indicators that give different type of information about a task or recourse:
    - **Resource Name:** the name of a task or a resource.
    - **Type:** indicates whether a resource is a **Work**, **Material**, or a **Cost** resource.
    - **Material** (**Material label**)**:** the unit of measurement you enter for a **Material** resource.
    - **Initials:** the abbreviation for a **Resource Name**.
    - **Group:** the name of the group that a resource belongs to.

- **Max. (Max. units):** the maximum percentage or capacity (number or units) for which recourse is available during the current time periods.
- **Std. Rate (standard rate):** rate of pay for regular, non over time work performed by a resource**.**
- **Ovt. Rate (overtime rate):** rate of pay for overtime work performed by a resource.

Cost: it's the total scheduled or projected cost for a task, resource, or assignment based on cost already incurred performed by resources assigned to the tasks, in addition for the cost planned for the remaining work.

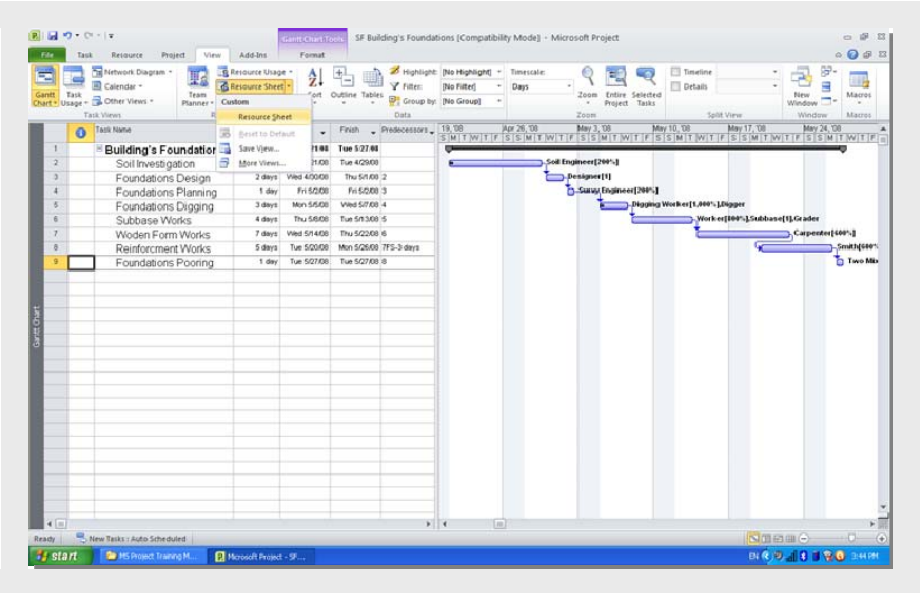
Cost = actual **Cost** + remaining **Cost**

Cost/use: **Cost** that accrues every time a resource is used for work recourse.

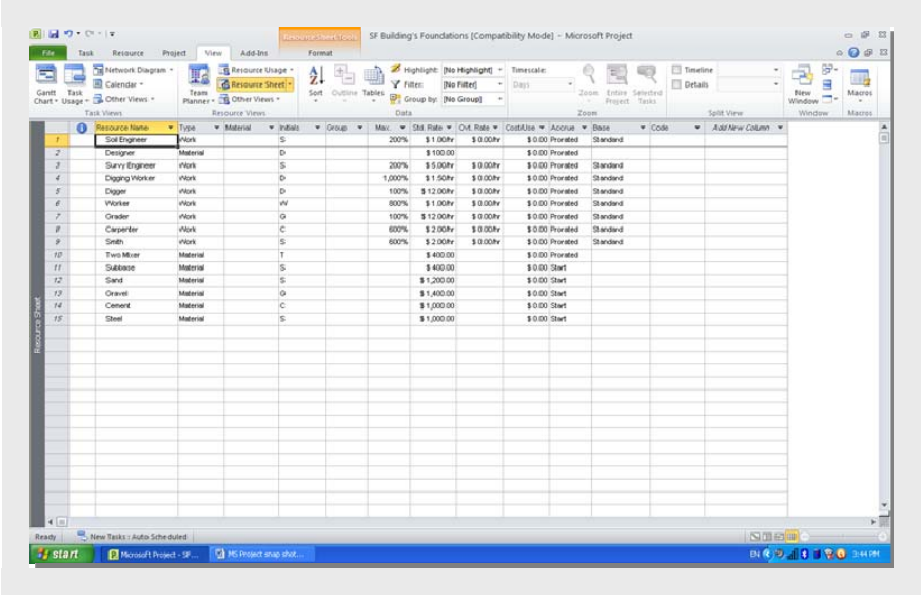
<u>OR</u>

Cost that accrues at one time regardless of the number of units for **Material** resource.

- **Accrue:** how and when resource standard and overtime costs are charged to the cost of task.
- **Base:** indicates the base calendar for the resource's calendar
- **Code:** any code, abbreviation, or number you want to enter as apart of a resource's information**.**



In the **Resource Name** field, type the names of the resources you will use for the project.



1- Entering Resource Capacity

The **Max. Units'** field represents the maximum capacity of a resource to accomplish any task. Specifying that a resource has 100% maximum units means that 100 percent of that resource's working time is available to work on assigned tasks in the project plan. **Microsoft Project** will alert you if you assign the resource to more tasks than they can accomplish at 100% maximum units (in other words, if the resource becomes **Overallocated**). 100% is the default Max. Units value for new resources.

For a resource that represents not a specific person, but a category of interchangeable people with a common skill set, you can enter a larger **Max. Units** value to indicate the number of available people.

Entering a Max. A unit setting such as 800% for such a resource means that you can expect that eight individual people who all belong to that resource category will be available to work full time every workday.

2- Adjusting Working Time for Individual Resources (Resource Calendar)

A **Resource Calendar** controls the working and nonworking times of an individual resource. **Microsoft Project** uses **Resource Calendar**s to determine when work for a specific resource can be scheduled. **Resource Calendar**s apply only to **Work Resources** (people and equipment), not to **Material** or **Cost Resources**.

When you initially create resources in a project plan, **Microsoft Project** creates a **Resource Calendar** for each work resource. The initial working time settings for **Resource Calendar**s exactly match those of the project calendar, which by default is

the Standard base calendar. The Standard base calendar is built into **Microsoft Project** and accommodates a default work schedule from **8 A.M to 5 P.M., Monday through Friday**, with an hour off for lunch each day. If all the working times of your resources match the working time of the project calendar, you do not need to edit any **Resource Calendar**s. However, chances are that some of your resources will need exceptions to the working time in the project calendar such as:

- A flex-time work schedule
- Vacation time
- Other times when a resource is not available to work on the project, such as time spent training or attending a conference.

Tip:

If you have a resource that is available to work on your project **only part time**, you might be tempted to set the working time of the resource in your project to reflect a part-time schedule, such as 8 A.M. to 12 P.M. daily. However, a better approach would be to adjust the availability of the resource as recorded in the Max. Units' field to 50%, changing the unit availability of the resource keeps the focus on the capacity of the resource to work on the project rather than on the specific times of the day when that work might occur.

You set the maximum units for a resource in the **Resource Sheet** view.

- Changes that you make to the project calendar are reflected automatically in **Resource Calendars** derived from the same project calendar. **For Example** if you specified a nonworking day for a staff morale event, and Project rescheduled all work to skip that day.

3- Entering Resource Pay Rates

You can enter standard rates and costs per use for work and material resources, as well as overtime rates for **Work Resources**.

When a work resource has a standard pay rate entered and is assigned to a task, Project calculates the cost of the assignment. Project does so by multiplying the assignment's work value by the resource's pay rate, both using a common increment of time (such as hours). You can then see **Cost per Resource**, **Cost per Assignment**, and **Cost per Task** (as well as costs rolled up to summary tasks and the entire project plan).

Project handles overtime expenses differently. Project will apply the overtime pay rate only when you specifically record overtime hours for an assignment. You will find more information about working with overtime Project does not automatically calculate overtime hours and associated costs because there's too great a chance that it would apply overtime when you did not intend it.

In addition to or instead of cost rates, a resource can include a set fee that Project - accrues to each task to which the resource is assigned. This is called a **Cost per Use**. Unlike cost rates, the cost per use does not vary with the task's duration or amount of work the resource performs on the task. You specify the **Cost per Use** in the **Cost / Use** field in the **Resource Sheet** view.

You can enter pay rates with a variety of time bases hourly (the default), daily, weekly, and so on. In fact, you can enter pay rates in all the increments of time for which you can enter task durations—from minutes to years.

4- Setting up Cost Resources

Another type of resource that you can use in Project is the **Cost Resource**. You can use a **Cost Resource** to represent a financial cost associated with a task in a project. While **Work Resources** (people and equipment) can have associated costs (hourly rates and fixed costs per assignment), the sole purpose of a cost resource is to associate a particular type of cost with one or more tasks. Common types of **Cost Resources** might include categories of expenses you'd want to track on a project for accounting or financial reporting purposes, such as travel, entertainment, or training.

Cost Resources do no work and have no effect on the scheduling of a task. The Max. Units Standard and Overtime pay rates and **Cost / Use** fields do not apply to cost resources. After you assign a cost resource to a task and specify the cost amount per task, you can then see the cumulative costs for that type of cost resource, such as total travel costs in a project.

The way in which cost resources generate cost values differs from that of work resources. When you assign a work resource to a task, the work resource can generate a cost based on a pay rate (such at $40 per hour for the length of the assignment), a flat per-use cost (such as $100 per assignment), or both. You set up such pay rates and cost per use amounts once for the work resource, as you did in "Resource Pay Rates" However, you enter the cost value of a cost resource only when you assign it to a task. You can do so in the cost field of the Assign Resources dialog box or in the cost field of the Task Form with the cost detail shown.

5- Assign resources to tasks

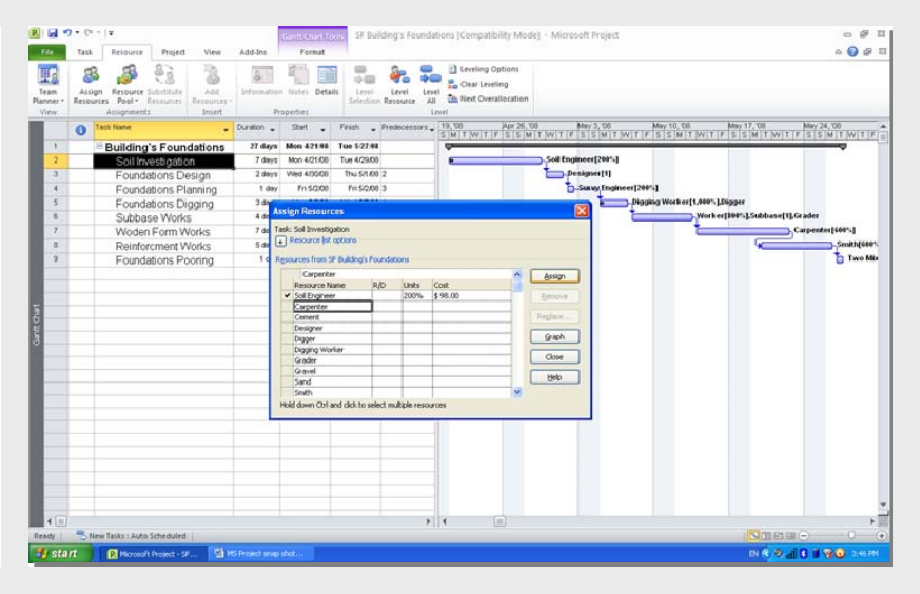
An assignment is the matching of a resource to a task to do work. From the perspective of a task, you might call the process of assigning a resource a task assignment; from the perspective of a resource, you might call it a resource assignment. It is the same thing in either case: a task plus a resource equals an assignment.

- In the **Gantt Chart** view, select a task to which you want to assign a resource.
- On the **Resources Tab**, in the **Assignments** group, **Click** Assign Resources.
- **Click** the **Resource Names**
- Then **Click** Assign.

Tips:

To select non adjacent **Resource Names**, select the first name, hold down the **Ctrl key**, and then select additional names.

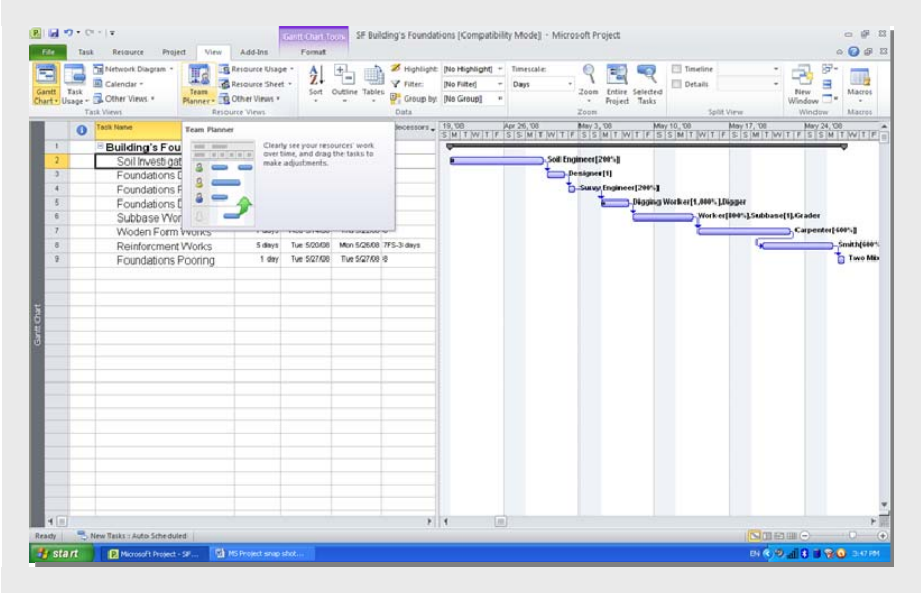
To remove or unassigned a resource from a selected task, in the **Assign Resources** dialog box, **Click** the **Resource Name**, and then **Click** Remove.

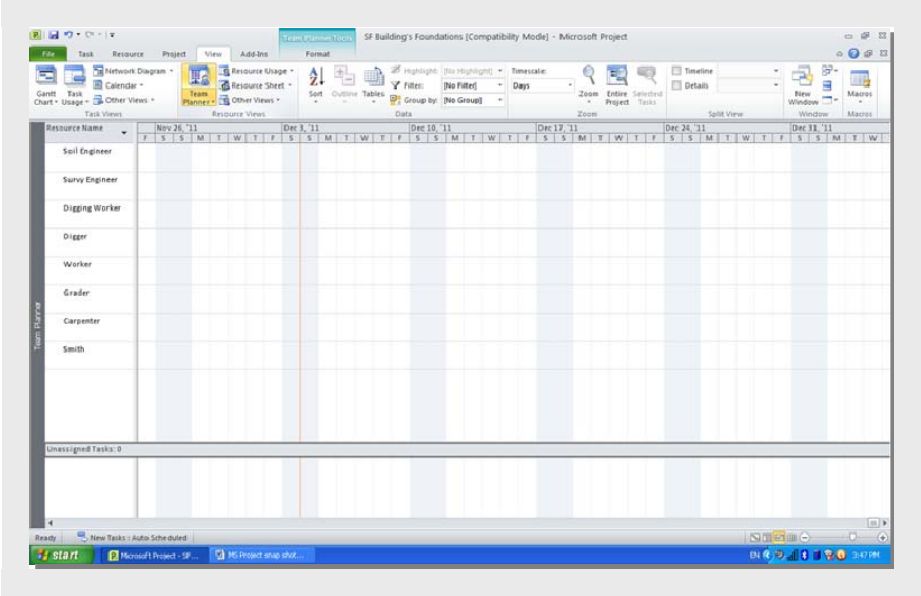


Tip:

Use the new Team Planner to drag and drop tasks around easily from one person to another within your team, or back and forth in the schedule.

- **Click** the **View Tab** In the Resources group
- **Click** Team Planner.
- You can even create new tasks on the Team Planner, or remove tasks by just dragging or dropping.





Know your task type

As soon as you assign resources to automatically scheduled tasks, Microsoft Project 2010 determines how to schedule the task based on the task type. (Manually scheduled tasks don't use task types) Durations might change as you assign resources to tasks.

How task types work

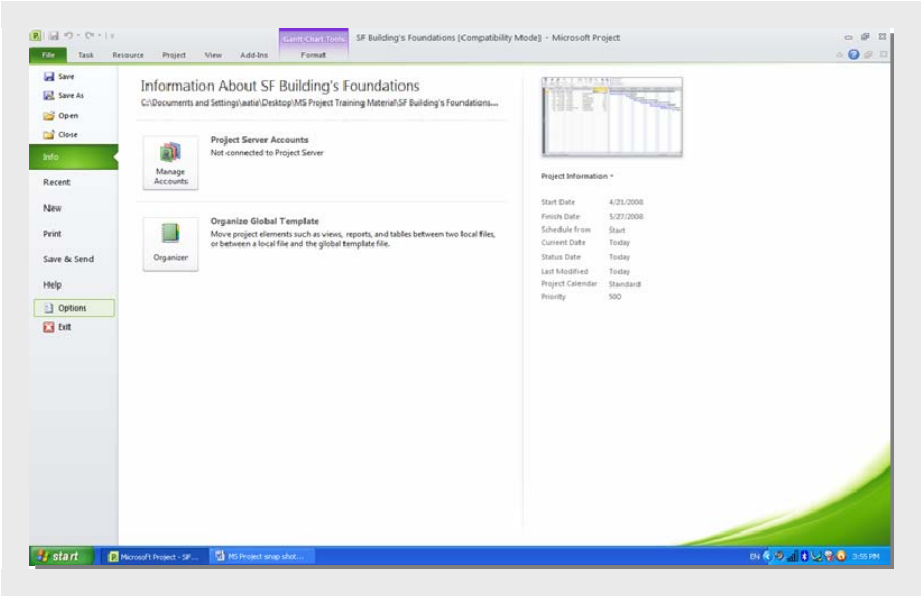
Work, duration, and units (% allocation) are determined by the formula: Work = D uration * Units.

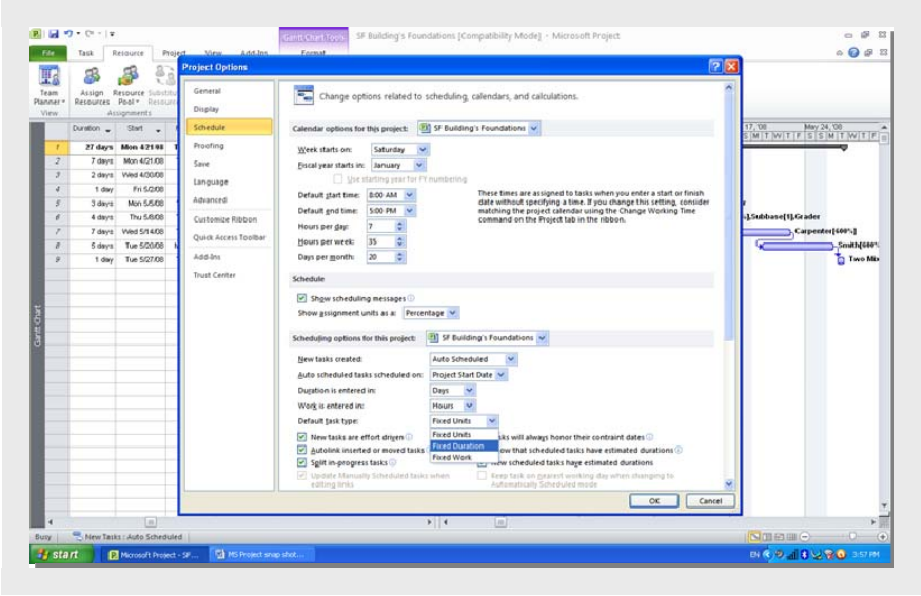
In a…	If you revise Work. . .	If you revise duration . . .	If you revise units . . .
Fixed units task	Duration changes	Work changes	Duration changes
Fixed work task	Duration changes	Units change	Duration changes
Fixed duration task	Units change	Work changes	Work changes

To set a default task type for the entire project,

- **Click** the File **Tab**,

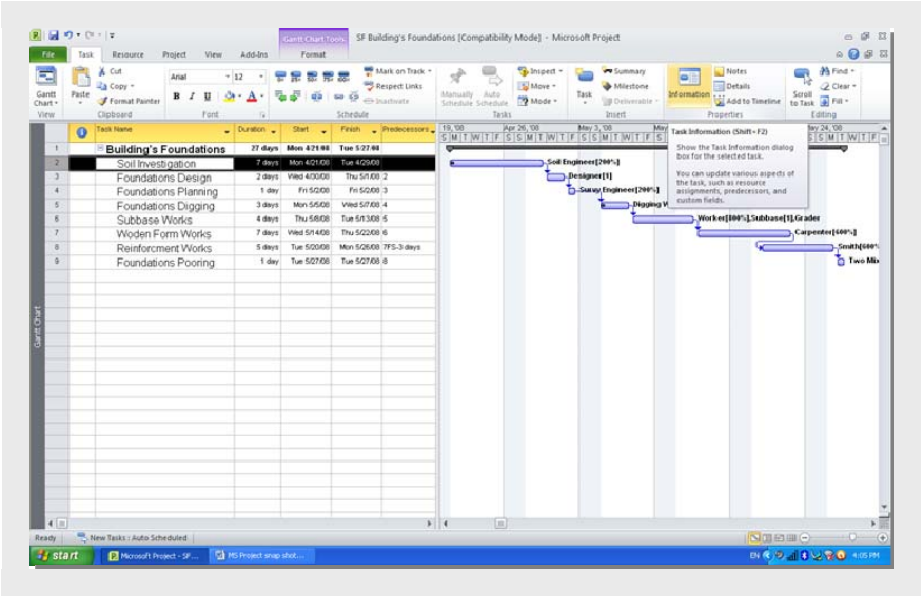
- Then **Click** **Options**.
- In the Default task type box, select **Fixed Units** (the default), **Fixed Duration**, or **Fixed Work**.





Tip:
To change the task type for an individual task:

- **Click** the **Task Tab**,
- Then in the **Properties** group, **Click** **Task Information** button.
- **Click** the **Advanced Tab**,
- Then in the Task type box, **Click** the task type that you want to create.



Controlling Work When Adding or Removing Resource Assignments

You define the amount of work that a task represents when you initially assign a resource or resources to it. When using automatically scheduled tasks, **Microsoft Project** gives you an option to control how it should calculate work on a task when you assign additional resources to the task or remove resources from the task. This option is called **Effort-Driven Scheduling**. You have a lot of flexibility in how you apply effort-driven scheduling. You can turn on effort-driven scheduling for an entire project plan or just specific tasks. You can also use the options in an Actions list to control how Project should recalculate work on a task immediately after making a resource assignment. Effort-driven scheduling applies only when you assign additional resources or remove resources from automatically scheduled tasks.

By default, **Effort-Driven Scheduling** is disabled for all tasks that you create in Project. To change the default setting for all new tasks in a project plan:

- On the File **Tab**, **Click** **Options.**
- In the **Project Options** dialog box, **Click** the **Schedule Tab.**

- Then select "the new tasks are effort-driven" check box. To control effort-driven scheduling for a specific task or tasks
- First select the task or tasks. Then, on the **Task Tab**, in the **Properties** group, **Click Information**
- On the **Advanced Tab** of the **Task Information** dialog box, select or clear the **"Effort Driven"** check box.

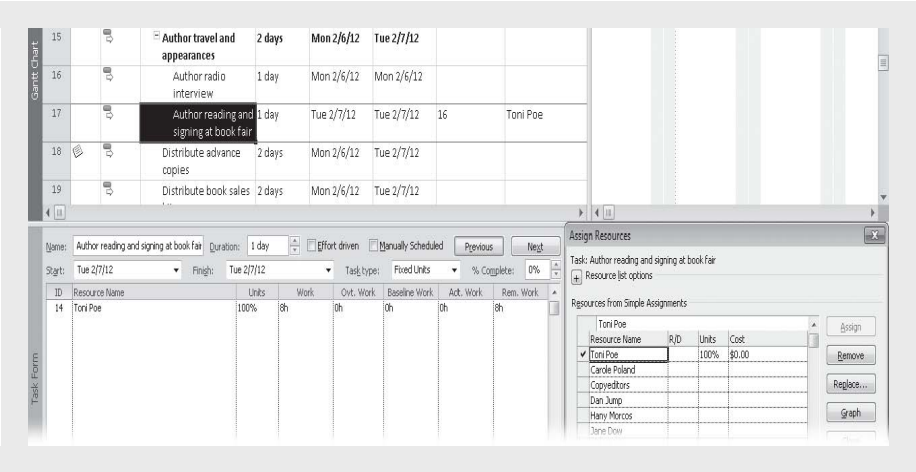
Note:
The order of your actions matters with regard to effort-driven scheduling. If you initially assign two resources to a task with a duration of three days (equal to 24 hours), Project schedules each resource to work 24 hours, for a total of 48 hours of work on the task. However, you might initially assign one resource to a task with duration of 24 hours and later add a second resource. In this case, effort-driven scheduling will cause Project to schedule each resource to work 12 hours in parallel, for a total of 24 hours of work on the task. Remember that when it's turned on, effort-driven scheduling adjusts task duration only if you add or remove resources from a task.

When Should Effort-Driven Scheduling Apply?
You should consider the extent to which effort-driven scheduling should apply to the tasks in your projects. **For Example**, if one resource should take 10 hours to complete a task, could 10 resources complete the task in 1 hour? How about 20 resources in 30 minutes? Probably not; the resources would likely get in each other's way and require additional coordination to complete the task. If the task is very complicated, it might require significant ramp-up time before a resource could contribute fully. Overall productivity might even decrease if you assign more resources to the task.

No single rule exists about when you should apply effort-driven scheduling and when you should not. As the project manager, you should analyze the nature of the work required for each task in your project and use your best judgment.

6- Assigning Cost Resources to Tasks
You'd like to enter planned costs for certain tasks. Since work has not yet started on this project at this time, these costs represent planned costs (indeed, you should consider all costs that Project has calculated so far in the schedule to be planned costs, such as those resulting from work resource assignments to tasks). Later, you can enter actual costs if you wish to compare them with the budget.

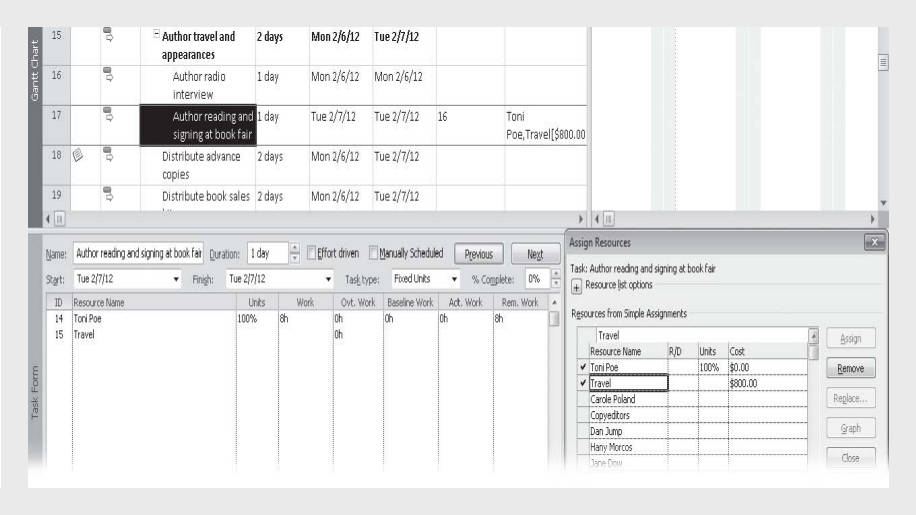
- **Click** the name of task; currently task no assigned resource and no **Cost**.
- First, you'll assign source to the task.
- In the **Resource Name** column in the **Assign Resources** dialog box, **Click** recourse,
- Then **Click** Assign.



As you can see in the **Cost field** of the **Assign Resources** dialog box, this assignment has no cost. That's because this work resource has no cost rate or per-use **cost**. So even though the assignment generated work, there's no cost associated with it. Next, you'll assign the **Cost Resource**.

- In the **Assign Resources** dialog box, select the **Cost field** for the cost resource, type 800
- Then **Click** **Assign**.
- Project assigns the **Cost Resource** to the task.

To see both assigned resources, scroll up the **Resource list** in the **Assign Resources** dialog box.



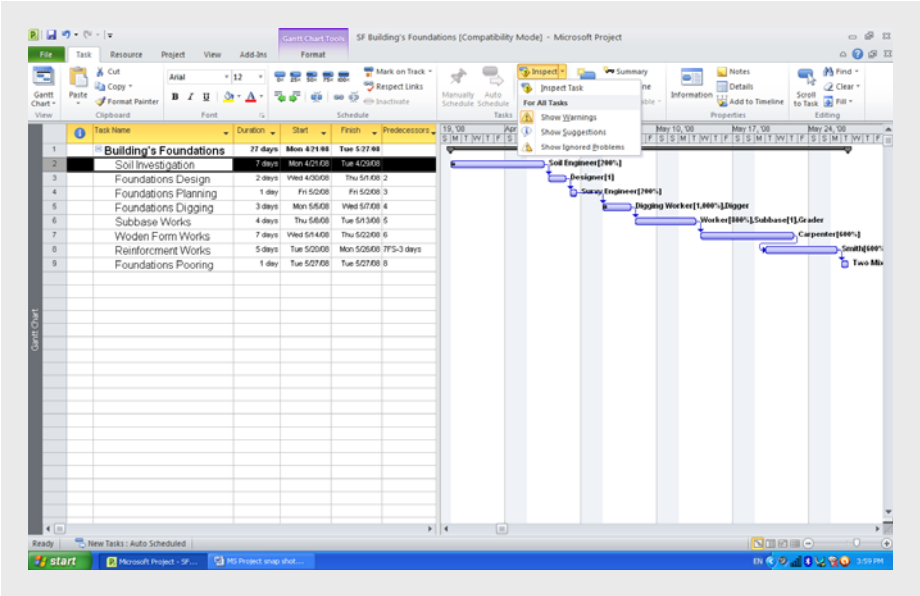
You can see the cost incurred by this assignment in the cost column of the **Assign Resources** dialog box. The cost value will remain the same regardless of any changes made to the scheduling of the task, such as **Work Resources** being assigned or unassigned, or the task's duration changing.

Note the task has the same duration of one day and recourse has the same units and work values as before. Assigning the cost resource affected only the cost incurred by this task.

Identify factors affecting task schedules

You can use Microsoft Project 2010 to help you understand how changes to one task can affect the rest of the project.

- **Click** the **Task Tab**
- Then in the **Schedule** group
- **Click** **Inspect Task**. A pane opens on the left showing the factors th at affect the scheduling of the selected task.



Tip:
You can also see task scheduling information (such as scheduling mode, duration, start and stop times) quickly by moving the mouse over the task's **Gantt Bars**.

7- Develop schedule
Applying **Leads** and **Lags** to finalize project schedule and produce **Project Schedule Baseline 0.**

Slack: is the amount of time that a task can slip before it affects another task or the project's finish date. Use the **Early Start, Early Finish, Late Start, Late Finish, Start Slack, and Finish Slack** fields to analyze project schedule delays and find available slack in your schedule.

The amount of slack in your schedule indicates how long tasks can be delayed before other tasks or the project finish date are affected. If you know where slack occurs in your schedule, you can move tasks when certain phases of the schedule have no slack and other phases have too much.

Total Slack: is the amount of time a task can be delayed before the project finish date is delayed.

Total Slack = LS-ES OR LF – EF

If **Total Slack** equals to zero for a task this task called **Critical** and it's on the **Critical Path** of the project, it can affect or change the total duration of that project.

Total Slack can be positive or negative. If **Total Slack** is a positive number, it indicates the amount of time that the task can be delayed without delaying the project finish date. If **Total Slack** is a negative number, it indicates the amount of time that must be saved so that the project finish date is not delayed. Negative slack indicates that there is not enough time scheduled for the task and is usually caused by constraint dates.

Free Slack: is the amount of time a task can be delayed before its following successor (**Successor**: A task that cannot start or finish until another task starts or finishes.) task is delayed.

Free Slack = ES (for follow activity) – EF (for selected activity)

Use the **Free Slack** to determine whether a task has any time available for a delay. This can be useful if a resource needs more time on a task, or if you want to assign a resource to another task. You can also use the **Free Slack** field to determine how to recover a schedule that is slipping.

8- Examining Resource Allocations over Time

Resource allocation is how the task assignments you've made affect the workloads of the **Work Resources** (people and equipment) of a project. A resource's capacity to work in a given time period is determined by his or her Max. Units and **Resource Calendar**. The relationship between a resource's capacity and his or her task assignments is called allocation. Each work resource is in one of three states of allocation:-

Underallocated: The resource's assignments do not fill the resource's maximum - capacity to do work. **For Example**, a full-time resource who has only 25 hours of work assigned in a 40-hour workweek is underallocated.

Fully allocated: The resource's assignments fill the resource's maximum capacity. **For Example**, a full-time resource that has 40 hours of work assigned in a 40-hour workweek is fully allocated.

Overallocated: The resource's assignments exceed the resource's maximum capacity for any period of time. **For Example**, a full-time resource that has 65 hours of work assigned in a 40-hour workweek is **overallocated**.

These states of allocation apply to **Work Resources**. **Cost** and **Material** resources do not do work; therefore, their assignments do not affect the overall duration of a project.

In **Microsoft Project**, a resource's capacity to work is measured in units; the maximum capacity of a given resource is called maximum units. Units are measured either as numbers (such as three units) or as a percentage (such as 300% units).

9- Evaluating Resource Allocation

Depending on the nature of your project and the resources working on it, some underallocations might be perfectly fine. Overallocation might not always be a problem either, depending on the amount of overallocation. If one resource is **overallocated** for just a half-hour, Project will fill the overallocation, but such a minor overallocation might not be a problem that you need to solve, depending on the resource involved and the nature of the assignment. Severe overallocation, **For Example**, a resource being assigned twice the work he or she could possibly accomplish in one week—is always a problem, however, and you should know how to identify it and maintain strategies for addressing it.

10-Resolving Resource Overallocation Manually

Editing an assignment manually is just one way to resolve a resource overallocation. Other solutions include the following:

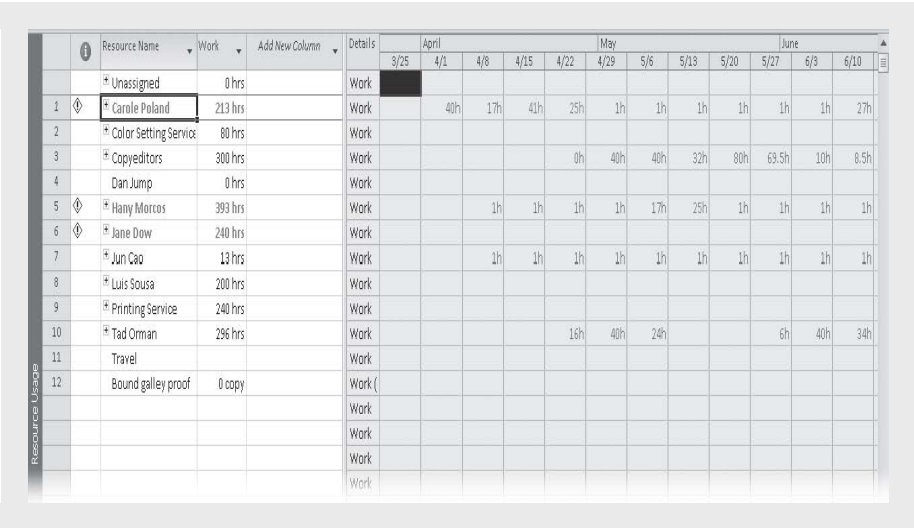
- Replace the **Overallocated** resource with another resource using the **Replace** button in the **Assign Resources** dialog box.
- Reduce the value in the **Units field** in the **Assignment Information** or **Assign Resources** dialog box.
- Assign an additional resource to the task so that both resources share the work.
- Add leveling delay to an assignment manually.

If the overallocation is not too severe (such as assigning 9 hours of work in a normal 8-hour workday), you can often leave the overallocation in the project plan.

Use the **Resource Usage** view to examine one **Overallocated** resource's assignments and edit the assignment to eliminate the overallocation.

On the **View Tab**, in the Zoom group, in the **Timescale** box:

- **Click** Weeks. At the weekly setting, you can more easily spot overallocation that may need to be addressed.
- Assigned work well over 40 hours per week for a full-time resource could be a serious problem.
- Recourse names appear in red. These are **Overallocated** resources.
- Horizontally scroll the **Usage** view to the right to examine the more severe overallocation per week.



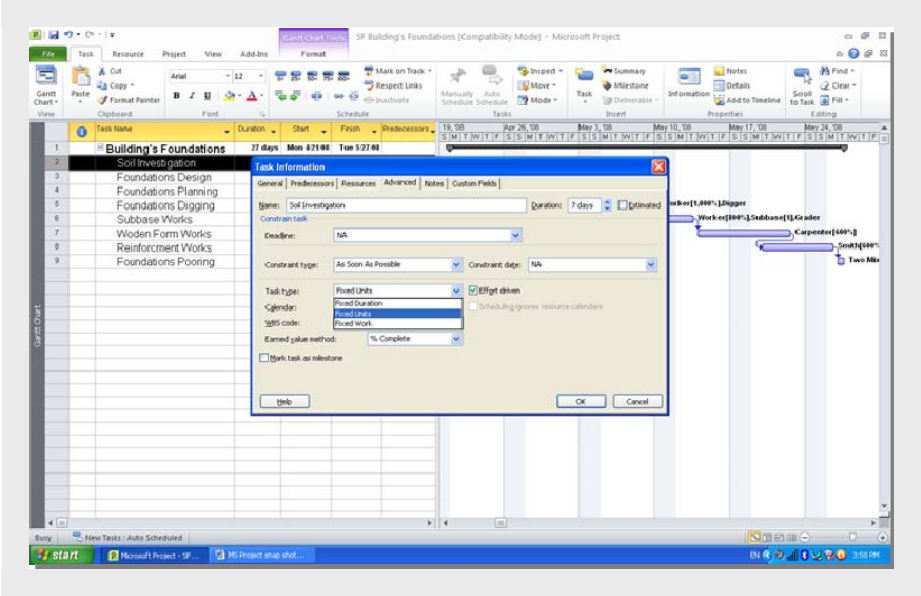
Resource Usage

	Resource Name	Work	Add New Column	Details	April				May				June		
					3/25	4/1	4/8	4/15	4/22	4/29	5/6	5/13	5/20	5/27	6/3	6/10
	Unassigned	0 hrs		Work												
1	Carole Poland	213 hrs		Work		40h	17h	41h	25h	1h	1h	1h	1h	1h	1h	27h
2	Color Setting Service	80 hrs		Work												
3	Copyeditors	300 hrs		Work					0h	40h	40h	32h	80h	69.5h	10h	8.5h
4	Dan Jump	0 hrs		Work												
5	Hany Morcos	393 hrs		Work			1h	1h	1h	1h	17h	25h	1h	1h	1h	1h
6	Jane Dow	240 hrs		Work												
7	Jun Cao	13 hrs		Work			1h	1h	1h	1h	1h	1h	1h	1h	1h	1h
8	Luis Sousa	200 hrs		Work												
9	Printing Service	240 hrs		Work												
10	Tad Orman	296 hrs		Work					16h	40h	24h			6h	40h	34h
11	Travel			Work												
12	Bound galley proof	0 copy		Work (												
				Work												
				Work												
				Work												
				Work												

- In the time phased grid of the **Resource Usage** view, select recourse assignment and reduce it, for all days of the week.
- You've addressed recourse overallocation for the week by reducing recourse work on the two tasks.

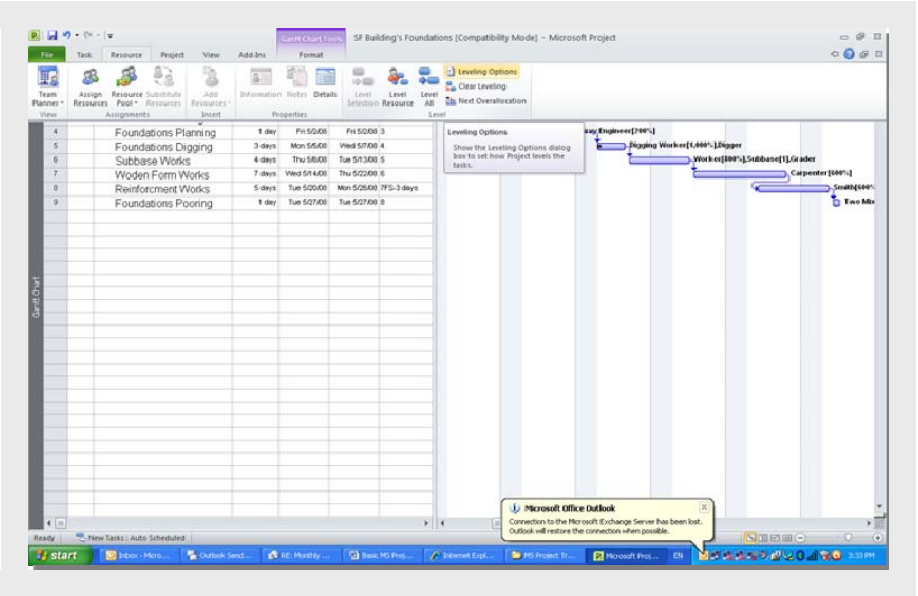
Note:

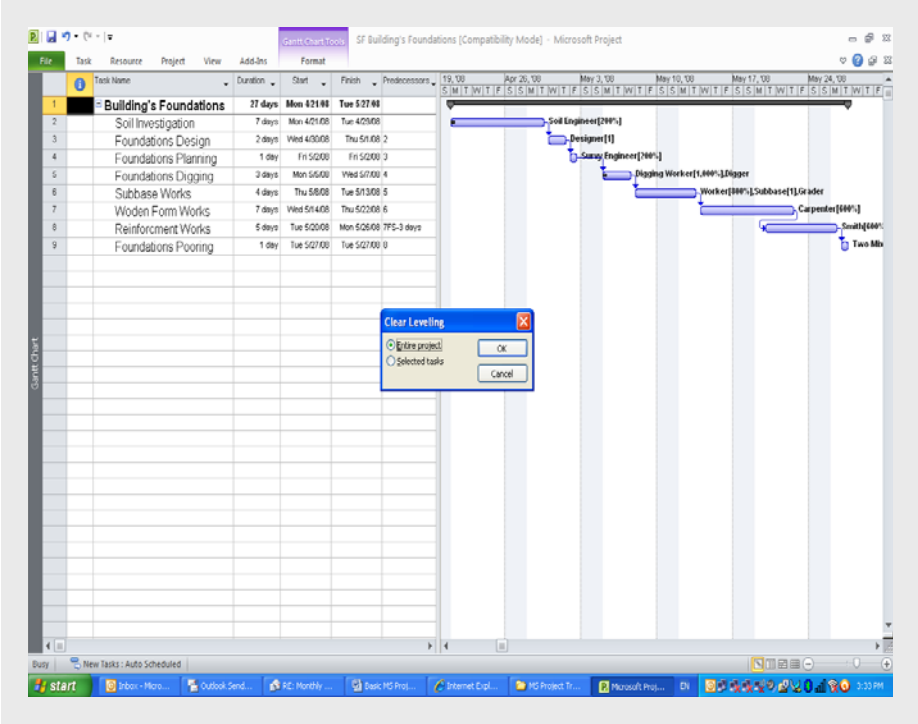
- Note that by taking this action, you have reduced not just this recourse work on these tasks, but the total work in the project plan.
- As a project manager, you have to use your judgment to determine the best course of action in such cases: reduce work, change resource assignments, or spread the work over a longer period of time.



11- Leveling Overallocated Resources

Resource leveling is the process of delaying or splitting a resource's work on a task to resolve an overallocation. The options in the **Level Resources** dialog box enable you to set parameters concerning how you want Project to resolve resource overallocation. Microsoft Project will attempt to resolve such overallocation when you choose to level resources. Depending on the options you choose, this might involve delaying the start date of an assignment or task or splitting the work on the task.





Button	Description
Level resource	level tasks for selected recourses
Level all	level entire project
Next overallocation	move to the next row where the resource is scheduled for more work than can be accomplished in the available working time
Clear leveling	clear any leveling delay that was previously added to the project (all project or selected tasks)

Note:

Although the effects of resource leveling on a schedule might be significant, resource leveling does not change who is assigned to tasks nor the total work or assignment unit values of those assignments.

You can level resources and view the effects on assignments and the project finish date as below:

- On the **View Tab**, in the **Resource Views** group, **Click Resource Sheet.**
- The **Resource Sheet** view appears. Note that a few **Resource Name**s appear in red and display the **Overallocated** icon in the Indicators column.
- On the **Resource Tab**, in the **Level** group, **Click Leveling Options**.
- The Resource Leveling dialog box appears. In the next several steps, you will walk through the options in this dialog box.
- Under **Leveling calculations**, make sure that **Manual** is selected. This setting determines whether Project levels resources constantly (Automatic) or only when you tell it to (Manual). Automatic leveling occurs as soon as a resource becomes **overallocated**.

All settings in the **Resource Leveling** dialog box apply to all project plans that you work with in Project, not only to the active project plan.

Using **Automatic leveling** might sound tempting, but it will cause frequent adjustments to project plans whether you want them or not. For this reason, we recommend you keep this setting on Manual.

- In the Look for overallocation on a . . . basis box, make sure that **Day by Day** is selected. This setting determines the time frame in which Project will look for Overallocation. If a resource is **overallocated**, its name will be formatted in red. If it's **overallocated** at the level you choose here, Project will also show the **Overallocated** indicator next to its name.
- Make sure that the Clear leveling values before leveling check box is selected. Sometimes you will need to level resources repeatedly to obtain the results that you want. **For Example**, you might initially attempt to level week by week and then switch to day by day. If the "Clear leveling values before leveling" check box is - selected, Project removes any existing leveling delays from all tasks and assignments before leveling. **For Example**, if you

previously leveled the project plan and then added more assignments, you might clear this check box before leveling again so that you wouldn't lose the previous leveling results.

- Under **Leveling Range** for **Advanced Plan**, make sure that Level entire project is Selected. Here you choose to level either the entire project or only those assignments that fall within a date range you specify. Leveling within a date range is most useful after you have started tracking actual work and you want to level only the remaining assignments in a project.
- In the Leveling order box, make sure that Standard is selected.
- You control the **priority** that Project uses to determine which tasks it should delay to resolve a resource conflict. The ID Only option delays tasks only according to their ID numbers: numerically higher ID numbers (**For Example**, 10) will be delayed before numerically lower ID numbers (**For Example**, 5). You might want to use this option when your project plan has no task dependencies or constraints. The Standard option delays tasks according to predecessor dependencies start dates, task constraints, slack, priority, and IDs. The Priority, Standard option looks at the task priority value before the other standard criteria. (Task priority is a numeric ranking between 0 and 1000 that indicates the task's appropriateness for leveling. Tasks with the lowest priority are delayed or split first.)
- Make sure that the Level only within **available slack** check box is cleared. Clearing this check box allows Project to extend the project's finish date, if necessary, to resolve resource allocations. Selecting this check box would prevent Project from extending the project's finish date to resolve resource overallocation. Instead, Project would use only the **Free Slack** within the existing schedule. Depending on the project, this might not be adequate to fully resolve resource overallocation.
- Make sure that the Leveling can adjust individual assignments on a task check box is selected. This allows Project to add leveling delay (or split work on assignments if "Leveling can create splits in remaining work" is also selected) independently of any other resources assigned to the same task. This might cause resources to start and finish work on a task at different times.
- Make sure that the Leveling can create splits in remaining work check box is selected. This allows Project to split work on a task (or on an assignment if "Leveling can adjust individual assignments on a task" is also selected) as a way of resolving an overallocation.

- Make sure that the Level manually scheduled tasks check box is selected. This allows Project to level a manually scheduled task just as it would an automatically scheduled task.

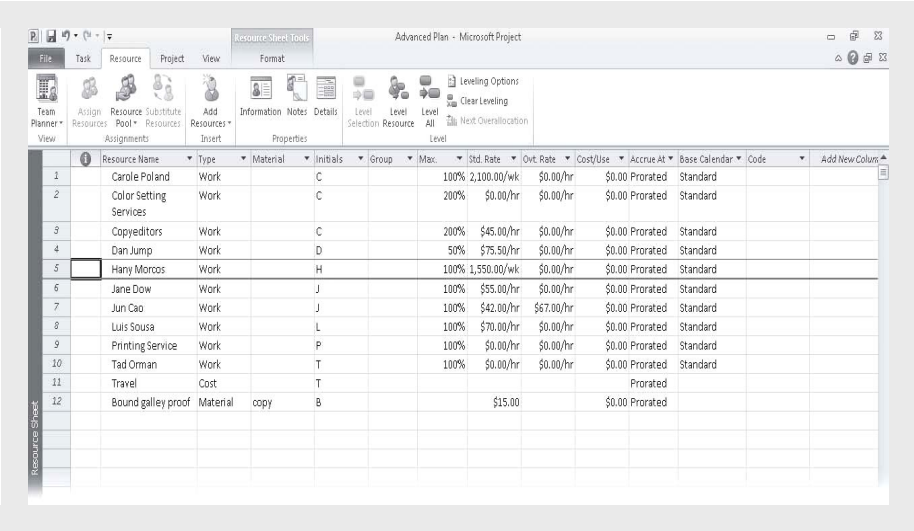
- **Click** Level All.

Important Note:

After you have set the leveling options that you want in the **Resource Leveling** dialog box, you can level the project plan by **Click** **Level All** button on the **Resource Tab** In the **Level group**.

You don't need to return to the **Resource Leveling** dialog box unless you want to change leveling options. Project levels the **overallocated** resources.

Notice that the **Overallocated** indicators are gone.

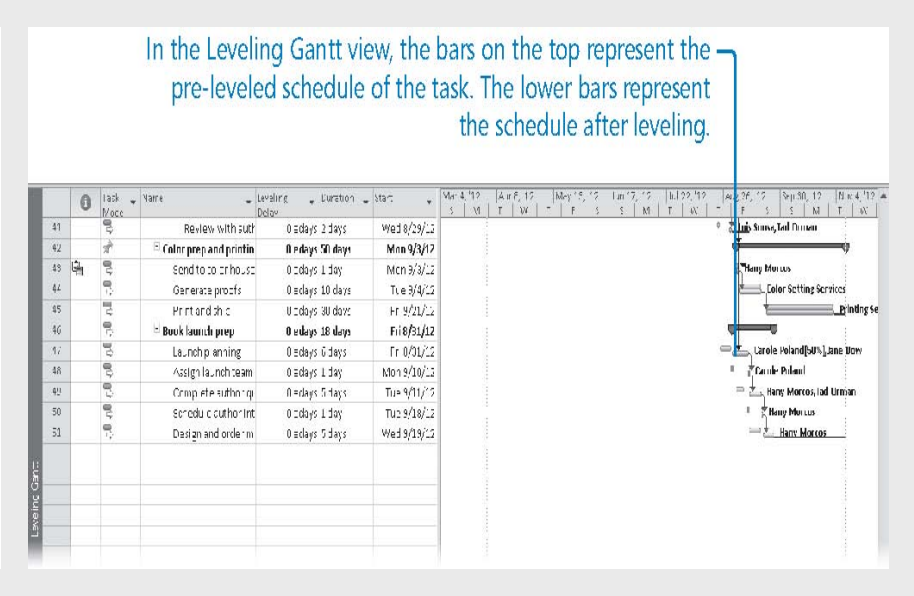


	Resource Name	Type	Material	Initials	Group	Max.	Std. Rate	Ovt. Rate	Cost/Use	Accrue At	Base Calendar	Code	Add New Column
1	Carole Poland	Work		C		100%	2,100.00/wk	$0.00/hr	$0.00	Prorated	Standard		
2	Color Setting Services	Work		C		200%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard		
3	Copyeditors	Work		C		200%	$45.00/hr	$0.00/hr	$0.00	Prorated	Standard		
4	Dan Jump	Work		D		50%	$75.50/hr	$0.00/hr	$0.00	Prorated	Standard		
5	Hany Morcos	Work		H		100%	1,550.00/wk	$0.00/hr	$0.00	Prorated	Standard		
6	Jane Dow	Work		J		100%	$55.00/hr	$0.00/hr	$0.00	Prorated	Standard		
7	Jun Cao	Work		J		100%	$42.00/hr	$67.00/hr	$0.00	Prorated	Standard		
8	Luis Sousa	Work		L		100%	$70.00/hr	$0.00/hr	$0.00	Prorated	Standard		
9	Printing Service	Work		P		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard		
10	Tad Orman	Work		T		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard		
11	Travel	Cost		T						Prorated			
12	Bound galley proof	Material	copy	B			$15.00		$0.00	Prorated			

Note:

When leveling resources with **Day By Day** selected, you might see the overallocation icons disappear, but some **Resource Name**s may still appear in red. This means that some resources are still **Overallocated hour by hour** (or minute by minute), but not day by day.

- Next, you will look at the project plan before and after leveling by using the **Leveling Gantt view**.
- On the **View Tab**, in the **Task Views** group, **Click** **Other Views** and
- Then **Click** **More Views**.
- In the **More Views** dialog box, **Click** **Leveling Gantt**,
- Then **Click** Apply. Project switches to the **Leveling Gantt view**.
- On the **View Tab**, in the **Zoom group**, **Click** **Entire Project**. This view gives you a better look at some of the tasks that were affected by leveling.



These are some of the tasks that were more substantially affected by resource leveling. Notice that each task has **two bars**. The **top bar** represents the **pre-leveled task**. You can see a task's pre-leveled start, finish, and duration by pointing to a light tan–colored bar. The **bottom bar** represents the **leveled task**.

Chapter Four
Baselines & Interim Plans

Chapter Four: Baselines & Interim Plans

Saving a Project Baseline
The original plan is called the **Baseline Plan**, or just **The Baseline**.

Baseline: is a collection of important values in a project plan such as the planned start dates, finish dates, and costs of the tasks, resources, and assignments.

When you save a baseline, Microsoft Project takes a **"snapshot"** of the existing values and saves it in your Project Plan for future comparison. The specific values saved in a baseline include the task, resource, and assignment fields, as well as the timephased fields. Timephased fields show task, resource, and assignment values distributed over time.

You should save the baseline when

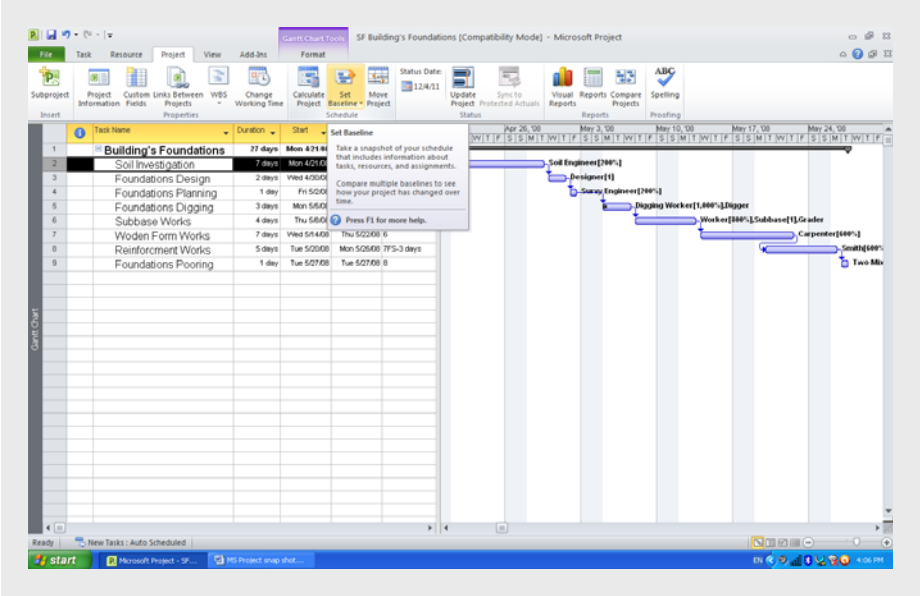
- You have developed the project plan as fully as possible. (However, this does not mean that you cannot add tasks, resources, or assignments to the project after work has started, for this is often unavoidable.)
- You have not yet started entering actual values, such as a task's percentage of completion.

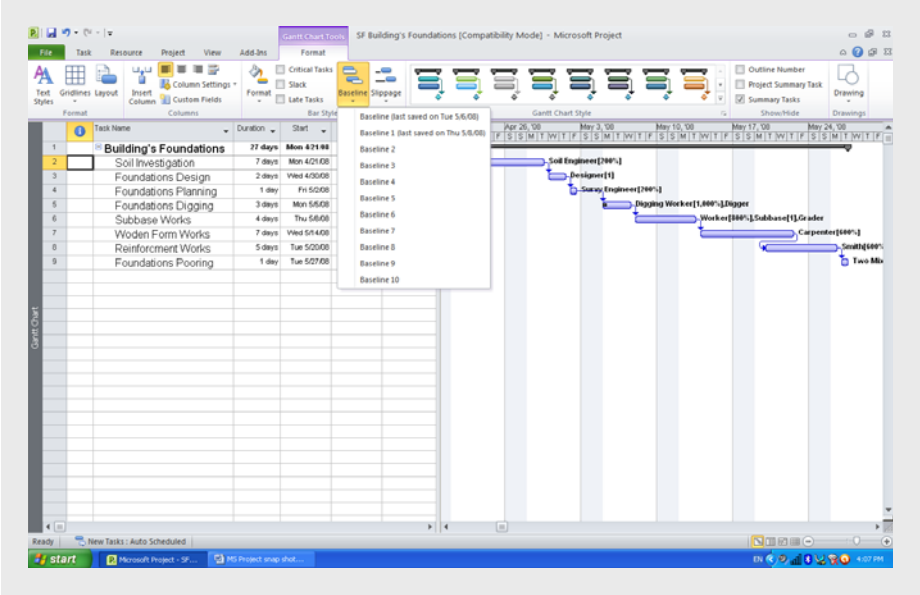
Project supports not just one baseline but up to eleven baselines in a single plan. The first one is called **Baseline Zero**, and the rest are Baseline 1 through Baseline 10.

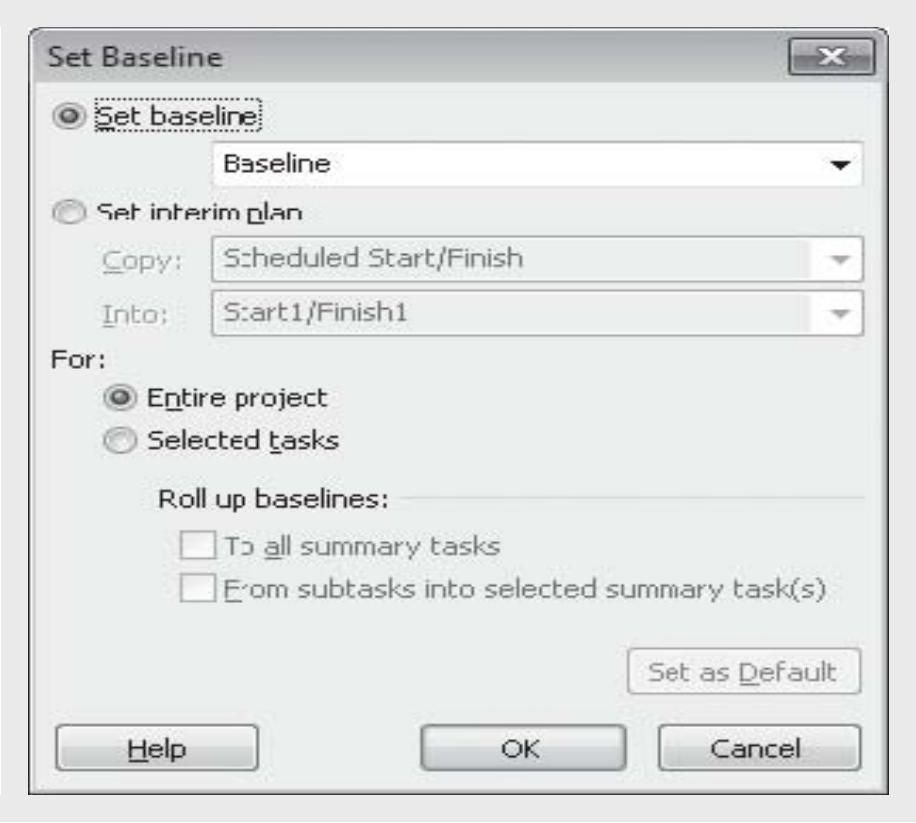
Saving multiple baselines can be useful for projects with especially long planning phases in which you might want to compare different sets of baseline values.

1- Save the baseline for a project plan and then view the baseline task values.

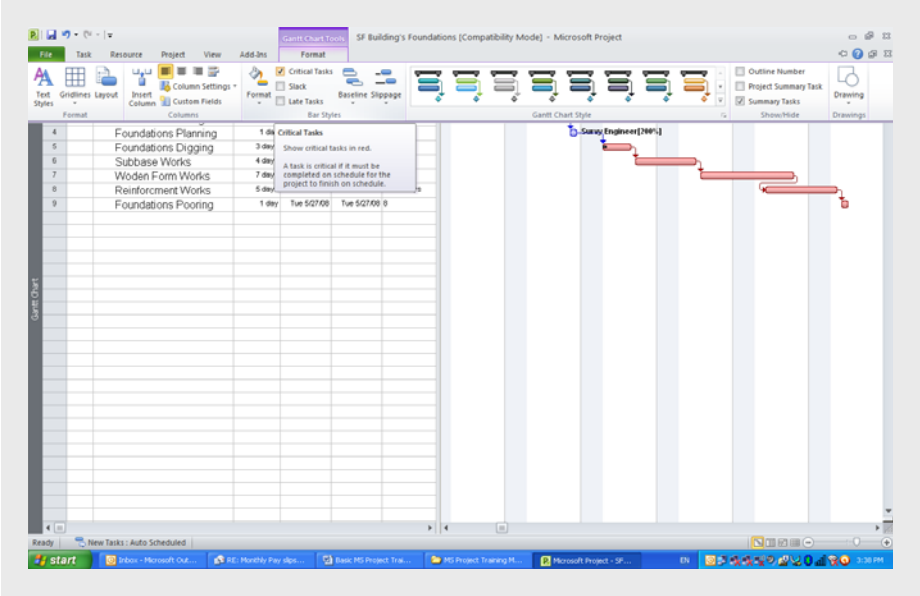
- **Click** the **Project** tab, in the **Schedule** group.
- **Click** **Set Baseline**.


SF Building's Foundations [Compatibility Mode] - Microsoft Project
Task Name
Duration
Start
Building's Foundations
Soil Investigation
Foundations Design
Foundations Planning
Foundations Digging
Subbase Works
Woden Form Works
Reinforcement Works
Foundations Pooring
Set Baseline
Take a snapshot of your schedule that includes information about tasks, resources, and assignments.
Compare multiple baselines to see how your project has changed over time.
Press F1 for more help.


SF Building's Foundations [Compatibility Mode] - Microsoft Project
Baseline (last saved on Tue 5/6/08)
Baseline 1 (last saved on Thu 5/8/08)
Baseline 2
Baseline 3
Baseline 4
Baseline 5
Baseline 6
Baseline 7
Baseline 8
Baseline 9
Baseline 10



- You'll set the baseline for the entire project by using the default settings of the dialog box. **Microsoft Project** saves the baseline, even though there's no indication in the **Gantt Chart** view that anything has changed. You will now see some of the changes caused by saving the baseline.
- View baseline data in a **Gantt Chart view (customize Gantt Chart view)**
- **Click** the **View** tab.
- Then **Click** the **Gantt Chart** button.
- **Click** the **Format** tab.
- Then in the **Bar Styles** group, **Click Baseline**.
- The baseline information is shown as the **lower** of the two **Gantt Bars** for each task, customizing **Gantt Chart** through format tab can used to view several option like critical activities, slack, or late tasks.



- On the **View tab,** in the **Task Views** group
- **Click Other Views**
- **Then Click Task Sheet.**
- The **Task Sheet** view appears. Because this is a tabular view, it does not include the **Gantt Chart**, so more room is available to see the fields in the table.
- Now you'll switch to the **Variance table** in the **Task Sheet** view. The **Variance table** is one of several predefined tables that include baseline values.
- **On the View tab, in the Data group, Click Tables.**
- In the listed tables, note the check mark next to Entry. This means that the Entry table is currently displayed in the **Task Sheet** view. You'll switch to another table next.
- **Click Variance.**
- The Variance table appears. This table includes both the scheduled and baseline starts and finish columns, shown side by side for easy comparison.

Task Sheet

	Task	Task Name	Start	Finish	Baseline Start	Baseline Finish	Start Var.	Finish Var.
0		**New Book Launch**	**Mon 1/2/12**	**Tue 2/21/12**	**Mon 1/2/12**	**Tue 2/21/12**	**0 days**	**0 days**
1		**Planning Phase**	**Mon 1/2/12**	**Mon 1/16/12**	**Mon 1/2/12**	**Mon 1/16/12**	**0 days**	**0 days**
2		Assign launch t	Mon 1/2/12	Mon 1/2/12	Mon 1/2/12	Mon 1/2/12	0 days	0 days
3		Complete auth	Tue 1/3/12	Mon 1/9/12	Tue 1/3/12	Mon 1/9/12	0 days	0 days
4		Schedule autho	Mon 1/2/12	Mon 1/9/12	Mon 1/2/12	Mon 1/9/12	0 days	0 days
5		Design and ord	Tue 1/3/12	Mon 1/16/12	Tue 1/3/12	Mon 1/16/12	0 days	0 days
6		Planning comp	Mon 1/16/12	Mon 1/16/12	Mon 1/16/12	Mon 1/16/12	0 days	0 days
7		**Internal Launch Pl**	**Tue 1/17/12**	**Fri 2/3/12**	**Tue 1/17/12**	**Fri 2/3/12**	**0 days**	**0 days**
8		Kickoff book la	Tue 1/17/12	Tue 1/17/12	Tue 1/17/12	Tue 1/17/12	0 days	0 days
9		Prepare book F	Wed 1/18/12	Fri 1/20/12	Wed 1/18/12	Fri 1/20/12	0 days	0 days
10		Plan author's tr	Wed 1/18/12	Thu 1/26/12	Wed 1/18/12	Thu 1/26/12	0 days	0 days
11		Channel Sales p	Wed 1/18/12	Wed 1/25/12	Wed 1/18/12	Wed 1/25/12	0 days	0 days
12		Complete book	Thu 1/26/12	Fri 1/27/12	Thu 1/26/12	Fri 1/27/12	0 days	0 days
13		Prepare book s	Thu 1/26/12	Wed 2/1/12	Thu 1/26/12	Wed 2/1/12	0 days	0 days
14		Distribute inter	Thu 2/2/12	Fri 2/3/12	Thu 2/2/12	Fri 2/3/12	0 days	0 days
15		**Public Launch Pha**	**Mon 2/6/12**	**Tue 2/21/12**	**Mon 2/6/12**	**Tue 2/21/12**	**0 days**	**0 days**
16		**Author travel a**	**Mon 2/6/12**	**Tue 2/7/12**	**Mon 2/6/12**	**Tue 2/7/12**	**0 days**	**0 days**
17		Author radic	Mon 2/6/12	Mon 2/6/12	Mon 2/6/12	Mon 2/6/12	0 days	0 days
18		Author readi	Tue 2/7/12	Tue 2/7/12	Tue 2/7/12	Tue 2/7/12	0 days	0 days
19		Distribute adve	Mon 2/6/12	Tue 2/7/12	Mon 2/6/12	Tue 2/7/12	0 days	0 days
20		Distribute book	Mon 2/6/12	Tue 2/7/12	Mon 2/6/12	Tue 2/7/12	0 days	0 days
21		Coordinate ma	Wed 2/8/12	Thu 2/16/12	Wed 2/8/12	Thu 2/16/12	0 days	0 days
22		Launch public v	Wed 2/8/12	Tue 2/14/12	Wed 2/8/12	Tue 2/14/12	0 days	0 days
23		Launch social m	Wed 2/15/12	Tue 2/21/12	Wed 2/15/12	Tue 2/21/12	0 days	0 days
24		Launch comple	Tue 2/21/12	Tue 2/21/12	Tue 2/21/12	Tue 2/21/12	0 days	0 days

Because **no actual work** has occurred yet and **no changes** to the scheduled work have been made, the values in the **Start and Baseline Start** fields are identical, as are the values in the Finish and Baseline Finish fields.

After actual work is recorded or later schedule adjustments are made, the scheduled start and finish values might differ from the baseline values. You would then see the differences displayed in the variance columns.

- On the **View** tab, in the **Task Views** group, **Click** **Gantt Chart**. The **Gantt Chart** view appears.

2- Saving Interim Plans

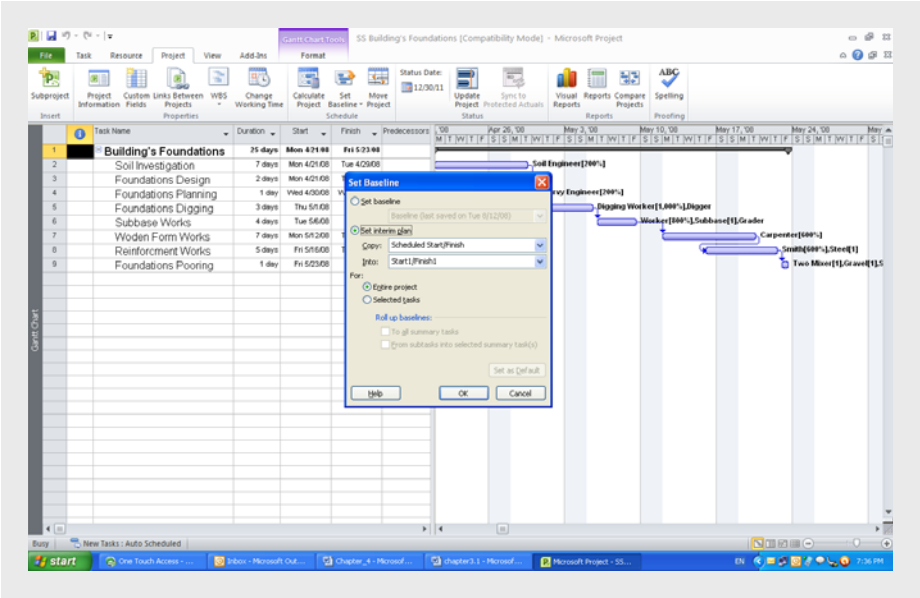
Interim plan: is a set of current values from the project plan that Project saves with the file, an interim plan saves only the start and finish dates of tasks, not resource or assignment values. It usually used to take snapshot of the current start and finish dates. **You can save up to 10 different interim plans during a project.**

If you find that you need multiple snapshots of scheduled values in addition to start and finish dates, you should instead save additional baselines. You might want to save an interim plan at any of the following junctures:

- At the conclusion of a major phase of work
- At preset time intervals, such as weekly or monthly
- Just before or after entering a large number of actual values Steps

To save an interim plan:

- On the **Project** tab, in the **Schedule** group, **Click Set Baseline**
- Then **Click Set Baseline**. In the **Set Baseline** dialog box,
- Select the **"Set interim plan"** option.



Chapter Five
Tracking Progress on Tasks and Assignments

Chapter Five: Tracking Progress on Tasks & Assignments

Microsoft Project 2010 supports several ways to track progress. Your choice of a tracking method should depend on the level of detail or control required by you, your project sponsor, and other stakeholders. Therefore, before you begin tracking progress, you should determine the level of detail you need. The different levels of tracking detail include the following:

- **Record project work as scheduled.** This level works best if everything in the project occurs exactly as planned.
- **Record each task's percentage of completion,** either at precise values or at increments such as 25, 50, 75, or 100 percent.
- **Record Actual Values for Tasks**: the actual start, actual finish, actual work, and actual and remaining duration for each task or assignment.
- **Track assignment-level work by time period.** This is the most detailed level of tracking. Here, you record actual work values per day, week, or other interval.
    - Tracking task-level and assignment-level work totals and work per time period, such as work completed per week or per day.
    - Tracking timephased actual is tracking work by time period (dates, recourses, assignments, and cost).

Note:
Because different portions of a project might have different tracking needs, you might need to apply a combination of these approaches within a single project plan. **For Example**, you might want to track high-risk tasks more closely than low-risk ones.

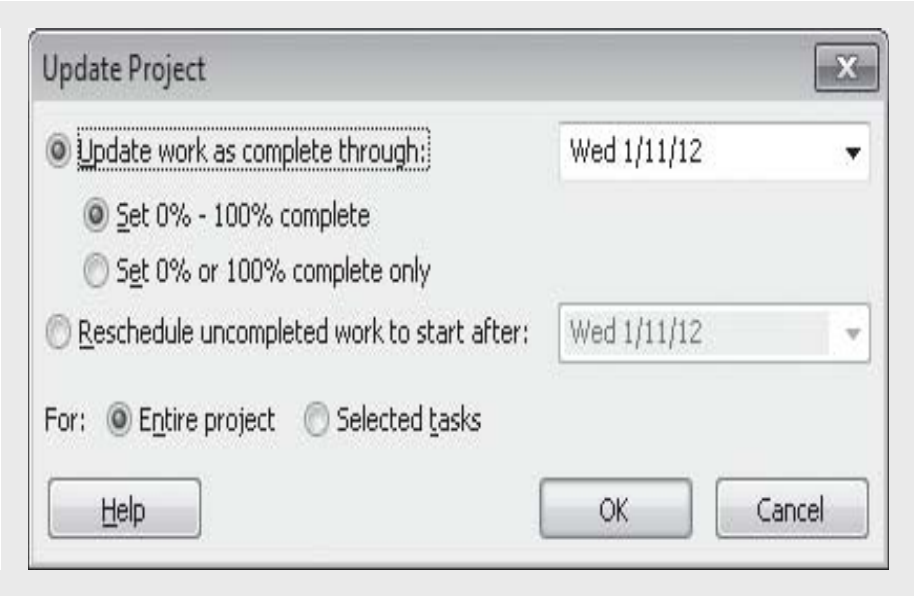
1-Tracking a Project work as Scheduled

The simplest approach to tracking progress is to report that the actual work is proceeding exactly as planned.

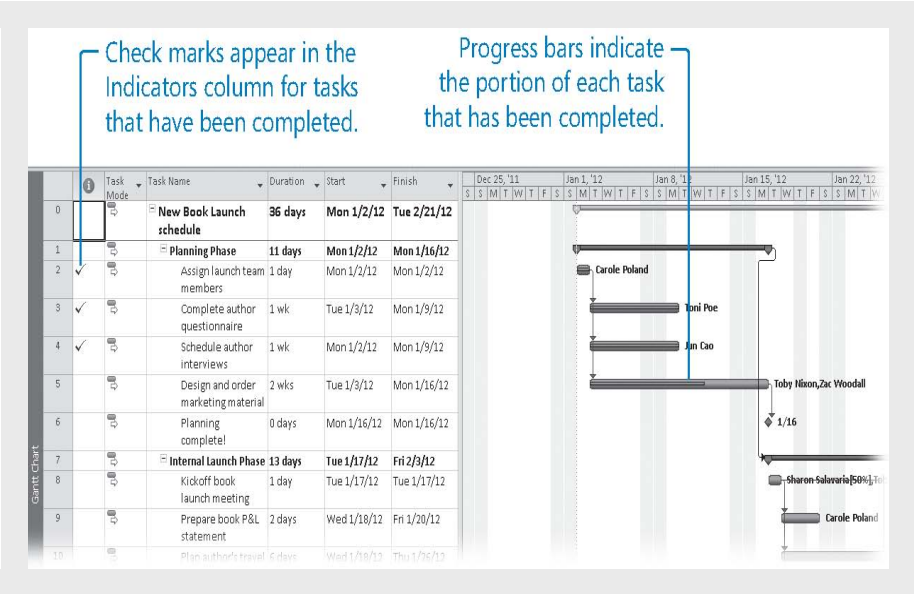
For Example, if the first month of a five-month project has elapsed and all its tasks have started and finished as scheduled, you can quickly record this in the Update Project dialog box. When you record progress through a specific date, Project calculates **actual duration, remaining duration, actual costs**, and other values up to the date you entered.

Suppose that some time has now passed since saving the baseline. Work has started, and all is well. You record project actuals by updating work to a specific date.

- On the **Project** tab, in the **Status** group, **Click** **Update Project**. The Update Project dialog box appears.
- Make sure the **Update work as complete through** option is selected.
- In the adjacent date box, type or select a certain date.



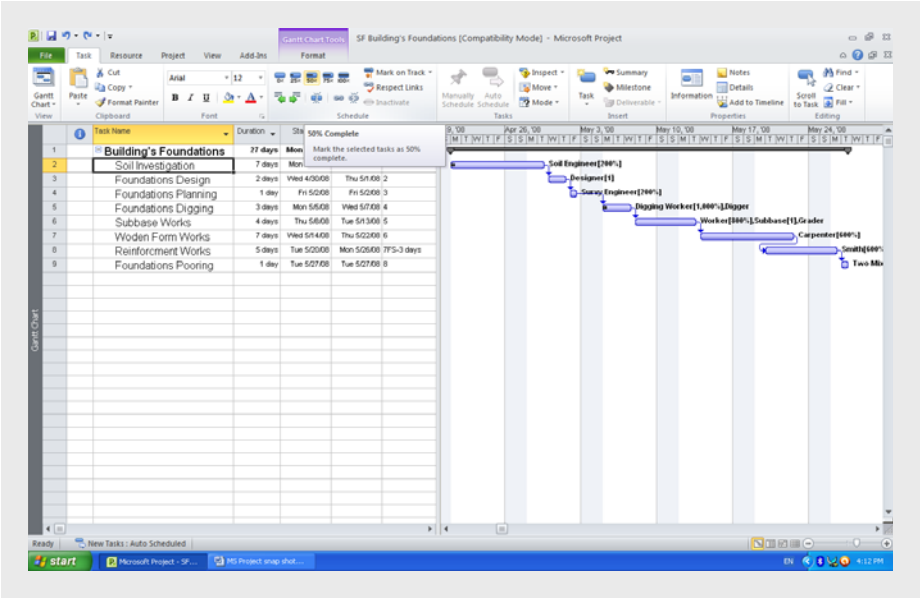
- **Click** **OK**. Project records the completion percentage for the tasks that were scheduled. It displays that progress by drawing progress bars in the **Gantt Bars** for those tasks.

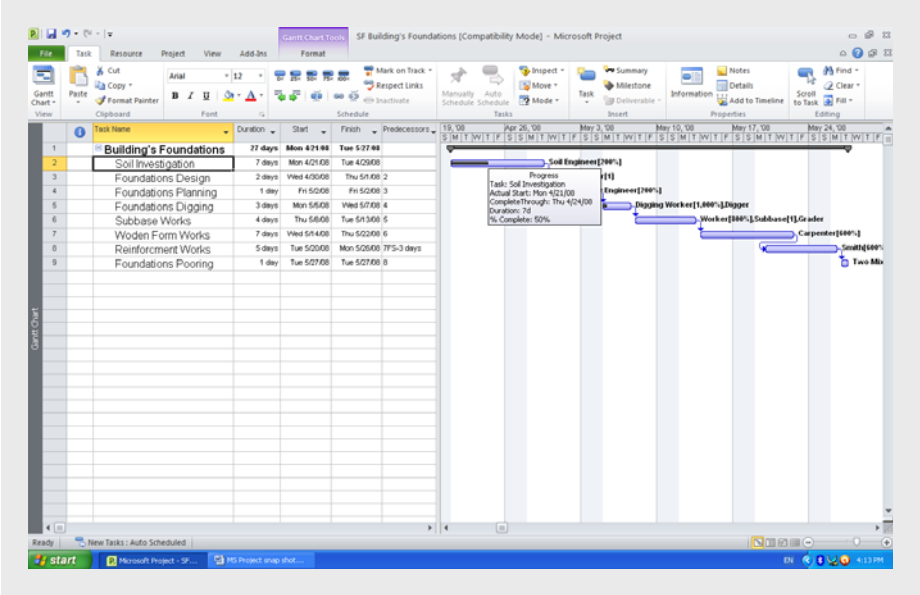


In the **Gantt Chart** view, the progress bar shows how much of each task has been completed. **A check mark** appears in the Indicators column for those tasks that have been completed, and the **progress bars** extend through the full length of those tasks' **Gantt Bars**.

2- Entering a Task's Completion Percentage

- **Click** the **Task tab.**
- Select the task for which you want to enter actual progress.
- In the **Tasks group**, select the **amount of progress done** on the task.





3- Entering Actual Values for Tasks

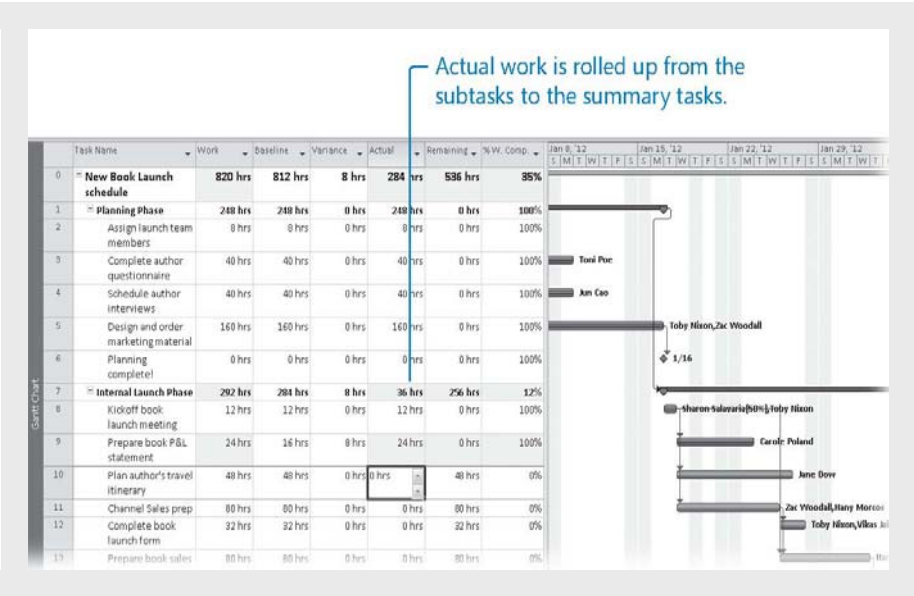
Record each **task's actual start, finish, work, and duration values**. When you enter these values, Project uses the following rules:

- When you enter a **task's actual start** date, Project moves the scheduled start date to match the actual start date.

- When you enter a **task's actual finish** date, Project moves the scheduled finish date to match the actual finish date and sets the task to **100% complete**.
- When you enter a **task's actual work value**, Project recalculates the task's remaining work value, if any.
- When you enter a **task's actual duration**, if it is **less** than the scheduled duration, Project subtracts the actual duration from the scheduled duration to determine the remaining duration.
- When you enter a **task's actual duration**, if it is **equal** to the scheduled duration, Project sets the task to **100% complete**.
- When you enter a **task's actual duration**, if it is **longer** than the scheduled duration, Project adjusts the scheduled duration to match the actual duration and sets the task to **100% complete**.

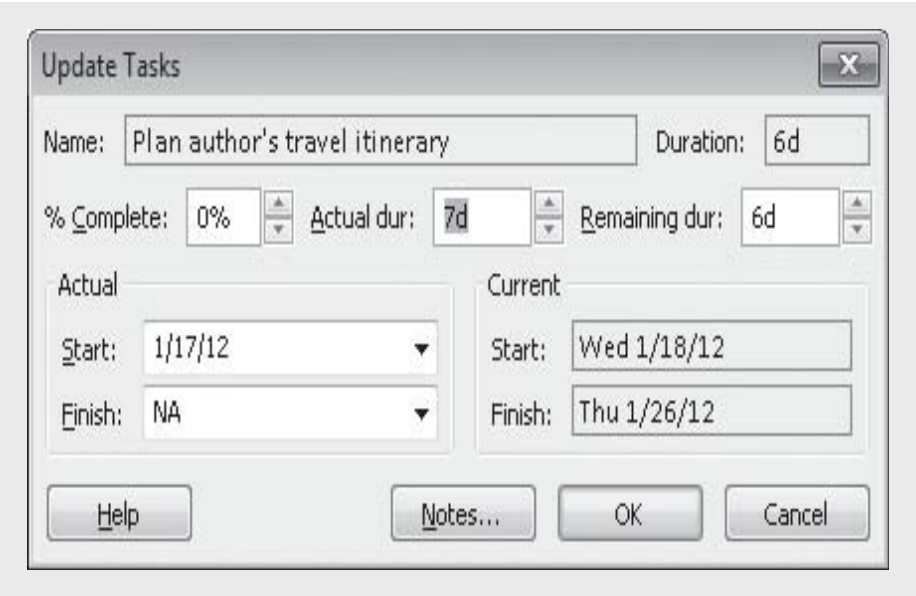
You can record actual work values for some tasks as well as start dates and durations for other tasks.

- On the **View** tab, in the **Data** group, **Click Tables**
- Then **Click Work**. The Work table appears.
- Drag the vertical divider bar to the right to expose the other columns in the **Work table**. This table includes both the total scheduled work (labeled "Work") and Actual and Remaining work columns. You'll refer to the values in these columns as you update tasks.
- In the **Actual** field for task, type or select number of work hours, and then press the **Enter** key. Project records that number of hours of work have been completed on task. if entered hours is greater than the originally scheduled, Project marks the task as completed and extends the Gantt bar of the task to indicate its longer duration.



You can enter actual start dates and durations of tasks.

- In the **Task Name** column, **Click** task.
- Record **start date and duration** information in the **Update Tasks** dialog box.
- On the **Task** tab, in the **Schedule** group, **Click** the down arrow to the right of the **Mark on Track** button, and then **Click Update Tasks**.
- The **Update Tasks** dialog box appears. This dialog box shows both the **actual and scheduled values** for the task's duration, start, and finish, as well as its remaining duration. In this box, you can update the actual and remaining values.
- In the **Start** field in the **Actual** group on the left side of the dialog box, type or select certain date.
- In the **Actual duration** field, type or select **certain duration**.



- **Click OK**. Project records the actual start date, duration, and scheduled and actual work of the task.

4- Track assignment-level work by time period

- **Tracking Actual and Remaining Values for Tasks and Assignments**
  For tasks that have resources assigned to them, you can enter actual and remaining work values for the task as a whole or for specific assignments to that task.

How Project handles the actual values you enter?

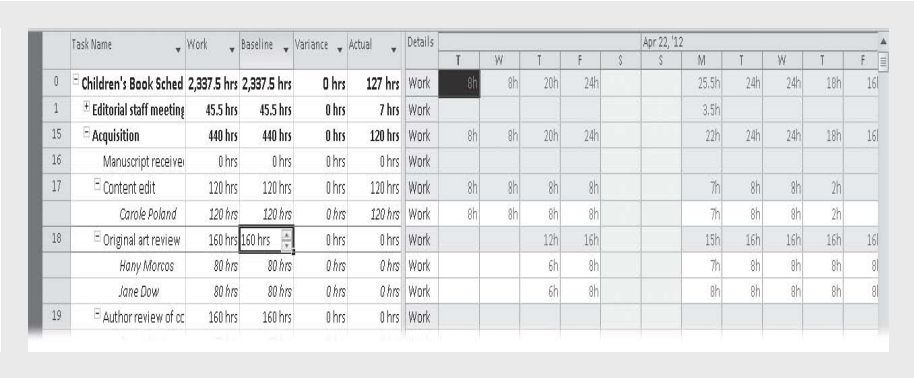
- **If a task has a single resource assigned** to it, the actual work values that you enter for the task or assignment apply equally to both

the task and the resource. **For Example**, if you record that the assignment started on April 23 and has five hours of actual work; those values apply to the task and to the assigned resource.

- **If a task has multiple resources assigned** to it; the actual work values that you enter for the task are distributed among or rolled down to the assignments according to their assignment units. This level of detail is appropriate if you aren't concerned about the details at the individual assignment level.
- **If a task has multiple resources assigned** to it; the actual work values that you enter for one assignment are rolled up to the task. However, the new actual work values do not affect the other assignments' work values on the task. This level of detail is appropriate if details at the individual assignment level are important to you.

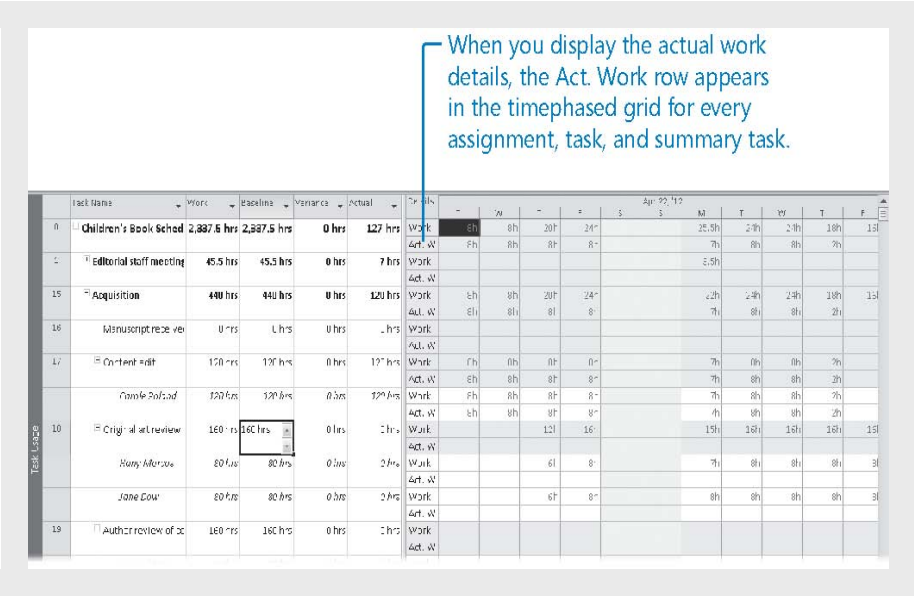
How the information is rolled up or down between tasks and assignments?

- On the **View** tab, in the **Task Views** group, **Click Task Usage.**
- The **Task Usage view** appears. The two sides of the usage view are split by a vertical divider bar. The **Task Usage** view lists resources under the tasks to which they're assigned. This information appears in the table on the left side. On the right side, you see rows organized under a timescale. The rows on the right side show you the scheduled work values for each task or assigned resource. The **Task Usage** view color-codes the rows on the right side: task rows have a shaded background, and assignment rows have a white background.
- In the **Task Name** column, **Click** the name of task.
- On the **Task** tab, in the **Editing** group, **Click Scroll to Task**. The timephased grid on the right side of the view scrolls to display the first scheduled work for the task.
- Next, you'll switch the table and details shown in the view.
- On the **View** tab, in the **Data** group, **Click Tables** and then **Click Work**.
- The **Work table** appears.

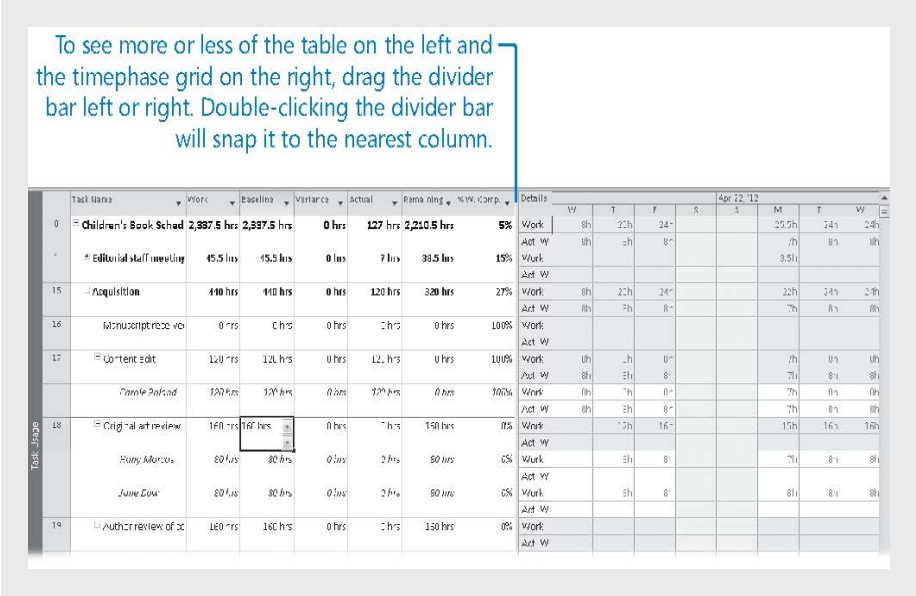


	Task Name	Work	Baseline	Variance	Actual	Details	Apr 22, '12										
							T	W	T	F	S	S	M	T	W	T	F
0	Children's Book Sched	2,337.5 hrs	2,337.5 hrs	0 hrs	127 hrs	Work	8h	8h	20h	24h			25.5h	24h	24h	18h	16
1	Editorial staff meeting	45.5 hrs	45.5 hrs	0 hrs	7 hrs	Work							3.5h				
15	Acquisition	440 hrs	440 hrs	0 hrs	120 hrs	Work	8h	8h	20h	24h			22h	24h	24h	18h	16
16	Manuscript receive	0 hrs	0 hrs	0 hrs	0 hrs	Work											
17	Content edit	120 hrs	120 hrs	0 hrs	120 hrs	Work	8h	8h	8h	8h			7h	8h	8h	2h	
	Carole Poland	120 hrs	120 hrs	0 hrs	120 hrs	Work	8h	8h	8h	8h			7h	8h	8h	2h	
18	Original art review	160 hrs	160 hrs	0 hrs	0 hrs	Work			12h	16h			15h	16h	16h	16h	16
	Hany Morcos	80 hrs	80 hrs	0 hrs	0 hrs	Work			6h	8h			7h	8h	8h	8h	8
	Jane Dow	80 hrs	80 hrs	0 hrs	0 hrs	Work			6h	8h			8h	8h	8h	8h	8
19	Author review of co	160 hrs	160 hrs	0 hrs	0 hrs	Work											

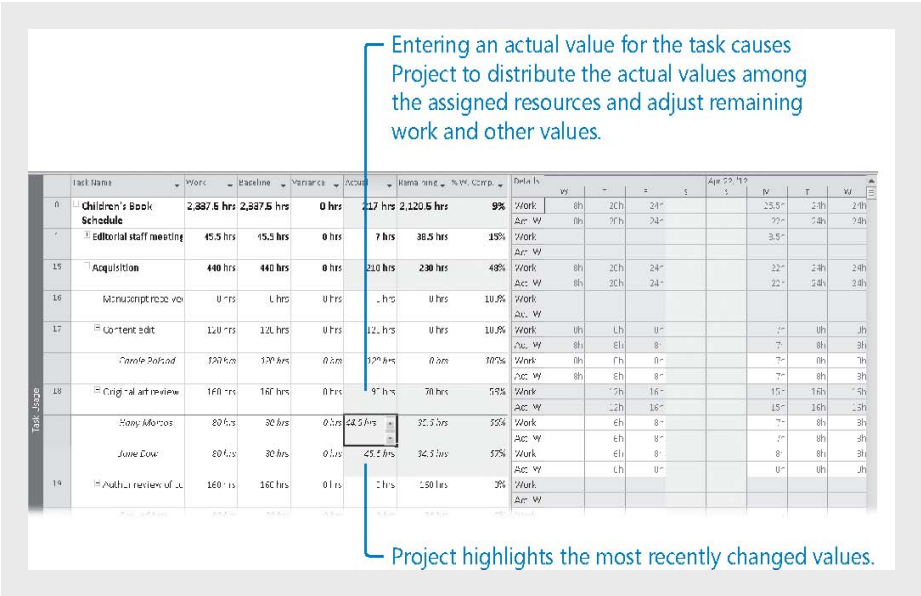
- This table includes the **Actual Work and Remaining Work** columns that you will work with shortly, although they might not yet be visible. The values in the Work column are the task and assignment totals for scheduled work. Note that each task's work value is the sum of its assignment work values. **For Example**, the work total for task equal to160 hours is the sum of two recourse 80 hours of work for each.
- Next, change the details shown on the **timephased** grid on the right side of the view.
- On the **Format** tab, in the **Details** group, **Click Actual Work**.
- For each task and assignment, Project now displays the **Work and Actual Work** rows on the timephased grid on the right side of the view.



- In the **timephased grid**, you see the scheduled work values per day. If you were to add up the daily work values for a specific task or assignment, the total would equal the value in the Work column for that task or assignment.
- In a **usage view**, you see work values at two different levels of detail: the total value for a task or assignment and the more detailed timephased level. These two sets of values are directly related.
- Next, enter **task-level and assignment-level actual work values.**
- Using the mouse, drag the vertical divider bar to the right until you can see all the columns in the **Work table.**



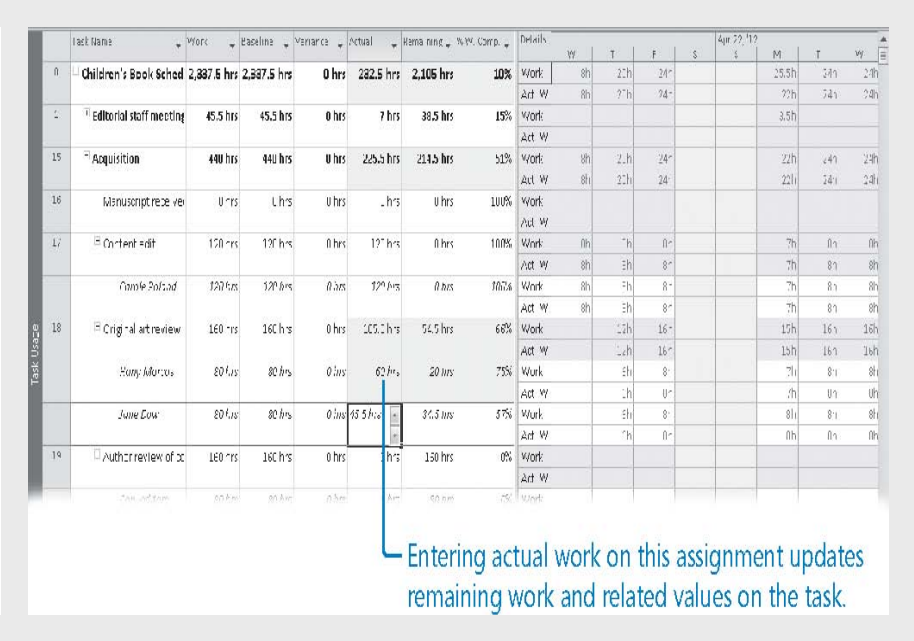
- In the **Actual** column for task, if typed cretin time, several important things will take place



  - Project applied change highlighting to the **updated values** in the table.
  - The amount of actual work you entered was subtracted from the **Remaining** column.
  - The actual work was distributed equally to the two assignments on the task, the updated remaining work value was recalculated for each assignment.
  - The updated actual and remaining work values were rolled up to the **Acquisition summary** task.

- The actual work values were also redistributed to the task and assignment timephased values.

- In the timephased grid side of the view, you can see the **daily scheduled work and actual work values for resources** Because you entered an actual work value for the entire task, Project assumes that the work was done as scheduled and records these timephased values for the resource assignments.



Tracking a task's actual work complete value is more detailed than entering a simple percentage complete on a task. However, neither method is as detailed as entering timephased actual work for tasks or assignments (as you will see in the next section).

There's nothing wrong with tracking actual work at the task or assignment level (or simply entering a percentage complete value, for that matter) if that level of detail meets your needs.

In fact, whether you see the timephased details or not, Project always distributes any percentage complete or task-level or assignment-level actual work value that you enter into corresponding timephased values, as you saw earlier.

This is one reason why new Project users sometimes are surprised to encounter extremely precise values, such as 7.67 hours of work, scheduled for a particular day.

Note:
If you generally understand the math that Project is following, however, you can figure out where such numbers come from. On the other hand, you might not care about this level of scheduling detail—and that's OK, too.

Entering Actual Costs Manually
Whenever you've entered actual work values Project has calculated actual cost values for the affected task, its summary task, and the resources assigned to the task, and the entire project.

By default, Project calculates actual costs and does not allow you to enter them directly. In most cases, this is what we recommend and what is done with the practice files used in this book. However, if you want to enter actual cost values yourself in your own project plans, follow these steps.

- On the **File** tab, Click **Options**. The Project Options dialog box appears.
- Click the **Schedule** tab.
- Under the **Calculation options for this project** label, clear the **Actual costs are always calculated by Project** check box.
- Click **OK**.

After automatic cost calculation is turned off, you can enter or import task- or assignment-level actual costs in the Actual field. This field is available in several locations, such as the **Cost table**. You can also enter actual cost values daily or at another interval in any timescale view, such as the **Task Usage or Resource Usage** view.

- With a **usage view** displayed, on the **Format** tab, in the **Details** group, Click Actual Cost.

- **Tracking Timephased Actual Work for Tasks and Assignments**

  Timephased: is the Information distributed over time. Entering timephased values might be the best approach to take if you have a group of tasks or an entire project that includes the following:

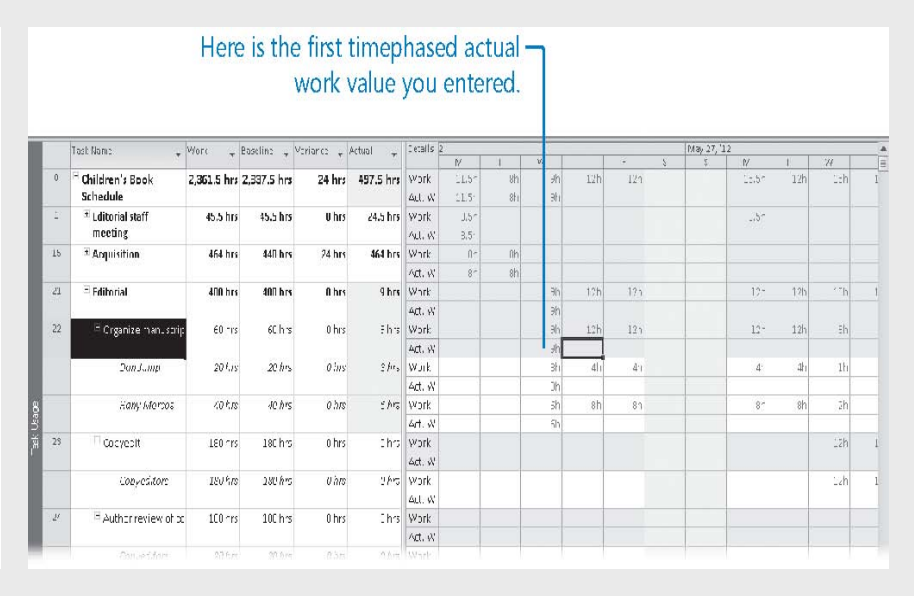
  - **High-risk tasks**
  - Relatively **short-duration tasks** in which a variance of even one day could put the overall project at risk
  - Tasks for which you'd like to **develop or validate** throughput metrics, or rates at which a given quantity of a deliverable can be completed over a given time period.

- Tasks in which sponsors or other stakeholders have an especially **strong interest.**
- Tasks that require **hourly billing for labor.**

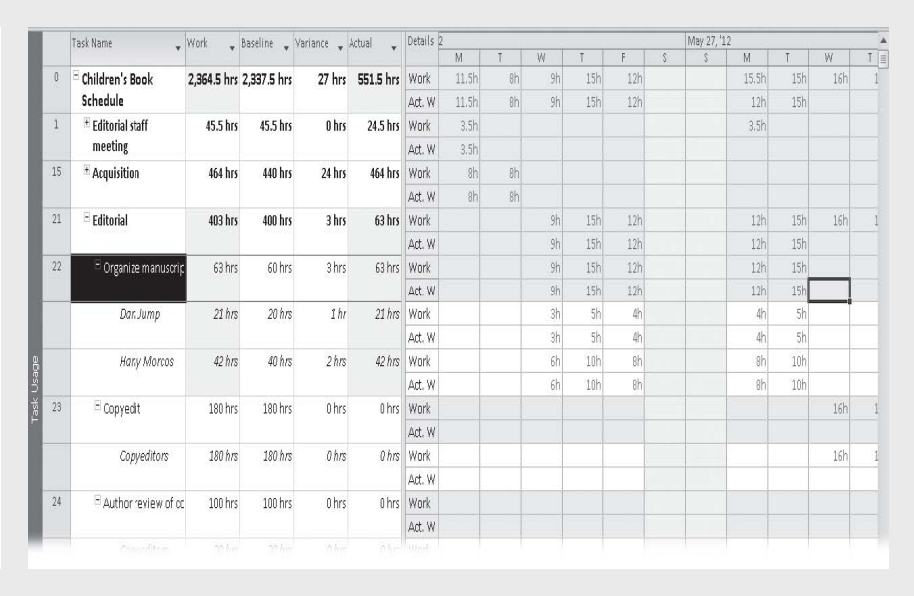
At this point in the new book project, the **Acquisition work** has been completed, and the **Editorial phase** has just begun. Because of the larger number of resources involved and the variability of the editorial work, these tasks are the riskiest ones so far in the project.

- In the **Task Name** column, **Click** the name of task on the **Task** tab,
- In the **Editing** group, **Click** **Scroll to Task**. Project scrolls the timephased grid to display the first scheduled work values of the Editorial phase.

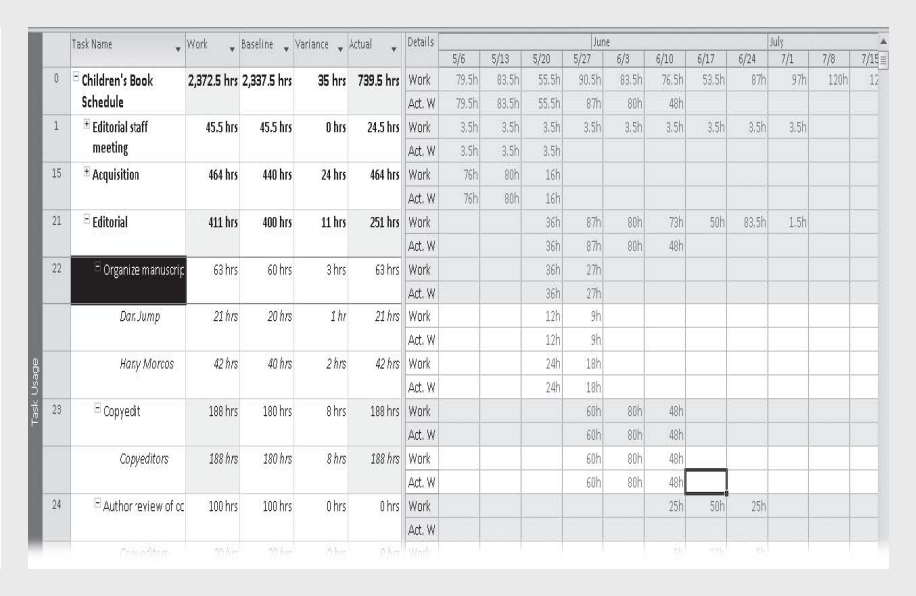
- The first timephased actual work values that you will enter are at the task level and not for specific assignments.
- Type **work in hours,** and then press the Tab key.



- As soon as you entered the first actual value for the task, the scheduled work value changed to match it. Both work and actual work values rolled up to the summary task levels and were distributed among the specific assignments to the task. You can see this happen in the timephased grid on the right and the table on the left.



- On the **View** tab, in the **Zoom** group, in the **Timescale** box, **Click Weeks**.



	Task Name	Work	Baseline	Variance	Actual	Details	5/6	5/13	5/20	5/27	6/3	6/10	6/17	6/24	7/1	7/8	7/15
0	Children's Book Schedule	2,372.5 hrs	2,337.5 hrs	35 hrs	739.5 hrs	Work	79.5h	83.5h	55.5h	90.5h	83.5h	76.5h	53.5h	87h	97h	120h	12
						Act. W	79.5h	83.5h	55.5h	87h	80h	48h					
1	Editorial staff meeting	45.5 hrs	45.5 hrs	0 hrs	24.5 hrs	Work	3.5h	3.5h	3.5h	3.5h	3.5h	3.5h	3.5h	3.5h	3.5h		
						Act. W	3.5h	3.5h	3.5h								
15	Acquisition	464 hrs	440 hrs	24 hrs	464 hrs	Work	76h	80h	16h								
						Act. W	76h	80h	16h								
21	Editorial	411 hrs	400 hrs	11 hrs	251 hrs	Work			36h	87h	80h	73h	50h	83.5h	1.5h		
						Act. W			36h	87h	80h	48h					
22	Organize manuscrip	63 hrs	60 hrs	3 hrs	63 hrs	Work			36h	27h							
						Act. W			36h	27h							
	Dan Jump	21 hrs	20 hrs	1 hr	21 hrs	Work			12h	9h							
						Act. W			12h	9h							
	Harry Morcos	42 hrs	40 hrs	2 hrs	42 hrs	Work			24h	18h							
						Act. W			24h	18h							
23	Copyedit	188 hrs	180 hrs	8 hrs	188 hrs	Work				60h	80h	48h					
						Act. W				60h	80h	48h					
	Copyeditors	188 hrs	180 hrs	8 hrs	188 hrs	Work				60h	80h	48h					
						Act. W				60h	80h	48h					
24	Author review of co	100 hrs	100 hrs	0 hrs	0 hrs	Work						25h	50h	25h			
						Act. W											

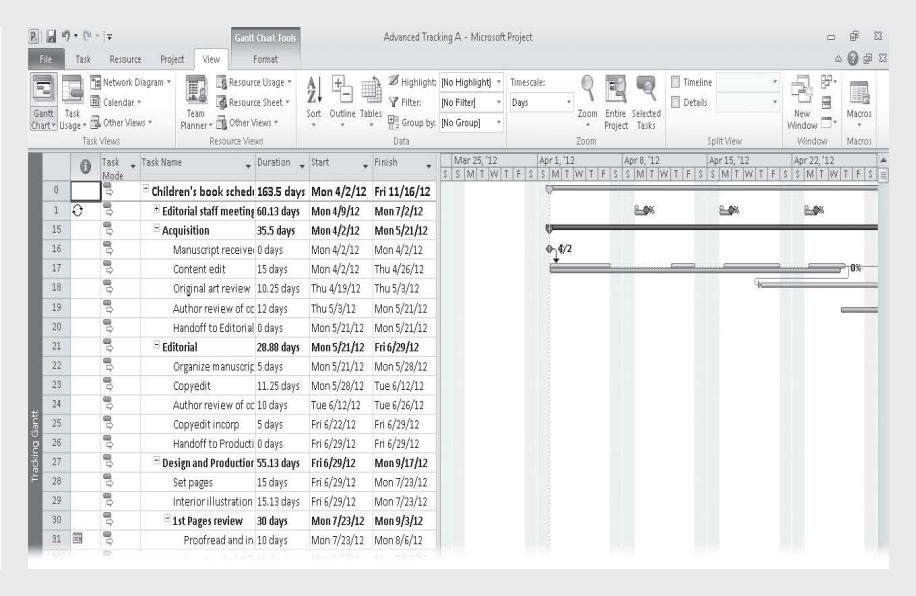
- The resource's actual work values were rolled up to the task's actual work values. The original work values were saved in the baseline should you ever need to refer to them later.

Update Baseline

Update a previously saved baseline plan prior to tracking actual work

Variance: is the difference between what you thought would happen (as recorded in the project plan) and what really happened (as recorded by your tracking efforts).OR is the planned against actual work.

- **Update the baseline for the entire project:** Replaces the original - baseline values with the currently scheduled values.
- **Update the baseline for selected tasks:** This does not affect the baseline values for other tasks or resource baseline values in the project plan.
- **Save a second or subsequent baseline:** You can save up to 11 baselines in a single Plan. The first one is called Baseline zero, and the rest are Baseline 1 through Baseline 10.
- On the **View** tab, in the **Task Views** group, **Click** the down arrow below the **Gantt Chart** button
- Then **Click** **Tracking Gantt**. The Tracking Gantt view appears.

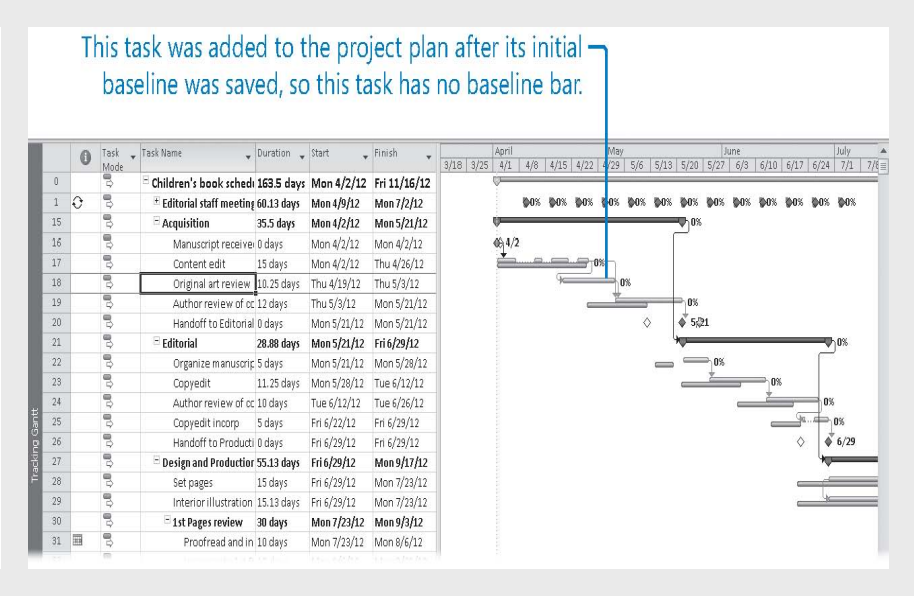


- In the chart portion of this view, the tasks as they are currently scheduled appear as blue bars (if they are not critical tasks) or red bars (if they are critical). Below them, the baseline values of each task appear as gray bars.
- In the **Task Name** column, **Click** the name of task.
- On the **Task** tab, in the **Editing** group, **Click** **Scroll to Task**.

The Tracking Gantt view scrolls to display the **Gantt bar** for task. This task was added to the plan after the initial baseline was saved. As you can see in the **Tracking Gantt** view, this task has no baseline bar, indicating that it has no baseline values.

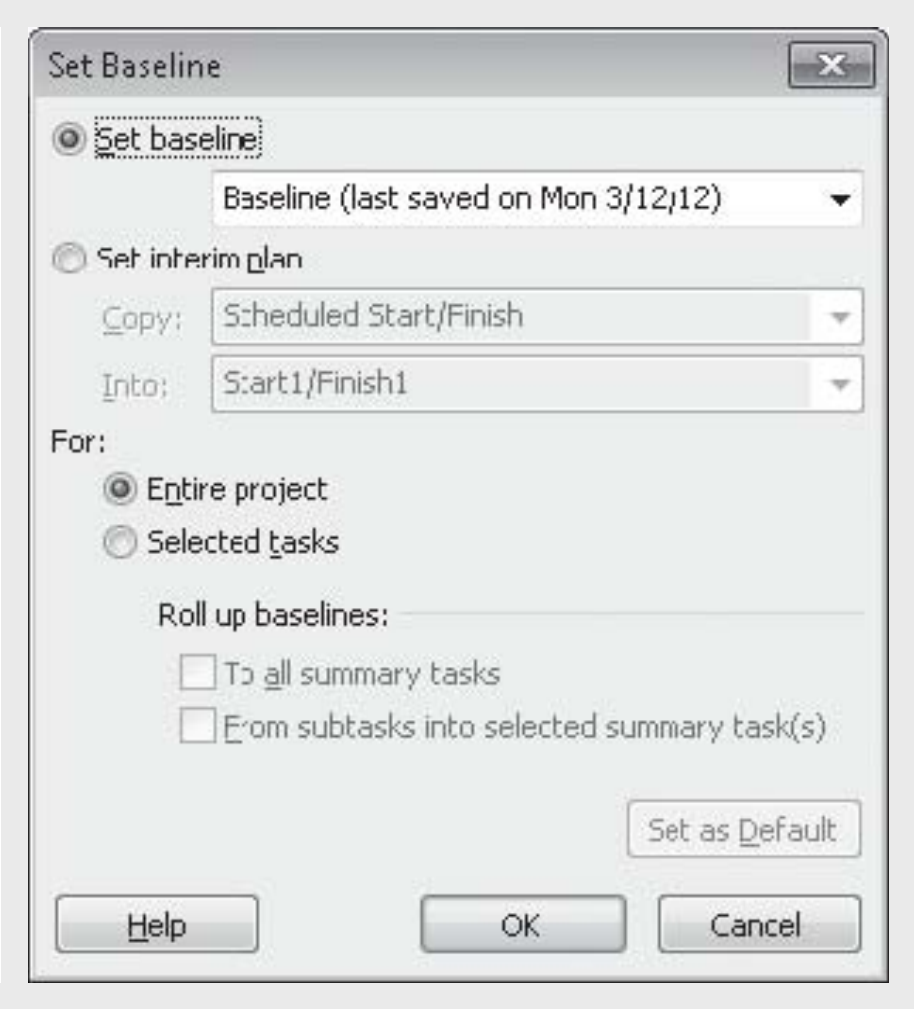
To get a broader look at the project plan's baseline, you'll adjust the zoom level.

- On the **View** tab, in the **Zoom** group, in the **Timescale** box, **Click** **Weeks**.
- You can see that currently none of the later tasks in the project plan match their baselines.



Note:
After work has been recorded, you should be careful about overwriting any previously saved baseline values. Once you overwrite a baseline, the original values are replaced and cannot be retrieved. Saving additional baselines is often a better strategy after work on the project has begun.

- On the **Project** tab, in the **Schedule** group, **Click** **Set Baseline**
- Then **Click** **Set Baseline**. The Set Baseline dialog box appears.
- Make sure that the **Set Baseline** option is selected. In the **for** area, make sure that the **Entire project** option is selected



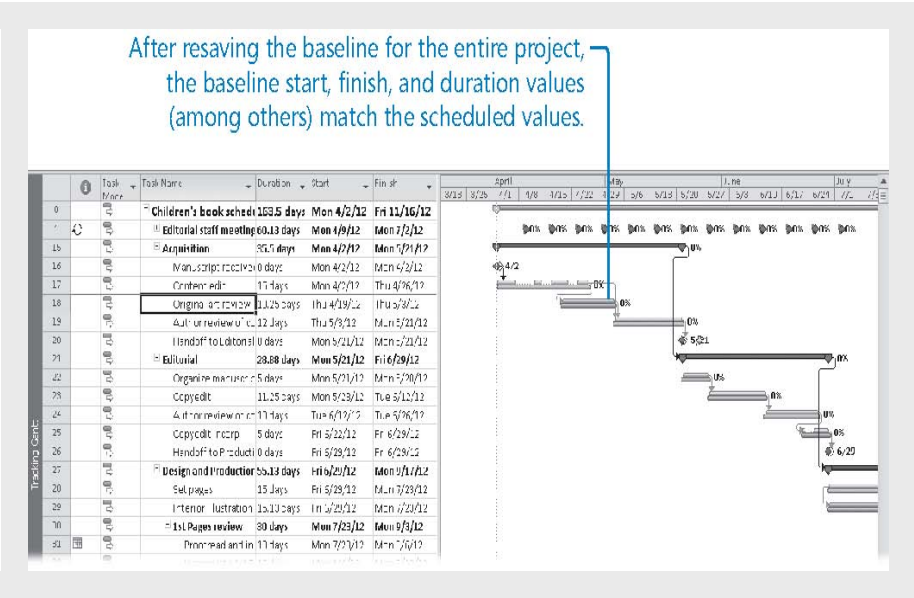
Tip:
To update a baseline just for selected tasks,

- You can **Click** **Selected Tasks** under for label.
- When you do this, the options under **Roll Up Baselines** become available.
- You can control how baseline updates should affect the baseline values for summary tasks. **For Example**, you could resave a baseline for a subtask and update its related summary task baseline values if desired.

To remove a baseline, on the Project tab, in the Schedule group,

- **Click** the **Set Baseline** button
- Then **Click** **Clear Baseline.**

- **Click** **OK** to update the baseline.
- Project alerts you that you are about to overwrite the previously saved baseline values.
- **Click** Yes. Project updates the baseline values for the project plan.



Rescheduling Incomplete Work

During the course of a project, work might occasionally be interrupted for a specific task or for the entire project. Should this happen, you can have Project reschedule the remaining work to restart after the date you specify. When you reschedule incomplete work, you specify the date after which work can resume—the rescheduled date. Here is how Project handles tasks in relation to the rescheduled date:

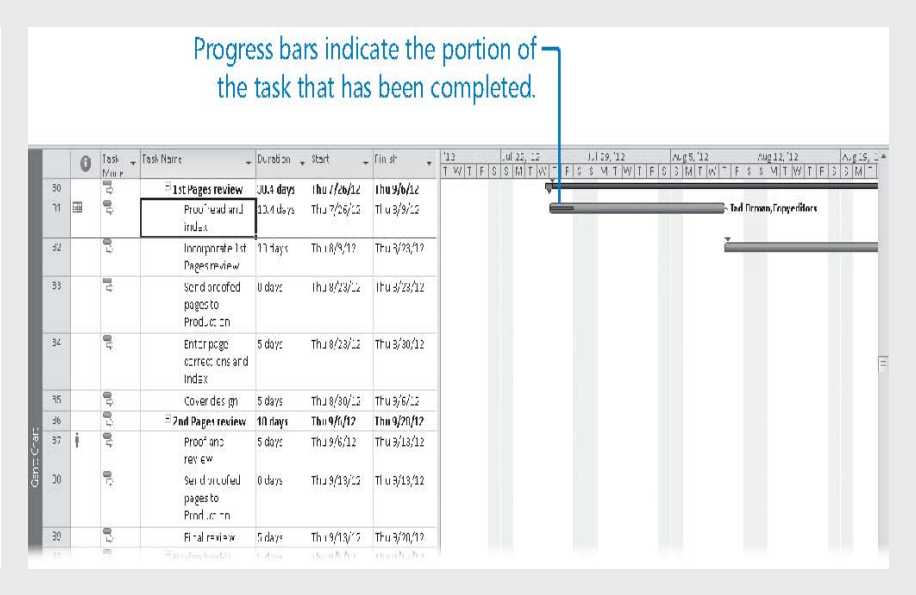
- **If the task does not have any actual work recorded** for it prior to the rescheduled date and does not have a constraint applied, the entire task is rescheduled to begin after that date.
- **If the task has some actual work recorded** prior to but none after the rescheduled date, the task is split so that all remaining work starts after the rescheduled date. The actual work is not affected.
- **If the task has some actual work recorded** for it prior to as well as after the rescheduled date, the task is not affected.

How to reschedule uncompleted work?

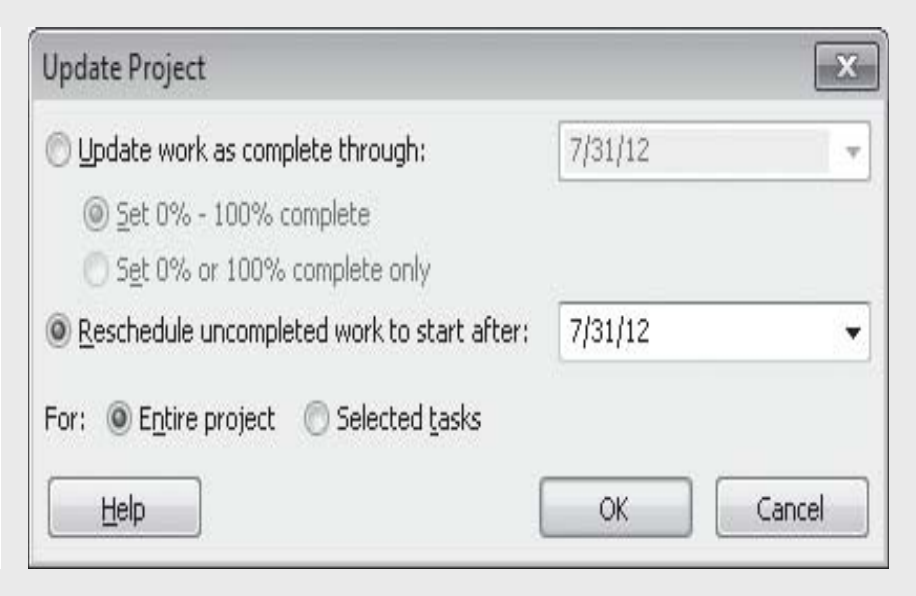
- On the **View** tab, in the **Task Views** group, **Click** the down arrow below the **Gantt Chart** button.
- Then **Click** **Gantt Chart.**
- In the **Task Name** column, **Click** the name of task
- On the **Task** tab, in the **Editing** group, **Click** **Scroll to Task**. The

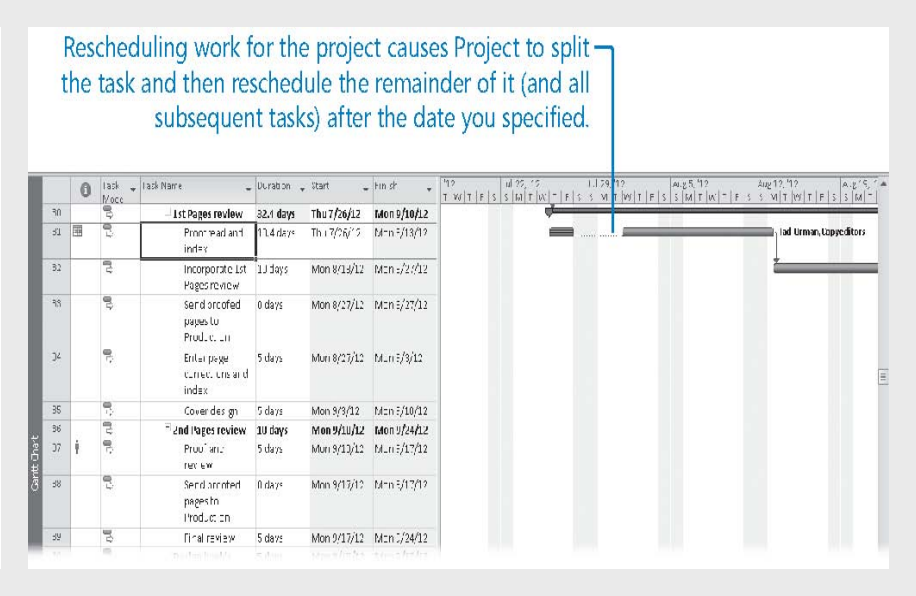
Gantt Chart view scrolls to display the Gantt bar for task.

- Scroll the **Gantt Chart** view.



- On the **Project** tab, in the **Status** group, **Click Update Project**. The Update Project dialog box appears.
- Select the **Reschedule uncompleted work to start after** option, and in the text box, type or select certain date.





- **Click OK** to close the **Update Project** dialog box. Project splits task so that the incomplete portion of the task is delayed

Few other things to keep in mind when tracking progress:

You can turn off Project's ability to reschedule incomplete work on tasks for which any actual work has been recorded.

- On the **File tab**, **Click Options.**
- In the **Project Options** dialog box, **Click** the **Schedule** tab,
- Then, under the **Scheduling** options for this project label, clear the **"Split in-progress tasks"** check box.

If you use status dates for reporting actuals, Project supports several options for controlling the way completed and incomplete segments of a task are scheduled around the status date. You can see the options by doing the following:

- On the **File** tab, **Click Options.**
- In the **Project Options** dialog box, **Click** the **Advanced tab**
- Then, under the **Calculation options** for this project label, adjust the settings **"Move end of completed parts after status date back to status date"** and the three other check boxes below it.

Chapter Six
Report and Present Project Performance

Report performance: is the process of collecting and distributing performance information including status reports, progress measurements, and forecasts. The performance reporting process involves the periodic collection and analysis of baseline versus actual data to understand and communicate the project progress and performance as well as to forecast the project results

Performance reports need to provide information at an appropriate level for each audience. Keeping stakeholders and team members up to date on project progress by providing them with access to online or printed views and reports.

The format my range from simple status report to more elaborate reports. A simple status report may show performance information, such as percentage complete or status dashboard in terms of cost, scope, and schedule for each area to:

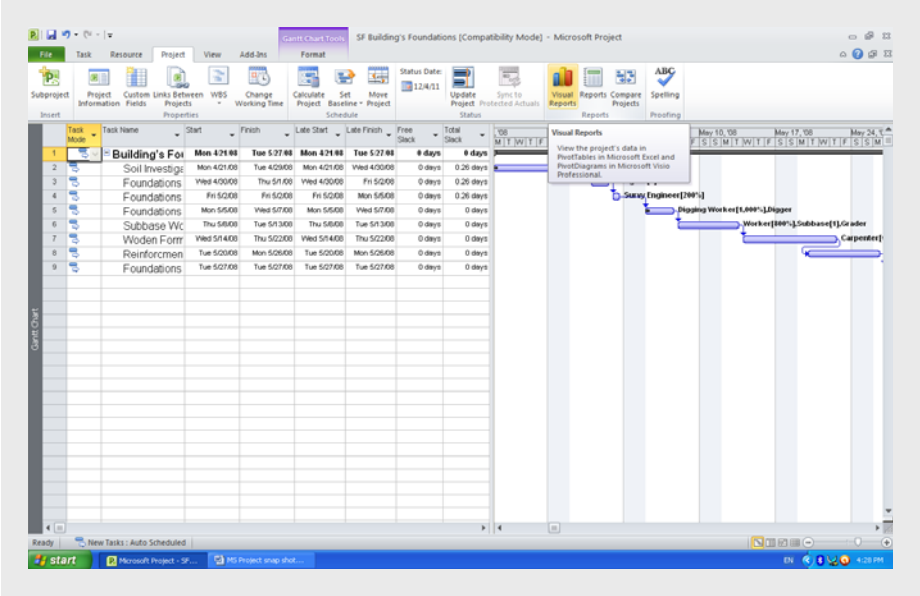
- Determine which tasks were started or completed late.
- View task costs at summary and detail levels.
- Examine resource costs and variance.
- Use custom fields to create a stoplight view that illustrates each task's cost variance.

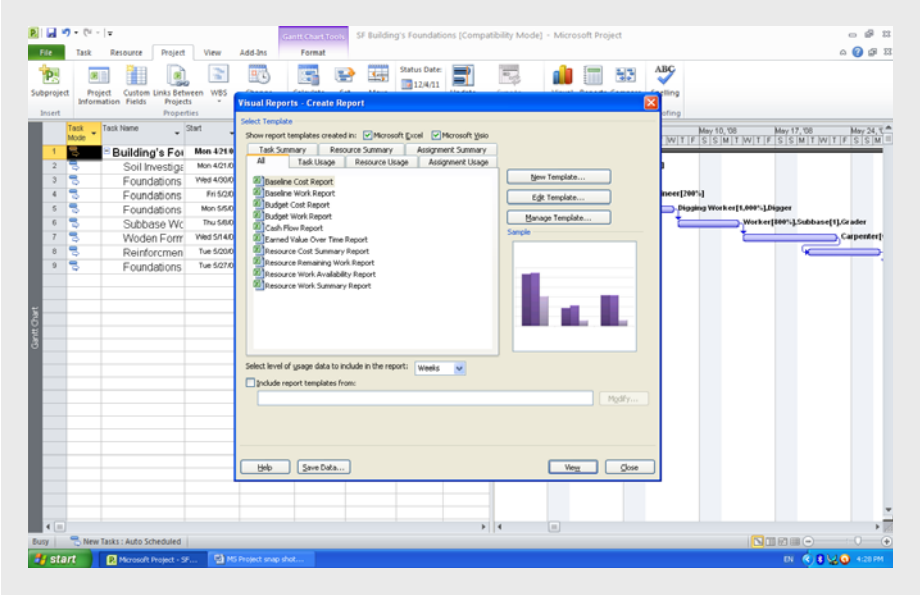
Microsoft Project 2010 provides many ways to print and distribute both detailed and overview information project information quickly and efficiently.

1- Generate a report

- **Click** the **Project** tab.
- Then in the **Reports** group, **Click** one of the following:

- **Visual Reports**
  Use visual reports to see your project's data as a **PivotTable** report in **Excel 2010** Or a **Pivot Diagram** view in **Visio Professional 2010**.

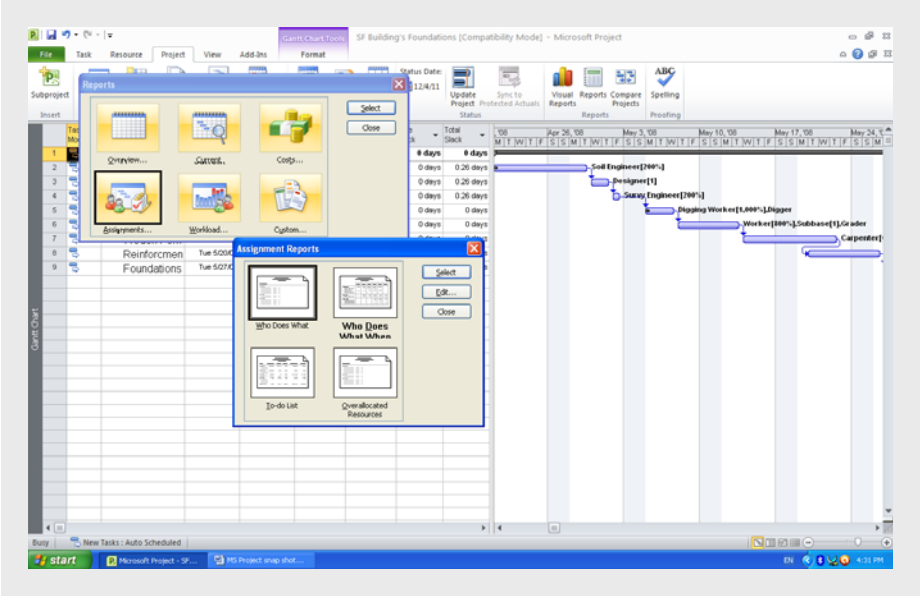




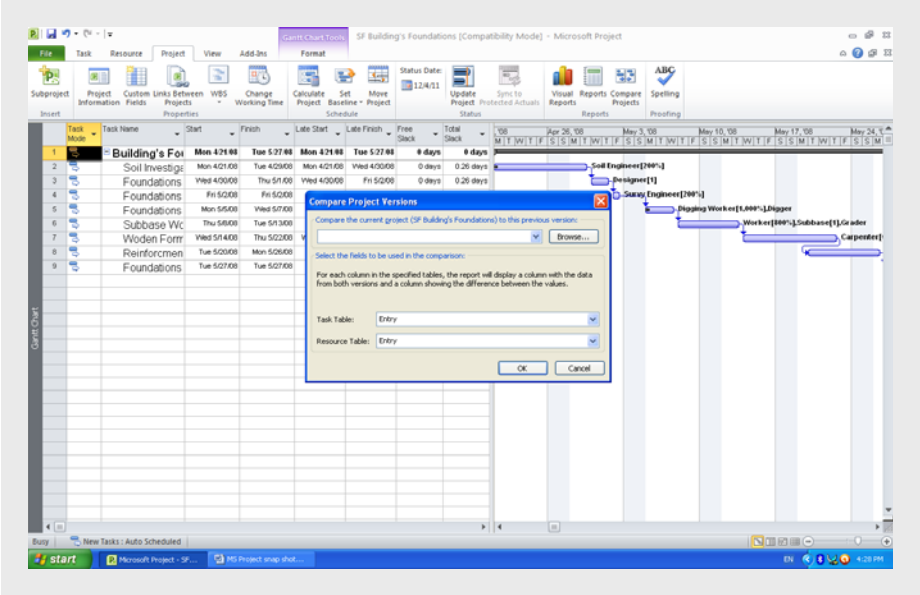
- **<u>Reports</u>**

  Use basic reports to see your project's data in tabular reports th at don't require **Excel or Visio**.

  These basic reports are collected in categories for easy selecting and printing.



- **<u>Compare Projects</u>**
  Use a compare projects report to view a report that displays changes in the current project compared to another project.

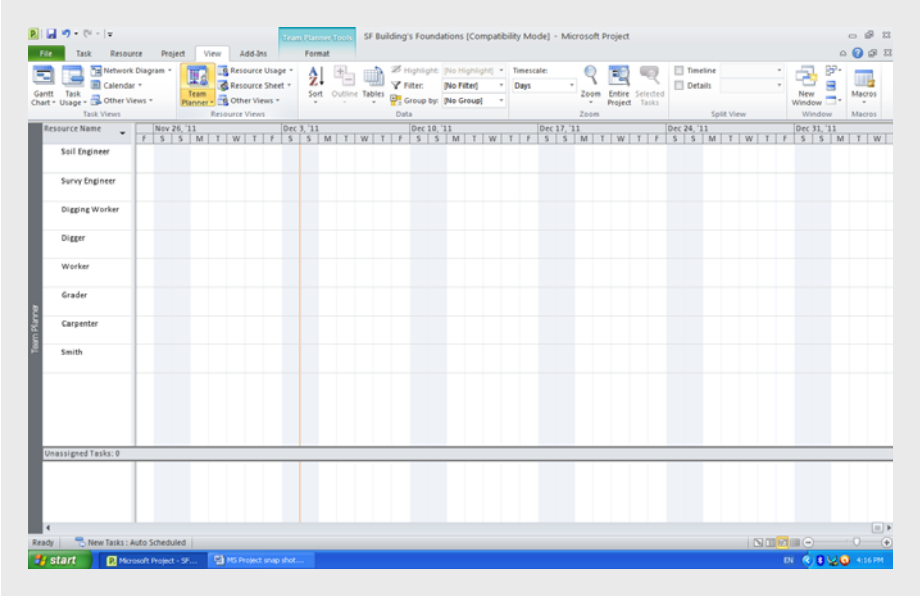


2- Select a view

Microsoft Project 2010 has some old views and some new views to help you see project information and report it to others on your team or organization.

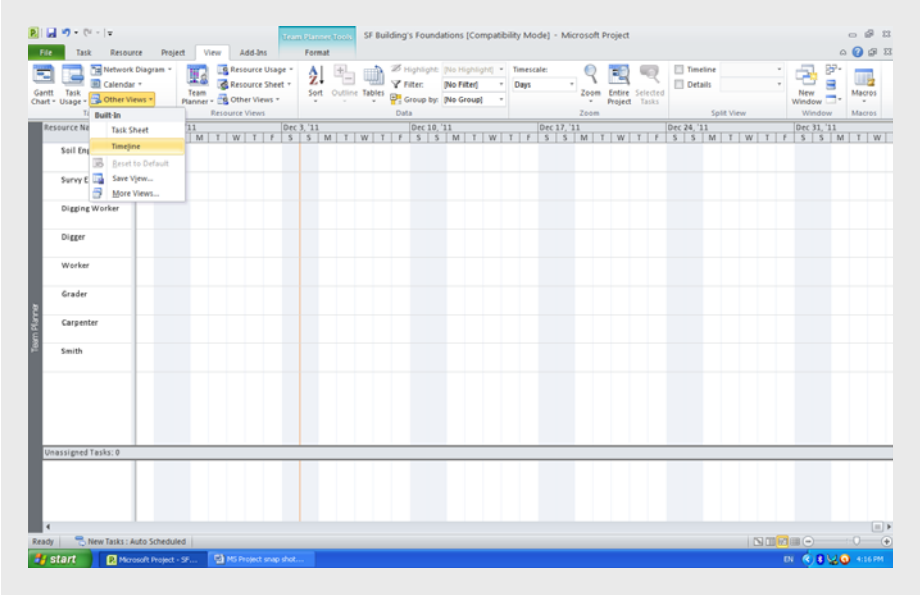
- **Click** the **View** tab. In either the **Task Views** group or the **Resourc e Views** group.
- Select the view you want to use. There are many views, but the m ost useful ones include:

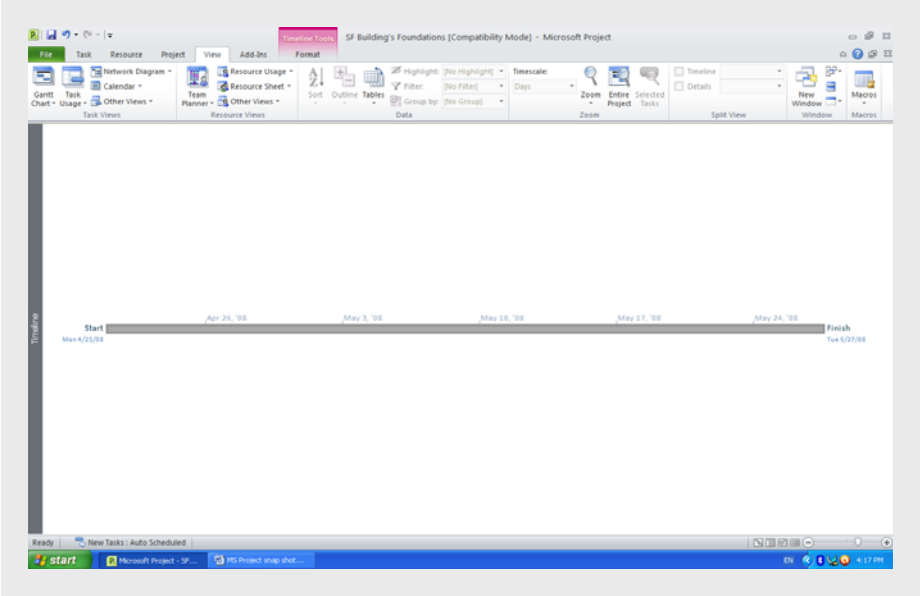
- **Team planner view:** Move tasks easily from one person to another within your team, or back and forth in the schedule. You can create new tasks in the team planner or remove tasks just by dragging them.



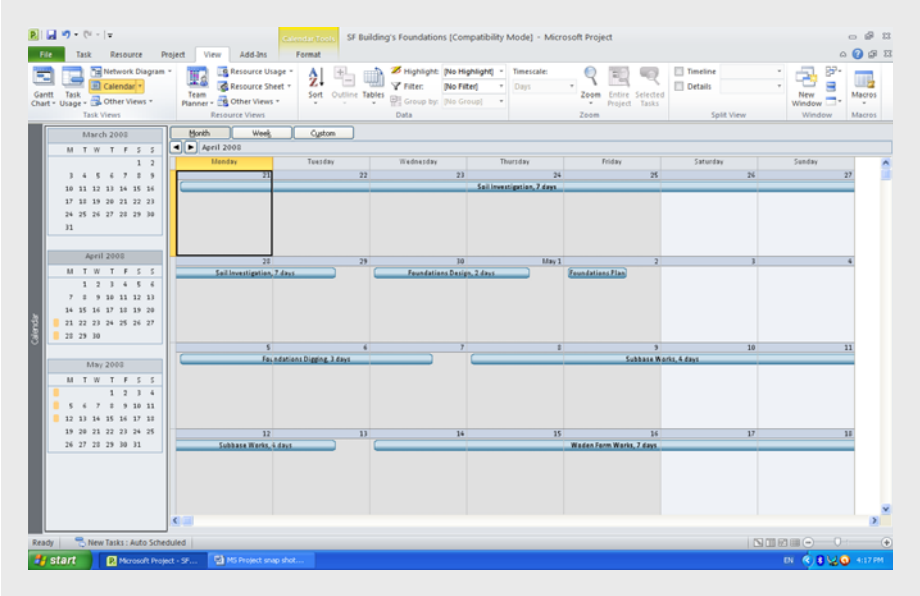
- **Timeline view:** Place tasks, subtasks, or milestones onto a single timeline at the top of most views. You can copy the timeline into Word, PowerPoint, Excel, or Outlook. You can instantly, create attractive project reports this way.

- **Click** the **Timeline** check box to see how the timeline works.





- **Gantt Chart view** View project tasks in a combination view, with columns on one side and bars along a timeline on the other side.
- **Calendar view** See project information in a familiar monthly or weekly calendar format that can be printed.



- **Add a column**
  Adding columns to a view is one of the easiest ways to cr eate the view that meets your needs.

- **Click** the **View** tab. In either the **Task Views** group or the **Resource Views** group.

- Select the view you want to use. **Right Click** on a column header to the left of where you want to insert a new column.
- Then **Click** **Insert column**. Type the name of the column you want to insert.
- You can also insert a custom column as easily as a built in column**. For example**, if you want a column called "Deliveries" type that name when you insert a new column. If you want the new column to contain only numbers (to specify the number of deliveries), then right **Click** the column down arrow, point to **Data Type**, and select the type of data that the column should contain.

  - **Customize a view**
    Customizing views beyond adding columns has been made considerably easier in Project 2010. Whether it's the Team Planner, Timeline, or classic **Gantt Chart**, all formatting options are available on the **Format** tab.

- Select the view you want to customize, and then on the **Format** tab
- **Click** the type of view element you want to change, such as the bar styles on the **Gantt Chart**, callout text on the Timeline, or the gridlines and timescales of any views.
- If you want to filter, sort, or group tasks prior to printing, **Click** the **View** tab, and then in the **Data** group,
- **Click** the **Sort**, **Filter**, or **Group** options.

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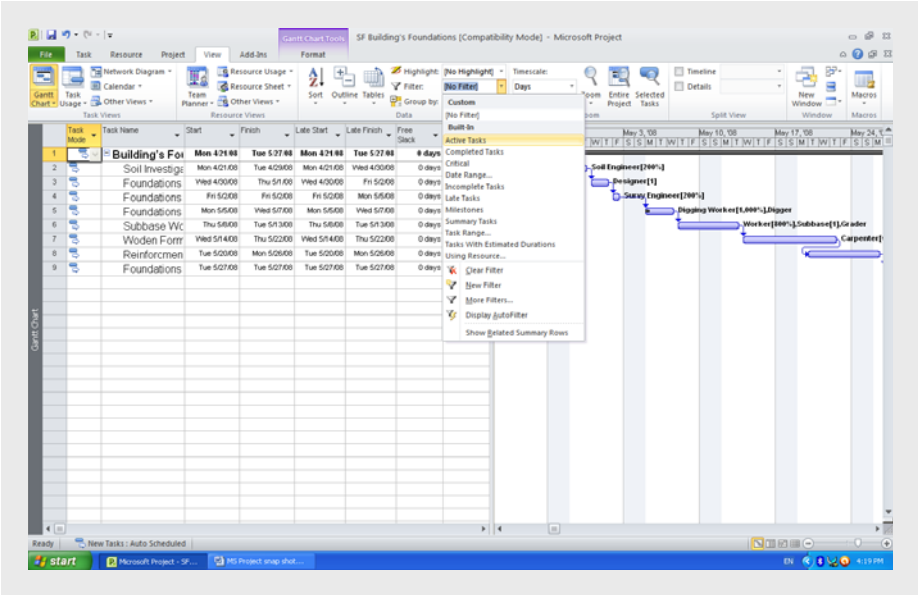
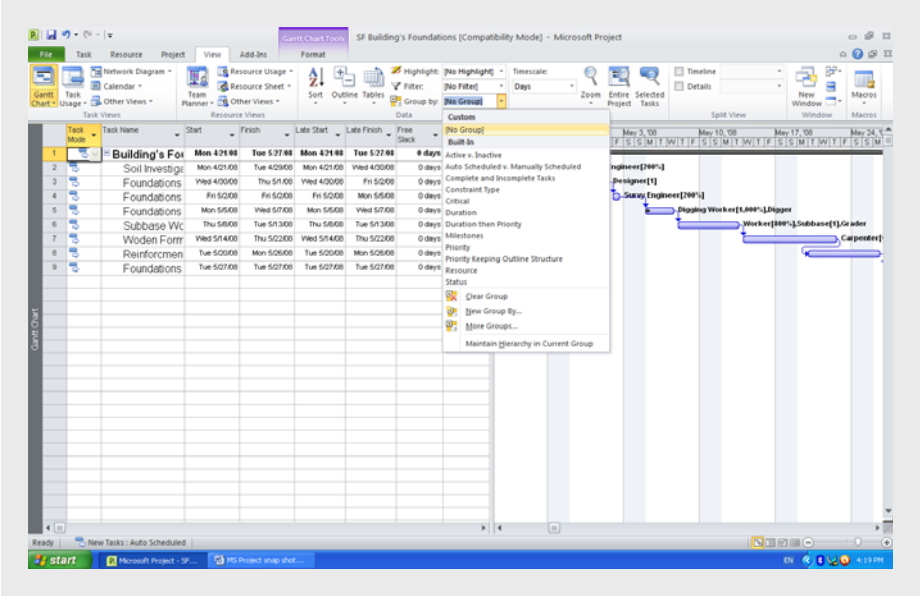
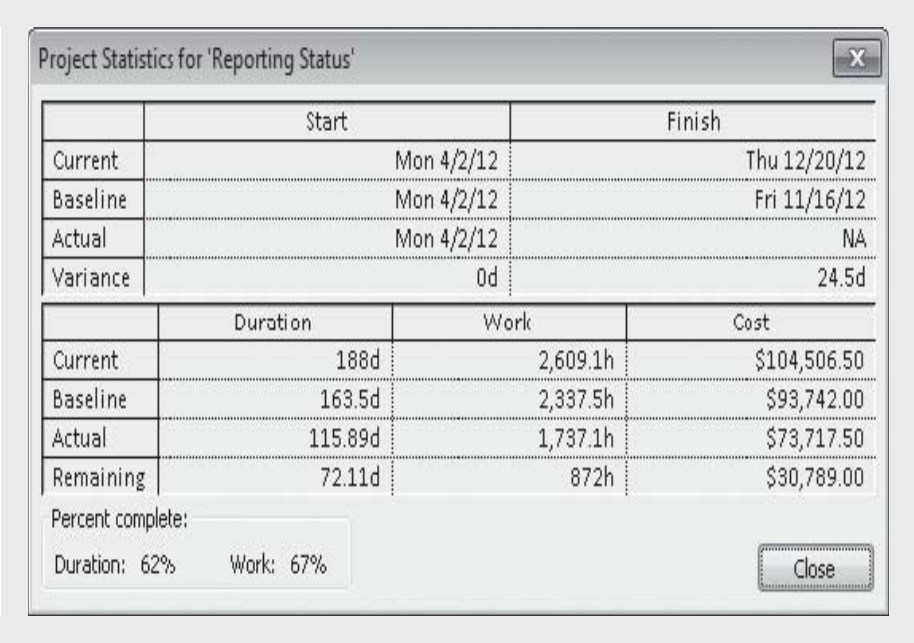


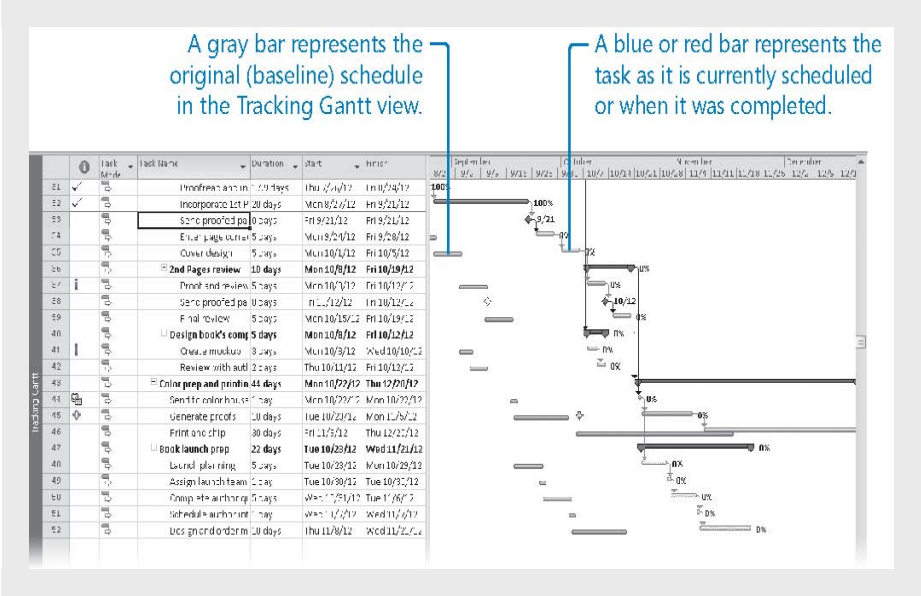


- **View Variance**
  Ways to view tasks with variance:

- Apply the **Tracking Gantt** view to compare tasks' baseline dates graphically with their actual or scheduled dates.
- On the **View** tab, in the **Task Views group**, **Click** the down arrow below the **Gantt Chart** button.
- Then **Click Tracking Gantt.**
- Apply the **Detail Gantt** view to show graphically each task's slippage from baseline.
- On the **View** tab, in the **Task Views** group, **Click Other Views**.
- **Click More Views**.
- Then **Double-Click Detail Gantt**.
- Apply the **Variance table** to a task view to see the number of days of variance for each task's start and finish dates.
- On the **View tab**, in the **Data group**, **Click Tables**
- Then **Click Variance**.
- Filter for delayed or slipping tasks with the S**lipped/Late Progress, Slipping Tasks, or Late Tasks filter.**
- On the **View** tab, in the **Data** group, in the **Filter** box, select the filter that you want to apply.
- On the **Project** tab, in the **Properties** group, **Click Project Information**.
- The **Project Information** dialog box appears.
- **Click Statistics**.
- The Project Statistics dialog box appears.



- **Click** **Close** to close the **Project Statistics** dialog box. For the remainder of this exercise, you will use various techniques to examine the specific task variance.
- On the **View** tab, in the **Task Views** group, **Click** the down arrow below the **Gantt Chart** button
- Then **Click** **Tracking Gantt**. Project displays the **Tracking Gantt** view.
- On the **View** tab, in the **Zoom** group, **Click** the down arrow next to the **Timescale** box
- Then **Click** **Weeks**. The timescale adjusts to show more of the project plan.
- In the **Task Name** column, **Click** the name of task and scroll the **Tracking Gantt** view up or down.
- On the **Task** tab, in the **Editing** group, **Click** Scroll to Task. You can also **Right-Click** the task name and in the shortcut menu that appears, **Click** **Scroll to Task**.
- In the chart portion of this view, the tasks as they are currently scheduled appear as **blue bars** (if they are not on the ***critical path***) or red bars (if they are on the critical path). In the lower half of each task's row, the baseline start and finish dates of each task appear as gray bars.



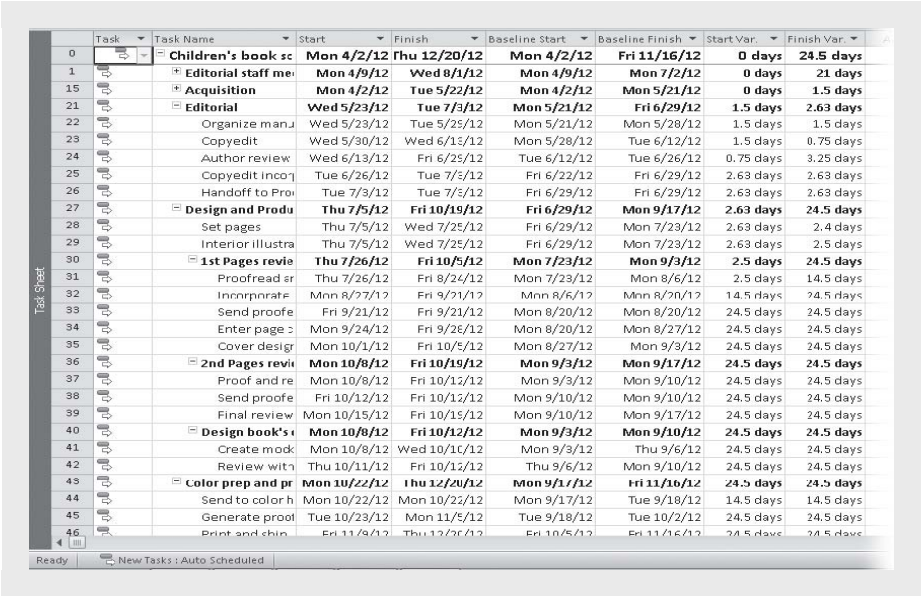
By comparing the currently scheduled **Gantt Bars** with the **baseline Gantt Bars**, you can see what tasks started later than planned or took longer to complete. To see details about any bar or other item in a **Gantt Chart** view, position the mouse pointer over it. After a moment, a **ScreenTip appears with details.**

To focus on only the slipping tasks, you will apply a filter.

- On the **View** tab, in the **Data group,** **Click** the arrow next to **Filter**:
- Then **Click** **More Filters**.
- The **More Filters** dialog box appears. In this dialog box, you can see all the predefined filters for tasks (when in a task view) and resources (when in a resource view) that are available to you.
- **Click** **Slipping Tasks**, and then **Click** **Apply**.
- On the **View** tab, in the **Data** group, **Click** the arrow next to **Filter:** and then **Click** **Clear Filter**.

The **Tracking Gantt** view graphically illustrates the difference between scheduled, actual, and baseline project performance. To see this information in a table format, you will display the **Variance** table in the **Task Sheet** view.

- On the **View** tab, in the **Task Views** group, **Click** **Other Views.**
- Then **Click** **Task Sheet**. **Microsoft Project** displays the **Task Sheet** view.
- Next, you'll switch to the Variance table.
- On the **View** tab, in the **Data** group, **Click** **Tables**
- Then **Click** **Variance**.
- You also can **Right-Click** the Select All button in the upper-left corner of the active table to switch to a different table.
- The **Variance table** appears in the **Task Sheet** view.
- In this table, you can view the **scheduled, baseline, and variance values per task.**



	Task	Task Name	Start	Finish	Baseline Start	Baseline Finish	Start Var.	Finish Var.
0		**Children's book sc**	**Mon 4/2/12**	**Thu 12/20/12**	**Mon 4/2/12**	**Fri 11/16/12**	**0 days**	**24.5 days**
1		**Editorial staff me**	**Mon 4/9/12**	**Wed 8/1/12**	**Mon 4/9/12**	**Mon 7/2/12**	**0 days**	**21 days**
15		**Acquisition**	**Mon 4/2/12**	**Tue 5/22/12**	**Mon 4/2/12**	**Mon 5/21/12**	**0 days**	**1.5 days**
21		**Editorial**	**Wed 5/23/12**	**Tue 7/3/12**	**Mon 5/21/12**	**Fri 6/29/12**	**1.5 days**	**2.63 days**
22		Organize manu	Wed 5/23/12	Tue 5/29/12	Mon 5/21/12	Mon 5/28/12	1.5 days	1.5 days
23		Copyedit	Wed 5/30/12	Wed 6/13/12	Mon 5/28/12	Tue 6/12/12	1.5 days	0.75 days
24		Author review	Wed 6/13/12	Fri 6/29/12	Tue 6/12/12	Tue 6/26/12	0.75 days	3.25 days
25		Copyedit incor	Tue 6/26/12	Tue 7/3/12	Fri 6/22/12	Fri 6/29/12	2.63 days	2.63 days
26		Handoff to Pro	Tue 7/3/12	Tue 7/3/12	Fri 6/29/12	Fri 6/29/12	2.63 days	2.63 days
27		**Design and Produ**	**Thu 7/5/12**	**Fri 10/19/12**	**Fri 6/29/12**	**Mon 9/17/12**	**2.63 days**	**24.5 days**
28		Set pages	Thu 7/5/12	Wed 7/25/12	Fri 6/29/12	Mon 7/23/12	2.63 days	2.4 days
29		Interior illustra	Thu 7/5/12	Wed 7/25/12	Fri 6/29/12	Mon 7/23/12	2.63 days	2.5 days
30		**1st Pages revie**	**Thu 7/26/12**	**Fri 10/5/12**	**Mon 7/23/12**	**Mon 9/3/12**	**2.5 days**	**24.5 days**
31		Proofread sr	Thu 7/26/12	Fri 8/24/12	Mon 7/23/12	Mon 8/6/12	2.5 days	14.5 days
32		Incorporate	Mon 8/27/12	Fri 9/21/12	Mon 8/6/12	Mon 8/20/12	14.5 days	24.5 days
33		Send proofe	Fri 9/21/12	Fri 9/21/12	Mon 8/20/12	Mon 8/20/12	24.5 days	24.5 days
34		Enter page s	Mon 9/24/12	Fri 9/28/12	Mon 8/20/12	Mon 8/27/12	24.5 days	24.5 days
35		Cover desigr	Mon 10/1/12	Fri 10/5/12	Mon 8/27/12	Mon 9/3/12	24.5 days	24.5 days
36		**2nd Pages revi**	**Mon 10/8/12**	**Fri 10/19/12**	**Mon 9/3/12**	**Mon 9/17/12**	**24.5 days**	**24.5 days**
37		Proof and re	Mon 10/8/12	Fri 10/12/12	Mon 9/3/12	Mon 9/10/12	24.5 days	24.5 days
38		Send proofe	Fri 10/12/12	Fri 10/12/12	Mon 9/10/12	Mon 9/10/12	24.5 days	24.5 days
39		Final review	Mon 10/15/12	Fri 10/19/12	Mon 9/10/12	Mon 9/17/12	24.5 days	24.5 days
40		**Design book's**	**Mon 10/8/12**	**Fri 10/12/12**	**Mon 9/3/12**	**Mon 9/10/12**	**24.5 days**	**24.5 days**
41		Create mock	Mon 10/8/12	Wed 10/10/12	Mon 9/3/12	Thu 9/6/12	24.5 days	24.5 days
42		Review with	Thu 10/11/12	Fri 10/12/12	Thu 9/6/12	Mon 9/10/12	24.5 days	24.5 days
43		**Color prep and pr**	**Mon 10/22/12**	**Thu 12/20/12**	**Mon 9/17/12**	**Fri 11/16/12**	**24.5 days**	**24.5 days**
44		Send to color h	Mon 10/22/12	Mon 10/22/12	Mon 9/17/12	Tue 9/18/12	14.5 days	14.5 days
45		Generate proof	Tue 10/23/12	Mon 11/5/12	Tue 9/18/12	Tue 10/2/12	24.5 days	24.5 days
46		Print and ship	Fri 11/9/12	Thu 12/20/12	Fri 10/5/12	Fri 11/16/12	24.5 days	24.5 days

Task Sheet

Ready | New Tasks : Auto Scheduled

Additional suggestions for viewing slipped tasks:

- All filters are available to you via the **Filter** button on the **Data** group of the **View** tab. The name of the active filter appears in this button;
  - **Click** the arrow next to the filter name to see other filters. If no filter is applied to the current view, *No Filter* appears in the Filter box. When a filter is applied, the text *Filter Applied* appears on the status bar.
- You can see the criteria that most filters use to determine which tasks or resources they will display or hide.
  - On the **View** tab, in the Data group, in the **Filter** box, **Click More Filters.**
  - In the **More Filters** dialog box, **Click** a filter
  - Then **Click Edit.**
  - In the **Filter Definition** dialog box, you can see the tests applied to various fields for the filter.
- You can quickly display late tasks; tasks that are late in relation to whatever status date you set.
  - To set a status date, on the **Project** tab, in the **Properties** group, **Click Project Information.**
  - Then on the **Format** tab, in the **Bar Styles** group, **check the Late Tasks check box.**
  - The **Gantt Bars** of tasks that were scheduled to be completed by the status date but are incomplete are formatted **black**.

- The **Slipping Tasks report** describes tasks that are off schedule.
  - To view a **Slipping Tasks report**, on the **Project tab**, in the **Reports** group, **Click Reports.**

- In the **Reports** dialog box, **Double-Click** **Current**.
- Then **Double-Click** **Slipping Tasks**.

- In this exercise, you have viewed variance for a task. To see variance for assignments to a task, switch to the **Task Usage** view, and then apply the **Variance table** (to see scheduled variance) or the **Work table** (to see work variance).

Techniques you can use in Microsoft Project to help you report project status include the following:

- Print the Project Summary report, to do this, on the Project tab, in the Reports group, **Click** **Reports**. Then **Click** **Overview**.

- If you have **Microsoft Excel 2003** or later or **Microsoft Visio 2007** or later, print a status-focused visual report (to do this, on the Project tab, in the Reports group, **Click** **Visual Reports**).

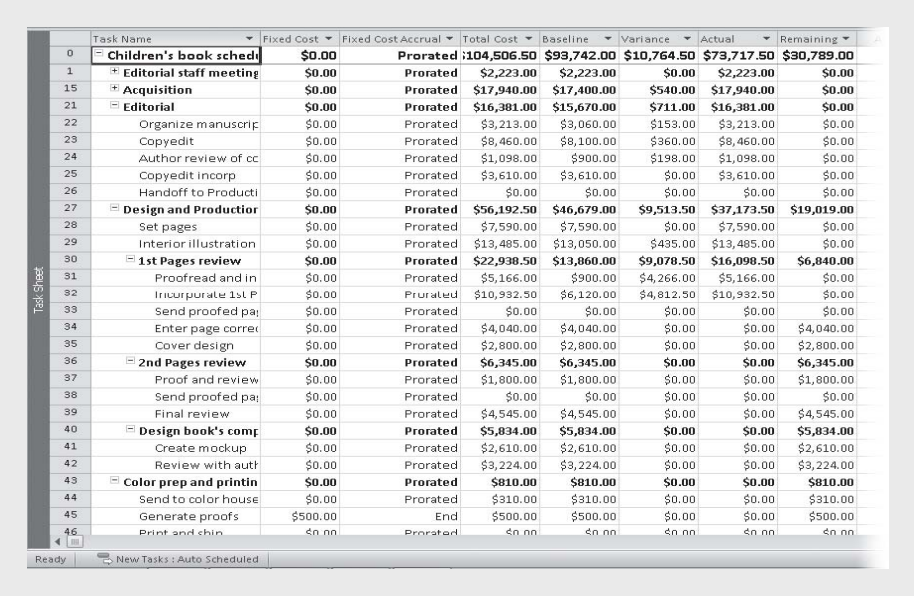
- **Copy Project data to other applications**, for example, use **Copy Picture** (to do this, on the **Task** tab, in the **Clipboard** group, **Click** the down arrow next to the **Copy** button) to copy the **Gantt Chart** view.

- **Save Project data in other formats** (to do this, on the **File** tab, **Click** **Save** As, and in the **Save As** Type box, select the format that you want), such as an editable format like **Excel Workbook, or in Portable Document Format (PDF) or XML Paper Specification (XPS) format for high-fidelity viewing.**

Examining Task Costs

Are tasks running over or under budget? Although tasks and resources (and their costs) are directly related, it's informative to evaluate each individually.

- On the **View** tab, in the **Data** group, **Click** **Tables**
- Then **Click** **Cost**. The **Cost table** appears in the **Task Sheet** view.



	Task Name	Fixed Cost	Fixed Cost Accrual	Total Cost	Baseline	Variance	Actual	Remaining
0	**Children's book schedu**	**$0.00**	**Prorated**	**$104,506.50**	**$93,742.00**	**$10,764.50**	**$73,717.50**	**$30,789.00**
1	**Editorial staff meeting**	**$0.00**	**Prorated**	**$2,223.00**	**$2,223.00**	**$0.00**	**$2,223.00**	**$0.00**
15	**Acquisition**	**$0.00**	**Prorated**	**$17,940.00**	**$17,400.00**	**$540.00**	**$17,940.00**	**$0.00**
21	**Editorial**	**$0.00**	**Prorated**	**$16,381.00**	**$15,670.00**	**$711.00**	**$16,381.00**	**$0.00**
22	Organize manuscrip	$0.00	Prorated	$3,213.00	$3,060.00	$153.00	$3,213.00	$0.00
23	Copyedit	$0.00	Prorated	$8,460.00	$8,100.00	$360.00	$8,460.00	$0.00
24	Author review of cc	$0.00	Prorated	$1,098.00	$900.00	$198.00	$1,098.00	$0.00
25	Copyedit incorp	$0.00	Prorated	$3,610.00	$3,610.00	$0.00	$3,610.00	$0.00
26	Handoff to Producti	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00
27	**Design and Productior**	**$0.00**	**Prorated**	**$56,192.50**	**$46,679.00**	**$9,513.50**	**$37,173.50**	**$19,019.00**
28	Set pages	$0.00	Prorated	$7,590.00	$7,590.00	$0.00	$7,590.00	$0.00
29	Interior illustration	$0.00	Prorated	$13,485.00	$13,050.00	$435.00	$13,485.00	$0.00
30	**1st Pages review**	**$0.00**	**Prorated**	**$22,938.50**	**$13,860.00**	**$9,078.50**	**$16,098.50**	**$6,840.00**
31	Proofread and in	$0.00	Prorated	$5,166.00	$900.00	$4,266.00	$5,166.00	$0.00
32	Incorporate 1st P	$0.00	Prorated	$10,932.50	$6,120.00	$4,812.50	$10,932.50	$0.00
33	Send proofed pa	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00
34	Enter page corre	$0.00	Prorated	$4,040.00	$4,040.00	$0.00	$0.00	$4,040.00
35	Cover design	$0.00	Prorated	$2,800.00	$2,800.00	$0.00	$0.00	$2,800.00
36	**2nd Pages review**	**$0.00**	**Prorated**	**$6,345.00**	**$6,345.00**	**$0.00**	**$0.00**	**$6,345.00**
37	Proof and review	$0.00	Prorated	$1,800.00	$1,800.00	$0.00	$0.00	$1,800.00
38	Send proofed pa	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00
39	Final review	$0.00	Prorated	$4,545.00	$4,545.00	$0.00	$0.00	$4,545.00
40	**Design book's comp**	**$0.00**	**Prorated**	**$5,834.00**	**$5,834.00**	**$0.00**	**$0.00**	**$5,834.00**
41	Create mockup	$0.00	Prorated	$2,610.00	$2,610.00	$0.00	$0.00	$2,610.00
42	Review with auth	$0.00	Prorated	$3,224.00	$3,224.00	$0.00	$0.00	$3,224.00
43	**Color prep and printin**	**$0.00**	**Prorated**	**$810.00**	**$810.00**	**$0.00**	**$0.00**	**$810.00**
44	Send to color house	$0.00	Prorated	$310.00	$310.00	$0.00	$0.00	$310.00
45	Generate proofs	$500.00	End	$500.00	$500.00	$0.00	$0.00	$500.00
46	Print and ship	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00

Task Sheet

Ready | New Tasks : Auto Scheduled

- In this table, you can see each **task's baseline cost, scheduled cost (in the Total Cost column), actual cost, and cost variance**. The variance is the difference between the baseline cost and the scheduled cost. **Cost values** include the following:-

  - The current cost value is the sum of the actual (that is, completed) and remaining (uncompleted) cost values.
  - The baseline cost value is the project's planned cost when its baseline was set.
  - The actual cost is the cost that's been incurred so far.
  - The remaining cost is the difference between the current cost and actual cost.

The Top Level Costs

- On the **View** tab, in the **Data** group, **Click Outline**
- Then **Click Outline Level 1**. Project hides all subtasks and nested summary tasks, leaving only the top-level tasks visible. Zero in on tasks that have cost variance.
- On the **View** tab, in the **Data** group, **Click Outline**
- Then **Click All Subtasks**. Project expands the task list to show all subtasks.
- On the **View** tab, in the **Data** group, **Click** the arrow next to **Filter:** and then **Click More Filters**.
- In the **More Filters** dialog box, **Click Cost Over-budget** and then **Click Apply**.
- **Microsoft Project** filters the task list to show only those tasks that had actual and scheduled costs greater than their baseline costs.
- On the **View** tab, in the **Data** group, **Click** the arrow next to **Filter:**
- Then **Click Clear Filter**. Project removes the filter.

	Task Name	Fixed Cost	Fixed Cost Accrual	Total Cost	Baseline	Variance	Actual	Remaining
0	**Children's book schedu**	**$0.00**	**Prorated**	**$104,506.50**	**$93,742.00**	**$10,764.50**	**$73,717.50**	**$30,789.00**
15	**Acquisition**	**$0.00**	**Prorated**	**$17,940.00**	**$17,400.00**	**$540.00**	**$17,940.00**	**$0.00**
19	Author review of cc	$0.00	Prorated	$4,140.00	$3,600.00	$540.00	$4,140.00	$0.00
21	**Editorial**	**$0.00**	**Prorated**	**$16,381.00**	**$15,670.00**	**$711.00**	**$16,381.00**	**$0.00**
22	Organize manuscrip	$0.00	Prorated	$3,213.00	$3,060.00	$153.00	$3,213.00	$0.00
23	Copyedit	$0.00	Prorated	$8,460.00	$8,100.00	$360.00	$8,460.00	$0.00
24	Author review of cc	$0.00	Prorated	$1,098.00	$900.00	$198.00	$1,098.00	$0.00
27	**Design and Productior**	**$0.00**	**Prorated**	**$56,192.50**	**$46,679.00**	**$9,513.50**	**$37,173.50**	**$19,019.00**
29	Interior illustration	$0.00	Prorated	$13,485.00	$13,050.00	$435.00	$13,485.00	$0.00
30	**1st Pages review**	**$0.00**	**Prorated**	**$22,938.50**	**$13,860.00**	**$9,078.50**	**$16,098.50**	**$6,840.00**
31	Proofread and in	$0.00	Prorated	$5,166.00	$900.00	$4,266.00	$5,166.00	$0.00
32	Incorporate 1st P	$0.00	Prorated	$10,932.50	$6,120.00	$4,812.50	$10,932.50	$0.00

Task Sheet

Additional suggestions for working with cost data:

- To see tasks that are **Over-Budget**, you can use the **Over-Budget Tasks report**.
  - To generate the **Over-Budget** Tasks report, on the **Project tab**, in the **Reports** group, **Click Reports**.
  - In the **Reports** dialog box, **Double-Click** Costs,
  - Then **Double-Click Over-Budget Tasks**.

- If you have **Excel 2003** or later, you can use the **Budget Cost Report**.
  - To create the **Budget Cost Report**, on the **Project** tab, in the **Reports** group, **Click Visual Reports**.
  - In the **Assignment Usage** tab of the **Visual Reports** dialog box, **Click Budget Cost Report**
  - Then **Click View**.
- Apply the Late/Over-Budget Tasks Assigned to filter for a specific resource.
  - To do this, on the **View** tab, in the **Data** group, **Click** the arrow next to **Filter:**
  - Then **Click More Filters**.
- Display work variance in the **Work table** in a task view.
  - To do this, on the **View** tab, in the **Data** group, **Click Tables**
  - Then **Click Work**. Remember that for a project plan where most costs are derived from work resources, examining work variance is one way to examine cost variance.

- You can compare timephased baseline and scheduled work in a **Usage View**. **For example**, in the **Task Usage** view, on the **Format** tab, in the **Details** group, **Click** **Baseline Work**.

- To see cost variance over time for assignments to a task, switch to the **Task Usage** view, and then apply the **Cost table**. While in a Usage View, you can also show **Cost, Baseline Cost, and Actual Cost** details via the **Add Details** dialog box. On the Format tab, in the **Details** group, select the options you want.

Examining Resource Costs

Use different views, tables, and sorting to see resource cost variance.

- On the **View** tab, in the **Resource Views** group, **Click** **Resource Sheet**. The Resource Sheet view appears.
- On the **View** tab, in the **Data** group, **Click** **Tables**.
- Then **Click** **Cost**. The **Cost table** appears.

Resource Sheet

	Resource Name	Cost	Baseline Cost	Variance	Actual Cost	Remaining
1	Carole Poland	$11,182.50	$11,182.50	$0.00	$9,082.50	$2,100.00
2	Color Setting Service	$0.00	$0.00	$0.00	$0.00	$0.00
3	Copyeditors	$18,864.00	$13,500.00	$5,364.00	$18,864.00	$0.00
4	Dan Jump	$11,362.75	$8,644.75	$2,718.00	$9,248.75	$2,114.00
5	Hany Morcos	$24,391.25	$21,988.75	$2,402.50	$15,306.25	$9,085.00
6	Jane Dow	$19,580.00	$19,580.00	$0.00	$11,990.00	$7,590.00
7	Jun Cao	$546.00	$546.00	$0.00	$546.00	$0.00
8	Luis Sousa	$14,280.00	$14,000.00	$280.00	$8,680.00	$5,600.00
9	Printing Service	$0.00	$0.00	$0.00	$0.00	$0.00
10	Ted Orman	$0.00	$0.00	$0.00	$0.00	$0.00
11	Travel	$3,500.00	$3,500.00	$0.00	$0.00	$3,500.00
12	Bound galley proof	$300.00	$300.00	$0.00	$0.00	$300.00

- In the **Cost table**, you can see each **resource's cost, baseline cost, and related cost values**.
- In most cases here, the cost values for work resources are derived from each resource's cost rate multiplied by the work on their assignments to tasks in the project plan.
- Currently, the resource sheet is sorted by resource ID. Next, you will sort it by resource cost.
- **Click** the **AutoFilter** arrow in the **Cost** column heading, and in the menu that appears.
- **Click** **Sort Largest to Smallest**.
- Project sorts the resources by cost from highest to lowest.
- Note that the resources are sorted according to the values in the

Cost column, which is the sum of their actual (or historical) costs, and their remaining (or expected) costs.

Resource Sheet

	Resource Name	Cost	Baseline Cost	Variance	Actual Cost	Remaining
5	**Hany Morcos**	**$24,391.25**	$21,988.75	$2,402.50	**$15,306.25**	**$9,085.00**
6	Jane Dow	$19,580.00	$19,580.00	$0.00	$11,990.00	$7,590.00
3	Copyeditors	$18,864.00	$13,500.00	$5,364.00	$18,864.00	$0.00
8	Luis Sousa	$14,280.00	$14,000.00	$280.00	$8,680.00	$5,600.00
4	Dan Jump	$11,362.75	$8,644.75	$2,718.00	$9,248.75	$2,114.00
1	Carole Poland	$11,182.50	$11,182.50	$0.00	$9,082.50	$2,100.00
11	Travel	$3,500.00	$3,500.00	$0.00	$0.00	$3,500.00
7	Jun Cao	$546.00	$546.00	$0.00	$546.00	$0.00
12	Bound galley proof	$300.00	$300.00	$0.00	$0.00	$300.00
2	Color Setting Service	$0.00	$0.00	$0.00	$0.00	$0.00
9	Printing Service	$0.00	$0.00	$0.00	$0.00	$0.00
10	Tad Orman	$0.00	$0.00	$0.00	$0.00	$0.00

- This sort quickly tells you who are cumulatively the most and least costly resources (as indicated in the Cost column), but it doesn't help you see variance patterns. You will do that next.
- **Click** the **AutoFilter** arrow in the **Variance** column heading, and in the menu that appears.
- **Click** **Sort Largest to Smallest**.
- Project re-sorts the resources by cost variance from highest to lowest.

Resource Sheet

	Resource Name	Cost	Baseline Cost	Variance	Actual Cost	Remaining
3	Copyeditors	$18,864.00	$13,500.00	$5,364.00	$18,864.00	$0.00
4	Dan Jump	$11,362.75	$8,644.75	$2,718.00	$9,248.75	$2,114.00
5	**Hany Morcos**	**$24,391.25**	$21,988.75	$2,402.50	**$15,306.25**	**$9,085.00**
8	Luis Sousa	$14,280.00	$14,000.00	$280.00	$8,680.00	$5,600.00
1	Carole Poland	$11,182.50	$11,182.50	$0.00	$9,082.50	$2,100.00
2	Color Setting Service	$0.00	$0.00	$0.00	$0.00	$0.00
6	Jane Dow	$19,580.00	$19,580.00	$0.00	$11,990.00	$7,590.00
7	Jun Cao	$546.00	$546.00	$0.00	$546.00	$0.00
9	Printing Service	$0.00	$0.00	$0.00	$0.00	$0.00
10	Tad Orman	$0.00	$0.00	$0.00	$0.00	$0.00
11	Travel	$3,500.00	$3,500.00	$0.00	$0.00	$3,500.00
12	Bound galley proof	$300.00	$300.00	$0.00	$0.00	$300.00

- With the resource list sorted by cost variance, you can quickly zero in on those resources with the greatest variance. You note this for future investigation.

- On the **View** tab, in the **Data** group, **Click** **Sort**,
- Then **Click** **by ID. Microsoft Project** re-sorts the resources by ID.

Additional suggestions for working with resource costs:
You can use the **Over-Budget** Resources report to list resources who are **Over-Budget**.

- To do this, on the **Project** tab, in the **Reports** Group, **Click** **Reports.**
- In the **Reports** dialog box, **Double-Click** **Costs**,
- Then **Double-Click** **Over-Budget Resources.**

You can also see timephased cost values in a usage view.

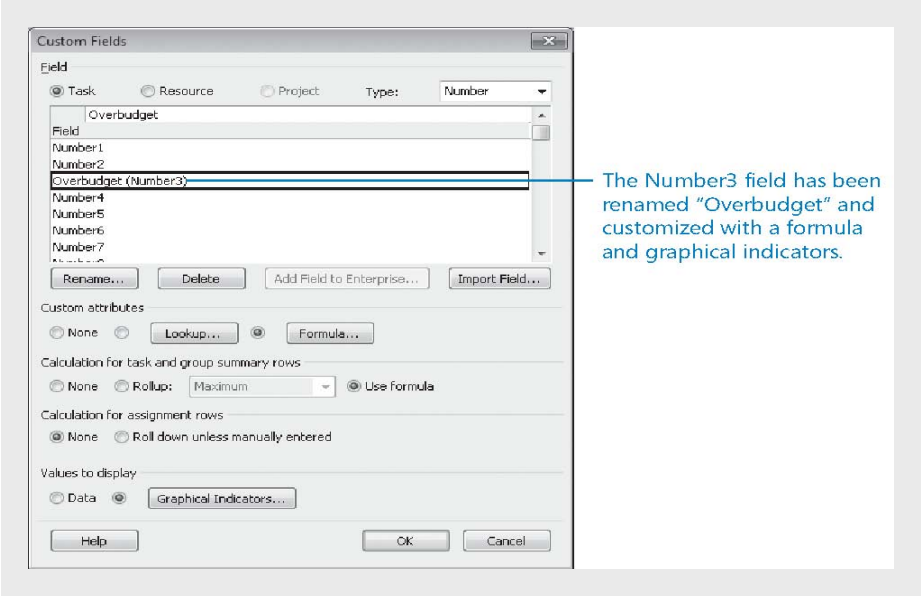
- **For example**, in the **Resource Usage view**,
- on the **Format** tab,
- In the **Details** group, **Click** **Add Details**.
- In the **Details Styles** dialog box, show the **Baseline Cost and Cost fields**. This also works in the **Task Usage view**.

If you have **Excel 2003** or later, you can use the **Resource Cost Summary Report**.

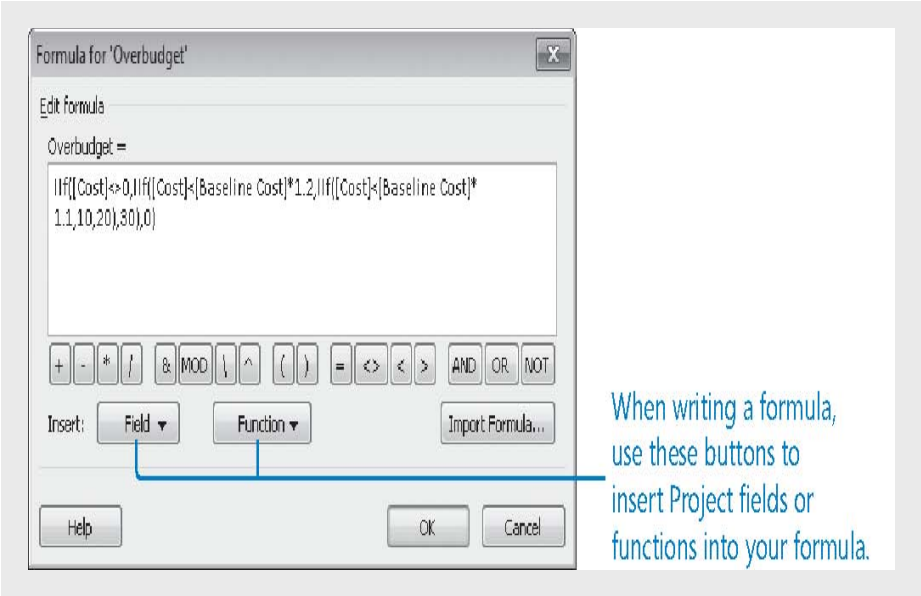
- To do this, on the **Project** tab,
- In the **Reports** group, **Click** **Visual Reports**.
- In the **Resource Usage** tab of the **Visual Reports** dialog box,
- **Click** **Resource Cost Summary Report**
- Then **Click** **View**.

Reporting Project Cost Variance with a Stoplight View
Create a view using custom fields to visually focus on project variance.

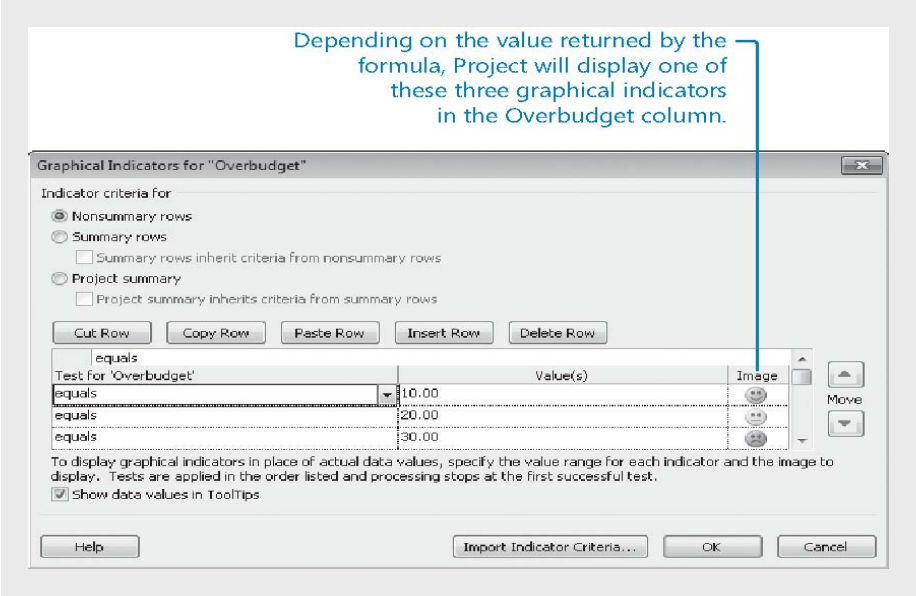
- On the **View** tab, in the **Task Views** group, **Click** **Other Views.**
- Then **Click** **Task Sheet**. Project displays the **Task Sheet** view. It currently contains the Cost table.
- To save your time, we have customized a field in this Project file containing a formula that evaluates each task's cost variance.
- Next, you will view the formula to understand what it does and then view the graphical indicators assigned to the field.
- On the **Format** tab, in the **Columns** group, **Click** **Custom Fields**.
- The Custom Fields dialog box appears.
- In the **Type** box located in the upper-right corner of the dialog box, **Click** **Number** on the drop-down list.
- In the list box, **Click** **Over-Budget (Number3)**. This is the customized field we've set up for you.



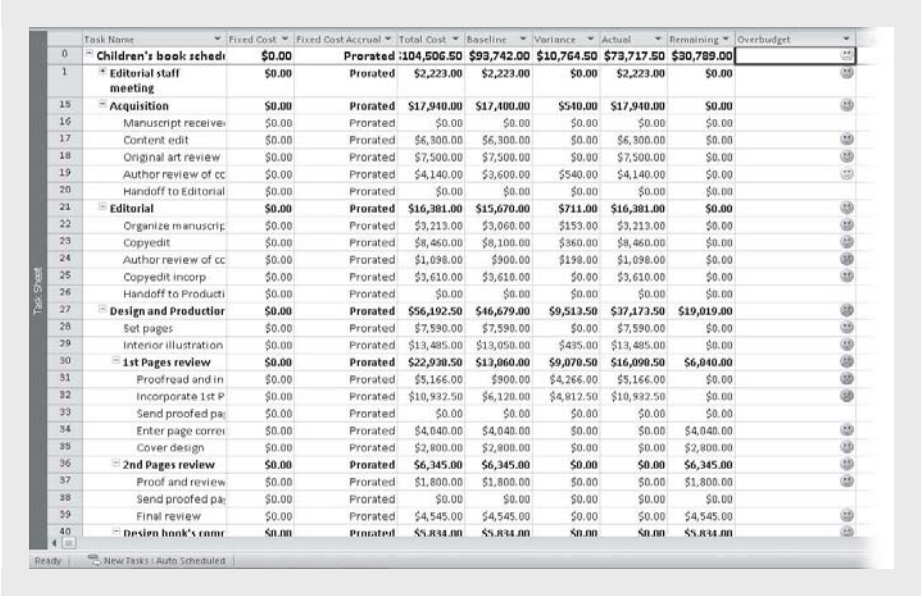
- Under **Custom attributes**, **Click** **Formula**. The Formula dialog box appears. This formula evaluates each task's cost variance.



- **Click** **Cancel** to close the **Formula** dialog box.
- In the **Custom Fields** dialog box, under **Values to display**, **Click** **Graphical Indicators**.
- The Graphical Indicators dialog box appears. Here, you specify a unique graphical indicator to display, depending on the value of the field for each task. Again, to save you time, the indicators are already selected.



- **Click** the first cell under the **Image** column heading (it contains a green smiley face).
- Then **Click** the drop-down arrow. Here, you can see the many graphical indicators that you can associate with the values of fields.
- **Click** **Cancel** to close the **Graphical Indicators** dialog box.
- Then **Click** **Cancel** again to close the **Custom Fields** dialog box.
- In the **Task Name** column, **Click** the minus sign next to the name of task summary task. The task list collapses to show just the summary task.
- On the right side of the table, **Click** the **Add New Column** column heading. A list of available fields appears.
- In the list of fields, **Click** **Over-Budget (Number3)** on the drop-down list. When selecting items from a list like this, you can begin typing the name of the item you want and when its full name appears, select it.



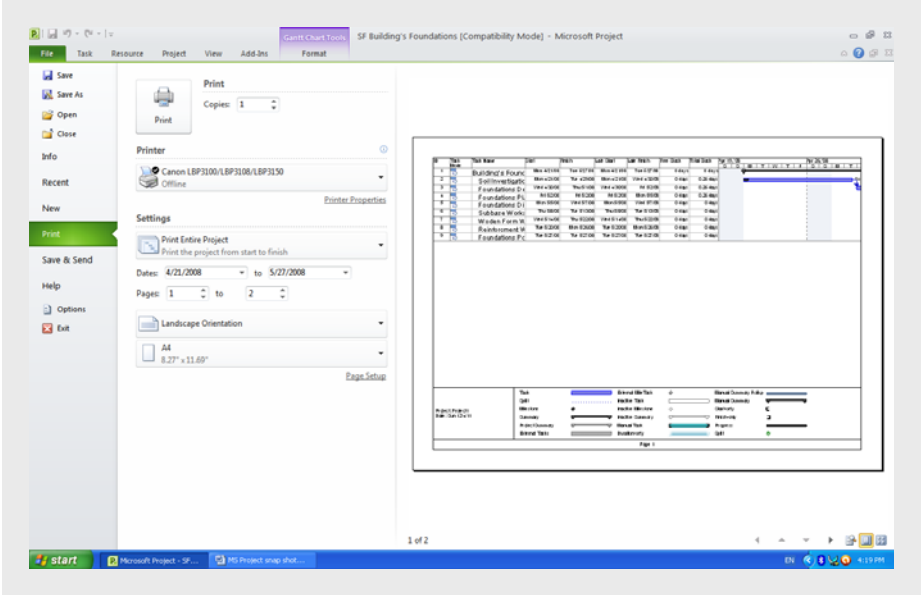
	Task Name	Fixed Cost	Fixed Cost Accrual	Total Cost	Baseline	Variance	Actual	Remaining	Overbudget
0	Children's book schedu	$0.00	Prorated	$104,506.50	$93,742.00	$10,764.50	$73,717.50	$30,789.00	
1	Editorial staff meeting	$0.00	Prorated	$2,223.00	$2,223.00	$0.00	$2,223.00	$0.00	
15	Acquisition	$0.00	Prorated	$17,940.00	$17,400.00	$540.00	$17,940.00	$0.00	
16	Manuscript receive	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00	
17	Content edit	$0.00	Prorated	$6,300.00	$6,300.00	$0.00	$6,300.00	$0.00	
18	Original art review	$0.00	Prorated	$7,500.00	$7,500.00	$0.00	$7,500.00	$0.00	
19	Author review of cc	$0.00	Prorated	$4,140.00	$3,600.00	$540.00	$4,140.00	$0.00	
20	Handoff to Editorial	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00	
21	Editorial	$0.00	Prorated	$16,381.00	$15,670.00	$711.00	$16,381.00	$0.00	
22	Organize manuscrip	$0.00	Prorated	$3,213.00	$3,060.00	$153.00	$3,213.00	$0.00	
23	Copyedit	$0.00	Prorated	$8,460.00	$8,100.00	$360.00	$8,460.00	$0.00	
24	Author review of cc	$0.00	Prorated	$1,098.00	$900.00	$198.00	$1,098.00	$0.00	
25	Copyedit incorp	$0.00	Prorated	$3,610.00	$3,610.00	$0.00	$3,610.00	$0.00	
26	Handoff to Producti	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00	
27	Design and Productior	$0.00	Prorated	$56,192.50	$46,679.00	$9,513.50	$37,173.50	$19,019.00	
28	Set pages	$0.00	Prorated	$7,590.00	$7,590.00	$0.00	$7,590.00	$0.00	
29	Interior illustration	$0.00	Prorated	$13,485.00	$13,050.00	$435.00	$13,485.00	$0.00	
30	1st Pages review	$0.00	Prorated	$22,930.50	$13,860.00	$9,070.50	$16,090.50	$6,840.00	
31	Proofread and in	$0.00	Prorated	$5,166.00	$900.00	$4,266.00	$5,166.00	$0.00	
32	Incorporate 1st P	$0.00	Prorated	$10,932.50	$6,120.00	$4,812.50	$10,932.50	$0.00	
33	Send proofed pa	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00	
34	Enter page corre	$0.00	Prorated	$4,040.00	$4,040.00	$0.00	$0.00	$4,040.00	
35	Cover design	$0.00	Prorated	$2,800.00	$2,800.00	$0.00	$0.00	$2,800.00	
36	2nd Pages review	$0.00	Prorated	$6,345.00	$6,345.00	$0.00	$0.00	$6,345.00	
37	Proof and review	$0.00	Prorated	$1,800.00	$1,800.00	$0.00	$0.00	$1,800.00	
38	Send proofed pa	$0.00	Prorated	$0.00	$0.00	$0.00	$0.00	$0.00	
39	Final review	$0.00	Prorated	$4,545.00	$4,545.00	$0.00	$0.00	$4,545.00	
40	Design book's comr	$0.00	Prorated	$5,834.00	$5,834.00	$0.00	$0.00	$5,834.00	

- Project displays the **Over-Budget** column in the **Cost table**. To see a graphical indicator's numeric value in a ScreenTip, just point to the indicator.

Print a view or report

Set up the current view the way that you want it to look when printed.

- **Click** the **File** tab, and then
- **Click** **Print**. A preview of the view will be printed appears on the right.



- **Click** in the preview part of the view to see the actual size of the view as it will be printed.

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

دراسات الجدوى الاقتصاديه
وتقييم المشاريع

January 2012

TARABOT
Iraq Administrative
Reform Project

ترابط
مشروع الإصلاح
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منـهج الدورة

1. **عنوان الدورة : دراسات الجدوى وتقييم المشاريع**

2. **مستوى الدورة : متقدم**

3. **وصف الدورة :** يشترط على جميع المشاركين هذه الدورة ان يكونوا على دراية أساسية بنظريات دراسات الجدوى ومنهجياتها .تم تصميم هذه الدورة لتزويد المشاركين بالمهارات ، الأدوات ، المعارف والتقنيات التي تستخدم في دراسات الجدوى لكونها ترتكز على مهارات عملية ومنهجيات.

4. **ساعات الاتصال:** 25 ساعة (5 ايام)

5. **متطلبات الدورة :** ينبغي أن يكون المشاركون أعضاء في أقسام أو وحدات إدارة المشاريع أو عملهم ذو صلة بتطبيقات إدارة المشاريع.

6. **تاريخ الدورة :** يتم تحديده لاحقا

7. **وقت المحاضرة:** 9:00 ص – 2:30 م

8. **مكان الدورة :** يتم تحديده لاحقا

9. **المدرب** : ترابط / مدربي وحدة إدارة المشاريع

10. **النص المطلوب وغيره من مصادر التعلم:**

- كراسات صفية

11. **لمحة عامة عن الدورة:**

- توفير الفرصة للمشاركين لتحسين و / أو اكتساب المعارف ومجموعة المهارات اللازمة في دراسات الجدوى ، وتحويل هذه المعرفة إلى إجراءات من شأنها أن تفيد الخدمات العامة .
- توفير مجموعة من المواد التعليمية التي تغطي مجموعة من المواضيع في دراسات الجدوى وتقييم المشاريع.
- تزويد المشاركين بمجموعة مختارة من مواد المستوى المتقدم في دراسات الجدوى ، معايير تقييم المشاريع وأفضل الممارسات.

12. **أهداف الدورة:**

- لتوفير الفرصة للمشاركين لتحسين وتعلم المعارف والمهارات اللازمة لمراجعة دراسات الجدوى لمشاريع الاستثمار الرأسمالية.
- لتعريف لماذا، متى وكيف نجري دراسات الجدوى، ومَنْ يشترك في هذه المرحلة الحرجة لاختيار المشاريع الناجحة.
- لتزويد المشاركين بالإجراءات والخطوات المطلوبة لمراجعة دراسة جدوى شاملة.
- لتعلم استعمال معايير التقييم لدعم صانعي القرار في اختيار بدائل المشروع الملائمة.
- مساعدة المشاركين على فهم مكونات دراسات الجدوى، كيفية انجازها ومراجعتها، تحديد المخاطر، تصنيف المشاريع واستنتاج وتقديم التوصيات إلى إدارة مؤسسة المشروع.

- في نهاية الجلسة التدريبية ، سيتمكن المشاركون من اكتساب المعرفة الأساسية عن المفاهيم الضرورية لعملية الاستثمار وإذا ما كان المشروع ذا جدوى اضافة الى تعلم متعمق للمكونات الرئيسية لدراسة الجدوى وتقييم إمكانية نجاح أو فشل المشروع.

13. سياسات الدورة:

- يتوقع من الطلبة حضور دورة كاملة الفترة ويجب أن يكونوا موجودين خلال جميع الفعاليات والامتحانات للحصول على المنفعة. إذا كان المشارك لديه ظرف خاص من شأنه أن يمنع حضوره / حضورها الامتحان المجدول ، ويمكن تحديد موعد جديد للامتحان وحسب وقت المدرب.
- يتم تأدية جميع الواجبات على النحو المحدد من قبل المدرب .
- يمكن للمشارك أن يغيب مدة أقصاها يوم واحد عن التدريب.

14. المنهجية : سيوفر المدرب دليل شامل للمشاركين ويجري عروض توضيحية ، وسيتم استخدام النهج القائم على المشاركة لتسهيل التعلم للمشاركين ، وسيتم استخدام الأمثلة ودراسات الحالة والأسئلة العملية / الفعاليات.

الوحدة رقم I

دراسات الجدوى لمشاريع الاستثمار الرأسمالية

Feasibility Studies of Capital Investment Projects

الوحدة رقم I. دراسات الجدوى لمشاريع الاستثمار الرأسمالية

القسم 1.0 نظرة عامة عن دراسات الجدوى

1.1. المقدمة

إن دراسات الجدوى وتقييم المشاريع الرأسمالية والاستثمارية هي من أهم الخطوات والأدوات لنجاح المشاريع حيث أن التخطيط السليم يضمن مدى نجاح وفعالية هذه المشاريع بالإضافة إلى العائد المادي (الربح المادي) الجيد المتوقع من هذه المشاريع، كما إنها تعطي منهجية فعالة للإدارة الإستراتيجية للمشاريع في مختلف الأنشطة الاقتصادية والاستثمارية بحيث تمكن من صنع القرارات الاستثمارية من خلال جمع المعلومات عن مشروع مقترح ومن ثم تحليلها لمعرفة إمكانية تنفيذ المشروع وتقليل المخاطر المتوقعة.

إن المشاريع تبدأ بفكرة أو مجموعة من الأفكار التي تنتقل من مرحلة إلى أخرى فتتعرض لعمليات تحليل لفصل الجيد عن الرديء ولضمان إن الفكرة أكثر تفصيلا ومحددة لهدف ما. ومن هنا فإن عدم القيام بإجراء دراسات الجدوى للمشاريع يضع صانع القرار في المضي بالمشروع قائما على العشوائية مما يجعل المستثمر سواء كان في القطاع العام أو الخاص غير مدرك أن الاستثمار ليس فقط أمر غير واضح وإنما يتحرك بطريقة لا يمكن توقعها إلا إذا كانت هناك تقديرات مسبقة دقيقة وسليمة قائمة على أسس وأساليب علمية تقوم بوضع التوقعات قبل البدء في تنفيذ المشروع والمتمثلة في دراسات الجدوى. ولذلك انبثقت وتولدت دراسات الجدوى من صلب النظرية الاقتصادية لتكون أداة علمية مهمة جدا لدعم صناعة القرارات الاستثمارية.

علما بان دراسات الجدوى هي ليست لتعريف فكرة جديدة ولكن هي الخطوة التي تأتي بعد الفكرة الأساسية التي قد تم مناقشتها وإعطاء صانع القرار الضوء الأخضر مسبقا للمضي قدما إلى مرحلة الدراسة.

من الضروري أن نتذكر إن دراسات الجدوى ليست السبيل لنحدد ما إذا كنا سنمضي بالمشروع أم لا، ولكن هي وسيلة للمساعدة على اتخاذ القرار إذا كان العائد الاقتصادي للمشروع يبرر المخاطر التي يتضمنها الاستمرار في المشروع.

وتنطوي دراسات الجدوى الاقتصادية على هدف رئيسي وهو تحديد ما إذا كان من الممكن اتخاذ قرار استثماري بإقامة مشروع من عدمه. ودراسة الجدوى تعتبر وثيقة أساسية يتخذ على ضوئها القرار الاستثماري النهائي للمشروع.

1.2. تعريف دراسات الجدوى

دراسات الجدوى من الناحية الاقتصادية هي منهجية لاتخاذ القرارات الاستثمارية التي تعتمد على مجموعة من الأساليب والأدوات والاختبارات التي تعمل على معرفة احتمالات نجاح أو فشل مشروع استثماري معين. دراسات الجدوى تقيّم احتمالية نجاح المشروع وتحتاج لمعرفة عميقة عن الجوانب الفنية والمالية للمشروع. مثلا: للمشاريع الإنتاجية هي طريقة تستخدم للتعرف على مدى توفر الإمكانيات اللازمة لتنفيذ المشروع وتسويق إنتاجه وهل هو مربح أم لا.
ومن خلال هذا التعريف لدراسات الجدوى والتعمق في المفهوم الأساسي نكتشف أنها نموذج محاكاة (**Simulation Model**) للمشروع وهنا نلاحظ التالي:

- إن من أهم محتويات دراسات الجدوى وتقييم المشاريع هو تقدير التدفقات النقدية الداخلة لتحديد صافي العائد على الاستثمار(**Net Return on Investment**)، وذلك على مدى العمر الافتراضي للمشروع، والذي سنشرح كيفية تقديره في المراحل اللاحقة من هذا الدليل.
- تؤدي دراسة الجدوى إلى وضع أولويات واتخاذ قرار استثماري بالبديل الذي يعطي أفضل عائد استثماري ممكن.
- وكما ذكرنا أعلاه: إن دراسات الجدوى هي بمثابة نموذج محاكاة للمشروع يتم تقديره قبل البدء بوضع خطة المشروع للتنفيذ لضمان الدخول في أنشطة استثمارية لها عائد أو فائدة واضحة.
- تعتبر دراسات الجدوى مهمة لجميع أنواع المشاريع الصناعية والزراعية والخدمية سواء كانت مشاريع خاصة أو حكومية .

- تساهم بتنظيم المشاريع وفقا للعوائد الصافية (**Net Returns**) والمقارنة بينها لاختيار أفضل المشاريع الاستثمارية.
- القطاعات التي يمكن أن تغطيها دراسات الجدوى:
  - القطاع الزراعي
  - القطاع الصناعي
  - قطاع البناء والتشييد والخدمات
  - قطاع النقل والمواصلات
- إن دراسات الجدوى تنطوي على دراسات جدوى مبدئية قد تسمح أو لا تسمح بأجراء دراسات الجدوى التفصيلية للمشروع، حيث أن الجدوى التفصيلية هي دراسة: الجدوى البيئية، الجدوى القانونية، الجدوى التسويقية، الجدوى الفنية، الجدوى المالية، والجدوى الاجتماعية. ومن الممكن أن تتضمن الدراسة الفنية البعد المؤسساتي والتشغيلي اعتمادا على نوع المشروع.

1.3. لماذا نحتاج أن نقوم بدراسات الجدوى؟

دراسات الجدوى هي المرحلة التي يقوم المخططين بواجباتهم المسبقة لمعرفة ما إذا كان المشروع سينجح. دراسات الجدوى تحتاج من مدراء المشاريع والإدارة العليا إعطاء الوقت الكافي لفهم تحليل المخاطر، تحليل الكلفة، وتحديد الوقت لإنهاء المشروع، قبل أن يتم الموافقة على ميزانية المشروع. إنها تساعدنا على وضع إطار محدد لبدائل المشروع لكي نتمكن دراسة هذه البدائل بعمق.

1.4. ما هي الأهداف من دراسة الجدوى؟

الأهداف المطلوبة من دراسة الجدوى معرفة إمكانية تنفيذ المشروع واقتراح الحلول البديلة، أي إنها توفر لصانعي القرار معلومات كافية لاتخاذ القرارات التالية:

- هل يمكن تنفيذ المشروع ؟
- هل النتيجة النهائية في مصلحة المستفيدين؟
- ما هي البدائل والحلول التي يمكن اختيارها خلال مراحل المشروع القادمة؟
- هل هناك خيار لبديل أفضل؟

1.5. مَنْ هم الذين يقومون بدراسات الجدوى؟

اعتمادا على نوع المشروع ومتطلباته تؤلف لجنة أو فريق للقيام بالدراسة وتتكون هذه اللجنة من عدة اختصاصات. وفي معظم الأحيان، كما يجري عادة في القطاع العام، تتم الاستعانة باستشاري مع الأخذ بعين الاعتبار المعايير التالية:

- أن يكون لديه خبرة مسبقة في دراسات الجدوى ونوعية المشروع.
- أن يعمل ضمن الميزانية المحددة له لدراسة الجدوى وضمن جدول زمني محدد.
- أن يكون لديه معلومات واضحة مسبقا وعنده الاستعداد أن يتعاون ويعمل مع اللجنة.
- لديه الاستعداد للقيام بالتعديلات المطلوبة خلال الدراسة.

إذا كان المشروع كبير ومعقد فمن الممكن توظيف عدة استشاريين وفقا للاختصاصات المختلفة والمطلوبة لإعداد دراسة الجدوى.

1.6. المعوقات والصعوبات في إجراء دراسات الجدوى

- تزداد مشاكل التعامل مع المتغيرات الداخلية والخارجية على حد سواء فيما يخص موضوع الاقتصاد مما يزيد مخاطر عدم التأكد في تقدير التكاليف الاستثمارية خلال العمر الافتراضي للمشروع مثل الأسعار وأسلوب الطلب والإنتاج
- تزداد صعوبات تقدير بنود التدفقات النقدية الداخلة والخارجة خصوصا الأخيرة أي التكاليف.

- عدم التوازن بين تكاليف دراسات الجدوى ورأس المال المخصص للاستثمار في المشروع.
- صعوبات فنية لا سيما مع قلة أو ندرة الخبرات الفنية مما يستلزم الاستعانة بالخبرات الفنية ذات المهارة العالية.
- نقص المعلومات أو البيانات أو تضاربها أو عدم وضوحها مما يؤثر على دقة تقدير بعض المتغيرات الداخلة في الدراسة.

القسم 2.0 <u>المشاريع التي تطبق عليها دراسات الجدوى</u>

بصورة عامة، إن المشاريع التي تطبق عليها دراسات الجدوى مقسمة كالأتي:

1. المشاريع الاستثمارية الجديدة (New Investment Projects)

وهي من أهم الأنواع لحاجتها إلى دراسات وتقديرات وافتراضات وتوقعات تعتمد على أساليب دقيقة في احتمالات عدم التأكد من نتائج المشروع الجديد.

إن دراسات الجدوى ضرورية للمشاريع الصناعية والزراعية والخدمية من أي حجم كانت صغيرة، متوسطة أو كبيرة. وقد تختلف دراسات الجدوى فيما بينها من حيث الحجم والتكلفة ولكنها تشترك في إنها تتم قبل التخطيط والبدء بتنفيذ المشاريع.

2. الإضافة أو التوسع في المشاريع القائمة (Additions to Existing Projects)

يحتاج هذا النوع الاستثماري إلى إجراء دراسات الجدوى لاتخاذ القرار الاستثماري الجيد. مثلا: إقامة مصنع تابع لمصنع قائم لإنتاج المواد النفطية أو إضافة خط إنتاج جديد لإحدى مشاريع تجميع السيارات الذي يكون فيه تأسيس فرع جديد في منطقة جديدة أو توسيع مطار أو مرفأ .... الخ.

3. الإحلال والتجديد (Replacement and Renewal)

استبدال آلة جديدة محل القديمة بعد انتهاء العمر الافتراضي ويكون الاختيار من بين عدة أنواع من الآلات ويتطلب دراسة التدفقات النقدية الداخلة والخارجة المتوقعة، والعائد من هذه الأنواع لاختيار البديل الأفضل. مثلا: استبدال مضخة مياه أو تجديد محطة توليد طاقة.

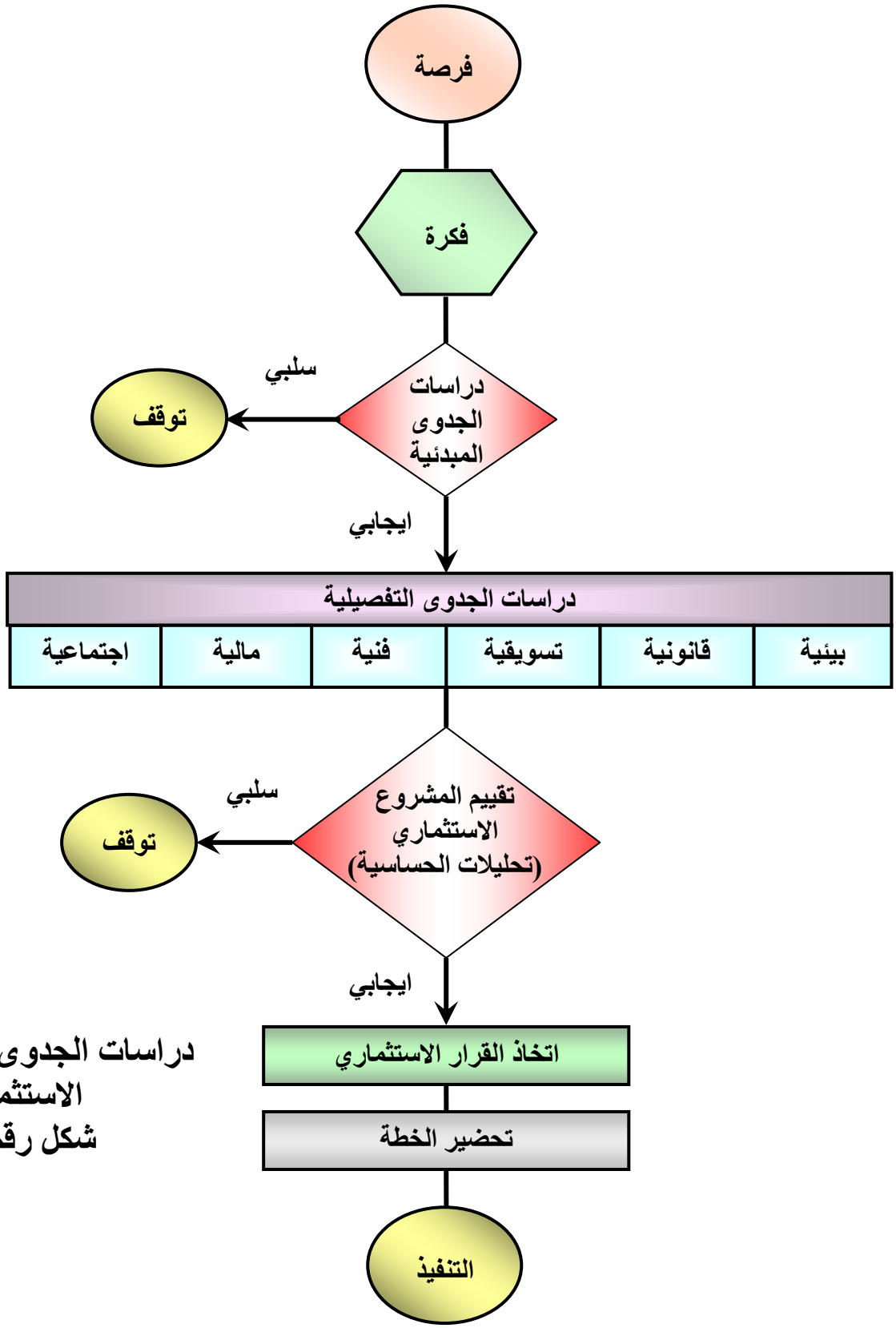
4. مشاريع التطوير التكنولوجي (Technological Development Projects)

دراسة الجدوى للمشاريع التكنولوجية والمعلوماتية. مثلا: تطوير برامج معلوماتية، مع مراعاة أن هنالك نوعين من التكنولوجيا:

- تكنولوجيا كثيفة العمل.
- تكنولوجيا كثيفة رأس المال.

القسم 3.0 دراسات الجدوى لاتخاذ القرار الاستثماري

دراسات الجدوى وتقييم المشاريع تمر بعدة مراحل للوصول إلى القرار الاستثماري الأفضل. ويوضح الشكل التالي تلك المراحل ابتداء بفكرة المشروع:



دراسات الجدوى لاتخاذ القرار الاستثماري
شكل رقم – 1

المرحلة الأولى: هناك فرصة استثمارية في مجال استثمار معين في احد الأنشطة الاقتصادية المتنوعة خارجية أو داخلية، من خلال متابعة المتغيرات الاقتصادية والاجتماعية أو من خلال تجميع رغبات العملاء أو التطور التكنولوجي، فعندما يحاول المستثمر أن يغتنم هذه الفرصة فإنه ينتقل إلى؛

المرحلة الثانية: الفكرة التي تحتاج إلى البحث والدراسة من خلال تجميع المعلومات الضرورية لدعم الفكرة الاستثمارية ويتحدد فيها الهدف من المشروع ومن ثم ينتقل إلى؛

المرحلة الثالثة: إجراء دراسات الجدوى المبدئية (**Pre-Feasibility Studies**) للمشروع ويقرر من خلالها الدخول في دراسات الجدوى التفصيلية أم لا. فإذا لم يكن هناك مؤشرات إلى وجود مشاكل أو معوقات ينتقل إلى؛

المرحلة الرابعة: مع أنه لا يوجد هناك إجراءات عمل تفرض أن نقوم بدراســـات الجــدوى وفقــا لتراتـبـيـــة معينـــة، فقد قمنـــا باختيـــار عمـــل دراســـات الجدوى التفصيليـــة (**Detailed Feasibility Studies**) وفقاً للترتيب التالي:

- دراسات جدوى بيئية (**Environmental**)
- دراسات جدوى قانونية (**Legal**)
- دراسات جدوى تسويقية (**Market**)
- دراسات جدوى فنية (**Technical**)
- دراسات جدوى مالية (**Financial**)
- دراسات جدوى اجتماعية (**Social**)

وتجدر الإشارة هنا انه من الناحية التراتبية التي قمنا باختيارها، لا ننتقل إلى المرحلة التالية من الدراسات إلا إذا ثبت جدوى الدراسة السابقة فعلى سبيل المثال لن يكون مجديا الخوض في دراسات الجدوى التسويقية إلا إذا قمنا بدراسات الجدوى البيئية والقانونية للمشروع وهكذا.

وينبغي النظر إلى استخدام الأساليب التقليدية خلال عملية التحليل بواسطة التحليل الرباعي (**SWOT Analysis**) وهو يوفر نقطة انطلاق قوية لتحليل مستقبلي (القوة – الضعف – الفرص – والتهديدات). وفي حال أثبتت الدراسات التفصيلية جدوى المشروع عندها يتم الانتقال إلى؛

المرحلة الخامسة: هذه المرحلة تتمثل بتطبيق مجموعة من المعايير التي تحدد مدى ربحية وجدوى المشروع وهي معايير تقييم المشاريع الاستثمارية وتكون على نوعين:

- معايير الاستثمار وتقييم المشروع من وجهة نظر المستثمر.
- معايير تعبر عن وجهة نظر ومصلحة الاقتصاد للبلد، علما أن هذه المرحلة تنطوي أيضا على ما يسمى بتحليلات الحساسية والتي تجري لاختبار بعض المتغيرات الاقتصادية للمشروع كسعر البيع أو سعر الصرف أو أسعار التشغيل (الطاقة أو المياه أو أسعار مكونات الإنتاج وغيرها).

الوحدة رقم II

أنواع دراسات الجدوى

Types of Feasibility Studies

الوحدة رقم II. أنواع دراسات الجدوى

القسم 1.0 الخلفية

كما أشرنا في الوحدة السابقة فإن دراسات الجدوى الاقتصادية تتكون من نوعين هما:

- دراسات الجدوى المبدئية **(Pre-Feasibility Studies)**
- دراسات الجدوى التفصيلية **(Detailed Feasibility Studies)**

وهناك علاقات داخلية مترابطة بين الجدوى المبدئية والتفصيلية، كما يوجد ترابط بين أنواع دراسات الجدوى التفصيلية.

1.1 دراسات الجدوى المبدئية\ التمهيدية

لتفادي الانتقال المباشر إلى مرحلة دراسة الجدوى التفصيلية دون بحث فكرة المشروع خطوة خطوة أو التمكن من عرض حلول بديلة يجب إجراء دراسات الجدوى المبدئية التي هي بمثابة المؤشر الذي يمكن أن يفتح الطريق أمام دراسات الجدوى التفصيلية أو يقفله. ولذلك تعتبر دراسات الجدوى المبدئية هي دراسة استكشافية لقياس الأمور والظروف المحيطة بالمشروع والتي يمكن من خلالها اتخاذ القرار بالدخول في دراسات الجدوى التفصيلية التي يمكن أن تكلف الكثير من الجهد والمال وهنا تكمن أهمية دراسات الجدوى المبدئية في تحديد ما إذا كان سيتم الدخول في دراسات الجدوى التفصيلية المكلفة أم لا.

تحتوي دراسات الجدوى المبدئية على مجموعة من المؤشرات والتقديرات المبدئية والتي يمكن أن توضح للمستثمر مدى إمكانية نجاح أو فشل المشروع قبل الدخول في دراسات الجدوى التفصيلية وترسل الإشارة إلى المستثمر أو القائمين على دراسات الجدوى بالتحول إلى مشروع أخر أو فرصة استثمارية أخرى لبدء طريق جديد وهي بالتالي لا يمكن الاستغناء عنها بالنسبة لأي مشروع. ونتيجة لذلك يمكن لدراسات الجدوى المبدئية أن تغطي عدد من الجوانب التي يتم دراساتها وتحليلها ومنها:

1. دراسة القضايا التشريعية وغيرها وفقا لتصنيف موقع معين يمنع إقامة مشاريع معينة عليها أو شروط أو قيود تتعلق مثلاً بقوانين البيئة أو موانع غير تشريعية مثل إقامة المشروع على أراضي خاصة يمتلكها أفراد أو أراضي لها ضوابط أمنية أو أماكن تخضع لعوائق أو شروط قد وضعها التنظيم المدني ... الخ.
2. دراسة القوانين التجارية للاستيراد والتصدير ونظام الجمارك ما يتعلق بها من قيود وموانع مثل مواد أو معدات معينة، وفي ذات السياق هنالك قوانين وقرارات تقتصر نشاط معين على الدولة مثل صناعة المشتقات النفطية أو التكرير وغيرها من الأنشطة.
3. التعرف على حالة الاقتصاد وسياساته الاقتصادية والظروف الأمنية والبيئية ومدى الاستقرار السياسي والاجتماعي بما في ذلك الأمور المتعلقة بالمجتمع والقيم والعادات والتقاليد الخاصة ومقارنة أهداف المشروع مع الأهداف العامة للمجتمع.
4. مدى أهمية المشروع والحاجة له هو ما يستدعي التعرف على حالة وطبيعة السوق واتجاهات الطلب على المنتجات أو الخدمات والأسعار السائدة ورغبات وتوقعات المستهلكين لهذا النوع من المنتجات أو الخدمات.
5. دراسة الاستثمار من الناحية التكنولوجية ومدى توافر مواد وأدوات الإنتاج واليد العاملة والقيود على استيرادها. كما تسعى الدراسة إلى معرفة مدى توافر الخامات والعنصر الفني للمشروع.

ومن الممكن الحصول على المعلومات التي تطلبها الدراسة المبدئية من عدة مصادر لعل أهمها:

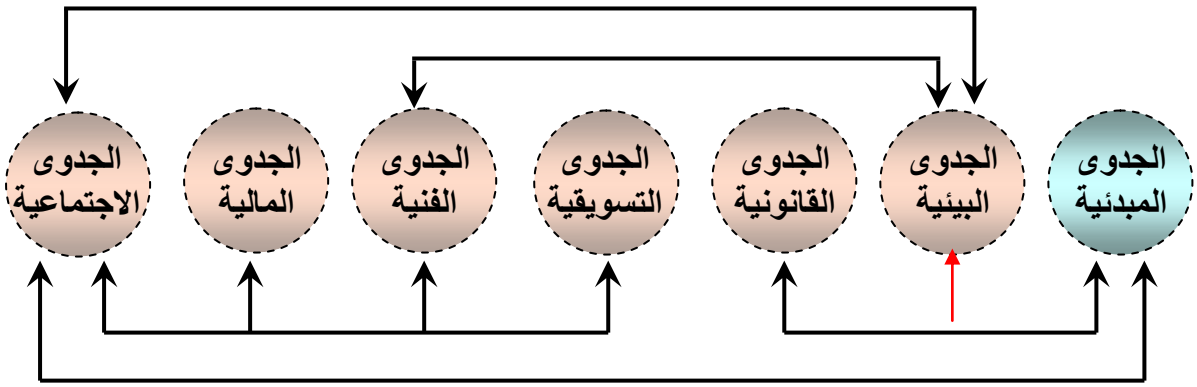
1. **مصادر ميدانية**
كالمقابلات الشخصية للزبائن والعملاء المحتملين والمسؤولين في الحكومة والغرف التجارية ونقابات العمال .... الخ.
2. **مصادر مكتبية**

وتتمثل في البيانات (**Data**) والإحصاءات والنشرات الصادرة عن الهيئات والأجهزة الحكومية مثل وزارة التخطيط والإدارة المركزية للمعلومات والإحصاء، البنك المركزي والبنوك التجارية بالإضافة إلى البحوث العلمية.

وكما ذكرنا سابقا إن دراسات الجدوى المبدئية تساعد على تقدير كلفة الدراسة التفصيلية والهدف الرئيسي منها هو اتخاذ القرار المتعلق بالدخول في دراسات الجدوى التفصيلية، بالإضافة إلى النتائج التي تسفر عنها الدراسة المبدئية مثل تقدير مبدئي للاستثمار والتكاليف الكلية المبدئية للمشروع، كما إنها يمكن أن تحدد المشاكل والمعوقات أو أنواع المخاطر التي يمكن أن تواجه المشروع وكيفية التعامل معها. ويلاحظ إن دراسة الجدوى المبدئية يمكن أن تدخل في تحليلاتها الجوانب البيئية والقانونية والتسويقية والفنية والمالية والاجتماعية للمشروع الاستثماري ولكن بشكل مختصر قدر الإمكان دون الخوض في تفاصيل مكلفة وبالقدر الذي يشير إلى ضرورة القيام بدراسات الجدوى التفصيلية.

1.2 دراسات الجدوى التفصيلية

بعد إعداد دراسات الجدوى المبدئية للمشروع والتي أعطت نتائج ومؤشرات ايجابية، عنده يمكن الدخول في المرحلة المتمثلة بدراسات الجدوى التفصيلية والتي تشتمل على الدراسة البيئية والدراسة القانونية والدراسة التسويقية والدراسة الفنية والدراسة المالية والدراسة الاجتماعية.



العلاقة بين الدراسة المبدئية وابعاد الدراسة التفصيلية
شكل رقم – 2

القسم 2.0 دراسة الجدوى البيئية

تتجه الدراسة للتعرف على الآثار الايجابية والسلبية للمشروع على البيئة، والعمل على تجنب الآثار السلبية والتقليل منها أو منع حدوثها وهي مسألة غاية في الأهمية حتى وان استدعى الأمر إسقاط المشروع. ومن ثم فأن الدراسة البيئية تقيس وتحدد أثر المشروع الاستثماري على البيئة الطبيعية والفنية والمادية وكذلك على الصحة العامة والعمالة وما هي الآثار الايجابية، فالمشروع يمكن أن يلوث البيئة سواء تلوث الهواء أو تلوث المياه من خلال استخدام المواد الكيمياوية وبالتالي الأضرار بالصحة أو إحداث أمراض معينة.

للتعرف على الآثار الايجابية والسلبية للبيئة على المشروع فإن التحليل الشامل لدراسات الجدوى البيئية للمشروع من الضروري أن يأخذ بالاعتبار الاثنين معاً، تأثير البيئة على المشروع وتأثير المشروع على البيئة، حيث أن اثر البيئية على المشروع يركز على البيئة الاستثمارية.

2.1. اثر المشروع على البيئة

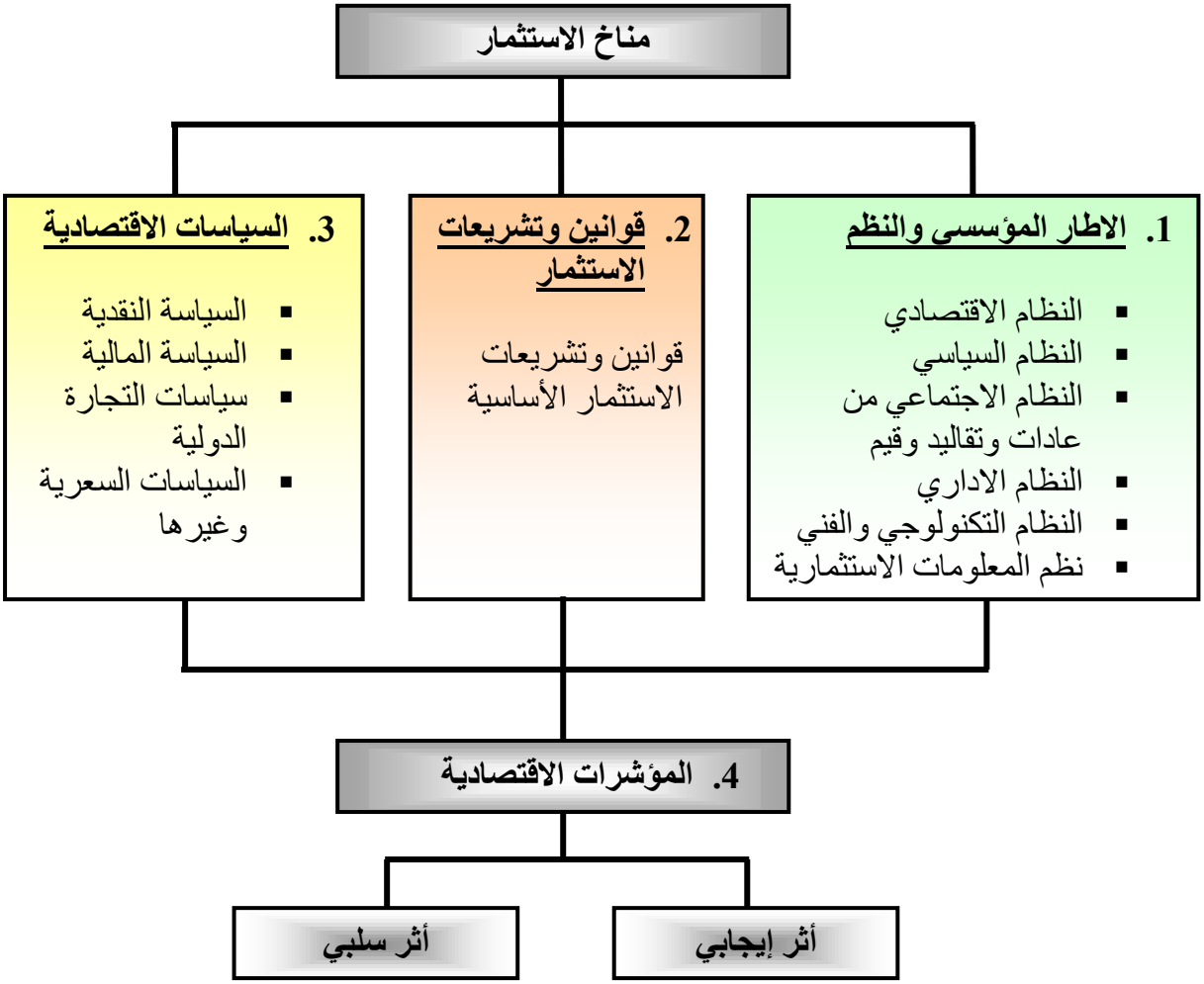
- دراسة الآثار الضارة بالبيئة ودراسة الطرق والوسائل لمعالجتها ولحماية البيئة منها بأقل ما يمكن من تكاليف استثمارية إضافية للمشروع أو اقتراح بديل للموقع المقترح.

- وبحال وجود أثار ضارة للبيئة لا يمكن معالجتها وحماية البيئة منها، عندها من الأفضل إسقاط المشروع.

ولهذا يجب الاطلاع على الشروط البيئية حسب موقع المشروع والالتزام بالقوانين والحصول على التراخيص من الجهات المعنية لحماية البيئة بشكل عام.

2.2. أثر البيئة على المشروع

وهنا نشير إلى البيئة التي سيقام ويعمل فيها المشروع ومن ثم فهي بيئة الاستثمار التي قد توفر المناخ الاستثماري وما هي التأثيرات الايجابية أو السلبية على المشروع،وبأخذ مفهوم البيئة بكل عناصرها الاقتصادية والسياسية والاجتماعية والفنية فإنها تشكل ما يسمى بمناخ الاستثمار والذي من الممكن أن يؤثر على القرارات الاستثمارية سلباً أو إيجابا.



مناخ الاستثمار
شكل رقم – 3

الشكل رقم – 3 يشير إلى أن مناخ الاستثمار يتكون من مجموعة عناصر ممكن أن تؤثر ايجابياً أو سلبياً على المشروع الاستثماري بالنحو التالي:

1. **الإطار المؤسسي والنظم:**
   - **النظام الاقتصادي:**
   عند وجود نظام اقتصادي منفتح يعطي الحرية الاقتصادية يكون له الأثر الايجابي على المشروع الاستثماري وهو يتضمن البيئـــة الاقتصاديـــة (**Economic Environment**) التي تحيط بالمشروع.
   - **النظام السياسي:**
   النظام السياسي له تأثيرات كبيرة على النظام الاقتصادي فإذا كان ديمقراطياً له الأثر الايجابي على المشروع الاستثماريً، ويرتبط ذلك بمدى الاستقرار السياسي والأمني الذي هو من العوامل الأساسـية لنجـاح أو فشـل المشـروع وتسـمى عوامـل البيئـة السياسـية (**Political Environmental Factors**).
   - **النظام الاجتماعي:**
   هذا النظام يتعلق بالقيم والعادات والتقاليد التي يتكون منها المجتمع وما هي تأثيراتها على المشروع. هذه العوامل تسمى عوامل البيئة الاجتماعية (**Social Environmental Factors**). مثلاً إنشاء مصنع لإنتاج الكحول في بلد تمنع تصنيع وتعاطي الكحول.
   - **النظام الإداري والمؤسساتي:**
   النظام الإداري الذي يتميز بأنظمة وكفاءة إجراءات واضحة بدلا من عقبات ومعوقات إدارية يكون له الأثر الايجابي على المشروع الاستثماري والعكس صحيح.
   - **النظام التكنولوجي والفني:**
   وهذا يتعلق بعوامل البيئة التكنولوجية والفنية (**Technological & Technical Environmental Factors**) ويتم دراسة الإمكانات الفنية المتوفرة ووسائل التكنولوجيا المتاحة وتأثيرها الايجابي أو السلبي على المشروع.
   - **نظام المعلومات الاستثمارية:**
   مدى توفر البيانات والمعلومات الاستثمارية بالدقة الملائمة تؤثر على إعداد دراسات الجدوى إيجابا أو سلبا. فإذا كانت أجهزة الإحصاء وبنوك المعلومات تتوفر فيها بيانات واضحة فأنها تعطي نتائج واضحة خلال إجراء دراسات الجدوى.

2. **قوانين وتشريعات الاستثمار:**
   دراسة عوامل البيئة القانونية (**Legal Environmental Factors**) لتحديد البيئة القانونية المؤثرة سلباً أو إيجابا على المشروع مثل الأنظمة التشريعية والعقود القانونية والمحاكم التي تحسم النزاعات وجهات التحكيم القانونية التابعة لوزارة العدل ومكاتب التسجيل العقاري بالإضافة إلى احد أهم العناصر وهي قوانين وتشريعات الاستثمار وقانون البنوك والضرائب وغيرها.

3. **السياسات الاقتصادية:**
   ونشير هنا إلى السياسات الاقتصادية بشكل عام، فإذا كانت هذه السياسات مرنة وواضحة الأهداف وتتميز بالكفاءة والفعالية وتتماشى مع التغييرات والتحولات الاقتصادية العالمية والمحلية سيكون لها أثرا ايجابياً على المشروع الاستثماري، والعكس هو الصحيح، وتعتمد على سياسة البلد المالية والنقدية والتسعيرية وأنظمة التجارة الدولية.

4. **المؤشرات الاقتصادية:**
   وهذه المؤشرات تحدد إذا كان الاقتصاد جاذباً للاستثمار. وهنا نشير إلى قياس درجة الانفتاح الاقتصادي على العالم كنسبة الصادرات إلى الناتج المحلي الإجمالي فكلما زادت هذه النسبة عبر الزمن كلما كان ذلك أفضل. ومن المؤشرات الاخرى القوة التنافسية للاقتصاد مثل معدلات نمو الصادرات ومعدل العائد على الاستثمار التي تؤثر سلباً أو إيجابا على المشروع.

القسم 3.0 <u>دراسة الجدوى القانونية</u>

هذه الدراسة تبحث الشكل القانوني المناسب للمشروع الاستثماري. وهنالك علاقة تربط بين دراسة الجدوى البيئية ودراسة الجدوى القانونية. ففي الوقت الذي يتم فيه دراسة الجدوى البيئية يتم بحث قوانين وتشريعات الاستثمار الأساسية والمكملة في دراسة الجدوى القانونية والتي تتمثل في التشريع المالي والضريبي وتشريعات

العمل والأجور والتأمينات وغيرها من القوانين التي تؤثر على إقامة المشروع. ويمكن أن تكون لها اثارا ايجابية ومن ثم تدفقات نقدية داخلة متوقعة قد تمنحها الحكومة للمشاريع الاستثمارية في إطار تشجيع الاستثمار في بعض المجالات مثلا الإعانات والمنح وبالتالي يجب تحديد مجالات الاستثمار في قوانين وتشريعات الاستثمار التي تنطبق على المشروع. ومن الممكن لقوانين الاستثمار أن تضيف تكاليف وأعباء قد تؤثر على التدفقات النقدية الخارجة للمشروع ويجب أن تأخذ بالاعتبار: الرسوم والمصروفات والتشريعات الخاصة بالوزارات المختلفة كوزارة البيئة والصناعة والتجارة والاقتصاد والزراعة والمالية والتخطيط التي يكون لها علاقة بالمشروع الاستثماري. إضافة إلى الجمارك وقوانين الاستيراد والنقل والتصدير والقيود على السلع والمنتجات.

3.1 قوانين وتشريعات الاستثمار

3.1.1 حوافز الاستثمار: وتنقسم إلى نوعين:

1. الإعفاءات الضريبية والجمركية:

الإعفاءات الضريبية المطلقة: إعفاء مدى حياة المشروع من دفع أي ضرائب أو بعض الرسوم الجمركية.

الإعفاءات الضريبية المؤقتة: فتعني إعفاء خلال فترة زمنية محددة (الإجازة الضريبية).

2. حوافز استثمارية أخرى مباشرة وغير مباشرة:

الحوافز الاستثمارية المباشرة: عبارة عن إعانات ومساعدات مالية من موازنة الدولة أو جهات خاصة أو بنوك للمشاريع، رغبة في تشجيعها كالمشاريع الإنتاجية والخدمية.

الحوافز الاستثمارية غير المباشرة: الدولة تقوم بتوفير المرافق العامة والبنية التحتية ورصف الطرق والكهرباء والمياه والصرف الصحي والهواتف وغيرها من وسائل الاتصال لتيسير أعمال المشروع. أحيانا تمنح الدولة امتيازات لمشاريع معينة أو استثمار ارض مملوكة للدولة لمدة معينة من الزمن مثلا 99 عاماً لمشروع إنتاجي أو فندق سياحي.

3.1.2 القيود والأعباء

إن قوانين وتشريعات الاستثمار الصعبة تضع قيود وأعباء على المشروع الاستثماري، مثلا القيود التي تمنع أي مستثمر أجنبي من الاستثمار في أنشطة معينة وبعض القيود التي تقف عقبة أمام المشاريع الخاصة في أنشطة إستراتيجية مثل البترول أو شركات الطيران والملاحة وغيرها.

وقد وضعت بعض الدول أسس ومعايير لتحقيق التوازن بين التكاليف الاجتماعية والعائد الاجتماعي مثل القيود المفروضة على نقل التكنولوجيا وتشغيل العمالة الأجنبية وقيود بيع العقارات للجنسيات الأجنبية وغيرها من القيود كتلك المتعلقة بالنقد الأجنبي وتداوله والقيود التي تفرضها بعض الجهات الحكومية والمنظمات المهنية مثل اتحاد الصناعات أو الغرف التجارية والصناعية. مثلاً ضوابط تشغيل العمالة والأرباح المحددة ومعايير الجودة والاستيراد والتصدير وغيرها.

بشكل عام، إن القوانين والتشريعات التي قد تؤثر على الاستثمار تضيف عقبات وأعباء وتكاليف على المشروع مثلاً: زيادة رسوم التسجيل العقاري ورسوم الترخيص للبناء وغيرها. وكذلك الأعباء الأخرى مثل قانون حماية البيئة ومن هنا نجد انه من الضروري تحديد الآثار على المشروع سواء الايجابية منها أو السلبية والوصول إلى ما إذا كان الأثر الصافي ايجابياً أم سلبياً وهو ما قد يؤدي إلى اتخاذ قرار بالاستمرار في دراسة الجدوى التفصيلية أو التوقف عنها وربما التحول إلى مشروع أخر.

3.2 الشكل القانوني للمشاريع الاستثمارية

وهنا نشير إلى أشكال المشاريع وصفتها القانونية ومنها:

1. المشاريع الفردية

شخص واحد يملك المشروع ويرسم سياسته ويتحمل مسؤوليته وتكون أملاكه ضمانة لتعهداته المالية والتجارية.

2. مشاريع المجموعة

وهي على ثلاثة أنواع:

شركات التضامن يتضامن الشركاء في إدارة الشركة وفي رسم سياستها وتحمل المسؤولية والوفاء بكل الشؤون المالية والتجارية والتعهدات، ولذلك فأن لاختيار الشركاء اثر كبير على نجاح المشروع.

شركات التوصية وهذا النوع يجمع بين نوعين من الشركاء الأول ضامن لديون المشروع وتعهداته، والثاني متضامن يشترك برأسماله ومسؤوليته محدودة بمقدار ما يدفعه فقط من حصة في أموال المشروع.

شركات المحاصصة تجمع عدد محدود من الأفراد ولمدة معينة ولا تتمتع بشخصية معنوية مستقلة.

3. المشاريع المساهمة

وهو من أهم أنواع الشركات الذي ينطبق على بعض المشاريع الكبيرة الحجم ويدخل فيه عدد كبير من المساهمين في عملية التمويل، ويقوم على إدارة هذه المشاريع مجلس إدارة ينتخبه المساهمون لمدة معينة. وتطرح أسهم هذه الشركات للاكتتاب العام وتعتبر هذه الشركات أفضل الأنواع التي تمثل وزناً كبيراً على الصعيد الدولي والمحلي.

4. المشاريع المختلطة

وهي تجمع بين شركات الأشخاص وشركات المساهمة حيث يوجد نوعين هما:

- **الشركات ذات المسؤولية المحدودة:**

في هذا النوع من الشركات تكون مسؤولية الشريك في حدود ما يساهم به في راس المال فقط ، لا تتعدى امواله الخاصة. مثل هذا النوع من الشركات يناسب الشركات الصغيرة ومتوسطة الحجم.

- **شركات التوصية بالأسهم:**

لا تختلف عن شركات التوصية السابقة الا في شكل المساهمة حيث يسمى نصيب الشريك في شركة التوصية البسيطة حصة بينما يسمى نصيب الشريك في شركة التوصية بالاسهم سهما. ويكون الشركاء المتضامنين مسؤولين عن التزامات الشركة – باعتبارهم مسؤولين عنها مسؤولية غير محدودة.

القسم 4.0 دراسة الجدوى التسويقية

إن دراسة الجدوى التسويقية تعتبر أساس دراسات الجدوى التفصيلية، ونتائجها تحدد الانتقال إلى المرحلة التالية من عدمه، فهي تضع الحد الفاصل بين احتمالات نجاح أو فشل المشاريع الاقتصادية.

4.1. مفهوم دراسة الجدوى التسويقية

وهي عبارة عن مجموعة أبحاث وتقديرات لتحديد ما إذا كان هنالك طلب على منتجات المشروع خلال عمره الافتراضي أم لا. ومن خلال نتائج دراسة الجدوى التسويقية تبنى باقي الجوانب لدراسات الجدوى التفصيلية للمشروع ويتوقف عليها الاستمرار في تلك الدراسات أم لا.

تتضمن دراسة السوق من حيث:

- ما هي خصائص سوق السلعة / المنتج؟
- كم حصتك في السوق؟
- كيف يمكن بيع المنتج في السوق؟

4.2. أهداف وخصائص دراسة الجدوى التسويقية

إن إعداد الجدوى التسويقية يعتمد على:

- دراسة وتقدير حجم الطلب على منتجات المشروع ومعدلات نموه، وحصته من الحجم الكلي للسوق.
- دراسة هيكل ونوع السوق ودرجات المنافسة التي يمكن أن يتعرض لها المشروع، هل هو تنافس تام ام احتكارففي الحالة الاولى يقع المنتج تحت ضغط المنافسة مع الغير ويكون متلقيا للسعر Price Taker . بعكس الحال عندما يكون محتكرا لسلعة او خدمة حيث يمكن التحكم في السعر Price Makerوتحديد التقسيم الجغرافي والتقسيم القطاعي للسوق وفقا لنوعيات المستهلكين ودخل الأفراد وأعمارهم.

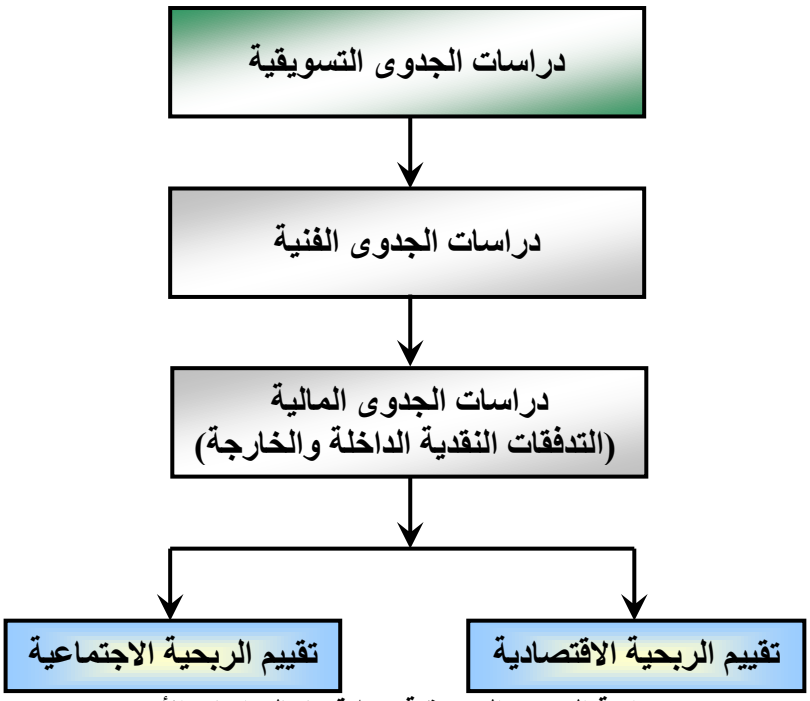
- دراسة الأسعار بشكل عام وتاريخ أسعار المنتج وتنبؤ (**Forecasting**) مستقبل السعر وتخطيط الإستراتيجية السعرية المرغوبة.
- دراسة إمكانية تسويق المنتج وطريقة تقديمه للسوق مع تحديد حجم الطلب عليه.
- دراسة الحملات الإعلانية والترويجية الخاصة بالسلعة المنتجة أو الخدمة.
- تقدير الفجوة التسويقية من خلال تحديد حصة المشروع من السوق الحالي والمستقبلي.
- التوصية بحجم الإنتاج الملائم طوال العمر الافتراضي للمشروع مع اعتبار ردود فعل المستهلكين والمنافسين.

وتتميز دراسات الجدوى التسويقية بمجموعة من الخصائص، ومن أهم هذه الخصائص التي يجب مراعاتها ما يلي:

- دراسات الجدوى التسويقية تحتاج إلى العديد من أساليب التحليل والتنبؤ لدراسة السوق وتقدير الطلب بأكبر درجة ممكنة من الدقة.
- يعتمد دقة إتمام دراسة الجدوى التسويقية على مدى توافر وتقدم الأساليب الكمية وتمثيل العينة المختارة في الدراسات الميدانية اللازمة لدراسة السوق بدرجة عالية من الكفاءة.
- حجم السوق ودرجة المنافسة التي لها اثر كبير في إجراء دراسات الجدوى التسويقية.

4.3. دراسات الجدوى التسويقية أساس دراسات الجدوى الاقتصادية

إن مفهوم وأهداف دراسة الجدوى التسويقية يؤدي إلى استنتاج أن تلك الدراسة تعتبر أهم ركيزة من ركائز دراسات الجدوى الاقتصادية، ويمكن مراجعة الشكل التالي لتوضيح ذلك:



دراسة الجدوى التسويقية وعلاقتها بالدراسات الأخرى
شكل رقم – 4

دراسات الجدوى التسويقية لها صلة وثيقة بدراسات الجدوى البيئية والقانونية، ويتوقف عليها قرار البدء في دراسات الجدوى الفنية للمشروع أم لا، وتستخدم نتائجها في تقدير أهم بنود التدفقات النقدية الداخلة خلال العمر الافتراضي للمشروع ومقارنة ذلك بالتكاليف المتوقعة أو التدفقات النقدية الخارجة، وهي أيضا توفر البيانات لتطبيق معايير تقييم المشاريع من ناحية الربحية الاقتصادية وتقييم الربحية الاجتماعية.
وان إهمال دراسات الجدوى التسويقية يعني إهدار للموارد ومعاناة المشاريع لمجموعة من المشاكل التي تؤدي إلى عدم تحقيق الكفاءة الاقتصادية أو افتقاد الجدوى من وجودها، فعدم التحقق من وجود طلب محلي أو خارجي قد يؤدي إلى خسارات كبيرة في الأرباح والتي قد تكون أكثر خطورة من القصور في رأس المال لتنفيذ المشاريع التي من الممكن الحصول عليها مثل القروض وغيرها من مصادر التمويل. لذلك فان سوق السلعة أو الخدمة يجب أن يتوفر قبل أن يكون هناك توافر لرأس المال لإقامة المشروع.

4.4. أنواع دراسات السوق

1- الدراسات المكتبية:

وهي تلك الدراسات التي تتمثل بالبيانات والإحصاءات الصادرة عن هيئات وجهات رسمية أو غير رسمية لها علاقة بالمشروع، والتي يمكن من خلالها الوصول إلى تحقيق الأهداف المطلوبة، ويطلق على البيانات التي يتم جمعها في الدراسات المكتبية بالبيانات الثانوية (**Secondary Data**).لكونها بيانات تم جمعها وتسجيلها سابقا في سجلات مشروع او المنشورة في البحوث العلمية.

ويحتاج إجراء الدراسات المكتبية درجة عالية من الخبرة والدقة حيث توجد العديد من المشاكل عند التعامل مع البيانات المكتبية منها تضارب البيانات وعدم تناسقها حيث يمكن أن تصدر أكثر من جهة نفس البيانات ولكن مع وجود اختلافات تحتاج إلى اختبار وإجراء التعديلات اللازمة وانتقاء البيانات الأكثر دقة من المصادر الموثوق منها.

إلا إن الدراسات المكتبية اقل تكلفة في كثير من الأحيان بالمقارنة مع الدراسات الميدانية وتناسب الكثير من أنواع المشاريع وخاصة التي ستتعامل في سلع معروفة من قبل المستهلك. ومن أهم المصادر التي تعتمد عليها الدراسات المكتبية هي:

- **المعلومات والبحوث السابقة:** حيث قد تستخدم للمقارنة بين البيانات والنتائج وتحديد نقاط الاختلاف والاتفاق، وتنشر تلك البحوث في عدة جهات مثل الصحافة وأجهزة البحوث والاتحادات الصناعية والتجارية والبنوك والجامعات والكليات والمعاهد العلمية، والباحثين الأخصائيين والشركات والمجلات العلمية وغيرها.
- **تقارير مندوبي البيع والموزعين والوسطاء،** وهي كبيرة الفائدة من حيث التعرف على مدى رضا العملاء وتحديد ملاحظاتهم وموقف السلع البديلة والمتاحة والتعرف على سياسات المشاريع المنافسة وغيرها من المعلومات.
- **البيانات والإحصاءات الرسمية:** وتتمثل فيما تنشره الهيئات والمؤسسات الاقتصادية والصناعية والتجارية والزراعية والوزارات (مثلا وزارة التخطيط) وأجهزة الإحصاء والأجهزة الحكومية والبنك المركزي وغيرها.
- البيانات التي تنشرها بنوك المعلومات وشركات تسويق المعلومات.

البيانات المكتبية:

- بيانات السكان والنمو السكاني.
- بيانات عن الدخل العام ومتوسط دخل الفرد ومعدلات نموه وتوزيعه.
- بيانات عن الأسعار والتكاليف ومعدلات البيع.
- بيانات عن نظام التوزيع وعدد الوكلاء والتجار وعائد المبيعات.
- بيانات عن معدلات الإنتاج والاستهلاك الحالي والمتوقع.
- بيانات عن المنافسين وطبيعة ودرجة المنافسة، وعددهم ومراكزهم التنافسية.
- بيانات عن العملاء، وسلوكهم ودوافعهم ورغباتهم ودخولهم.
- بيانات عن التجارة الخارجية (الاستيراد والتصدير) والطلب داخلياً وخارجياً للتعرف على الفرص المتاحة ومستقبل السلعة.

2- الدراسات الميدانية:

هي تلك الدراسات التي تعتمد على جمع المعلومات والبيانات وتحليلها خصيصاً للمشروع الذي يبحث جدواه من خلال استمارات استقصاء وأدوات أخرى لتحقيق الأهداف المطلوبة. ويطلق على البيانات التي يتم جمعها في الدراسات الميدانية بالبيانات الأولية (**Primary Data**) وهي البيانات التي يتولى الباحث جمعها بنفسه. وهذه يمكن أن تحتوي على المقابلات الشخصية مع البائعين والعملاء المحتملين والمسؤولين في الحكومة والغرف التجارية ونقابات العمال ... الخ.

وفي معظم الأحيان تكون الدراسة الميدانية أكثر تكلفة من الدراسات المكتبية وتتفوق على الأخيرة في تحليل السلع الجديدة التي تدخل حديثا إلى السوق، وربما تحتاج إلى وقت أطول من الدراسة المكتبية، وقد تصل إلى نتائج منطقية ودقيقة.

من أهم الأدوات التي يتم من خلالها إجراء دراسات ميدانية:

- الملاحظة (**Observation**)، ويعطي هذا المصدر البيانات من خلال المشاهدة أو المراقبة الفعلية وتسجيل نتائج المشاهدة في كشوف معدة لهذا الغرض.
- الاستقصاء(**Questionnaire**)، يستخدم في تجميع البيانات الميدانية الخاصة بالسوق وسلوك العملاء المرتقبين واتجاهاتهم ودوافعهم للشراء، ويتم تجميع البيانات من خلال قوائم استقصاء والتي تصنف الى ثلاثة انواع رئيسية:
  - **استقصاء الحقائق:** وتتمثل في معلومات عن المستقصى عنه، مثل السن، الدخل، المهنة، الإقامة، وأنواع وكميات السلع التي يشتريها، وأنواع المتاجر والشركات.
  - **استقصاء الرأي:** للتعرف على وجهات نظر المستقصى منه تجاه السلعة ودرجة تفضيله لماركة أو شكل معين.
  - **استقصاء الدوافع:** للتعرف على دوافع الشراء وتفضيل المستهلكين للسلعة محل الدراسة أو السلع الأخرى.

ويمكن أن يتم الاستقصاء عن طريق المقابلة الشخصية، البريد، والتليفون والانترنت مع العلم أن كل طريقة لها مزاياها وعيوبها ويتحكم في عملية الاختيار الوقت، الميزانية، وإمكانيات البحث. وبعد الأنتهاء من مرحلة اعداد وتجمبع البيانات والمعلومات الثانوية والاولية تاتي الخطوة التالية في دراسة الجدوى التسويقية وهي مرحلة تحليل البيانات والمعلومات وهذه المرحلة هي التي يتحقق من خلالها الهدف النهائي من دراسة الجدوى التسويقية وهو قياس حجم السوق والتنبؤ بشانه.

4.5. دراسة وتقدير الطلب

إن دراسة وتقدير الطلب هي صلب الدراسة التسويقية لأنها تقدم في النهاية جدول الطلب على منتجات المشروع الذي يعتبر حجر الأساس الذي تقوم عليه اقتصاديات تشغيل المشروع وربحيته وكفاءته التشغيلية. ومن هنا تتخذ قرارات حجم الإنتاج ومدى الحاجة إلى التوسع في المشاريع القائمة أو إقامة مشاريع جديدة واختيار الموقع المناسب وتحديد الجدول والتوقيت الزمني لبدء المشروع والإنتاج حتى يمكن توفير احتياجات السوق المحلي والسوق الخارجي.

4.6. تحديد نوع السوق ودرجة المنافسة

إن تحديد نوع السوق يمكن أن يعطي فكرة مبدئية عن مدى سهولة أو صعوبة المنافسة في الأسواق ومن ثم ارتفاع أو انخفاض حجم الطلب خلال العمر الافتراضي للمشروع، وبصفه عامة يمكن تحديد أربعة أنواع من الأسواق والتي يمكن أن يعمل المشروع في إطار واحد منها وهي كالتالي:

- **سوق المنافسة الكاملة:**
  السوق الذي يضم عدد كبير من المتعاملين، بائعين وزبائن، يتعامل كل منهم في حجم محدود جداً من إجمالي حجم السلع المنتجة والمباعة والمتجانسة، وبالتالي لا يمكن لأحد منهم أن يؤثر على سعر السوق السائد، فإن سعر السلعة في هذا السوق معطى والربح المحقق في الأجل الطويل هو الربح العادي، ذلك لأن المنافسة تبلغ أقصى درجاتها.

- **سوق المنافسة الاحتكارية:**
  السوق الذي يتنافس فيه عدد كبير من المشاريع بحرية على إنتاج وبيع سلعة أو خدمة واحدة معينة، إلا إن كل مشروع يعرض نوعاً مميزاً خاصاً به من هذه السلعة أو الخدمة، وبالتالي لم تعد المنتجات متجانسة، وقد تختلف الأسعار في هذا النوع من الأسواق.

- **سوق احتكار القلة:**
  السوق الذي يتميز بوجود عدد قليل من المنتجين الذين يقومون بإنتاج سلع معينة، ويمكن أن نجد احتكار غير متجانس. ويتميز هذا السوق بأنه يروج الاتفاق على أسعار البيع واضطرار بقية المحتكرين إلى تعديل أسعار بيعهم لتكون في نفس المستوى وإلا اضطروا إلى الخروج من السوق.

- **سوق الاحتكار الكامل:**

وهو السوق الذي تقوم فيه مؤسسة بمفردها (أو مشروع) بإنتاج سلعة ليس لها بدائل قريبة تتنافس معها حيث يكون المنتج الوحيد، وتنعدم المنافسة. وهنا يستطيع المحتكر التحكم بالسوق بالكامل من ناحية الطاقة الإنتاجية والسلع المعروضة في السوق.

وبصورة عامة فإن تحديد نوع السوق يعطي فكرة مبدئية عن مدى سهولة أو صعوبة المنافسة في الأسواق، ومن ثم ارتفاع أو انخفاض حجم الطلب خلال العمر الافتراضي للمشروع.

4.7. تحديد العوامل المحددة للطلب والحجم الكلي للسوق

تحديد الحجم الكلي للسوق:
إن هذا التحديد يوضح مدى صعوبة أو سهولة تسويق السلعة أو الخدمة التي ينتجها المشروع، حيث انه يحدد حجم الطلب الكلي على السلعة أو الخدمة. فإذا تبين أن الحجم الكلي للسوق كبير لدرجة أن المشاريع القائمة لا توفر كافة الاحتياجات للمستهلكين، فإن المشروع الجديد يمكن أن ينتج عدداً من الوحدات التي تساهم في سد الفجوة بين العرض الكلي والطلب الكلي ضمن قدرات المشروع الإنتاجية.

تقسيمات العوامل الاساسية المحددة للطلب على منتجات المشروع:

(1)	(2)	(3)	(4)
العوامل المحددة للطلب المحلي والعوامل المحددة للطلب الخارجي	العوامل المحددة للرغبة في الشراء والعوامل المحددة للقدرة على الشراء "الطلب"	العوامل التي يمكن قياسها والعوامل التي لا يمكن قياسها	عوامل تؤثر في الأجل القصير وعوامل تؤثر في الأجل الطويل

التقسيمات المختلفة للعوامل المحددة للطلب
الشكل رقم – 5

ويمكن التركيز هنا على التقسيم الأول والثاني:

1. تقسيم العوامل المحددة للطلب المحلي والعوامل المحددة للطلب الخارجي.

العوامل المحددة للطلب المحلي:
يتم دراستها إذا كانت السلعة موجهة إلى السوق المحلي والعوامل هي:

- **السعر:** حيث توجد علاقة عكسية بين الطلب والسعر، فكلما زاد السعر قل الطلب والعكس بالعكس.
- **الدخل:** توجد علاقة طردية بين الطلب والدخل فكلما زاد الدخل زاد الطلب والعكس بالعكس.
- **عدد المستهلكين:** حيث توجد علاقة طردية بين الطلب وعدد المستهلكين، فكلما زاد عدد المستهلكين زاد الطلب والعكس بالعكس.

- **أسعار السلع البديلة أو المكملة[1]:** حيث توجد علاقة طردية بين الطلب على السلعة والسلعة البديلة، فكلما زاد سعر السلعة البديلة كلما زاد الطلب على السلعة الأساسية والعكس صحيح. كذلك هنالك علاقة عكسية بين الطلب على السلعة والسلعة المكملة لها، فكلما زاد سعر السلعة المكملة انخفض الطلب على السلعة محل الطلب والعكس بالعكس.

- **حجم الاستهلاك من السلع البديلة أو المكملة:** حيث يوجد نفس تأثير العامل السابق مباشرة.
- **حجم الاستثمارات في الخطة:** إن زيادة الاستثمارات في البنية التحتية وفي مشاريع لها أثار أمامية وخلفية ولها علاقة بالمشروع بزيادة الطلب على منتجات المشروع والعكس بالعكس. مثلاً إنشاء بنية تحتية في مواقع معينة يشجع المستثمر لإقامة مشروع ما كفندق سياحي.

العوامل المحددة للطلب الخارجي:

بحال كان هدف إنتاج السلعة للتصدير في السوق الخارجي، يجب الأخذ في الاعتبار هذه العوامل ومنها:
- الأسعار العالمية للسلع المزمع إنتاجها وتصديرها.
- على الصعيد الدولي دراسة التكتلات والتحولات الاقتصادية التي تحدث أو المتوقع حدوثها.
- المنظمات العالمية والجهات العامة والخاصة ومنظمة التجارة العالمية وتأثيراتها الحالية والمستقبلية.
- ما هي درجة المنافسة في الأسواق الدولية؟
- ما هي نسبة الصادرات إلى إجمالي الصادرات العالمية؟
- ما هو وضع إنتاج السلعة في الدول المستورد؟
- ما هي نسبة الاستهلاك من السلعة في الدولة المستوردة وما هي تطورات هذه السلعة للتحقق من استمرار السوق؟
- ما هو حجم واردات السوق من نفس السلعة من الدول الأخرى إلى الأماكن التي تنوي تصديرها؟

2. العوامل المحددة للرغبة والقدرة على الشراء (الطلب).

الطلب (Demand) = رغبة + قدرة

- **العوامل المؤثرة على القدرة على الشراء (الطلب):**
  - **السعر:** هنالك علاقة عكسية بين الأسعار والكميات المطلوبة.
  - **الدخل:** توجد علاقة طردية بين الدخل والكمية المطلوبة، مع الأخذ في الاعتبار تأثير الدخل الدائم والدخل العارض والدخل الحالي والدخل في المستقبل.

- **العوامل المؤثرة على الرغبة في الشراء (الطلب):**
  - معدل نمو السكان والمواليد والوفيات
  - معدل الزواج والطلاق
  - الأذواق والموضة
  - التقليد والمحاكاة
  - نمط الاستهلاك
  - العوامل السيكولوجية
  - وقت الفراغ
  - جودة السلعة أو الخدمة
  - التجديدات والاختراعات الحديثة
  - توقعات المستهلكين

4.8. تحديد الحصة التسويقية للمشروع

يتم تحديد حصة المشروع الاستثماري خلال سنوات العمر الافتراضي للمشروع من خلال تقدير الحصة أو الشريحة التي يمكن أن يسوق فيها المشروع منتجاته مع التفريق بين:

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[1] مثال السلع البديلة، الشاي والقهوة ومثال السلع المكملة السيارات والبنزين

- اختبار الطلب على السلع التي تنتج لأول مرة وغير معروفة للمستهلكين وبالتالي معرفة مدى استجابة كل منهم لطلب السلعة (الخدمة)، وهنا تأخذ عينة من الناس ودراسة ردود الفعل كتجربة تسويقية ثم افتراض نفس النسبة لحساب الطلب على مستوى السوق الإجمالي.
- اختبار الطلب على السلع التي تكون معروفة للمستهلكين من خلال تجميع البيانات من البائعين وغيرهم على المستويات المختلفة.

4.9. سياسة الأسعار

في هذه الدراسة يتم تحديد السياسة السعرية والتي تكفل أفضل الأسعار، ويمكن أن يبيع بها المشروع منتجاته من خلال إتباع الأساليب التالية:

- **الأسلوب الحدي (Marginal):**

يستعمل الأسلوب الحدي لمعرفة الربحية القصوى الممكنة في ظل تعظيم حجم الطلب (المبيعات) أو إتباع أسلوب السعر الاحتكاري.

- **أسلوب تحليل التعادل:**

عند الافتراض أن أسعار عناصر الإنتاج والتقنيات وأسعار البيع وحجم الطاقة المستغلة ونوعية المنتجات، يعتمد هذا الأسلوب على المقارنة بين التكاليف المتغيرة والتكاليف الثابتة

$$\text{حجم التعادل} = \frac{\text{الكلفة الثابتة}}{\text{الربح الحدي للوحدة}}$$

* الربح الحدي للوحدة : سعر الوحدة ـ الكلفة المتغيرة للوحدة

- **أسلوب تحليل التكاليف:**

يتم تحديد أسعار تكاليف الإنتاج الإجمالية بالإضافة إلى هامش ربح يضاف على رأس المال.

السعر = مجموع التكاليف الثابتة + التكاليف المتغيرة + هامش ربح

وهو من الأكثر استخداماً في الحياة العملية.

- **الأسعار السائدة:**

يتم تحديد التسعير على أساس الأسعار السائدة للمنتجات المماثلة الموجودة في السوق المحلي. ويجب حساب المكون الأجنبي المستخدم في الإنتاج المحلي للسلعة عند تحديد أسعار السلع المصدرة إلى الخارج وتحليل السعر الخارجي لتحقيق إضافة لموارد الدولة من النقد الأجنبي ودعم قيمة العملة المحلية.

4.10. التنبؤ بالطلب على منتجات المشروع

تعتبر الأساليب الرياضية والإحصائية والقياسية من أكثر الأساليب استخداما في التنبؤ **(Forecasting)** على الطلب. وفي هذه المرحلة يتم تمديد الفترة الزمنية التي سيعطيها التنبؤ واختيار طريقة التنبؤ المثلى من خلال تحليل البيانات والافتراضات وفقا للطرق التالية:

الطريقة البسيطة:

إن تقدير الطلب **(Demand Prediction)** يتم من خلال استخدام متوسط استهلاك الفرد بواسطة تحليل ميداني أو عن طريق الجهات المتخصصة في نشر البيانات مثل الجهاز المركزي للإحصاء.

1. متوسط استهلاك الفرد (تحليل ميداني):

الصورة الأولى	**حجم الطلب المتوقع = عدد العملاء المرتقبين X متوسط استهلاك الفرد في سوق المشروع**

مثال تطبيقي رقم (1)

يفكر احد المستثمرين في إنشاء محطة بنزين على الطريق العام بين بغداد – كركوك علماً أن متوسط عدد السيارات التي تسلك الطريق يومياً والمارة بالمحطة المقترحة 4,000 سيارة ومعدل توقف السيارات 3% ومتوسط استهلاك السيارة 25 لتر بنزين يومياً وعدد أيام العمل السنوية 260 يوم عمل.

المطلوب: تقدير حجم الطلب المتوقع.

الحـــــــــــل

عدد العملاء المرتقبين = عدد السيارات المارة X معدل توقف السيارات في المحطة
عدد العملاء المرتقبين = 4,000 X 3%
= 120 سيارة
حجم الطلب اليومي = عدد السيارات المتوقع توقفها X معدل الاستهلاك اليومي للسيارة
حجم الطلب اليومي = 120 X 25
= 3,000 لتر / يومياً
حجم الطلب السنوي = حجم الطلب اليومي X عدد أيام العمل السنوي
حجم الطلب السنوي = 3,000 X 260
= 780,000 لتر / سنوياً

الصورة الثانية	**حجم الطلب المتوقع = عدد السكان X متوسط استهلاك الفرد اليومي X عدد أيام السنة**

مثال تطبيقي رقم (2)
تفكر مديرية الماء في حي الكرادة ببناء خزان مياه عام ويبلغ عدد سكان الحي في عام 2008 حوالي 250,000 نسمة، ومعدل الزيادة السكانية في الحي 12%. وتشير الدراسات الإحصائية إلى أن متوسط استهلاك الفرد 53 غالون من المياه يوميا.
المطلوب: تقدير حجم الطلب السنوي لأعوام 2008، 2009، 2010، 2011 تمهيدا لتحديد حجم خزان المياه.

الحـــــــــــل

1) تقدير عدد السكان في حي الكرادة	
السنوات	**عدد السكان**
2008	250,000
2009	280,000
2010	313,600
2011	351,232

2) حجم الطلب = عدد السكان X متوسط استهلاك الفرد اليومي X عدد أيام السنة			
السنوات	**عدد السكان**	**متوسط استهلاك الفرد (غالون)**	**حجم الطلب المتوقع سنوياً**
2008	250,000	53	365 X 53 X 250,000 = 4,836,250,000
وهكذا بالنسبة للسنوات الأخرى			

2. متوسط استهلاك الفرد (تحليل مكتبي)

$$\text{متوسط أ.ظ} = \frac{\text{حجم الاستهلاك السنوي}}{\text{عدد السكان}} =$$

حجم الطلب المتوقع = متوسط الاستهلاك X حجم السكان المتوقع

علماً بأن:
حجم الاستهلاك السنوي المتوقع = (حجم الإنتاج المحلي + حجم الواردات)-(حجم الصادرات)

مثال تطبيقي رقم (3)

إذا كان عدد السكان المستهلكين في عام 2008 يصل إلى حوالي 50 مليون نسمة، ومعدل النمو السنوي 2%، والإنتاج المحلي 7 مليون طن من احد السلع، والواردات 2 مليون طن، والصادرات 3 مليون طن.
المطلوب: تقدير حجم الطلب المتوقع لعام 2009.

الحـــــــــــــل

الاستهلاك الظاهري = (7 + 2) -3 = 6 مليون طن

متوسط استهلاك الفرد = $\frac{6,000,000 \text{ طن}}{50,000,000 \text{ نسمة}}$ = 0.12 طن = 120 كيلو غرام

حجم الزيادة في السكان = 50,000,000 نسمة X 2% = 1,000,000 نسمة

الحجم الكلي للسكان = 50,000,000 + 1,000,000 = 51,000,000 نسمة

حجم الطلب المتوقع لعام 2009 = 51,000,000 X 0.12 = 6,120,000 طن

ونستطيع تحديد الطلب المتوقع للعام 2010 أو الأعوام اللاحقة بنفس الطريقة.

4.11. تقدير حجم العرض الكلي

يتكون حجم العرض الكلي من العرض المتاح حاليا في السوق سواء من المصادر المحلية أو الخارجية في شكل واردات بالإضافة إلى العرض المتوقع في السنوات القادمة والتي تغطي عمر المشروع الافتراضي. وللوصول إلى حجم العرض الكلي، يجب توافر بيانات: الطاقة الفعلية والقصوى للمشاريع القائمة، الطاقات التوسعية المستقبلية للمشاريع القائمة وبرامج تنفيذها، والطاقات التوسعية للمشاريع المماثلة قيد التنفيذ وحجم الواردات واتجاهاتها المستقبلية.

ومع أن هناك صعوبة في التقدير الدقيق لحجم الواردات لأنها ترتبط بعوامل كحجم التجارة الخارجية والرسوم الجمركية وغيرها ولكن لا يزال بالإمكان تقدير حجم العرض الكلي للمنتج محل الدراسة من خلال الحصول على معلومات عن المشاريع المماثلة. وكذلك الأخذ بالاعتبار ما يمكن أن يطرأ على الحجم المقدر من العرض المحلي نتيجة انخفاض نسب استغلال الطاقات المتاحة حاليا لنقص الخامات أو انخفاض كفاءة المعدات إضافة إلى الصعوبات التي قد تواجه تنفيذ المشاريع والتي تعوق إنشاء المشاريع وطرح إنتاجها في الأوقات المحددة.

4.12. تقدير حجم الفجوة التسويقية ونصيب المشروع منها

تتمثل الفجوة التسويقية في الفرق بين الطلب الكلي المتوقع للمنتج والعرض الكلي المتوقع لنفس المنتج. فإذا كان العرض (**Supply**) مساويا للطلب (**Demand**) أو اكبر منه دل ذلك على تشبع السوق وبالتالي لا مجال لإنتاج المزيد من المنتج، وعند ذلك يجب التوقف عند هذه المرحلة ولا داعي لاستكمال دراسات الجدوى اللاحقة لعدم وجود فرصة تسويقية. أما إذا ظهر الفرق بين الطلب والعرض موجبا (الطلب يزيد على العرض) يعني أن هناك فرصة متاحة ولكن يجب تحديد هذه الفجوة إذا كانت صغيرة أو كبيرة مع الأخذ بالاعتبار دخول مستثمرين آخرين، عندها يجب دراسة سياسة المنافسين، جودة السلعة، تكلفة الإنتاج، واتجاهات نمو السوق ليتم تقدير نصيب المشروع من الفجوة لكي يحقق أقصى ربحية ممكنة.

4.13. تقدير وقياس الفجوة التسويقية:

الطلب الكلي على السلعة (Total Demand) = الطلب المحلي + الصادرات.

كذلك فإن:

العرض الكلي المتاح من السلعة (Total Supply) = الإنتاج المحلي + الواردات.

(مع افتراض عدم وجود مخزون ولا تغير في المخزون)

وبعبارة أخرى، فإن الفجوة التسويقية المتاحة (**Market Share**) هي عبارة عن المساحة السوقية المتاحة لمنتجات المشاريع الجديدة بما فيها المشروع المقترح والتي لم تتمكن المشاريع القائمة من تغطيتها.
ولقياس الفجوة التسويقية يمكن الاستعانة بالعلاقات التالية:

الفجوة التسويقية = الطاقة الاجمالية الاستيعابية للسوق – الاستهلاك الحالي

الاستهلاك الحالي من السلعة = الانتاج الحالي من السلعة + (الواردات من السلعة – الصادرات من السلعة)

الفجوة التسويقية المتاحة تمثل الفرق بين الطاقة الإجمالية الاستيعابية للسوق الحالي (الطلب) وبين حجم الاستهلاك الحالي من السلعة (العرض الكلي) موضوع الدراسة.

مثال تطبيقي رقم (4)

أثنـاء تقدير العرض المتاح من ألواح الزجـاج، اتضح أن حجم الإنتـاج الفعلي حـوالي 80,000 طن/سنوياً وحجم الإنتاج تحت التنفيذ 14,000 طن/سنويا، فالمطلوب تقدير الفجوة التسويقية أو فائض الطلب المتوقع إذا علمت أن :

حجم العرض أثناء العمر الافتراضي للمشروع = حجم الإنتاج الفعلي + حجم الإنتاج تحت التنفيذ + (الواردات – الصادرات).

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بما إن حجم الواردات والصادرات لم يذكر، فإن الصادرات والواردات = صفر

وبالتالي فأن:

حجم العرض المتوقع = حجم الإنتاج الفعلي + حجم الإنتاج تحت التنفيذ

= 80,000 + 14,000 = 94,000 طن / سنوياً

ومع افتراض ثبات العرض، وحجم الطلب معطى أدناه (**given**)، فإن الفجوة التسويقية المتوقعة خلال العمر الافتراضي للمشروع هي كالاتي:

السنوات	الطلب المتوقع بالطن	العرض المتوقع بالطن	الفجوة التسويقية بالطن
2008	130,000	94,000	36,000
2009	140,000	94,000	46,000
2010	150,000	94,000	56,000

القسم 5.0 دراسة الجدوى الفنية

وبعد تحديد الفجوة التسويقية منها ننتقل إلى اختيار حجم وموقع المشروع وما يلزم من الناحية الفنية، ومن هنا نجري الدراسة الفنية التي تختص بالمسائل الفنية المتعلقة بإقامة المشروع وبطريقة تفصيلية. وتعد هذه الدراسة المحور الأساسي لأي دراسة جدوى، وهي تمثل نقطة البداية لتقديرات التكاليف الرأسمالية، المصروفات، الإنتاج، العمالة، الإدارة، اختيار الموقع الملائم للمشروع، اختيار الطريقة الملائمة للإنتاج، تحديد متطلبات المشروع من العناصر الأساسية ومدى توفرها، تقدير العمر الاقتصادي للمشروع، وصف المشروع وتقدير تكاليف المشروع، برنامج التنفيذ، وتأثيرات المشروع على البيئة. وان القائمون على هذه الدراسة هم عادة متخصصون في النواحي الفنية والهندسية للمشروع.

إن دراسة الجدوى الفنية تعتمد على البيانات والمعلومات التي تم الحصول عليها في دراسة السوق حيث تم تحديد الطلب الكلي على السلعة والعرض الكلي المتاح منها بالإضافة إلى الفجوة التسويقية التي يمكن للمشروع أن يساهم في إشباعها.

وفي هذا الإطار يمكن تعريف دراسات الجدوى الفنية على إنها " مجموعة الاختبارات والتقديرات والتصورات المتعلقة ببحث مدى إمكانية إقامة المشاريع الاستثمارية فنياً وتنطوي على مجموعة من الدراسات التي من خلالها يتم التأكد من جدوى وسلامة تنفيذ المشروع المقترح من الناحية الفنية.

وبناء على ذلك فإن دراسات الجدوى الفنية يمكن أن تحتوي على العديد من الجوانب لعل من أهمها، تحديد حجم الإنتاج وتحديد حجم المشروع واختيار موقع المشروع واختيار أسلوب الإنتاج الملائم وتحديد العمليات والمعدات، والتخطيط الداخلي للمشروع، وتحديد العمر الاقتصادي للمشروع، وتحديد الاحتياجات من المواد والعمالة، وتقدير تكاليف المشروع.

5.1 تحديد حجم الإنتاج

يحدد حجم الإنتاج المناسب ذو الجدوى الفنية وفقاً للنتائج التي خرجت من الجدوى التسويقية. فبعد أن تم تحديد حجم الطلب المتوقع في دراسة السوق نسعى إلى تحديد حجم الإنتاج المتوافق مع حجم الطلب عبر العمر الافتراضي للمشروع، وحجم الإنتاج يعتمد على تحديد مستوى الطاقة الإنتاجية التي سيعمل على أساسها المشروع.

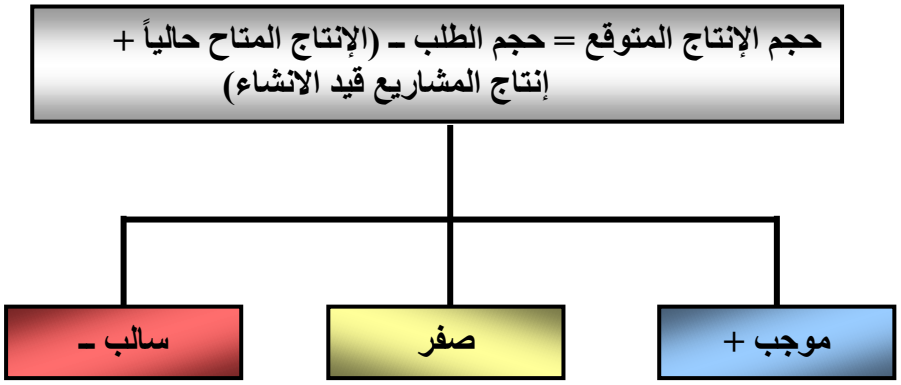
5.1.1 حجم الإنتاج للمشروع:

وفقاً للمواصفات والمعايير المطلوبة للمنتج (أو السلعة) يتحدد حجم الإنتاج في ضوء معرفة الطلب الكلي (محلي + صادرات) وحجم الإنتاج المتاح الحالي والمستقبلي عبر العمر الافتراضي للمشروع. ويحدد حجم الإنتاج وفقا للطاقة الإنتاجية المطلوبة والزيادات المفترضة خلال التشغيل ومستوى الطاقة الإنتاجية الذي سيعمل بها المشروع خلال عمره الافتراضي.

ولتحديد حجم الإنتاج والطاقة الإنتاجية يجب توافر العديد من البيانات من بينها:

- عدد الوحدات الإنتاجية القائمة والأنواع والطاقة الإنتاجية الحالية والمستقبلية لكل منها.
- الطلب المحلي الحالي والمتوقع.
- الصادرات الحالية والمستقبلية.
- التعرف على الحجم الاقتصادي الذي يتضمن إنتاج هذا النوع من المنتجات، بهدف تلبية احتياجات الطلب المتزايد من جانب وتفادي حدوث طاقة عاطلة من جانب أخر مع مراعاة هيكل السوق الذي يعمل فيه المشروع.

وعند توفر هذه البيانات والمعلومات يكون



حجم الإنتاج
شكل رقم – 6

عندما تكون النتيجة موجب (+)

النتيجة اكبر من إمكانيات المشروع الفنية والمادية والمالية، وهنا يمكن البحث في اختيار حجم إنتاج كبير، والبحث عن أدوات تمويل جديدة أخرى لزيادة حجم الإنتاج إن أمكن. أو العمل عند مستويات مختلفة من الطاقة الإنتاجية أو السماح بدخول مشاريع أخرى لإنتاج نفس السلعة.

مثال تطبيقي رقم (5)

إن الطلب على السلعة في السوق بلغ 1,900,000 وحدة، وكان إنتاج المشاريع الحالية قد وصل إلى 500,000 وحدة، وإنتاج المشاريع قيد التنفيذ 200,000 وحدة.

حجم الإنتاج المتوقع = 1,900,000 – (500,000 + 200,000)
= 1,200,000 وحدة

فإذا افترضنا أن إمكانيات المشروع الفنية المادية والمالية لا تسمح إلا بإنتاج 300,000 وحدة، فإن الأمر يخضع إما إلى:

- محاولة المشروع أن يبحث عن أدوات تمويلية جديدة تؤدي به إلى إنتاج 500,000 وحدة على سبيل المثال ويترك الباقي للمشاريع الأخرى، أو
- أن يعمل المشروع على إنتاج 300,000 وحدة فقط، ويسمح بدخول حوالي خمس مشاريع أخرى لإنتاج 900,000 وحدة، أو
- البحث في إمكانية تعديل مواصفات السلعة لتقديم منتج يتميز بالجودة الأعلى والسعر التنافسي وهنا يحتاج الأمر إلى حملة دعاية وإعلان الذي يتطلب تكاليف إضافية.

عندما تكون النتيجة = صفر

فإن معنى ذلك إن السوق في حالة اكتفاء من هذا المنتج، ويحتاج الأمر في هذه الحالة إما إلى:

- التوقف عن دراسة الجدوى الفنية، أو
- البحث عن إمكانية تعديل مواصفات المنتج لتقديم منتج يتميز بالجودة العالية ويكون سعره مناسباً للسوق.

عندما تكون النتيجة سالب (-)

التوقف عن دراسة الجدوى الفنية والبحث عن مشروع أخر له جدوى أو النظر الى بدائل اخرى.

مثال تطبيقي رقم (6)

أفترض في الحالتين السابقتين إن إنتاج المشاريع الحالية 1,550,000 وحدة، وإنتاج المشاريع قيد التنفيذ 650,000 وحدة، فإن حجم الإنتاج المتاح يكون كما يلي:

حجم الإنتاج المتوقع = 1,900,000 - (1,550,000 + 650,000)
= - 300,000 وحدة

ويجب التوقف عن دراسة الجدوى الفنية وربما التحول إلى مشروع أخر ذو جدوى.

5.1.2 الطاقة الإنتاجية:

بعد تحديد حجم الإنتاج، يحدد مستوى الطاقة الإنتاجية للمشروع، وفي هذه الحالة يجب أن يتم تحديد الطاقة الإنتاجية الأكثر اقتصادية لمواجهة الطلب عبر سنوات العمر الافتراضي للمشروع. فليس هناك ضرورة لتلبية الطلب بمستوى يصل إلى ذروته في وقت معين مما يتطلب تكاليف استثمارية عالية وتتواجد هذه المشكلة في حالات الإنتاج الموسمي وكذلك في مجال الخدمات بصفة خاصة.

والنصائح لحل هذه المشكلة ممكن أن تتضمن زيادة أوقات الإنتاج لمواجهة الزيادة على الطلب في فترات معينة، ورفع الأسعار في فترات الذروة وتخفيضها في الفترات التي يقل فيها الطلب.

إن الطاقة الإنتاجية للمشروع هي عدد الوحدات التي يمكن إنتاجها خلال فترة زمنية معينة، وتقاس الطاقة الإنتاجية أيضا بعدد ساعات التشغيل خلال فترة زمنية معينة وتعتبر الطاقة الإنتاجية مقياساً

لقدرة النظام الإنتاجي على تلبية احتياجات العملاء من السلع والخدمات معبراً عنها بكمية الوحدات المنتجة (أو ساعات التشغيل) خلال وحدة الزمن (كمية/يوم/أسبوع/شهر).

الطاقة الإنتاجية لدى الاقتصاديون "هي حجم الإنتاج المتولد في مدة معينة عند أدنى تكلفة إنتاجية (متوسطة) ممكنة اعتماداً على أسلوب إنتاجي معين، وهنا يتضح الربط بين الطاقة الإنتاجية وحجم الإنتاج المراد تحقيقه.

أ. **الطاقة القصوى:**

طاقة الإنتاج المحددة، خلال مدة زمنية معينة وفقاً لمواصفات عناصر الإنتاج.

ب. **الطاقة المتاحة:**

الطاقة الإنتاجية القصوى مطروحاً أو مستبعداً منها الاختناقات داخل مراحل الإنتاج أو مراكز الإنتاج والاختناقات هي بعض المسموحات للمعوقات التي لا يمكن تجنبها مثل تغيب بعض العمال في إجازات إجبارية، والأوقات الضائعة وتعطل الآلات بسبب انقطاع التيار الكهربائي أو غيرها.أي أن:

الطاقة المتاحة = الطاقة القصوى ـ المسموحات الإلزامية.

ج. **الطاقة المستغلة:**

وهي عبارة عن الطاقة الفعلية المستخدمة في الإنتاج خلال فترة زمنية معينة أي التي يتم تشغيلها وهي تخضع لعوامل فنية بحتة وبالتالي ممكن أن تكون:

الطاقة المستغلة = الطاقة المتاحة ـ الطاقة غير المستغلة

ويمكن أن تكون:

الطاقة المستغلة = الطاقة المتاحة.

د. **الطاقة غير المستغلة:**

وتنقسم الطاقة غير المستغلة إلى:

- الطاقة الفائضة وتنشأ عن وجود طاقة إنتاجية كبيرة تفوق ما يرغب المشروع في استخدامه.
- الطاقة العاطلة، وتنتج بسبب وجود عطل مؤقت للإمكانيات المادية التي يسببها البطئ في الإنتاج الناتج عن النقص المؤقت في حجم الطلب المتوقع، هذا النوع يعتبر طاقة ضائعة.

مثال تطبيقي رقم (7)

أثناء القيام بدراسات الجدوى الفنية لأحد المشاريع الصناعية، تم الحصول على البيانات التالية:

- حجم الإنتاج المتوقع شهرياً: 1,700 وحدة
- نسبة الفاقد(التلف وغيره"**Loss**") من الإنتاج في المشاريع المماثلة: 5%
- الوقت لإنتاج الوحدة: 0.16 ساعة
- المشروع يعمل في الأسبوع: 40 ساعة (وجبة عمل واحدة)

المطلوب:

- تقدير عدد الآلات اللازمة للإنتاج الشهري للمشروع
- تحديد مقدار الطاقات المتاحة والمستغلة والفائضة

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من خلال العلاقات بين الطلب المتوقع الشهري ونسبة الفاقد (**Loss**) يمكن الوصول إلى:

$$\text{حجم الإنتاج الشهري الواجب إنتاجه} = \frac{1,700}{0.95} = 1,790 \text{ وحدة}$$

تحديد عدد الآلات المطلوبة في الشهر يكون على النحو التالي:

طالما ان المشروع يعمل 40 ساعة في الأسبوع
والشهر عبارة عن 30 يوم
والأسبوع عبارة عن 7 أيام

فإن معدل التشغيل = $\frac{30}{7}$ = 4.3 أسابيع
الوقت الذي يقوم فيه المشروع بالإنتاج طوال الشهر
= 40 X 4.3
= 172 ساعة

وعدد ساعات التشغيل للآلة التي يحتاجها إنتاج السلع خلال الشهر:
= كمية الإنتاج X الوقت النمطي
= 1,790 X 0.16
= 286.4 ساعة

عدد الآلات المطلوبة لإنتاج 1,790 وحدة في الشهر

= عدد ساعات التشغيل المطلوبة / الوقت اللازم للإنتاج في الشهر = 286.4 / 172 = 1.67 آلة

ويلاحظ فنياً ان المطلوب 2 آلة
ويستنتج من ذلك أن:
الطاقة المتاحة = 2 آلة فنياً

الطاقة المستغلة = $\frac{1.67}{2}$ X 100% = 83.5%

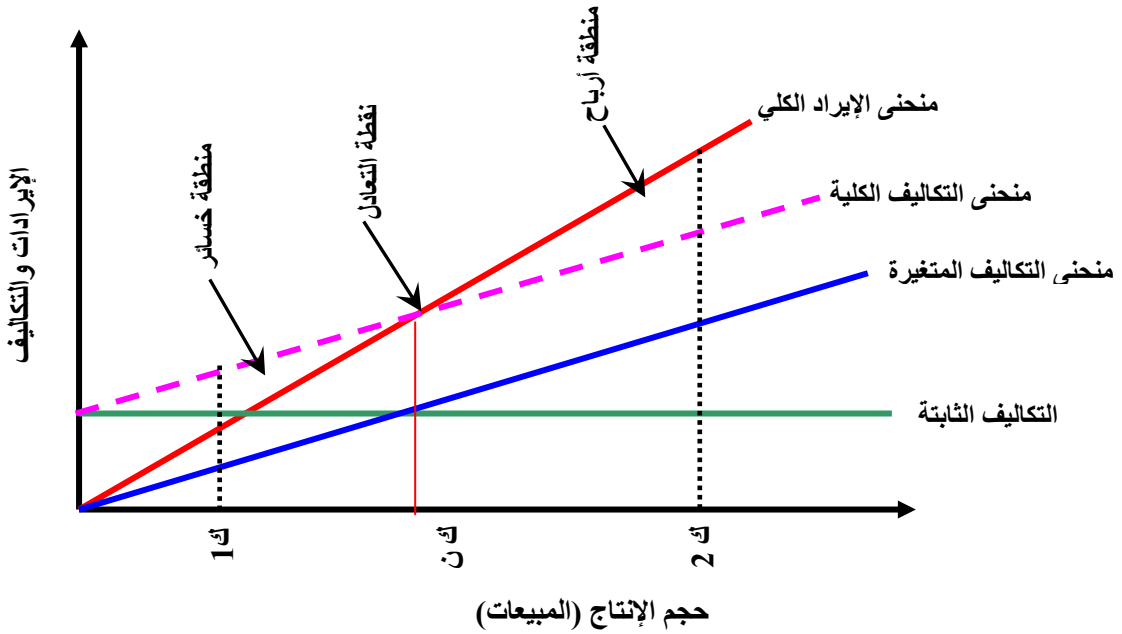
الطاقة غير المستغلة (الزائدة/الفائضة) = $\frac{(1.67 - 2)}{2}$ X 100% = 16.5%

5.2 تحديد حجم المشروع

تحديد الحجم الاقتصادي للمشروع، وتوفير البيانات التي تبين طبيعة التكاليف وعناصرها، وسلوك التكاليف تجاه تغير حجم المشروع والاحتمالات المستقبلية للسوق وأثرها على تكلفة الإنتاج.
ان تحليل التعادل يلعب دوراً رئيسياً في تحديد الحجم الأمثل للمشروع وتمثل نقطة التعادل **(Break-even Point)** ذلك الحجم أو المستوى من الإنتاج الذي عنده يتعادل الإيراد الإجمالي مع التكاليف الإجمالية، أي النقطة التي لا توجد عندها أرباح ولا خسائر.

ويوجد طريقتين لتحليل نقطة التعادل:

1. ***الطريقة القياسية (طريقة التعادل الخطي):*** الحجم الأمثل للمشروع يتحدد عن طريق محاولة زيادة حجم الإنتاج إلى أقصى حد ممكن بحيث يتجاوز نقطة التعادل ولا يتجاوز حجم الإنتاج اللازم لتغطية احتياجات السوق. الشكل رقم – 7 يبين نقطة التعادل ومناطق الخسائر والأرباح.



منحنيات نقطة التعادل (الطريقة القياسية)
شكل رقم – 7

2. ***الطريقة الجبرية (طريقة التعادل غير الخطية):*** الحجم الأمثل للمشروع يتحقق عندما يتعادل الإيراد الحدي للوحدة المباعة مع التكلفة الحدية لها، أي عندما يتعادل ميل منحنى الإيراد الكلي مع ميل منحنى التكلفة الكلية، وذلك بما لا يتجاوز حجم الإنتاج اللازم لتغطية احتياجات السوق.

ان نقطة التعادل تساعد في التعرف على النسبة من الطاقات الإنتاجية التي يصل المشروع عندها، ومن ثم التعرف على ما إذا كان المشروع يحققها عند نسبة كبيرة من الطاقات الإنتاجية أم لا، ولذلك يمكن حساب نقطة التعادل على أساس نسبة الطاقة الإنتاجية الواجب استغلالها ليتحقق التعادل، أي حساب الطاقة التي يتحقق عندها التعادل، ومن ثم فأن ما يهمنا في هذا التحليل هو التعبير عن كمية التعادل أو قيمة التعادل النقدي كنسبة من الطاقة الكلية للمشروع كالأتي:

$$\text{كمية التعادل} = \frac{\text{التكاليف الثابتة}}{\text{سعر الوحدة – كلفة الوحدة المتغيرة}}$$

كمية التعادل كنسبة من الطاقة الإنتاجية الكلية للمشروع:

$$= \frac{\text{كمية التعادل}}{\text{الطاقة الإنتاجية الكلية للمشروع}} \times 100$$

قيمة التعادل النقدي كنسبة من الطاقة الكلية للمشروع:

$$= \frac{\text{قيمة التعادل النقدي}}{\text{الطاقة الإنتاجية الكلية للمشروع بالوحدات النقدية}} \times 100$$

مثال تطبيقي رقم (8)

- الطاقة الكلية للمشروع: 40,000 وحدة
- التكاليف الثابتة: 150,000 دولار
- التكلفة المتغيرة للوحدة: 15 دولار
- سعر بيع الوحدة: 25 دولار

المطلوب:
تحديد كمية وقيمة التعادل كنسبة من الطاقة الكلية للمشروع

الحـــــــــــل

الصورة الأولى:
إيجاد كمية التعادل كنسبة من الطاقة الكلية للمشروع:

$$\text{كمية التعادل} = \frac{\text{التكاليف الثابتة}}{\text{سعر بيع الوحدة - التكاليف المتغيرة للوحدة}}$$

$$= \frac{150,000}{25 - 15} = 15,000 \text{ وحدة}$$

كمية التعادل كنسبة من الطاقة الكلية للمشروع

$$= \frac{\text{كمية التعادل}}{\text{الطاقة الإنتاجية الكلية للمشروع}} \times 100\%$$

$$= \frac{15,000 \text{ وحدة}}{40,000 \text{ وحدة}} \times 100 = 37.5\%$$

ومعنى ذلك انه عندما يتم إنتاج 15,000 وحدة يتوقع ان لا يحقق المشروع أرباحا أو خسائر وسوف يستخدم 37.5% من طاقته الإنتاجية.

الصورة الثانية:
إيجاد قيمة التعادل كنسبة من الطاقة الكلية للمشروع:

$$\text{قيمة التعادل النقدي} = \frac{\text{التكاليف الثابتة}}{1 - (\text{التكاليف المتغيرة للوحدة} \backslash \text{سعر بيع الوحدة})}$$

$$= \frac{150,000}{1 - (15 \backslash 25)}$$

$$= \frac{150,000}{} = 375,000 \text{ دولار}$$

0.4

او قيمة التعادل النقدي = سعر بيع الوحدة x كمية التعادل بالوحدات الانتاجية
= 25 x 15000
= 375,000 دولار

قيمة التعادل كنسبة من الطاقة الإنتاجية = قيمة التعادل النقدي / الطاقة الإنتاجية الكلية X سعر بيع الوحدة X 100%

= 375,000 / 40,000 X 25 X 100% = 37.5 %

ان نقطـة التعـادل للمشـروع بالوحـدات النقديـة 375,000 دولار تمثـل 37.5% مـن الطاقـة الإنتاجيـة الكليـة للمشروع.

كلما كانت الطاقة الإنتاجية أكبر من حجم إنتاج التعادل الذي يتساوى عنده الإيراد الكلي مع التكلفة الكلية كلما تمكن المشروع من تحقيق أرباح.

5.3 اختيار موقع المشروع

إن اختيار موقع المشروع هو من الجوانب المهمة التي تشملها دراسة الجدوى الفنية. فاختيار الموقع الملائم أحد مقومات نجاح أي مشروع، وحدوث خطأ في هذا المجال يحدث اندثار ضار للمشروع. ان طبيعة المشروع نفسه تفرض قيدا على المناطق التي يقام فيها المشروع. فالمشاريع السياحية تقام عادة على الشواطئ والمشاريع الصناعية كالاسمنت والصناعات الكيماوية لا تصلح ان تقام في مناطق آهلة بالسكان نظراً لتسببها في تلوث الهواء والبيئة وغيرها.

يبدأ اختيار الموقع المناسب بتحديد المنطقة، وهنا تتم عملية المفاضلة بناء على تحديد البدائل المختلفة لكل موقع واعتبارات اختيارها المبدئي مع إدخال عنصر التكاليف المباشرة وغير المباشرة في الاعتبار بما في ذلك الوفورات الخارجية الناتجة ومعاملات وتكلفة الإنتاج للوحدة لكل موقع بديل. وهناك العديد من العوامل المؤثرة والمحددة في اختيار موقع المشروع يتم دراستها ووضع أوزان نسبية لها، وبناء عليها يتم اتخاذ قرار باختيار الموقع المناسب، مع الأخذ بالاعتبار ان العوامل المؤثرة تؤثر على حجم التدفقات النقدية الداخلة المتوقعة والتدفقات الخارجة سواء التكلفة الاستثمارية أو تكاليف التشغيل. وعلى سبيل المثال اختيار الموقع لمشروع زراعي يعتمد على اختيار المكان الذي توجد فيه التربة التي تصلح لذلك الإنتاج.
ومن أهم عوامل اختيار موقع المشروع :

1. **مدى القرب من مصادر المواد الأولية:**
ويتوقف أهمية هذا العامل ودرجة تأثيره على طبيعة المشروع ونوع السلعة المنتجة، فإذا كانت السلعة سريعة التلف مثل منتجات الألبان، أو إذا كانت تكاليف نقلها كبيرة كما في صناعة الاسمنت والحديد، فهنا يفضل ان يكون موقع المشروع بالقرب من مصادر المواد الخام، حيث تتحقق من خلال ذلك توفير مواد خام خارجية من مواقع جغرافية مختلفة.

2. **تكلفة الأراضي والمساحة الكافية لإقامة المشروع:**
ان هذا العامل له تأثير على التكلفة الاستثمارية وتكاليف التشغيل وزيادة الطاقة الإنتاجية في المستقبل، وتختلف المناطق في أسعار الأراضي اختلافاً كبيراً، ومن هنا يمكن ان يلعب هذا العامل دوراً متزايداً خاصة في اختيار موقع المشروع في المناطق العمرانية الجديدة، أيضا عندما يحتاج المشروع إلى مساحات كبيرة.

3. **القرب من السوق:**

يحتاج المشروع ان يكون قريباً من تجمعات المستهلكين ويجب ان تكون هناك وفورات خارجية خاصة بنقل المنتجات والتخزين وغيرها. وهذا العامل يساعد أيضا على تقديم خدمات أفضل وأسهل للمستهلكين.

4. احتياجات القوى العاملة:

إذا توافرت العمالة في الموقع، بالمهارات والتخصصات المطلوبة ومستويات أجور مناسبة مع تقديم خدمات عمالية من النقابات الموجودة، فإن ذلك يزيد من الوزن النسبي فإن هذا العامل يؤثر على اختيار موقع المشروع بالقرب من أماكن العمالة. ولا بد ان يؤخذ في الاعتبار أيضا مدى توافر مراكز لتدريب وتنمية مهارات العمالة في المنطقة. وهنا تحدد احتياجات القوى العاملة بهدف تقدير كلفتها، ومقارنة ما يلزم من عمال وموظفين مع هيكل القوى العاملة المتوفرة في منطقة المشروع وتقييم احتياجات التدريب. ويعتمد تقدير احتياجات المشروع من القوى العاملة على التكنولوجيا المختارة وبالتالي الآلات والمعدات. وعند حساب الأجور والرواتب يجب إضافة التكاليف التالية: الإجازات السنوية و التدريب و الضمان الاجتماعي والتأمينات الصحية ومنح السكن والضرائب المفروضة على الرواتب

5. القرب من مصادر الخدمات الأساسية:

من العوامل الأخرى المحددة للموقع مدى توافر الخدمات الأساسية كالطاقة الكهربائية، والمياه، وشبكة النقل والمواصلات، والمدارس والمستشفيات والسكن.

حيث يؤثر هذا العامل على اقتصاديات المشروع من خلال ما يحصل عليه من مزايا ووجود مرافق البنية الأساسية في المدن والمراكز الحضرية، المتمثلة بالقرب من الوزارات ومؤسسات التوريد والبنوك وما ينتج عن ذلك من متوفرات خارجية إيجابية، على ان لا ننسى من ان لهذه الأمور السلبية مثل ارتفاع الأسعار في المناطق الحضرية، والضوضاء والتلوث، وبالتالي لا بد من إجراء تحليل التكلفة والعائد للوصول إلى تحديد الوزن النسبي لهذا العامل.

6. العوامل الطبيعية والظروف المناخية والأثر على البيئة:

ان الوزن النسبي لهذا العامل قد يزداد إذا كان المشروع سياحياً فقد تكون العوامل الطبيعية مواتية، وقد تكون العوامل الطبيعية سلبية في حالة ما إذا كانت المنطقة تتعرض لكوارث طبيعية كالزلازل والهزات الأرضية والأعاصير وغيرها، ومن ناحية أخرى قد يفضل في بعض المشاريع الموقع الجغرافي الذي يكون قريباً من الأنهار ومصادر المياه وان تكون الأرض تصلح لإقامة المشروع عليها من النواحي الفنية وغيرها.

7. الاستقرار الأمني:

وجود المشروع بالقرب من المناطق الآمنة التي يتوفر فيها خدمات الشرطة والحراسة والإطفاء من الأسباب التي تؤثر إيجابا على المشروع.

8. توفر التسهيلات وحوافز الاستثمار:

النظر إلى التسهيلات وحوافز الاستثمار مثل الإعفاء من الضرائب أو تخفيضها أو دعم مستلزمات الإنتاج الداخلة في إنتاج المنتج النهائي.

9. درجة التوطن في بعض المناطق:

وتقاس درجة التوطن في منطقة معينة عن طريق حساب معامل التوطن للتعرف على مدى توطن نشاط اقتصادي، فمعامل التوطن يقارن بين نصيب المنطقة (المحافظة أو الإقليم) النسبي في نشاط معين إلى نصيبه النسبي من النشاط الاقتصادي الكلي على مستوى اقتصاد الدولة.

ولحساب عامل التوطن للنشاط (الصناعي في هذه الحالة) في محافظة أو اقليم معين باستخدام المعادلة التالية:

التوطن للنشاط (الصناعي) في محافظة =

عدد العمال في صناعة معينة في المحافظة	عدد عمال كل الصناعات في المحافظة
مجموع عدد العمال في هذه الصناعة	عدد عمال كل الصناعات في الدولة

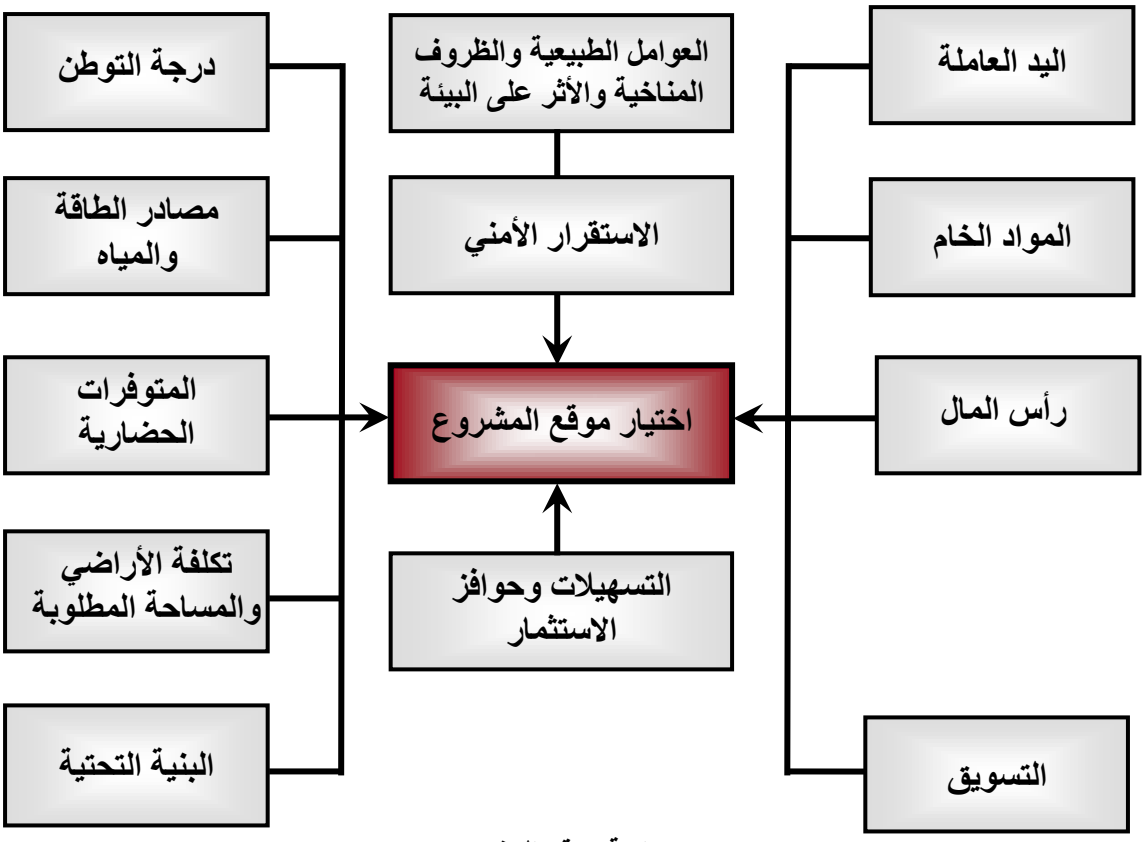
فعلى سبيل المثال إذا كان هناك تفكير في إنشاء مشروع لصناعة الجلود في محافظة البصرة، فمن الممكن حساب معامل التوطن على النحو التالي:

عدد عمال صناعة الجلود في محافظة البصرة	عدد عمال كل الصناعات في محافظة البصرة
مجموع عدد عمال صناعة الجلود في العراق	مجموع عدد عمال كل الصناعات في العراق

فإذا كان ناتج معامل التوطن < 1 (موجب)، فان ذلك يعني ان الصناعة المعنية غير متوطنة في المنطقة المعنية، وتعتبر منطقة جذب ومشجعة.

أما إذا كان معامل التوطن > 1 (موجب)، فإن ذلك يعني ان الصناعة المعنية متوطنة (متواجدة) في تلك المنطقة، لهذا فإنها تعتبر منطقة طرد وغير مشجعة لإقامة المشروع على اعتبار ان هناك مشاريع مماثلة.

عادة يتم اختيار الموقع الأقل تكلفة والذي يمكن ان يحقق اكبر عائد. وإن العناصر ذات العلاقة باختيار الموقع المناسب للمشروع محددة بالشكل التالي:



دراسة موقع المشروع

شكل رقم – 8

5.4 أسلوب الإنتاج

اختيار أسلوب الإنتاج الأمثل اقتصاديا والذي ينتج بأقل تكلفة ممكنة وبأقصى درجة إنتاجية.
و تعتبر هذه المرحلة مهما جدا لعلاقتها بفترة التنفيذ والتشغيل ، و تتم الدراسة بهدف مقارنة مختلف الحلول لهدف واحد مع الاخذ بنظر الاعتبار الحلول الممكنه و الظروف المحلية للمشروع ، لذلك تسمى هذه المرحلة في بعض كتب الاقتصاد بمرحلة اختيار الفن الانتاجي من المتغيرات التي تساعد و تحدد الاسلوب الفني للانتاج :

- متغيرات مادية : المواد الاولية (الوفرة ، النوعية ، كلفة الاستخراج و التحضير و النقل) ، المنافع (الطاقة و الماء) من حيث الوفرة و النقل ، القطاع الارتكازي (شبكة المواصلات و الانابيب)
- الجو و الظروف الطبيعية : (الرطوبة ، الامطار ، الجفاف)
- العوامل الاجتماعية : الاختيار بين التكنولوجيا و الايدي العاملة ، حيث ان هذا الاختيار يؤثر بشكل واضح على الكلفة الاستثمارية و التشغيلية.

التكنولوجيا:

اختيار تكنولوجيا الإنتاج يعتمد على:

- النظام الإنتاجي.
- الاستثمارات المتاحة للمشروع.
- تأثير نوع التكنولوجيا المقترح على الجودة المطلوبة.
- السوق والمنافسة.
- نوع العمالة المتوفرة.

تحديد العمليات الإنتاجية والتخطيط الداخلي للمشروع:

ان تحديد العمليات الإنتاجية هي البداية الأساسية للوصول إلى التخطيط الداخلي الأمثل للمشروع، فإذا كانت العمليات الإنتاجية تعني تحديد مراحل أداء العمليات المختلفة ابتداءاً من استلام المواد الخام حتى الحصول على المنتج، فإن تزامن دراسة هذه العملية مسألة ضرورية مع التخطيط الداخلي للمشروع، لأن الأخير يعني تحديد المساحات المناسبة لكل مكونات المشروع.

بنهاية تحديد العمليات الإنتاجية المطلوبة تبدأ دراسة التخطيط الداخلي للمشروع، حيث تكون اتضحت كل المعلومات المطلوبة لتحديد المساحات الأنسب لكل قسم وكل إدارة، وغيرها من أماكن الخدمات والمرافق داخل المشروع.

تقدير احتياجات المشروع:

تقدير احتياجات المشروع من وسائل وعناصر الإنتاج والتسهيلات الإنتاجية على النحو التالي:

1. تقدير عدد الآلات والمعدات المطلوبة.
2. تقدير مساحات وتكاليف الأرض للمشروع.
3. تقدير الاحتياجات من العمالة:
   - العمالة المطلوبة في مرحلة إنشاء المشروع
   - العمالة المطلوبة في مرحلة التشغيل
4. احتياجات المشروع من المواد الأولية.
5. احتياجات المشروع الأخرى:

- مثل الأثاث، المعدات، وسائل النقل، المخازن... الخ.

5.5 ملخص نتائج دراسات الجدوى الفنية وتقديرات تكاليف المشروع

يتم تحديد حجم الإنتاج الممكن فنياً، وتحديد الطاقة الإنتاجية، وتحديد حجم المشروع وخطوط الإنتاج ومراحله، واختيار الموقع المناسب، واختيار التكنولوجيا المناسبة، ونوع وعدد الآلات والمواد الخام، وكذلك بيان العمالة المطلوبة في مرحلة الإنشاء ومرحلة التشغيل، واحتياجات المشروع من الأثاث والمعدات ووسائل النقل وغيرها من التسهيلات الإنتاجية.
وكل تلك البيانات تجمع لتقدير التكاليف الاستثمارية والتشغيلية للمشروع.

1. التكاليف الاستثمارية:

تكاليف الإنشاء والتجهيزات وكما يلي:

- تكاليف الأراضي.
- تكلفة المباني والإنشاء.
- الآلات والمعدات.
- تكلفة الأثاث والتجهيزات المكتبية.
- وسائل النقل الداخلي والخارجي.
- مصروفات التأسيس، وتتضمن دراسات السوق ودراسات الجدوى الاقتصادية، ومصروفات التسجيل والترخيص، والمصروفات القانونية ومصاريف الحصول على حقوق الإنتاج مثل العلامة التجارية وغيرها.
- مصاريف التشغيل لدورة واحدة (رأس المال العامل)، وتتضمن كافة بنود المصروفات الواجب إنفاقها حتى يتم تشغيل المشروع خلال دورة الإنتاج والتسويق والتحصيل الأولى.

2. تكاليف التشغيل:

أي تلك المصاريف التي تبدأ مع سنة التشغيل الأولى للمشروع بتفصيلاتها المختلفة سواء كانت تكاليف مباشرة أو غير مباشرة، وإنتاجية وتسويقية وإدارية. وكل هذه التقديرات تنقل المشروع إلى الدخول في مرحلة أخرى من مراحل دراسات الجدوى الاقتصادية وهي دراسات الجدوى المالية بكل أبعادها.

القسم 6.0 دراسة الجدوى المالية

تهدف دراسة الجدوى المالية إلى التأكد من مدى توافر الموارد المالية اللازمة لإقامة وتشغيل المشروع في الأوقات المناسبة بتكلفة معقولة وتحديد مدى قدرة المشروع على الوفاء بالتزاماته. وتقوم الدراسة المالية بإعداد التقديرات عن إيرادات المشروع والتكاليف الاستثمارية وتكاليف التشغيل على مدى العمر الإنتاجي (أو الخدمي) للمشروع. ومن خلال صافي التدفق النقدي تسعى الدراسة للتأكد من قدرة المشروع على استرداد تكلفة الاستثمارات وقدرة المشروع على تحقيق معدل عائد مناسب وقدرته على تحقيق التوازن بين الاحتياجات المالية اللازمة ومصادر الحصول عليها.

والدراسة المالية تعتمد على نتائج الدراسات التسويقية والفنية بما تعكس هذه الدراسات من أثار على التدفقات النقدية (الإيرادات المتوقعة) والتدفقات النقدية الخارجة (التكاليف المتوقعة) خلال العمر الافتراضي للمشروع.

ان دراسات الجدوى المالية تتضمن عملية جدولة للنتائج التي يتم الحصول عليها من دراسات الجدوى الأخرى، أي وضعها في شكل جداول وتحليلات معينة حتى يتسنى الوصول إلى إبراز المنافع المالية والاقتصادية والتكاليف التي يتحملها المشروع في مقابل الحصول على تلك المنافع، ولذلك فإن أهم نتائج تلك الجداول والتحليلات المالية هي الوصول إلى جدول التدفقات النقدية الذي يعطي في نهايته صافي التدفقات النقدية للمشروع عبر العمر الافتراضي ويكون الأساس لتقييم المشروع الاستثماري من وجهة نظر المستثمر وبعض الجهات المانحة، وهذا الجدول يمكن التوصل من خلاله فيما إذا كان المشروع له جدوى مالية واقتصادية من

عدمه وتتوقف الإجابة على النتائج التي يتم التوصل إليها والتي توضح ما إذا كان صافي التدفقات النقدية للمشروع بالموجب أو السالب عبر العمر الافتراضي للمشروع.

دراسات الجدوى المالية تحول كل مكونات المشروع إلى أرقام وبيانات رقمية مبنية على أسس عملية، فإن القائمين على تلك الدراسات يكونون دائما على تنسيق تام مع الفنيين والمهندسين والاقتصاديين لتحديد العمر الافتراضي للمشروع.

وتتناول دراسة الجدوى المالية النواحي التالية:

6.1 تقدير إجمالي التدفقات النقدية الداخلة

تحديد التدفقات النقدية الداخلة أو الإيرادات المتوقعة على العديد من البنود أهمها إيرادات المبيعات والإعانات والقروض والقيمة التخريدية (**Scrap Value**) المتبقية للمشروع في نهاية عمره الافتراضي.

1. إيرادات المبيعات (Sales Revenues):

الإيراد الكلي للمبيعات في أي فترة هو عبارة عن سعر بيع الوحدة المباعة من السلعة أو الخدمة مضروبا في الكمية المباعة، ويتم الحصول على تلك البيانات عبر العمر الافتراضي للمشروع من نتائج دراسات الجدوى التسويقية، أي ان قيمة المبيعات تساوي حجم الطلب المتوقع مضروباً في سعر السلعة (أو الخدمة)، وتعتمد إستراتجية أو سياسة التسعير على:

- تكاليف إنتاج السلعة
- هدف المشروع، وهيكل ونوع السوق
- حجم الطلب على السلعة ومرونته
- موقف المشاريع الأخرى في سوق السلعة وردود أفعالها
- دورة حياة السلعة

مثال تطبيقي رقم (9)

دراسة الجدوى التسويقية لأحد المشاريع الاستثمارية أوضحت ان أرقام الطلب المتوقعة على منتجات المشروع تصل إلى 4,000,000 وحدة في السنة طوال الخمس سنوات القادمة، اعتباراً من 2008 إلا ان الأرقام المنتظر تحقيقها ستقل عن هذا بسبب تشغيل المشروع بأقل من طاقته الإنتاجية خلال الثلاث سنوات الأولى، أي في مرحلة التشغيل الأولى بنسبة 65% في السنة الأولى، 85% من الطاقة في السنة الثانية، 90% من الطاقة في السنة الثالثة، ثم بكامل طاقته 100% خلال السنتين الباقيتين، كما أتضح ان السعر المتوقع هو 5 دولار للوحدة مع افتراض عدم تغييره على مدار الخمس سنوات.

الحـــــــــــــل

إيرادات المبيعات السنوية المتوقعة للمشروع الاستثماري خلال عمره الافتراضي

البيـــــــــان	التشـــغيل الأولى	التشـغيل الثانيــة	التشغيل الثالثـة	التشغيل الرابعة	التشغيل الخامسة
	2008 %65	2009 %85	2010 %90	2011 %100	2012 %100
أرقام المبيعات المتوقعة	2,600,000	3,400,000	3,600,000	4,000,000	4,000,000
السعر المتوقع	5	5	5	5	5

إجمالي إيراد المبيعات السنوية المتوقعة	**13,000,000**	**17,000,000**	**18,000,000**	**20,000,000**	**20,000,000**

2. القيمة البيعية المتبقية للمشروع والتخريدية المبنية على وجود عمر افتراضي:

القيمة المتبقية تعتمد على معدلات إهلاك الأصول (**Assets Depreciation**) وما يتبقى فعلياً من المشروع، ويتم بيعه بقيمة تخريدية تمثل القيمة السوقية للأصول الموجودة في حينها، وتمثل إيرادات متوقعة ترصد قيمتها ضمن التدفقات النقدية الداخلة في السنة الأخيرة من العمر الافتراضي للمشروع.

$$\text{العمر الافتراضي} = \frac{\text{التكاليف الاستثمارية للأصول}}{\text{متوسط معدلات الإهلاك للأصول}}$$

فعلى سبيل المثال، إذا كانت التكلفة الاستثمارية لآلة من الآلات هي 150,000 دولار ومعدل الإهلاك السنوي لها هو 9 % فأن العمر الافتراضي لهذه الآلة

$$= \frac{150,000}{150,000 \times 9\ \%} = 11 \text{ سنة}$$

ان المعايير والأسس لتحديد العمر الافتراضي للمشروع هي:

- طريقة إهلاك الأصول محاسبياً، مع الاعتبار انه إذا زادت معدلات الإهلاك انخفض العمر الافتراضي والعكس بالعكس؛ حسابات التشغيل الفعلي إلى الطاقة الكلية للمشروع فارتفاع نسبة التشغيل الفعلي إلى الطاقة القصوى للمشروع يؤدي إلى زيادة معدلات الإهلاك ومن ثم يقلل من العمر الافتراضي والعكس بالعكس.
- الصيانة الدورية والصيانة العامة، فعدم وجود صيانة فعالة ينقص من العمر الافتراضي للأصول والمشروع.
- التكنولوجيا المستخدمة ودرجة جودتها فكلما ارتفع مستوى التكنولوجيا المستخدمة ودرجة جودة صناعة الأصول، كلما أدى إلى زيادة العمر الافتراضي للمشروع والعكس صحيح.
- العوامل الطبيعية التي تؤدي إلى تلف المباني والمعدات وغيرها.

الفرق بين العمر الافتراضي والعمر الاقتصادي ان الأخير هو العمر الفعلي، وعادة يزيد عن العمر الافتراضي، بينما دراسة الجدوى في النهاية تأخذ بالعمر الافتراضي الذي يجب ان يأخذ بالحسبان كل العوامل السابقة.

3. القروض (Loans):

من الموارد الهامة التي تصب كتدفقات نقدية داخلة للمشروع ويعتبر ضمن التدفقات الداخلة المهمة للمشروع وخاصة إذا كان المشروع يتجه إلى الاعتماد على القروض بنسبة كبيرة في هيكل التمويل.

4. الإعانات (Subsidies):

الإعانات هي أحد التدفقات النقدية الداخلة لأي مشروع إن وجدت، حيث تقرر إعانات الإنتاج لبعض المشاريع في شكل مالي لأسباب عديدة وكحوافز على الدخول والاستمرار في أنشطة معينة.

5. إيرادات أخرى (Other Revenues):

ان من الممكن ان تباع بعض الوحدات من السلعة المنتجة أثناء تجارب التشغيل أو تباع بعض المعدات وغيرها وتعتبر حصيلتها في هذه الحالة ضمن التدفقات النقدية الداخلة، وقد ينشأ قبل بداية العمر الافتراضي للمشروع أي أنشطة قد تأتي ببعض الإيرادات والتي لابد من أخذها بالحسبان عند تقدير إجمالي التدفقات النقدية الداخلة للمشروع.

6.2 تقدير إجمالي التدفقات النقدية الخارجة

أ. تقدير التكاليف الاستثمارية للمشروع:

تعرف التكاليف الاستثمارية للمشروع على إنها جميع التكاليف والمصروفات التي تنفق في الفترة من بدء المشروع وحتى انتهاء تجارب التشغيل.

وما يسمى بالسنة الصفرية للمشروع تعرف بالسنوات التي يتم فيها الإنشاء لإخراج المشروع للوجود، والسنة الصفرية تظهر في جدول التدفقات النقدية باعتبارها سنة وبالتالي تظهر في جدول تحليل التكاليف الاستثمارية أي المصروفات في تلك الفترة في الخانة الخاصة بالسنة الصفرية، وهنا يصب أيضا مجموع الإنفاق في جدول تحليل التكاليف الاستثمارية بالإجمالي في الخانة المخصصة للسنة الصفرية في جدول التدفقات النقدية الذي نحصل من خلاله على صافي التدفقات النقدية للمشروع.

تقدير التكاليف الاستثمارية يتم على مرحلتين:

- تقدير التكلفة الاستثمارية للأصول الثابتة وتتكون من تكاليف الإنشاءات والتجهيزات التي هي عبارة عن تكلفة الأراضي، وتكلفة المباني والإنشاءات والآلات والمعدات.
- التكاليف الاستثمارية الأخرى وأهمها مصاريف التأسيس وتقدير رأس المال العامل[2] مع وجود نقد صافي لمقابلة المصروفات الأخرى وغيرها من التكاليف مثل فوائد القروض المدفوعة أثناء فترة الإنشاء.

[2] تقدير رأس المال العامل يعتمد على عدد من البيانات من بينها: عدد الوحدات المطلوب انتاجها يومياً/أسبوعياً/شهرياً، مصروفات الإنتاج والبيع بالنسبة للوحدة، طول فترة الإنتاج والبيع والتحصيل.

نموذج تحليل التكاليف الاستثمارية

البيـــــــــان	التكاليف الاستثمارية خلال فترة الإنشاء											
	السنة صفر			س صفر 1			س صفر 2			الإجمالي للسنة الصفرية		
البنود التفصيلية	محلي	أجنبي	إجمالي	محلي	أجنبي	إجمالي	محلي	أجنبي	إجمالي	محلي	أجنبي	إجمالي
(1) الأصول الإنتاجية الثابتة: • المباني والإنشاءات • الآلات والمعدات • أصول ثابتة أخرى **(2) مصروفات التأسيس:** • التراخيص والرسوم • براءات وحقوق معرفة • دراســـات الجـــدوى والخدمات الاستشارية • تدريب العاملين • تجارب التشغيل • تكاليف دعاية واعلان • أخرى **(3) رأس المال العامل:** • رأس المـــال لبـــدء التشغيل • احتيـاطي رأس المـال العامل **(4) استثمارات مبدئية**												
(5) فوائد أثناء التشغيل												
(6)إجمـــــالي التكـــــاليف الاستثمارية												

ب. تقدير تكاليف التشغيل:

تكاليف التشغيل السنوية تشمل كل المصروفات والنفقات التي تنفق مع بداية تشغيل المشروع، أي مع أول سنة تشغيل طوال العمر الافتراضي للمشروع، وهي في ذلك تختلف عن التكاليف الاستثمارية للمشروع حيث تحسب الأخيرة في السنة الصفرية فقط أي في سنة أو سنوات الإنشاء بينما يتم حساب تكاليف التشغيل كل سنة، أي سنوياً عبر العمر الافتراضي للمشروع، أي بعد السنة الصفرية وبالتالي يبدأ حسابها مع سنة أولى تشغيل أي بعد نهاية مرحلة التجارب ومع بدء التشغيل الفعلي للمشروع.

تكاليف التشغيل:

- تكاليف المستلزمات السلعية: حيث تمثل المواد الخام والوقود وقطع الغيار ومواد التعبئة والتغليف.... الخ.
- الأجور والرواتب: حيث تشمل أجور العمال والمشرفين ورواتب الإدارة الوسطى والعليا والمكافآت والحوافز والعمولات والتأمينات الاجتماعية.
- تكاليف تشغيل المرافق والخدمات الأساسية.

- تكاليف التشغيل للبحوث والتطوير.
- تكاليف الصيانة.
- تكاليف الإيجارات.
- تكاليف تجديد التراخيص والتسجيل.
- تكاليف النقل والشحن للمواد الخام والمبيعات.
- أقساط التأمين.
- مصاريف الانتقال وبدلات السفر.
- تكاليف الدعاية والإعلان للسلعة أو الخدمة.
- تكاليف الخدمات البريدية والتلفونية والكهرباء.
- الاندثار

نموذج تحليل تكاليف التشغيل السنوية

البيـــــــــــان	السنة 1			السنة 2			السنة ن		
البنود التفصيلية	متغيرة	ثابتة	إجمالي	متغيرة	ثابتة	إجمالي	متغيرة	ثابتة	إجمالي
(1) تكاليف التشغيل الإنتاجية: • المواد • الأجور (محلية/أجنبية) • أخـــــرى (طـــــوارئ وغيرها)									
(2) تكاليف التسويق: • المواد • الأجور • إعلانات ودعاية • رسـوم وضـرائب علـى المبيعات • أخرى									
(3) التكاليف الإدارية: • المواد • الأجور • أخرى									
(4) إجمالي 1 + 2 +3									
(5) الإهلاك									
(6) إجمالي 4 + 5									

6.3 تقدير صافي التدفقات قبل وبعد الضرائب

بعد تحديد كل من التكاليف الاستثمارية وتكاليف التشغيل السنوية، تأتي الخطوة الضرورية لمعرفة جدوى المشروع قبل خصم الضرائب وبعد خصم الضرائب من خلال مقابلة تكاليف التشغيل السنوية بالإيرادات المتوقعة السنوية لاستخراج الربح قبل خصم الضرائب ثم يتم بعد ذلك قياس تأثير العبء الضريبي على ربحية المشروع، وما إذا كان هناك جدوى من إقامة المشروع في ظل هذا العبء من عدمه.

6.4 تقدير صافي التدفقات النقدية

يقدر صافي التدفقات النقدية للمشروع من خلال تحليل جدول التدفقات الذي يحول كل الإيرادات المتوقعة إلى تدفقات نقدية داخلة، وكل التكاليف المتوقعة إلى تدفقات نقدية خارجة، ويستخرج صافي التدفقات النقدية بمقابلة التدفقات النقدية الداخلة بالخارجة مع مراعاة التالي:

- القيمة التخريدية (**Scrap Value**) للمشروع والتي يتم رصدها في أخر سنة من سنوات العمر الافتراضي للمشروع مع إضافة الضرائب لهذه السنة.
- تعتبر قيمة القروض الممنوحة من البنوك أو احد الدائنين من التدفقات النقدية الداخلة، بينما تعتبر قيمة الأقساط التي يسددها المشروع وفاء لقيمة القرض من التدفقات الخارجة عند السداد.
- عدم اعتبار الإهلاك من بنود التدفقات الخارجة باعتباره بنداً محاسبياً، ويستخدم الإهلاك فقط عند حساب قيمة الضرائب المستحقة على المشروع فقط.

مثال تطبيقي رقم (10)

كانت البيانات المتاحة والخاصة بإنشاء مشروع صناعي كالتالي:

1- إجمالي التكاليف الاستثمارية 12,000,000 دينار وسنة الإنشاء عام 2007.
2- الإنتاج يبدأ عام 2008 ولمدة خمس سنوات، بطاقة إنتاجية 70 % لمدة ثلاث سنوات و80 % للعامين الباقيين، علماً بأن الطاقة القصوى بلغت 12,000 طن سنوياً، وحدد سعر البيع بحوالي 2,000 دينار للطن.
3- قدرت تكاليف التشغيل السنوي على النحو التالي:

▪ مواد خام	2,000,000 دينار	3,340,000 دينار
▪ أجور	800,000 دينار	
▪ مياه وكهرباء	40,000 دينار	
▪ مصروفات أخرى	500,000 دينار	
▪ إهلاك	80,000 دينار	

4- معلومات أخرى:
- المشروع يخضع للضرائب بنسبة 35 %
- تقدير القيمة البيعية المتبقية للمشروع في نهاية العمر الافتراضي بنحو 1,000,000 دينار
- قدر سعر الخصم للأموال المستثمرة بحوالي 11 %
- ان كل الإنتاج يتم بيعه بالكامل سنوياً

والمطلوب: جدول التدفقات النقدية.

الحـــــــــــل

لاحظ ان إيرادات المبيعات تغيرت حسب نسبة الطاقة الإنتاجية المستغلة، ففي السنوات 2008، 2009، 2010 قدرت إيرادات المشروع على أساس:

12,000 طن **X** 70% = 8,400 طن **X** 2,000 دينار = 16,800,000 دينار

أما عامي 2011 و 2012 فقد قدرت إيرادات المبيعات على أساس:

12,000 **X** 80% = 9,600 **X** 2,000 دينار = 19,200,000 دينار.

جدول تقدير التدفقات النقدية للمشروع

البيـــــــان	سنة الإنشاء	سنوات العمر الافتراضي للمشروع				
	س صفر	س 1	س 2	س 3	س 4	س 5
	2007	2008	2009	2010	2011	2012
(1) التدفقات النقدية الداخلة						
1.1. إيرادات المبيعات		16,800,000	16,800,000	16,800,000	19,200,000	19,200,000
2.1. القيمة البيعية المتبقية للمشروع		–	–	–	–	1,000,000
إجمالي التدفقات النقدية الداخلة		16,800,000	16,800,000	16,800,000	19,200,000	20,200,000
(2) التـــدفقات النقديـــة الخارجة						
1.2. الاستثمارات المبدئية التكاليف الاستثمارية	(12,000,00)					
2.2. تكـــاليف التشـــغيل السنوي		3,340,000	3,340,000	3,340,000	3,340,000	3,340,000
3.2. قسط الإهلاك		80,000	80,000	80,000	80,000	80,000
إجمالي التدفقات النقدية الخارجة	(12,000,00)	3,420,000	3,420,000	3,420,000	3,420,000	3,420,000
صافي التدفقات النقدية قبل الضرائب[3] – الضرائب (35%)	(12,000,00)	013,380,00 4,683,000	13,380,000 4,683,000	13,380,000 4,683,000	15,780,000 5,523,000	16,780,000 5,873,000
صافي التدفقات النقدية بعد الضرائب	(12,000,00)	8,697,000	8,697,000	8,697,000	10,257,000	10,907,000
+ قسط الإهلاك Depreciation	(12,000,00)	80,000	80,000	80,000	80,000	80,000
صافي التدفقات النقدية فقط	(12,000,00)	8,777,000	8,777,000	8,777,000	10,337,000	10,987,000

6.5 الهيكل التمويلي للمشروع

يحقق أقصى ربح لملاك المشروع وبالتالي يضم مجموعة محتملة من مصادر التمويل التي تحمل المشروع أقل تكلفة ممكنة وبالتالي يعزز من عوائد المشروع إلى أقصى حد ممكن.
وللوصول إلى هيكل التمويل السليم على أساس القاعدة التالية:

- مصادر التمويل القصيرة الأجل تمول رأس المال العامل (الأصول المتداولة) عدا الجزء الثابت منها.
- مصادر التمويل طويلة الأجل تمول الأصول الثابتة والجزء الثابت من الأصول المتداولة.

يجب مراعاة تكلفة الحصول على كل مصدر تمويل على اقتصاديات المشروع.

[3] صافي التدفقات النقدية قبل الضرائب = إجمالي التدفقات النقدية الداخلة – إجمالي التدفقات النقدية الخارجة

وسوف نتطرق إلى معايير الربحية التجارية والربحية الاجتماعية المتعلقة بالتحليل المالي والاقتصادي في الوحدة رقم III.

تستخدم نتائج الدراسة المالية والتي تتضمن جداول التكاليف والإيرادات في التحليل المالي والاقتصادي للمشروع. الوحدة III في هذا الدليل تحتوي على الأساليب المعتمدة لتقييم المشاريع باستخدام معايير الربحية التجارية والربحية الاجتماعية.

القسم 7.0 دراسة الجدوى الاجتماعية

ان تقييم المشاريع يركز في جزء منه على تقييم المشاريع من خلال معايير الربحية التجارية، كما من الضروري تحديد المعايير التي تعظم الربحية الاجتماعية لكي تتحقق أهداف المجتمع الاقتصادية لتحقيق توافق بين المصلحة الخاصة المتمثلة بمعايير الربحية التجارية والمصلحة العامة المتمثلة بمعايير الربحية الاجتماعية.
ان اقتصاد الدولة له أهدافه الاقتصادية التي يسعى إلى تحقيقها ولذلك له معاييره التي يتم تقييم المشاريع الاستثمارية على أساسها من وجهة نظر اقتصاد الدولة من خلال منظور تعظيم الربحية الاجتماعية، إلا انه لا يتجاهل بأي حال من الأحوال معايير الربحية التجارية.

7.1 الأهداف الاقتصادية للدولة ومعايير التقييم

من الأهداف الاقتصادية تحقيق زيادة دخل الدولة والنمو الاقتصادي والوصول إلى التوظف الكامل وتحقيق التوازن في ميزان المدفوعات والاستقرار الاقتصادي واستقرار الأسعار والحفاظ على قيمة العملة واستقرار سعر الصرف وتحسين توزيع الدخل وتحقيق عدالة التوزيع وكذلك حماية البيئة كما موضح في الجدول أدناه:

الهـــدف	المعيـــــار
زيادة دخل الدولة	القيمة المضافة لقياس أثر المشروع الاستثماري على دخل الدولة أو الناتج المحلي الإجمالي
التوظف الكامل	التوظف لقياس أثر المشروع على العمالة وخلق فرص عمل جديدة لتخفيض معدل البطالة
توازن ميزان المدفوعات	ميزان المدفوعات لقياس أثر المشروع على ميزان المدفوعات ومن ثم مدى مساهمته في تحسين أوضاع ميزان المدفوعات
الحفاظ على قيمة العملة الوطنية واستقرار سعر الصرف	سعر الصرف لقياس أثر المشروع في الحفاظ على قيمة العملة الوطنية
حماية البيئة	حماية البيئة لقياس أثر المشروع على البيئة ومن ثم مدى مساهمته في حماية البيئة.

7.2 مفهوم الربحية الاجتماعية

ان الربحيـة الاجتماعيـة علـى مستوى اقتصـاد الدولـة تعنـي قيـاس الآثـار المختلفـة للمشـروع الاسـتثماري علـى اقتصاد الدولة ومدى مساهمته في تحقيق الأهداف الاقتصـادية للمجتمـع، ومـن ثـم تعظـيم المصـلحة والنفـع العـام للمجتمع في مجموعة.

والصورة العامة للربحية الاجتماعية = (**إجمالي العوائد الاجتماعية المباشرة وغير المباشرة**) (**إجمالي التكاليف الاجتماعية المباشرة وغير المباشرة**)

ان تقيـيم المشـروع علـى مسـتوى اقتصـاد الدولـة، يحـدده قيـاس كفـاءة الاسـتثمار مـن منظـور تعظـيم الربحيـة الاجتماعية للبلد وتحديد المدى المتوقع الوصول إليه من صافي العائد المحقق من المشروع اقتصـاديا ونصـيب الدولة من هذه العوائد ومن تحقيق الكفاءة الاقتصادية للمشروع بهدف التأكد من ان المشروع الاستثماري يحقق الأهداف الاقتصادية للمجتمع وان العائد الاقتصادي والاجتماعي اكبر من الحد الأدنى الذي يقبله المجتمع.

بعض المجالات التي يفضل فيها تعظيم الربحية الاجتماعية للمشاريع:

- دراسات جدوى المشاريع العامة المملوكة للدولة كلياً أو تلك التي تساهم فيها جزئياً سواء الجديدة أو التوسعية.
- دراسة جدوى البرامج العامة أو الممولة من الدولة مثل برامج التنمية كالطرق العامة والإسكان والصحة.
- دراسات جدوى المشاريع التي تحتاج إلى الحصول على ترخيص لمزاولة نشاطها أو ترغب في الحصول على قروض أو إعانات أو دعم من الدولة أو إعفاءات ضريبية وحماية جمركية.
- دراسات جدوى المشاريع ذات المساهمة الأجنبية الكاملة أو الجزئية خاصة تلك التي ترغب في الاستفادة من الإعفاءات الضريبية أو الجمركية.

7.3 الاختلافات بين تقييم المشاريع بمعايير الربحية الاجتماعية ومعايير الربحية التجارية

1. تقييم المشاريع بمعايير الربحية الاجتماعية ينطوي على مستوى اقتصاد البلد إلى تحديد مدى مساهمة المشروع في تحقيق الأهداف الاقتصادية للمجتمع وقياس مدى استخدام المشروع للموارد الاقتصادية المتاحة وتحدد كل تلك الجوانب ما يسمى صافي العائد الاجتماعي، بينما يركز تقييم المشاريع على مستوى المستثمر بناءا على معيار الربحية التجارية أي العائد والربحية اللذان يعظمان منفعة المستثمر.

2. يقوم تقييم المشاريع بمعايير الربحية التجارية على تحليل المنافع والتكاليف النقدية المباشرة للمشروع، ومن ثم الأخذ في الاعتبار الآثار النقدية المباشرة الملموسة فقط، أي قياس المنافع والتكاليف المترتبة على المشروع بغض النظر عن الآثار التي يحدثها في غيره من المشاريع فيما يعرف بالتشابك الاقتصادي بين المشاريع. بينما يقوم تقييم المشاريع بمعايير الربحية الاجتماعية بقياس وتقدير الآثار الكلية للمشروع سواء كانت مباشرة أو غير مباشرة، أي الأخذ في الاعتبار ما يعرف بعلاقات التشابك الاقتصادي بين المشاريع والأنشطة المختلفة.

3. يعتمد القياس في تقييم المشاريع بمعايير الربحية التجارية على أسعار السوق لتقدير التدفقات النقدية الداخلة والتدفقات النقدية الخارجة، غير ان القياس في تقييم المشاريع بمعايير الربحية الاجتماعية يعتمد على ما يسمى أسعار الظل (**Shadow Prices**) لأنها تعكس المنافع والتكاليف الحقيقية الموازية للتضحية التي يقوم بها اقتصاد البلد أو الدولة من خلال تخصيصه موارد معينة لمشروع معين، وهي عبارة عن الأسعار المعدلة التي تعكس المنافع والتكاليف الحقيقية بينما أسعار السوق التي يؤخذ بها تقييم المشاريع بمعايير الربحية التجارية لا تعكس المنافع والتكاليف الحقيقية التي يضحي بها المجتمع عند تخصيصه موارد معينة لمشروع معين.

4. الاختلاف بين بنود التكاليف والإيرادات، مثل إعانات الدعم الحكومي التي تعد إيراداً أي تدفقاً نقدياً داخلاً في تقييم المشاريع بمعايير الربحية التجارية، بينما تعد تكلفة على المجتمع بالإضافة إلى كونها إيراد للمشروع عند تقييم المشاريع بمعايير الربحية الاجتماعية وبالتالي فإن المنفعة التي يحصل عليها المشروع تلغيها التكلفة التي يتحملها اقتصاد البلد أو المجتمع.

7.4 لماذا الاختلاف في الأسعار عند حساب العوائد والتكاليف الاجتماعية؟

يختلف التقييم الاجتماعي عن التقييم التجاري عند حساب التدفقات للمشروع من التكاليف والعوائد ويرجع سبب الاختلاف الرئيسي إلى ان أسعار السوق للسلع قد لا تعكس القيمة الاجتماعية لها لعدة أسباب وخصوصا في الدول النامية، ومن ابرز تلك الأسباب:

- إن تدخل الدولة في فرض القيود والضرائب من جهة وتقديم الدعم والإعانات للسلع والأنشطة من جهة أخرى يقيد حركة السوق ويشوه العلاقة بين العرض والطلب الأمر الذي يؤثر على الأسعار السائدة في السوق
- إن عدم تكامل السوق الناتج عن مثل هذا التدخل يؤدي إلى ارتفاع الأسعار أو هبوطها إلى مستوى يتجاوز التكلفة الحدية للإنتاج
- إن تدخل الدولة في التجارة الخارجية للسلع والعوامل سواء في دعم الصادرات أو تقييد الاستيراد يعني أن أسعار تلك السلع والعوامل لا تعكس القيمة الاجتماعية لها ولهذا نشهد سوق ثانية لهذه السلع وبأسعار مختلفة

الخلاصة ان هنالك نوعين من الأسعار الاجتماعية تتحكم فيها عوامل تخرج عن نظام السوق السائد وأسعاره وهما الأسعار الاجتماعية (**Social Prices**) للسلع وأسعار الظل (**Shadow Prices**) لأجور العمال، حيث ان مثل هذه الأسعار تأتي معدلة لأسعار السوق المعلنة والتي تشكو من المؤثرات والعيوب نتيجة التدخل في السوق. أما كيف نحصل على الأسعار الاجتماعية للسلع فهنالك طريقتين:

1. **الطريقة الأولى:** وتسمى طريقة اليونيدو **UNIDO** (منظمة الأمم المتحدة للتنمية الصناعية) ويتم بموجبها تصحيح أسعار السوق المحلية للسلع بمعامل التصحيح للعلاقة بين أسعار السلع المحلية والسلع الأجنبية وهذا المعامل يعبر عنه بسعر الظل لمعدل التبادل (سعر الصرف) الأجنبي.
2. **الطريقة الثانية:** وتعرف بطريقة ليتل-ميرليس[4] ويتم بموجبها تقييم السلع بالأسعار العالمية.

المثال التالي يوضح جملة التعديلات الواجب إجراؤها في جانبي التكاليف والعوائد على حساب الربحية التجارية لتقييم المشروع بقصد تحويلها إلى حساب للربحية الاجتماعية للمشروع.

[4] MD Little and JA Mirrlees "Project Appraisal and Planning for Developing Countries" London 1974

مثال تطبيقي رقم (11)

الافتراضات:

- ان إنتاج المشروع يصدر بالكامل إلى الخارج.
- السعر الرسمي للعملة يزيد عن قيمته الحقيقية بمقدار 40%.
- يتم استيراد مواد خام من الخارج بالسعر الرسمي بقيمة 150,000,000 دينار.
- ان المشروع يساهم في تخفيض نسبة البطالة في المجتمع بمقدار 25%.

	الربحية التجارية		الربحية الاجتماعية
العائد	**500 مليون دينار**	**(+40%)**	**700 مليون دينار**
تكاليف التشغيل			
مواد خام.	150	(+40%)	210
أجور عمال.	100	(-25%)	75
مصاريف بيع وتسويق.	20		20
الاندثار.	50		50
فوائد (رأس المال).	30		30
ضرائب حكومية.	50	(-100%)	صفر
إجمالي التكاليف	**400**		**385**
صافي الربحية	**100**		**315**
عائد رأس المال	$\frac{100}{500}$ **= 20%**		$\frac{315}{700}$ **= 45%**

المطلوب

حساب الربحية الاجتماعية للمشروع بافتراض ان العائد على رأس المال المستثمر في المشروع هو 500,000,000 دينار

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وفيما يتعلق بتقييم المشروع اجتماعيا واقتصاديا سوف يتم بحث جملة من المعايير الأساسية في الوحدة III من هذا الدليل.

الوحدة رقم III

عملية تقييم المشاريع

Projects Evaluation Process

الوحدة رقم III. عملية تقييم المشاريع

القسم 1.0 مفهوم عملية تقييم المشاريع

هي عبارة عن "عملية وضع المعايير اللازمة التي يمكن من خلالها التوصل إلى اختيار البديل أو المشروع المناسب من بين عدة بدائل مقترحة، الذي يضمن تحقيق الأهداف المحددة واستنادا إلى أسس علمية".

ان عملية تقييم المشاريع هي مرحلة لاحقة لدراسات الجدوى للمشروع ومرحلة سابقة لمرحلة تنفيذ المشروع ، تلك المرحلة التي يترتب عليها اتخاذ قرار أما بتنفيذه أو التخلي عنه أو تأجيله إلى فترة أخرى.

القسم 2.0 أهمية تقييم المشاريع

ان أهمية تقييم المشاريع يمكن ان يعود إلى عاملين أساسيين:

- ندرة الموارد الاقتصادية خاصة رأس المال نتيجة لتعدد المجالات والنشاطات التي يمكن ان تستثمر فيها الأموال المتاحة. لذلك يجب اختيار الفرصة الاستثمارية المناسبة، لان استخدام رأس مال معين في مجال معين، معناه التضحية في استخدامه في مجال أخر وهذا ما يطلق عليه بتكلفة الفرصة البديلة.

- التقدم العلمي والتكنولوجي الذي وفر العديد من البدائل أمام المنتج أو المستثمر وما عليه إلا ان يختار البديل المناسب، إذا اخذ بنظر الاعتبار ان البدائل التكنولوجية تختلف فيما بينها من حيث الحجم والطاقة والطرق الإنتاجية والتكلفة وفي الحاجة إلى مستلزمات الإنتاج والقوى العاملة من مختلف الاختصاصات، وما يتلائم منها لصناعة معينة ، قد لا يتلائم مع صناعة أخرى، بالإضافة إلى سرعة تناقل المعلومات من خلال ثورة الاتصالات والمعلومات.

القسم 3.0 أهداف عملية تقييم المشاريع

تتمثل أهداف عملية التقييم بالتالي:

1. يمكن ان تساعد في تحقيق الاستخدام الأمثل للموارد المتاحة. ومن اجل تحقيق الاستخدام الأمثل للموارد المتاحة، لابد ان تتضمن عملية تقييم المشاريع العلاقات الترابطية بين المشروع المقترح والمشاريع القائمة.

2. تساعد في التخفيف من درجة المخاطرة بالأموال المستثمرة، حيث يمكن اختيار البديل المناسب من بين عدة بدائل مقترحة.

3. تساعد على ترشيد القرارات الاستثمارية.

القسم 4.0 معايير تقييم المشاريع

ان عملية تقييم المشاريع لابد ان تستند على معايير علمية دقيقة وذلك من اجل ما يلي:

1. تجاوز المخاطر.
2. إيجاد مستوى من الأمن للأموال المستثمرة.

تتميز عملية اختيار المعايير بأن:

- المعايير المستخدمة لقياس هدف معين قد لا تكون مناسبة لقياس هدف أخر.
- المعايير التي تستخدم لتقييم المشاريع العامة قد تكون غير مناسبة لتقييم المشاريع الخاصة.

- المعايير التي تستخدم لقياس الربحية التجارية للمشاريع الخاصة تختلف عن تلك التي تستخدم لقياس الربحية الاجتماعية للمشاريع العامة.
- هنالك معايير تستخدم في ظل ظروف التأكد وأخرى في ظل ظروف عدم التأكد.

4.1. تقييم المشاريع بمعايير الربحية التجارية في ظل ظروف التأكد:

لأجراء هذا التقييم تطبق مجموعة من معايير تقييم الاستثمار التي يطلق عليها معايير الربحية التجارية، التي تهم المستثمر بالدرجة الأساس.

- معيار فترة الاسترداد (**Payback Period**).
- معيار معدل العائد على رأس المال المستثمر (**ARR**).
- معيار صافي القيمة الحالية للتدفقات النقدية (**NPV**).
- معيار معدل العائد\الكلفة أو معيار دليل الربحية (**Benefit/Cost, PI**).
- معيار معدل العائد الداخلي للمشروع (**IRR**).

لا يوجد معيار واحد يمكن الاعتماد عليه فقط عند قبول أو رفض احد المشاريع، ولكل معيار مزاياه وعيوبه وظروف لتطبيقه وبذلك قد يصلح معيار معين للتقييم بينما يفشل أخر، فهنا يجب تطبيق مجموعة المعايير في ان واحد.

4.1.1. معيار فترة الاسترداد

الفترة الزمنية التي يمكن ان يسترد فيها المستثمر أمواله من خلال صافي التدفقات النقدية السنوية، والاسترداد هنا للتكاليف الاستثمارية (الاستثمار المبدئي).
وفترة الاسترداد تمثل الفترة الزمنية اللازمة لتساوي صافي التدفقات النقدية السنوية بالاستثمار المبدئي.

$$\text{معيار فترة الاسترداد} = \frac{\text{الاستثمار المبدئي}}{\text{متوسط صافي التدفقات النقدية السنوية}}$$

مثال تطبيقي رقم (12)

التكاليف الاستثمارية (الاستثمار المبدئي) لمشروع ما تصل إلى 110,000 دولار وان متوسط صافي التدفقات النقدية السنوية في هذا النوع من الاستثمار يصل إلى 18,000 دولار.

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$$\text{معيار فترة الاسترداد} = \frac{\text{الاستثمار المبدئي}}{\text{متوسط صافي التدفقات النقدية السنوية}}$$

$$= \frac{110,000}{18,000} = 6.1 \text{ سنوات}$$

مزايا معيار فترة الاسترداد:

- يتميز بالبساطة وسهولة الحساب حيث يعتبر من أكثر المعايير استخداما وخصوصا للمشاريع الاستثمارية قصيرة الأجل وهو مفضل لدى جهات التمويل والتي يهمها استرداد أموالها في اقل فترة زمنية من منظور الكفاءة في اقتصاديات توظيف وتشغيل الأموال.

- يعطي مؤشرا مبدئيا وسريعا فيما إذا كان المشروع الاستثماري يستحق المزيد من البحث والدراسة.
- يحقق قدرا من الأمان للمشاريع التي تتأثر أعمالها بالتقلبات الاقتصادية والتكنولوجية والفنية.
- يبين مستوى السيولة المتدفق للمشروع في كل سنة من سنوات تشغيل المشروع قبل استرداد كامل قيمة الاستثمار.
- مؤشر يقيس مستوى المخاطرة في المشروع حيث كلما امتد زمن المشروع كلما ازدادت مخاطر الاستثمار بشكل عام.

عيوب معيار فترة الاسترداد:

- لا يأخذ القيمة الحالية للنقود في الاعتبار وبالتالي قد ينطوي على نوع من الخداع وعدم الدقة حيث يتجاهل تغير الأسعار في المستقبل وتأثيرها على صافي العائد على الاستثمار.
- يتجاهل التدفقات النقدية التي يمكن ان تتحقق بعد فترة الاسترداد على اعتبار ان قسم من المشاريع قد تحقق عائد منخفض في سنوات التشغيل الأولى ويتصاعد في السنوات الأخيرة.
- يتجاهل القيمة التخريدية للمشروع في نهاية عمره الافتراضي حيث تمثل إيرادا وتدفقا نقديا.
- يهتم بالسيولة على حساب الاهتمام بالربحية.

<u>مثال تطبيقي رقم (13)</u>

تتساوى البدائل المبدئية الاستثمارية التالية بينما تختلف في صافي التدفقات النقدية السنوية (الأرباح) وفترات الاسترداد، حيث تشير البيانات إلى ان البديل (ص) هو الأفضل من منظور معيار فترة الاسترداد من دون النظر إلى إجمالي الأرباح المتحققة.

البدائـــــل / التدفقـــات	س	ص	ع
الاستثمارات المبدئية	200000	200000	200000
متوسط صافي التدفقات النقدية السنوية	40000	80000	20000
فترة الاسترداد	5	2.5	10
العمر الافتراضي	8	2.5	20
إجمالي التدفقات النقدية	**320000**	**200000**	**400000**

4.1.2. معيار معدل العائد المتوسط على رأس المال المستثمر ARR

يستخدم لمعرفة جدوى المشروع الاستثماري من خلال مقارنة عائد المشروع بعائد الفرصة البديلة والمتمثلة بسعر الفائدة في السوق. كما يمكن استخدامه أيضا للاختيار من بين عدة بدائل وتتم المفاضلة على أساس مقارنة المعدلات واختيار أعلى المعدلات شريطة ان يكون هذا المعدل أعلى من عائد الفرصة البديلة.

$$\text{معيار معدل العائد المتوسط على الاستثمار المبدئي} = \frac{\text{متوسط صافي التدفقات السنوية (الربح}^{5}\text{)}}{\text{الاستثمار المبدئي}} \times 100$$

[5] بعد خصم الضرائب والاهلاك

مثال تطبيقي رقم (14)

إذا كان صافي التدفقات النقدية لكل من البديلين X و Y على النحو التالي (بالدولار).

السنوات	البديل (X)	البديل (Y)
1	6,000,000	5,000,000
2	7,000,000	8,000,000
3	8,000,000	13,000,000
4	3,000,000	6,000,000
5	5,000,000	4,000,000

وكانت التكاليف الاستثمارية (الاستثمار المبدئي) لكل بديل هي 24,000,000 دولار، فأيهما تختار إذا كنت بصدد دراسة جدوى لكل منهما علماً بأن سعر الفائدة في السوق هو 11% .

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بالنسبة للبديل (X)

صافي التدفقات النقدية السنوية (الربح السنوي) = $\frac{6 + 7 + 8 + 3 + 5}{5}$ متوسط

= $\frac{29}{5}$ = 5.8 مليون دولار

معيار معدل العائد المتوسط على رأس المال المستثمر (ARR) = $\frac{5.8}{24}$ X 100%

= 24.2 %

بالنسبة للبديل (Y)

متوسط صافي التدفقات النقدية السنوية (الربح السنوي) = $\frac{4 + 6 + 13 + 8 + 5}{5}$

= $\frac{36}{5}$ = 7.2 مليون دولار

معيار معدل العائد المتوسط على رأس المال المستثمر (ARR) = $\frac{7.2}{24}$ X 100%

= 30 %

وبالتالي فالبديل الثاني (Y) أفضل من البديل الأول (X) طبقاً لمعيار معدل العائد المتوسط.

مزايا معيار معدل العائد المتوسط على رأس المال:

- سهولة الحساب والفهم
- يأخذ بنظر الاعتبار عامل الربحية المتوقعة من الاستثمار الأمر الذي أهمله معيار فترة الاسترداد.
- تقييم أداء المشروع من خلال العائد السنوي على الوحدة من رأس المال فيما يعرف بإنتاجية رأس المال مقارنة بتكلفة الوحدة من رأس المال المستثمر وقدرة المشروع على توفير مصادر التمويل.

عيوب معيار معدل العائد المتوسط على رأس المال:

- يتجاهل القيمة الزمنية للنقود وبالتالي لا يأخذ بعين الاعتبار تقلبات الأسعار وهو يشترك في ذلك مع معيار فترة الاسترداد.
- يساوي بين المشاريع ذات المعدلات المتساوية من العائد وإن اختلفت تدفقاتها النقدية من حيث توقيت حدوثها حيث تكون المشاريع ذات التدفقات النقدية في السنوات الأولى أفضل وذلك بسبب إمكانية إعادة استثمار تلك التدفقات خلال سنوات التشغيل.
- يتجاهل المدة الزمنية للمشاريع في موضوع المفاضلة بين المشاريع البديلة حيث ان بعض المشاريع قصيرة الأجل قد تعطي معدل عائد سنوي متساوي مع مشاريع طويلة الأجل وهذه الأخيرة أفضل كونها تعطي تدفقا لمدة أطول.

4.1.3. معيار صافي القيمة الحالية للتدفقات النقدية (NPV)

جاء هذا المعيار ليعالج أهم عيوب المعيارين السابقين للتقييم وهما معيار فترة الاسترداد ومعيار معدل العائد المتوسط على رأس المال المستثمر، حيث يأخذ معيار صافي القيمة الحالية للتدفقات النقدية والتغير في قيمة النقود الزمنية في الاعتبار، ومن ثم ينظر إلى فترة حياة المشروع ككل. معيار صافي القيمة الحالية (**NPV**) لتدفقات المشروع هو الفرق بين القيمة الحالية للتدفقات النقدية التي ستتحقق على مدى عمر المشروع وبين قيمة الاستثمار في بداية حياة المشروع. ويتحدد صافي القيمة الحالية للمشروع الاستثماري بطرح القيمة الحالية للتدفقات النقدية الخارجة من القيمة الحالية للتدفقات النقدية الداخلة.

معيار صافي القيمة الحالية للتدفقات النقدية

(**NPV**) = إجمالي القيمة الحالية لصافي التدفقات السنوية ـ الاستثمار المبدئي

ويحسب بطرح التدفقات النقدية الخارجة من التدفقات النقدية الداخلة للحصول على صافي التدفقات النقدية ويتم خصم صافي التدفقات النقدية بسعر خصم معين ثم يطرح مجموع صافي قيمة التدفقات النقدية من الاستثمار المبدئي.هنالك ثلاثة احتمالات في حالة استخدام معيار صافي القيمة الحالية (**NPV**) للتدفقات النقدية لتقييم المشاريع الاستثمارية وهي على النحو التالي:

أولا: يشير إلى ان مجموع صافي القيمة الحالية للتدفقات النقدية يكون رقماً **موجباً**

(**NPV**) > **صفر** أي ان ناتج الطرح لمجموع صافي القيمة الحالية للتدفقات النقدية عبر عمر المشروع مطروحاً من الاستثمارات المبدئية (التكاليف الاستثمارية) يكون اكبر من الصفر[6] وبالتالي فإن المشروع الاستثماري في هذه الحالة يكون له ربحية اقتصادية ومن ثم له جدوى ويكون مقبولا طبقاً لهذا المعيار.

ثانياً: يشير إلى ان مجموع صافي القيمة الحالية للتدفقات النقدية تكون رقماً **سالباً**

[6] أي يحقق عائد اكبر من العائد المطلوب كحد ادنى

(NPV) < صفر أي ان نـاتج الطـرح لمجمـوع صـافي القيمـة الحاليـة للتـدفقات النقديـة عبـر عمـر المشـروع مطروحـاً مـن الاسـتثمارات المبدئيـة (التكـاليف الاسـتثمارية) يكـون أقـل مـن الصـفر أي بالسالب وبالتالي فإن المشروع الاستثماري في هذه الحالة لا يكون له ربحية اقتصادية ومن ثم ليس له جدوى ويكون غير مقبولا ومرفوضاً طبقاً لهذا المعيار.

ثالثاً: يشير إلى ان مجموع صافي القيمة الحالية للتدفقات النقدية يكون **مساوياً للصفر**

(NPV) = صفر أي القيمتان متساويتان وبالتـالي فـإن المشـروع الاسـتثماري فـي هـذه الحالـة يحقـق العائـد الحـدي المتوقـع فقـط الـذي يكفـي لتغطيـة تكلفـة الأمـوال لا أكثـر ولا يترتـب عليـه أي عائـد إضـافي، ويتوقـف قبـول أو رفـض المشـروع فـي هـذه الحالـة علـى عـدة اعتبـارات أخـرى.

القيمة الحالية (القيمة المخفضة أو سعر الخصم) من الدولار والمتاحة لعدد السنوات في المستقبل:

$$\frac{1}{(1+r)^T} =$$

R=سعر الخصم

T=السنة التي يراد حساب العائد لها

وينطبق ذلك على الفوائد والتكاليف. فان صافي القيمة الحالية من المشروع هو المبلغ من القيمة الحالية **PV** للفوائد مطروح منه القيمة الحالية للكلفة.

مثال تطبيقي رقم (15)

هناك بديلان استثماريان معروضان، عمر كل مشروع 5 سنوات وكانت البيانات المتاحة لكل بديل على النحو التالي بما في ذلك معدل خصم 10%.

السنوات	صافي التدفقات النقدية		القيمة الحالية للدولار عند سعر خصم 10%
	مشروع (M)	مشروع (N)	
0	(80,000)	(70,000)	1.00
1	20,000	16,000	0.909
2	20,000	21,000	0.826
3	30,000	20,000	0.751
4	30,000	24,000	0.683
5	50,000	30,000	0.621

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يمكن إيضاح كيفية حساب معيار صافي القيمة الحالية للمشروعين (M) و (N) من خلال الجدول التالي:

السنة	القيمة الحالية للدولار بسعر خصم 10% سنوياً	المشروع (M)		المشروع (N)	
		صافي التدفق النقدي	القيمة الحالية لصافي التدفق النقدي	صافي التدفق النقدي	القيمة الحالية لصافي التدفق النقدي
1	0.909	20,000	[7]18,180	16,000	14,544
2	0.826	20,000	16,520	21,000	17,346
3	0.751	30,000	22,530	20,000	15,020
4	0.683	30,000	20,490	24,000	16,392
5	0.621	50,000	31,050	30,000	18,630
مجموع صافي القيمة الحالية للتدفقات النقدية عبر سنوات التشغيل ـ الاستثمار المبدئي			108,770 80,000		81,932 70,000
			28,770		**11,932**

ويتضح من الجدول السابق ان البديل (M) يحقق صافي قيمة حالية اكبر من المشروع (N) وبالتالي يكون الاختيار للمشروع (M) الذي يحقق اكبر قيمة موجبة لصافي القيمة الحالية.

مزايا معيار صافي القيمة الحالية للتدفقات النقدية:

- ميزة مهمة جدا ألا وهي مراعاة التغير في القيمة الزمنية للنقود حيث يأخذ في الحسبان تغير الأسعار وبالتالي يبين مدى قدرة المشروع على تغطية التكاليف وتحقيق عائد إضافي.
- يأخذ بالاعتبار المكاسب النقدية طوال عمر المشروع وبالتالي فهذا المعيار أفضل بالمقارنة مع معيار فترة الاسترداد ومعيار معدل العائد المتوسط على رأس المال المستثمر.
- يفضل استخدامه عندما تكون التدفقات النقدية الداخلة تتمازج بين تدفقات نقدية موجبة وأخرى سالبة.
- يعكس قيمة البدائل الاستثمارية من خلال استخدام سعر الخصم والذي يمثل تكلفة رأس المال.

عيوب معيار صافي القيمة الحالية للتدفقات النقدية:

- لا يعطي ترتيبا دقيقا للمشاريع الاستثمارية في حالة اختلاف قيمة الاستثمار أو عمر المشروع.
- لا يفيد كثيرا في التعرف على إنتاجية الوحدة النقدية الواحدة من تكلفة الاستثمار وإنما يعطي القيمة المطلقة للدخل الصافي للمشروع خلال سنوات التشغيل وهو بالتالي يساوي بين مشروع تكلفته الاستثمارية مثلا 2 مليون دولار ومشروع تكلفته الاستثمارية 10 مليون دولار، وهي معضلة يساعد على حلها المعايير اللاحقة أي معيار معدل العائد \ الكلفة ومعيار معدل العائد الداخلي.
- اعتماد المعيار على سعر الخصم قد يفاقم من مشكلة المخاطر في تقييم المشاريع كون هذا المعيار يضيف متغيرا جديدا قابل لاحتمالات التغير، أي الدخول في مخاطر عدم التأكد.
- يتجاهل عوامل عدم التأكد وما يرتبط بها من مخاطر ذات تأثير على ربحية المشروع.

[7] 18,180 = 0.909 X 20,000

4.1.4. معيار معدل العائد \ الكلفة

يتعامل هذا المعيار مع القيمة الزمنية للنقود ويطلق على هذا المعيار أحيانا دليل الربحية **(Profitability Index)**، ونقطة الاختلاف بين هذا المعيار ومعيار صافي القيمة الحالية **(Net Present Value)** ان الأخير يحدد العائد الصافي للوحدة النقدية المستثمرة في حين ان معيار معدل العائد \ الكلفة يحدد العائد الإجمالي للوحدة النقدية المستثمرة، فمثلا إذا تم استثمار دولار واحد في مجال معين وحقق عائد صافياً قدره (0.25) دولار فذلك يشير إلى صافي القيمة الحالية، أما إذا كان الدولار المستثمر قد حقق (1.25) دولار فيعني ذلك ان الدولار المستثمر قد حقق عائد إجمالي يساوي 1.25 وهذا العائد الإجمالي يتكون من (الدولار الأصلي المستثمر + العائد الصافي).

ويمكن التعبير عن هذا المعيار بالصيغة التالية:

معيار معدل العائد\الكلفة= القيمة الحالية للتدفقات النقدية الداخلة / القيمة الحالية للتدفقات النقدية الخارجة (التكلفة الاستثمارية الأولية)

ويعتبر المشروع مقبول اقتصاديا إذا كانت النتيجة أكبر من واحد صحيح كما يعتبر المشروع مرفوض اقتصاديا إذا كانت النتيجة أصغر من واحد صحيح.

تحليل التكاليف والفوائد

تحليل التكاليف والفوائد تقدر قيمة الأموال من الفوائد والتكاليف لتحديد ما إذا كان المشروع له جدوى.

- **ينبغي ان تكون هناك وحدة مشتركة للقياس**
  بالإضافة إلى التضخم وعوامل أخرى يجب ان تؤخذ في الاعتبارفان الدولار المتاح بعد ست سنوات من الآن ليس كالدولار المتاح الآن لان هذا الدولار يمكن ان يستثمر ويحقق فائدة وقيمة اكبر في نهاية الفترة.

- **تحليل مردود الكلفة والفوائد يقيم العائد من حيث الأفضليات والاختيارات:**
  فعلى سبيل المثال: عندما يقرر ان يعيش الفرد اقرب إلى عمله وينفق 20 دولار إضافية يوميا أكثر من مكان ابعد ويحتاج إلى 20 دقيقة إضافية للوصول إلى مكان العمل والعودة، فمن الممكن ان يختار إنفاق 100 دولار إضافية خلال 5 أيام عمل في الأسبوع لتوفير الوقت مما يعني ان الوقت له قيمة تساوي دولار في الدقيقة الواحدة.

- **في بعض الأحيان يقتضي لقياس فائدة حياة الإنسان مثل فوائد بعض المشاريع التي تقلل من خطر الموت:**
  على سبيل المثال: تركيب الحواجز لتجنب الفيضان أو إنشاء مركز لعلاج الحالات الطبية الطارئة.

مثال تطبيقي رقم (16):

توفرت المعلومات التالية عن البدائل (أ، ب، ج)

المعلومات	البديل (أ)	البديل (ب)	البديل (ج)
الكلفة الاستثمارية الأولية	6,000	4,000	2,000
العمر الإنتاجي (سنة)	5	4	3
قيمة البديل في نهاية عمره الإنتاجي (كخردة)	1,500	1,000	1,400
التدفقات النقدية قبل الاندثار والضريبة	2,500	1,500	2,000

علما ان:

- سعر الخصم المستخدم هو 15%.
- تستخدم طريقة القسط الثابت في احتساب الاندثار السنوي.
- تقدر ضريبة الدخل بـ 20% من العائد السنوي.

المطلـــــــــــوب:

1. حدد أي من البدائل هو الأفضل ولماذا؟ وذلك باستخدام معيار معدل العائد \ الكلفة.
2. رتب البدائل حسب أفضليتها.
3. حدد أي من البدائل مقبول اقتصاديا ولماذا؟

الحـــــــل/ يتم إتباع الخطوات التالية:

- احتساب حصة الاندثار السنوي.
- احتساب متوسط العائد السنوي بعد خصم الضريبة واضافة الاندثار، وفي هذه الحالة لابد من استخدام نفس الأسلوب الذي تم اعتماده في معيار فترة الاسترداد.
- يتم استخدام نفس متوسط العائد السنوي ولجميع سنوات العمر الإنتاجي للبديل عدى السنة الأخيرة يضاف إليها قيمة الخردة ثم يتم خصم جميع التدفقات بالخصم المعطى من اجل تحويل القيم الجارية إلى قيم حالية.
- يتم تنظيم جدول أخر لاحتساب صافي القيمة الحالية.
- يتم استخراج معيار معدل العائد \ الكلفة ثم تتم الإجابة على الأسئلة المطروحة سابقا.

المعلومات	البديل (أ)	البديل (ب)	البديل (ج)
حصة الاندثار السنوي	1,500 - 6,000 ——— 5 900	1,000 - 4,000 ——— 4 750	1,400 - 2,000 ——— 3 200
التدفقات النقدية السنوية قبل الاندثار والضريبة - الاندثار السنوي	2,500 900	1,500 750	2,000 200
العائد السنوي الخاضع للضريبة - ضريبة الدخل 20%	1,600 320	750 150	1,800 360
متوسط العائد بعد الضريبة + الاندثار السنوي	1,280 900	600 750	1,440 200
متوسط صافي العائد السنوي	2,180	1,350	1,640

بعد ذلك ينظم جدول لتحويل التدفقات النقدية الجارية إلى قيم حالية

السنة	القيمة الحالية للدولار بخصم 15%	البديل (أ)		البديل (ب)		البديل (ج)	
		تدفق نقدي	قيمة حالية	تدفق نقدي	قيمة حالية	تدفق نقدي	قيمة حالية
1	0.870	2,180	1,896.6	1,350	1,174.5	1,640	1,426.8
2	0.756	2,180	1,648.08	1,350	1,020.6	1,640	1,239.84
3	0.658	2,180	1,434.44	1,350	888.3	1,400 + 1,640	2,000.32
4	0.572	2,180	1,246.96	1,000 + 1,350	1,344.2	—	
5	0.497	1,500 + 2,180	1,828.96	–	-	—	
مجموع القيمة الحالية للتدفقات النقدية الداخلة			8,055.04		4427.6		4,666.96
مجموع القيمة الحالية للتدفقات النقدية الخارجة			6,000		4,000		2,000
صافي القيمة الحالية الداخلة ـــــــــ الخارجة =			8,055.04 — 6,000 1.342		4427.6 — 4,000 1.107		4,666.96 — 2,000 2.333
البدائل حسب الأفضلية (المطلوب الثاني)			الثاني		الثالث		الأول

- يعتبر البديل (ج) هو الأفضل لأنه حقق عائد إجماليا على الدولار المستثمر أكبر من البدائل الأخرى **(وهو المطلوب الأول).**
- تعتبر جميع البدائل مقبولة اقتصاديا، لأنها حققت عائد على الدولار المستثمر أكبر من الواحد الصحيح **(وهو المطلوب الثالث).**

<u>مثال تطبيقي رقم (17):</u>

توفرت المعلومات التالية عن المشاريع (أ، ب)

المعلومات	المشروع (أ)	المشروع (ب)
الكلفة الاستثمارية الأولية	40,000	30,000
قيمة البديل في نهاية عمره الإنتاجي (كخردة)	5,000	3,000
العمر الإنتاجي (سنة)	4	3
التدفقات النقدية السنوية كانت بالشكل التالي:		
1	15,000	10,000
2	12,000	15,000
3	10,000	12,000
4	8,000	–

علما ان سعر الخصم المستخدم هو 12%

المطلـــــــوب:

1. حدد أي من المشروعين هو الأفضل، ولماذا؟ وذلك باستخدام معيار معدل العائد\الكلفة (أو دليل الربحية).
2. رتب المشاريع حسب أفضليتها.
3. أيهما يعتبر مقبول اقتصاديا، ولماذا؟

الحـــــــــــل/

السنة	القيمة الحالية للدولار بخصم 12%	المشروع (أ)		المشروع (ب)	
		التدفق النقدي	القيمة الحالية	التدفق النقدي	القيمة الحالية
1	0.893	15,000	13,395	10,000	8,930
2	0.797	12,000	9,564	15,000	11,955
3	0.712	10,000	7,120	15,000=3000+12,000	10,680
4	0.636	13,000=5000+8000	8,268	–	–
القيمة الحالية للتدفقات النقدية الداخلة			38,347		31,565
معيار معدل العائد \ الكلفة القيمة الحالية للتدفقات النقدية الداخلة القيمة الحالية للتدفقات النقدية الخارجة =			38,347 40,000 0.958		31,565 30,000 1.052
حسب الأفضلية **(المطلوب الثاني)**			الثاني		الأول

- يعتبر المشروع (ب) هو الأفضل، لأنه حقق عائد إجمالي على الدولار المستثمر اكبر من المشروع (أ)، وهو المطلوب الأول.
- يعتبر المشروع (ب) مقبول اقتصاديا لأنه حقق عائد إجمالي على الدولار المستثمر اكبر من الواحد الصحيح، وهو المطلوب الثالث.

مزايا معيار معدل العائد \ الكلفة:

- يعكس فعالية وإنتاجية الاستثمار حيث يقيس العائد الاجمالي للوحدة النقدية الواحدة من رأس المال المستثمر وبالتالي فهذا المعيار يعد مؤشرا جيدا لقياس الكفاءة الإنتاجية للمشروع.
- يستخدم كمعيار مرجح لمعيار صافي القيمة الحالية لغرض ترتيب المشاريع الاستثمارية التي تحقق صافي قيمة حالية موجبة وبالتالي اختيار المشروع صاحب العائد الأعلى.
- يراعي التغير في القيمة الزمنية للنقود.

عيوب معيار معدل العائد \ الكلفة:

- لا يعالج مشكلة الخطر وعدم التأكد التي تصاحب التدفقات النقدية الداخلة والخارجة.
- يعتمد تطبيق المعيار على معامل أو سعر الخصم المناسب وذلك لخصم التدفقات النقدية مما يعني ان الخطأ في تقدير هذا السعر أو العامل سيكون له أثر على صناعة القرار الاستثماري.

4.1.5. معيار معدل العائد الداخلي:

معيار معدل العائد الداخلي (IRR) يعبر عن الحد الأدنى من العائد على رأس المال المستثمر الذي يحتاجه المشروع، ويعرف بأنه سعر الخصم الذي تتساوى عنده قيمة الاستثمار المبدئي مع القيمة الحالية للتدفقات النقدية السنوية طوال عمر المشروع الافتراضي.

ويعرف أيضا بأنه سعر الخصم الذي يجعل صافي القيمة الحالية للمشروع مساوية للصفر، حيث تتعادل عنده القيمة الحالية للتدفقات النقدية الداخلة مع القيمة الحالية للتدفقات الخارجة ومن ثم فإن معدل العائد الداخلي للمشروع هو المعدل الذي يجعل القيمة الحالية الصافية للمشروع تساوي صفر.

ان معدل العائد الداخلي للاستثمار يقارن بسعر الفائدة في السوق أو المتوسط المرجح لتكلفة الأموال المستخدمة في تمويل المشروع أو معدل العائد الداخلي للمشاريع المماثلة، فإذا كان أعلى فالمشروع الاستثماري يصبح له جدوى وله ربحية والعكس صحيح.

يقاس معدل العائد الداخلي للمشروع بطريقة التجربة والخطأ (**Trial & Error**)، ويتطلب تطبيق هذه الطريقة تحديد التدفقات النقدية الخارجة والتي تمثل في هذه الحالة الاستثمار المبدئي اللازم لتنفيذ المشروع، وتقدير صافي التدفقات النقدية السنوية خلال عمر المشروع ثم محاولة إيجاد معدل العائد الذي تتساوى عنده القيمة الحالية للاستثمار المبدئي مع القيمة الحالية لصافي التدفقات النقدية السنوية.

وللوصول إلى معدل العائد الداخلي بصورة أكثر دقة يمكن استخدام معادلة استكمال رياضي لتحديد سعر الخصم الذي يجعل صافي القيمة الحالية مساوية للصفر من خلال الصيغة التالية[8]:

معدل العائد الداخلي =

$$\text{سعر الخصم الأدنى} + \frac{\text{صافي القيمة الحالية عند سعر الخصم الأدنى}}{\text{المجموع المطلق لصافي القيمة الحالية عند سعر الخصم}} \times \text{الفرق بين سعر الخصم}$$

<u>مثال تطبيقي رقم (18)</u>

البيانات الخاصة بأحد المشاريع الاستثمارية وضحت قيمة الاستثمارات المبدئية 13,000 دولار، والعمر الافتراضي للمشروع 3 سنوات، وقدرت صافي التدفقات النقدية السنوية على النحو التالي:

السنوات	صافي التدفقات النقدية
1	5,000
2	5,000
3	6,000

والمطلوب حساب معدل العائد الداخلي علماً بإن سعر الفائدة السائد في السوق 16% مع اتخاذ قرار بقبول أو رفض المشروع

<u>الحـــــــل</u>

ان صافي التدفقات النقدية السنوية للمشروع غير متساوية[9] ومن ثم فإننا سنقوم باستخدام طريقة التجربة والخطأ للوصول إلى معدل العائد الداخلي للمشروع.

[8] معظم برامج الحاسب الالي حاليا تتضمن عملية حساب معدل العائد الداخلي مما يسهل عملية حسابة

السنوات (1)	صافي التدفقات النقدية السنوية (2)	سعر الخصم عند 16% (3)	القيمة الحالية عند سعر الخصم 16% 3 X 2 = (4)	سعر الخصم عند 14% (5)	القيمة الحالية للتدفقات عند سعر خصم 14% X 2 = (6) 5	سعر الخصم 10% (7)	القيمة الحالية للتدفقات عند سعر خصم 10% X 2 = (8) 7
1 2 3	5,000 5,000 6,000	0.862 0.743 0.641	4,310 3,715 3,846	0.877 0.769 0.675	4,385 3,845 4,050	0.909 0.826 0.751	4,545 4,130 4,506
إجمالي صافي القيمة الحالية			11,871		12,280		13,181
الاستثمار المبدئي			13,000		13,000		13,000
صافي القيمة الحالية (إجمالي صافي القيمة الحالية ـ الاستثمارات المبدئية)			1129 –		720 –		181

افترض ان سعر الخصم 10% أعطى +181 وهنا نقترب من الهدف المطلوب ويعني ذلك ان معدل العائد الداخلي سيكون اكبر من 10% واقل من 14% ، أي انه محصور بين هذين المعدلين.

مزايا معيار معدل العائد الداخلي:

- تتوافر فيه الخصائص الأساسية لمعيار التقييم السليم حيث يتميز هذا المعيار بالموضوعية إلى ابعد الحدود وبالتالي يعتبر مقياسا دقيقا للربحية ويعبر بوضوح عن قوة الإيراد في المشروع.
- يمكن استخدامه بدرجة عالية من الاطمئنان في ترتيب المشاريع من حيث درجة ربحيتها وجدواها الاقتصادية.
- يراعي التغير في القيمة الزمنية للنقود.
- يعبر عن ربحية المشروع الاستثماري كنسبة مئوية مما يتيح إمكانية المتابعة ومقارنة التنفيذ الفعلي بالتقديرات عند الدراسة.
- يبين مدى المخاطرة التي يتعرض لها المشروع من خلال حساب مدى الفرق بين العائد الداخلي وتكلفة رأس المال.
- يتفادى مشكلة اختيار سعر الخصم الملائم لخصم التدفقات النقدية السنوية للوصول إلى صافي القيمة الحالية والتي شكلت تحديا لمعيار صافي القيمة الحالية.

عيوب معيار معدل العائد الداخلي:

- يستلزم بذل جهد كبير في حالة عدم تساوي التدفقات النقدية السنوية عبر عمر المشروع إلا ان هذا العيب ينعدم في ظل استخدام الحاسبات الآلية أو البرامج الحسابية.
- يفترض إعادة استثمار التدفقات النقدية الداخلة بمعدل يساوي معدل العائد الداخلي وهو أمر يصعب تحقيقه في ظل اعتبارات عدم التأكد.
- في حالة محدودية الموارد الاستثمارية فأن المعيار يكون اقل جودة في اختيار المشاريع الاستثمارية مقارنة بمعيار دليل الربحية أو العائد\الكلفة، لكنه يبقى متفوقا على معيار صافي القيمة الحالية في اختيار المشاريع الاستثمارية ذات محدودية الموارد أنفة الذكر.

[9] حيث يحبذ استخدام طريقة التجربة والخطأ في حساب معدل العائد الداخلي عندما تكون صافي التدفقات النقدية السنوية للمشروع غير متساوية سنوياً وهي الحالة الغالبة.

نستنتج ان معايير تقييم المشاريع لقياس الربحية التجارية في ظل ظروف التأكد لا تعني بالضرورة ان تكون متنافسة مع بعضها البعض أو بديلة، ولكن يمكن ان تكون مكملة يتمم احدهما الأخر حيث ان لكل منها دلالته الخاصة وبناء على ذلك فأن استخدام أكثر من معيار يساعد في عملية اتخاذ القرار السليم في جدوى الاستثمار من عدمه.

4.2. تقييم المشاريع بمعايير الربحية التجارية في ظل ظروف عدم التأكد:

فيما جاء ذكره انفاً اعتمدت المناقشات على فرضية التأكد أو اليقين بأن التدفقات النقدية للمشاريع المقترحة تتطابق مع الواقع العملي الذي يتحقق خلال عمر المشروع، غير ان مثل هذا التطابق يندر تحققه في واقع الحياة العملية بسبب صعوبة استقراء المستقبل بشكل دقيق وعدم توفر المعلومات والبيانات المطلوبة وصعوبة استقراء السياسات الاقتصادية والمالية خصوصا في البلدان النامية. ومن هنا فأن المشاريع تواجه حالة من عدم التأكد أو عدم اليقين.
وبالرغم من ذلك فهنالك طرق وأساليب علمية من شأنها التخفيف أو التقليل من شدة تأثير الحدث أو عدم اليقين ومن بين هذه الأساليب نختار التالي:

4.2.1. أسلوب تحليل الحساسية (Sensitivity Analysis)

مفهوم تحليل الحساسية

ان تحليل الحساسية يبين كيف يمكن ان تتأثر قيمة المعيار المستخدم في عملية التقييم (كمعيار صافي القيمة الحالية أو معدل العائد الداخلي) من خلال تغير يحدث في قيمة احد المتغيرات المستخدمة في قياس صافي التدفقات النقدية مثلا (التغير في حجم الاستثمارات، سعر بيع الوحدة، تكلفة الوحدة المتغيرة أو أسعار الخصم المستخدمة). ويعتبر هذا الأسلوب من أكثر الأساليب شيوعاً واستخداماً سواء على مستوى الدراسات النظرية أو التطبيقية في مجال دراسات الجدوى وتقييم المشاريع وبخاصة في ظل ظروف عدم التأكد. عند استخدام أسلوب تحليل الحساسية لا بد من الأخذ بعين الاعتبار المسائل التالية:

- تحديد المتغيرات الرئيسية التي تؤثر على المعيار أو المعايير المستخدمة في التقييم.
- تحديد العلاقة الرياضية بين المتغيرات.
- تقدير القيم الأكثر تفاؤلاً أو الأكثر تشاؤماً لتلك المتغيرات.
- حساب المعايير المستخدمة في عملية التقييم تحت ظروف عدم التأكد.
- لا بد من التركيز على تقدير التقييم الأكثر تفاؤلاً والأكثر تشاؤماً لقيم المتغيرات المحددة وليس كل احتمالات تلك القيم.

وبناء على هذا التحليل يمكن لصانع القرار ان يسأل عدة أسئلة مثلاً:
- ماذا يحدث إذا انخفض سعر بيع الوحدة عما هو متوقع؟
- ماذا يحدث إذا ارتفعت تكلفة الوحدة المتغيرة عن توقع معين؟
- ماذا يحدث إذا زادت كلفة الاستثمار المبدئية عن التقدير المتوقع؟
- ماذا يحدث إذا تأخر تنفيذ المشروع؟

ونفرق في هذا الخصوص بين الحالات التالية:

- **حساسية ربحية المشروع تجاه معدل الخصم:**
من المتغيرات الأساسية والتي تؤثر على جدوى المشروع هو معدل الخصم حيث إذا أخذنا صافي القيمة الحالية كمؤشر لقياس الربحية فأننا نلاحظ ان ارتفاع معدل الخصم يؤثر سلبا على صافي القيمة الحالية، وبالتالي يتعين إجراء تحليل الحساسية لمعرفة درجة تأثر صافي القيمة الحالية بارتفاع معدل الخصم.

مثال تطبيقي رقم (19):

لنفترض ان البيانات المعطاة في الجدول التالي خاصة بمشروع عمره الافتراضي خمس سنوات:

السنة	الإيرادات المتوقعة	التكاليف المتوقعة	صافي العائد
0	صفر	100	100 –
1	200	100	100
2	300	150	150
3	350	200	150
4	400	250	150
5	600	300	300

فإذا علمنا ان الحد الأدنى الذي لا يمكن ان ينخفض معدل الخصم دونه هو 10% وان الحد الأقصى الذي لا يمكن ان يتجاوزه معدل الخصم هو 25%

المطلـــــوب:

تحديد درجة حساسية صافي القيمة الحالية للتغير في معدل الخصم

الحـــــل:

1. نبدأ اولاً بحساب صافي القيمة الحالية عند معدل خصم 10%
2. ثم نعيد حساب صافي القيمة الحالية عند معدل خصم 25%
3. نقارن نتيجة الخطوة الأولى مع الخطوة الثانية ونحدد ما إذا كان المشروع ما زال مربحاً في ظل معدل الخصم المرتفع أم لا.

السنة	صافي العائد	معدل خصم 10%		معدل خصم 25%	
		معامل الخصم	القيمة الحالية	معامل الخصم	القيمة الحالية
0	100 –	1	100 –	1	100 –
1	100	0.91	91	0.8	80
2	150	0.83	124.5	0.64	96
3	150	0.75	112.5	0.51	76.5
4	150	0.68	102	0.41	61.5
5	300	0.62	186	0.33	99
صافي القيمة الحالية			**516**		**313**

ويتضح من الجدول ان المشروع ما زال مربحاً بالرغم من ارتفاع معدل الخصم إلى 25% حيث يحقق صافي قيمة حالية موجبة = 313 .

- **حساسية ربحية المشروع للتغييرات في الإيرادات والتكاليف:**
ان تغير الإيرادات والتكاليف يعتبر من المتغيرات الأساسية أيضا والتي تؤثر على ربحية المشروع، وبالتالي يتعين اختبار درجة حساسية الربحية للانخفاض في الإيرادات الكلية بنسبة معينة أو للارتفاع في التكاليف الكلية بنسبة معينة أو الاثنين معاً.

مثال تطبيقي رقم (20):

ويمكن الاستعانة ببيانات الجدول السابق، لافتراض:
- ارتفاع التكاليف بنسبة 10%
- وانخفاض الإيراد الكلي بنسبة 10%

الحـــــــــل:

صافي العائد = الإيراد الكلي – التكاليف الكلية

السنوات	قبل التغير			بعد التغير				
	الإيراد الكلي (1)	التكاليف الكلية (2)	صافي العائد (2 –1)	الإيراد الكلي بعد انخفاضه بنسبة 10% (3)	التكاليف الكلية بعد ارتفاعها بنسبة 10% (4)	صافي العائد بعد انخفاض الإيراد فقط (2 – 3)	صافي العائد بعد ارتفاع التكاليف فقط (4 – 1)	صافي العائد بعد انخفاض الإيراد وارتفاع التكاليف (4 – 3)
0	0	100	100 –	صفر	110	100 –	110 –	110 –
1	200	100	100	180	110	80	90	70
2	300	150	150	270	165	120	135	105
3	350	200	150	315	220	115	130	95
4	400	250	150	360	275	110	125	85
5	600	300	300	540	330	240	270	210

وعند افتراض ثبات معدل الخصم عند مستوى 10% يمكن تحديد صافي القيمة الحالية بعد وقبل التغير:

السنوات	معامل الخصم (معدل 10%) (5)	القيمة الحالية قبل التغير (5) *(2-1)	القيمة الحالية بعد انخفاض الإيراد فقط (5) *(2-3)	القيمة الحالية بعد ارتفاع التكاليف فقط (5) *(4-1)	القيمة الحالية بعد ارتفاع التكاليف وانخفاض الإيراد (5) *(4-3)
0	1	100 –	100 –	110 –	110 –
1	0.91	91	72.8	81.9	63.7
2	0.83	124.5	99.6	112.1	87.2
3	0.75	112.5	86.3	97.5	71.3
4	0.68	102	74.8	85	57.8
5	0.62	186	148.8	167.4	130.2
صافي القيمة الحالية		**516**	**382.3**	**433.9**	**300.2**

ويتضح من الجدول أعلاه ان المشروع مربح بالرغم مما افترضناه من ارتفاع في التكاليف وانخفاض في الإيرادات، وهذا يعني ان احتمالات نجاح المشروع تحت هذه الظروف السيئة مازال قائماً.

- **حساسية ربحية المشروع للتأخير في التنفيذ:**

يمكن حساب درجة حساسية ربحية المشروع بسبب التأخر في التنفيذ عن طريق افتراض تأخر تولد الإيرادات فترة معينة من الوقت ولتكن سنتين ثم حساب صافي القيمة الحالية ومقارنتها بصافي القيمة الحالية في حالة عدم حدوث تأخير.

مثال تطبيقي رقم (21):

السنوات	الإيراد الكلي	التكاليف الكلية	صافي العائد	معامل الخصم (10%)	صافي القيمة الحالية
0	صفر	50	50 -	1	50 -
1	صفر	50	50 -	1	50 -
2	200	100	100	0.91	91
3	300	150	150	0.83	124.50
4	350	200	150	0.75	112.50
5	400	250	150	0.68	102
المجموع					**330**

يتضح من الجدول أعلاه ان زيادة فترة إنشاء المشروع بنسبة 100% (من سنة إلى سنتين) يؤدي إلى انخفاض صافي القيمة الحالية من (516) إلى (330) مع ثبات العوامل الأخرى.

4.3. المعايير التي تستخدم لقياس الربحية الاجتماعية:

4.3.1. معيار صافي القيمة المضافة ومعدل العائد الاجتماعي:

يمثل القيمة المضافة للمشروع بشكل عام وهو الفرق بين قيمة الإنتاج وقيمة مستلزمات الإنتاج (المخرجات والمدخلات)، وعند استخدام معيار صافي القيمة المضافة لأغراض التقييم الاجتماعي للمشروع، يجب التعامل مع المفاهيم التالية:

- إجمالي القيمة المضافة في أي سنة خلال العمر الافتراضي للمشروع
  = قيمة الإنتاج بسعر البيع – قيمة مستلزمات الإنتاج

- صافي القيمة المضافة في أي سنة خلال العمر الاقتصادي للمشروع
  = قيمة الإنتاج بسعر السوق – (قيمة مستلزمات الإنتاج + قسط الإهلاك)

- صافي القيمة المضافة لكل السنوات
  = إجمالي قيمة الإنتاج بسعر السوق – (مجموع قيمة مستلزمات الإنتاج + مجموع الإهلاك خلال العمر الافتراضي)

<u>مثال تطبيقي رقم (23):</u>

تبين عند دراسة جدوى احد المشاريع الاستثمارية ان بيانات المشروع كالتالي :

استثمارات المشروع:	700 مليون دينار
قيمة الإنتاج بسعر السوق:	900 مليون دينار
الأجور السنوية:	20 مليون دينار
تحويلات للخارج سنويا:	100 مليون دينار
قسط الإهلاك السنوي:	30 مليون دينار
مستلزمات الإنتاج:	450 مليون دينار

علما ان عمر المشروع 5 سنوات **والمطلوب:**

- تقدير إجمالي القيمة المضافة في أي سنة خلال عمر المشروع.
  = قيمة الإنتاج بسعر البيع – قيمة مستلزمات الإنتاج
  = 900 – 450 = 450 مليون دينار

- تقدير صافي القيمة المضافة في أي سنة خلال عمر المشروع.
  = قيمة الإنتاج بسعر السوق – (قيمة مستلزمات الإنتاج + قسط الإهلاك)
  = 900 – (450 + 30) = 420 مليون دينار

- تقدير صافي القيمة المضافة لكل سنوات عمر المشروع
  = إجمالي قيمة الإنتاج بسعر السوق – (مجموع قيمة مستلزمات الإنتاج + مجموع الإهلاك خلال العمر الافتراضي)
  = (5 X 900) – (5 X 450 + 5 X 30)
  = 4500 – (2250 + 150)
  = 4500 – 2400 = 2100 مليون دينار

4.3.2. معيار التوظف:

يحدد حجم العمالة الذي يساهم المشروع في توظيفها سواء كانت عمالة ماهرة أو غير ماهرة وسواء كانت عمالة مباشرة أو غير مباشرة.

يهتم معيار التوظف بمعرفة متوسط أجر العامل الوطني مقارنة بمتوسط أجر العامل الأجنبي، وترتفع درجة الربحية الاجتماعية كلما ارتفعت نسبة العمالة الوطنية إلى إجمالي العمالة الكلية للمشروع، وكلما ارتفع متوسط نصيب العامل الوطني من متوسط الأجور الكلية.

أ. **معيار التوظف الإجمالي لقياس الأثر على العمالة =**

$$\frac{\text{العدد الكلي للعمالة الجديدة}}{\text{الاستثمارات الكلية (مباشرة وغير مباشرة)}}$$

ويشير هذا المعيار إلى ما يترتب على استثمار مبلغ معين من فرص عمل جديدة سواء عمالة مباشرة أو غير مباشرة

ب. **معيار التوظف الجزئي لقياس الأثر على العمالة المباشرة =**

$$\frac{\text{عدد العمالة المباشرة}}{\text{الاستثمارات المباشرة (داخل المشروع)}}$$

ويشير هذا المعيار إلى ما يترتب على استثمار مبلغ معين من فرص عمل جديدة للعمالة المباشرة سواء كانت ماهرة أو غير ماهرة.

ج. **معيار التوظف الجزئي لقياس الأثر على العمالة غير المباشرة =**

$$\frac{\text{عدد العمالة غير المباشرة}}{\text{الاستثمارات غير المباشرة}}$$

ويشير هذا المعيار إلى ما يترتب على استثمار مبلغ معين في المشاريع الأخرى المرتبطة من فرص عمل جديدة سواء في المشاريع التي تزود المشروع الأصلي بالمدخلات أو المشاريع التي تستخدم مخرجات المشروع الأصلي كخدمات.

د. **معيار التوظف الجزئي لقياس الأثر على العمالة الماهرة =**

$$\frac{\text{عدد العمالة الماهرة}}{\text{الاستثمارات الكلية}}$$

ويشير هذا المعيار إلى ما يترتب على استثمار مبلغ معين من فرص عمل جديدة للعمالة الماهرة سواء مباشرة أو غير مباشرة.

مثال تطبيقي رقم (24)

توفرت المعلومات التالية عن مشروع يدرس جدواه ويتم تقييمه على مستوى اقتصاد البلد من خلال قياس أثر المشروع على العمالة:

#	البيان	إجمالي العمالة	عمالة ماهرة	عمالة غير ماهرة	التكلفة الاستثمارية
1	المشروع الجديد	500	300	200	400,000
2	مشاريع تزود المشروع الجديد بالمدخلات	300	200	100	50,000
3	مشاريع تستخدم مخرجات المشروع الجديد	200	100	100	50,000
	الإجمالي	1,000	600	400	500,000

المطلوب حساب ما يلي:

- معيار التوظف الإجمالي لقياس الأثر على العمالة
- معيار التوظف الجزئي لقياس الأثر على العمالة المباشرة
- معيار التوظف الجزئي لقياس الأثر على العمالة غير المباشرة
- معيار التوظف الجزئي لقياس الأثر على العمالة الماهرة
- معيار التوظف الجزئي لقياس الأثر على العمالة غير الماهرة

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- معيار التوظف الإجمالي لقياس الأثر على العمالة = $\frac{1000}{500,000}$ = 0,0020

وهذا يعني ان كل 10,000 دولار من الاستثمارات الكلية تؤدي إلى خلق 20 فرصة عمل

- معيار التوظف الجزئي لقياس الأثر على العمالة المباشرة = $\frac{500}{400,000}$ = 0,0013

وهذا يعني ان كل 10,000 دولار من الاستثمارات المباشرة تؤدي إلى خلق 13 فرصة عمل جديدة

- معيار التوظف الجزئي لقياس الأثر على العمالة غير المباشرة = $\frac{500}{100,000}$ = 0,0050

وهذا يعني ان كل 10,000 دولار من الاستثمارات غير المباشرة تؤدي إلى خلق 50 فرصة عمل جديدة غير مباشرة أي لمشاريع أخرى غير المشروع الأصلي

- معيار التوظف الجزئي لقياس الأثر على العمالة الماهرة = $\frac{600}{500,000}$ = 0,0012

وهذا يعني ان كل 10,000 دولار من الاستثمارات الكلية تؤدي إلى خلق 12 فرصة عمل للعمالة الماهرة

- معيار التوظف الجزئي لقياس الأثر على العمالة غير الماهرة = $\frac{400}{500,000}$ = 0,0008

وهذا يعني ان كل 10,000 دولار من الاستثمارات الكلية تؤدي إلى خلق 8 فرص عمل للعمالة غير الماهرة

4.3.3. معيار ميزان المدفوعات:

يهدف معيار ميزان المدفوعات إلى قياس أثر المشروع الاستثماري على ميزان المدفوعات وبالتالي التعرف على مدى مساهمة المشروع في دعم وتحسين أوضاع ميزان المدفوعات:

معيار ميزان المدفوعات = (**الصادرات السلعية + المتحصلات والتحويلات من النقد الأجنبي من مصادر أخرى**) (**الواردات السلعية + المدفوعات والتحويلات الأخرى من النقد الأجنبي**)[10]

إذا كانت نتيجة هذا المعيار موجبة فإن المشروع له ربحية اجتماعية ويساهم في تحقيق هدف توازن ميزان المدفوعات، أما إذا كانت النتيجة سالبة فإن هذا المشروع طبقاً لهذا المعيار ليس له جدوى اجتماعية أي من وجهة نظر اقتصاد البلد/الدولة.

ولإجراء عملية قياس الأثر على ميزان المدفوعات من خلال هذا المعيار نحتاج إلى التالي:

التدفقات النقدية الداخلة:

- **الصادرات:** حجم الصادرات التي سيصدرها المشروع عبر سنوات عمره الافتراضي من خلال ضرب كمية المنتجات **X** متوسط سعر التصدير كل عام.
- **المتحصلات بالعملة الأجنبية من مصادر خارجية**: الإيرادات التي يحصل عليها المشروع من مصادر خارج البلاد في تأدية خدمات لجهات أجنبية أو الحصول على إيجارات لمباني تابعة للمشروع في دولة أخرى وكذلك الأعمال الاستشارية والتدريبية لجهات في دول أخرى.
- **التحويلات من الخارج بالنقد الأجنبي**: رأس مال المشروع مقابل التوسعات لدعم وزيادة رأس المال ويدخل في ذلك الأرباح المحولة من الخارج أو عوائد الأوراق المالية التي يملكها المشروع في الخارج.

التدفقات النقدية الخارجة:

- **الواردات:** كميات الواردات للمشروع من المواد الخام وقطع الغيار ومستلزمات الإنتاج وغيرها **X** متوسط سعر الاستيراد خلال سنوات المشروع للحصول على قيمة الواردات.
- **المدفوعات بالنقد الأجنبي:** المدفوعات بالنقد الأجنبي مقابل الخدمات التي يحصل عليها المشروع من جهات أجنبية مثل المدفوعات مقابل أعمال الاستشارات والتدريب والبعثات ومقابل أيضا الحصول على براءات الاختراع وحقوق الامتياز وغيرها.
- **التحويلات إلى الخارج بالنقد الأجنبي:** تحويلات بالنقد الأجنبي إلى الخارج (أرباح أو فوائد) وكذلك تحويلات رأس المال لإنشاء مشروع أو وحدات جديدة تابعة للمشروع في دولة أجنبية وأيضا الأقساط والفوائد التي يدفعها المشروع لجهات أجنبية أو في الخارج.

[10] ممكن ان تكون الصادرات خدمية في حالة كون المشروع خدمي

كلما زادت التدفقات النقدية الداخلة من صادرات ومتحصلات وتحويلات بالنقد الأجنبي عن التدفقات النقدية الخارجة للمشروع من واردات ومدفوعات وتحويلات بالنقد الأجنبي كلما كان الأثر ايجابياً على ميزان المدفوعات وزادت الربحية الاجتماعية للمشروع وأصبح له جدوى من وجهة نظر اقتصاد البلد/الدولة.

ولقياس اثر المشروع بدقة على ميزان المدفوعات سواء كان هذا الأثر ايجابي أم سلبي فلا بد من تقدير التدفقات النقدية الداخلة والخارجة المباشرة وكذلك التدفقات النقدية الداخلة والخارجة غير المباشرة خصوصا عندما يكون المشروع له أثار من خلال علاقة التشابك الاقتصادي بين المشروع والمشاريع الأخرى ويمكن تصوير ذلك من خلال الجدول التالي:

جدول التدفقات النقدية لقياس أثر المشروع على ميزان المدفوعات		
البنـــــود	**سنوات الإنشاء**	**سنوات التشغيل س1، س2، س3، س ن**
اولا: التدفقات النقدية الداخلة **1. التدفقات المباشرة** 1.1. الصادرات من السلع (الخدمات) 1.2. المتحصلات من النقد الأجنبي 1.1.1. إيجارات 1.1.2. أعمال استشارية 1.1.3. خدمات نقل 1.3. التحويلات من الخارج بالنقد الأجنبي 1.3.1. رأس المال 1.3.2. عوائد وأرباح وأقساط وفوائد 1.3.3. قروض ومساعدات **2. التدفقات غير المباشرة** (والمتعلقة بالمشاريع المرتبطة)		
إجمالي التدفقات النقدية الداخلة		
ثانيا: التدفقات النقدية الخارجة **1. التدفقات المباشرة** 1.1. الواردات من السلع والمواد الخام 1.2. المدفوعات بالنقد الأجنبي 1.2.1. أعمال استشارية 1.2.2. خدمات النقل 1.2.3. براءات اختراع 1.3. التحويلات إلى الخارج 1.3.1. الأجور 1.3.2. الأرباح والفوائض 1.3.3. تحويلات رأس المال 1.3.4. الأقساط والفوائد 2. **التدفقات غير المباشرة**: والمتعلقة بالمشاريع المرتبطة مثل الواردات وغيرها من البنود		
صافي التدفقات بالنقد الأجنبي = اولا ـ ثانيا		

4.3.4. معيار سعر الصرف:

ان معيار سعر الصرف من المؤشرات الكمية التي تحدد مدى مساهمة المشروع الاستثماري في تحسين ودعم قيمة العملة الوطنية فيما إذا كان هذا الأثر ايجابياً فيعتبر المشروع في هذه الحالة له ربحية اجتماعية وجدوى من وجهة نظر اقتصاد البلد/الدولة، أما إذا كان هذا الأثر سلبياً فإن المشروع ليس له ربحية اجتماعية.

ولقياس أثر المشروع الاستثماري على قيمة العملة الوطنية يجب تقدير سعر الصرف الضمني ومقارنته بسعر الصرف المعلن، فإذا تبين ان سعر الصرف الضمني أعلى من سعر الصرف المعلن فإن اثر المشروع في هذه الحالة يعتبر أثراً سلبياً وليس له ربحية اجتماعية لأن ذلك يعني ان أقامة المشروع سوف يؤدي إلى زيادة عدد وحدات النقد المحلي مقابل الوحدة من النقد الأجنبي مقارنة بسعر الصرف المعلن من البنك المركزي.

ومن ناحية أخرى، ان انخفاض سعر الصرف الضمني عن سعر الصرف المعلن يشير إلى زيادة درجة الربحية الاجتماعية للمشروع، لأنه يؤدي إلى الحفاظ على قيمة العملة الوطنية بل وزيادة قيمتها تجاه العملات الأجنبية الأخرى.

وفي حالة تساوي سعر الصرف الضمني مع سعر الصرف المعلن فإن الأمر يترك لصانع القرار الاستثماري في القبول أو الرفض على اعتبار ان الأمر سيتوقف على دراسة عوامل أخرى قد تكون مع القبول أو الرفض.

$$\text{سعر الصرف الضمني} = \frac{\text{التكاليف المحلية الجارية بالعملة المحلية}}{\text{القيمة المضافة للمشروع بالعملة الأجنبية}}$$

وتتكون التكاليف الاقتصادية المحلية من البنود التالية:

- الأجور.
- المواد الخام والوسيطة.
- الصيانة والإحلال والتجديد.
- تكاليف ما تستخدمه العمالة الأجنبية من موارد محلية.
- تكاليف جارية أخرى.

<u>مثال تطبيقي رقم (25)</u>

عند دراسة جدوى احد المشاريع الاستثمارية من وجهة نظر اقتصاد البلد ان:

- إجمالي التكاليف المحلية الجارية تبلغ 1,500,000 دينار
- وقيمة المنتجات التي سوف ينتجها المشروع بالأسعار العالمية تصل إلى 3,500,000 دينار
- سعر الصرف بالدولار = 3.5 دينار \ دولار

المطلوب: تقدير القيمة المضافة لهذا المشروع بالعملات الأجنبية إذا علمت ان:

- واردات المشروع وتحويلات النقد الأجنبي للعاملين فيه إلى الخارج 550,000 دينار

وضح ما إذا كان المشروع له جدوى ربحية اجتماعية من عدمه من وجهة نظر اقتصاد البلد/الدولة في حال وصول سعر الصرف المعلن إلى 3.5 دينار للدولار.

الحـــــــــــل

القيمة المضافة بالدينار = 3,500,000 – 550,000 = 2,950,000 دينار

القيمة المضافة بالدولار = 2,950,000 دينار / 3.5 دينار \ دولار = 842,857 دولار

سعر الصرف الضمني = 1,500,000 دينار / 842,857 دولار = 1.78 دينار\دولار

وبما ان سعر الصرف الضمني أقل من سعر الصرف المعلن فأن المشروع يكون له أثر ايجابي علـى قيمـة العملـة الوطنيـة أي ان المشـروع فـي هـذه الحالـة لـه جـدوى ربحيـة اجتماعيـة مـن وجهـة نظـر اقتصـاد البلد/الدولة.

المصطلحات العربية والانكليزية

English Terms	Arabic Terms
Actual Capacity	الطاقة الفعلية
Adjusted Exchange Rate	سعر الصرف المُعدل
Appraisal of pay-back Period Criterion	تقييم معيار فترة الاسترداد
Appraisal of Project Objectives	تقييم أهداف المشروع
Available Capacity	الطاقة المتاحة
Average Rate of Return	معدل العائد المتوسط
Balanced Investor	المستثمر المتوازن
Benefit / Cost Criterion	معيار معدل العائد \ الكلفة
Break-Even Point	نقطة التعادل
Capacity	طاقة
Commercial Profitability Under Uncertainty Conditions	الربحية التجارية في ظل ظروف عدم التأكد
Conservative Investor	المستثمر المُتقظ
Cost of Transportation	كلفة النقل
Criteria for Measurement of Commercial Profitability Under Uncertainty Conditions	معايير قياس الربحية التجارية في ظل ظروف عدم التأكد
Criteria for Measurement of Non-Discounted Commercial Profitability Under Certainty Conditions	معايير قياس الربحية التجارية غير المخصومة وفي ظل ظروف التأكد
Criteria of Investment of Project Evaluation	معايير تقييم المشاريع الاستثمارية
Data	البيانات
Decision Tree	شجرة القرار
Degree of Localization	درجة التوطن
Demand Forecasting	تقدير حجم الطلب (التنبؤ بالطلب)
Depreciation	إهلاك/اندثار
Designed Capacity	الطاقة التصميمية
Detailed Feasibility Studies	دراسات الجدوى التفصيلية
Determination of Labor Requirement	تحديد احتياجات المشروع من القوى العاملة
Determination of Project Objectives	تحديد أهداف الأداء
Determination of Row Material Requirement	تحديد احتياجات المشروع من المواد الخام
Discounting	الخصم
Distant From Market	مدى القرب من السوق
Economic Feasibility Studies and Evaluation Projects	دراسات الجدوى الاقتصادية وتقييم المشاريع
Estimated Value	القيمة المقدرة

Expected Value	القيمة المتوقعة
Fixed Value	قيمة ثابتة
Internal Project Planning	التخطيط الداخلي للمشروع
Internal Rate of Return	معيار معدل العائد الداخلي
Investment Goals (Objectives)	أهداف الاستثمار
Investment and Economic Feasibility Studies	الاستثمار ودراسات الجدوى الاقتصادية
Investment Determines	محددات الاستثمار
Investment Opportunities	فرص الاستثمار
Labor Force	القوى العاملة
Liquidity	السيولة
Long-run and Short-run Investment	الاستثمار طويل الأجل والقصير الأجل
Market Share	الفجوة التسويقية المتاحة (حصة السوق)
Methods of Measurement the Present Value of Cash Flow	أساليب احتساب القيمة الحالية للتدفقات النقدية
Nature and Importance of Projects Evaluation Processes	طبيعة وأهمية عملية تقييم المشاريع
Net Present Value Criterion	معيار صافي القيمة الحالية
Pay-Back Period	فترة الاسترداد
Population Growth Rate	معدل النمو السكاني
Present Value	القيمة الحالية
Pre-Economic Feasibility Study	دراسات الجدوى الاقتصادية المبدئية
Probability	احتمالية
Product According to Demand	الإنتاج حسب الطلب
Production Types and Productive Processes	تحديد نوعية الإنتاج والعمليات الإنتاجية
Profitability	الربحية
Profitability (present value) Index	مؤشر القيمة الحالية
Project Contribution in Added Value	مساهمة المشروع في القيمة المضافة
Project Contribution in Employment	مساهمة المشروع في توفير فرص عمل
Project Contribution in Payment Balance	مساهمة المشروع في ميزان المدفوعات
Project Evaluation Criteria	معايير تقييم المشاريع
Project Location	موقع المشروع
Quantitive Variables	المتغيرات الكمية
Ranking Investment Alternatives	ترتيب بدائل الاستثمار
Rate of Return on Investment Criterion	معيار درجة العائد على رأس المال
Row Material	المادة الخام
Safety	الأمان
Sensitivity Analysis	تحليل الحساسية
Shadow Prices in Social Feasibility Studies	استخدام أسعار الظل في دراسات الجدوى الاجتماعية

Simulation	محاكاة
Source	مصدر
Speculator Investor	المستثمر المضارب
Standard Value	القيمة المعيارية
Statistics	إحصاء
Subrogation/Replacement	الإحلال / الإبدال
Suitable Size	دراسات الجدوى الاقتصادية المفصلة
Survey	مسح
Technical Feasibility Study	دراسة الجدوى الفنية
Technical Methods	الأساليب الفنية
Technological Progresses	التقدم التكنولوجي
The Importance of Investment	أهمية الاستثمار
The Importance of Project in Payment Balance	أهمية المشروع في ميزان المدفوعات
The Nature and Importance of Economic Feasibility Study for Investment Projects	طبيعة وأهمية دراسات الجدوى الاقتصادية للمشاريع
The Nature of Relationship Between Return and Risk	طبيعة العلاقة بين العائد ودرجة المخاطرة
The use of Adjusted Exchange Rate	استخدام سعر الصرف المعدل
Trial and Error	أسلوب التجربة والخطأ
Types of Investment	أنواع الاستثمار
Value	قيمة
Variable	متغير

المـــــــــراجع
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ملحـــــــــــق "أ"
تعليمات وزارة التخطيط
رقم 1 لسنة 1984 (المعدلة)

Appendix "A"
Ministry of Planning Guidelines
No.1, 1984 (Modified)

Republic of Iraq
Ministry of Planning &
Development Cooperation

جمهورية العراق
وزارة التخطيط والتعاون الإنمائي
مكتب الوزير

العدد : ٦٣٣/٧/١ التاريخ : ٢٧/٧/٢٠٠٨

إلى / الوزارات كافة – مكتب معالي الوزير
الجهات غير المرتبطة بوزارة
المحافظات كافة – مكتب السيد المحافظ

م / أسس دراسات الجدوى لمشاريع التنمية

تهدي وزارة التخطيط والتعاون الإنمائي أطيب تحياتها ...
نرفق طيا نسخة من ((أسس دراسات الجدوى لمشاريع التنمية)) التي قامت هذه الوزارة بأعدادها راجين اعتماد هذه الأسس عند اقتراح مشاريعكم الاستثمارية الجديدة واعتبار ذلك من الأمور الهامة التي تساهم في رفع كفاءة الاختيار و المفاضلة بين المشاريع .

مع التقدير .....

المرفقات /
أسس دراسات الجدوى

علي غالب بابان
وزير التخطيط و التعاون الإنمائي

نسخة منه إلى /
مجلس الوزراء / لجنة الشؤون الاقتصادية – للتفضل بالاطلاع .. مع التقدير
الأمانة العامة لمجلس الوزراء / للتفضل بالاطلاع ..... مع التقدير
الدوائر الفنية كافة / مع التقدير.

aqmopdc@yahoo.com
العراق - بغداد - عرصات الهندية

ملحـــــــــــــق "ب"
القواعد المركزية لنسب الاندثارات

Appendix “B”
Central Rules of the Depreciation Rates

Central Rules of the.docx

ملحـــــــــــق "ج"
واجب لحالة دراسية
(مشروع إنشاء ســـــد)

Appendix “C”
Case Study
(Dam Construction Project)

Dam Construction
Case Study 1 Jan 201

ملحـــــــــــق "ح"

حساب معامل الخصم

Appendix “D”

Calculation of the Discounting Rate

Calculation of the
Discounting Rate.doc

Iraq Administrative Reform Project
TARABOT
Project Management Consulting Unit

Project Management Processes
Earned Value Management

January 2012

TARABOT
Iraq Administrative
Reform Project

ترابـــــط
مشروع الإصلاح
الإداري العراقي

Chapter 1
Earned Value Project Management overview:

Introduction:

Earned Value Management (EVM) is a management methodology for integrating scope, schedule, and resources; objectively measuring project performance and progress; and forecasting projects outcomes. Once established, these baselines will become best source for comparison of the actual data of cost and schedule to make timely and useful decisions.

The purpose of this practice standard is to:

- Provide a standard for project management practitioners and other stakeholders that defines the essential aspects of applying earned value in project management

- Provide reference for the basic concepts and applications of earned value management that is consistent and globally applicable.

EVM can play a crucial role in answering management questions that are critical to the success of every project, such as:

- Are we delivering more or less work than planned?
- When the project likely to be completed?
- Are we currently over or under budget?
- What is remaining work likely to cost?
- How much will be over or under budget at the end of the project?
- What is driving the significant cost and schedule variance?

EVM and the Project Management Process

There is a relationship between EVM and the PMBOK Guide's Project Management Process Groups and the Knowledge Areas as shown,

Project planning is mostly a matter of determining:

- What work must be done (scope) and in what pieces (work breakdown structure)
- Who is going to perform and manage the work (responsibility assignment matrix)
- When the work will be done (schedule)
- The cost and quality of the labor, material, and related resources the work will acquire.

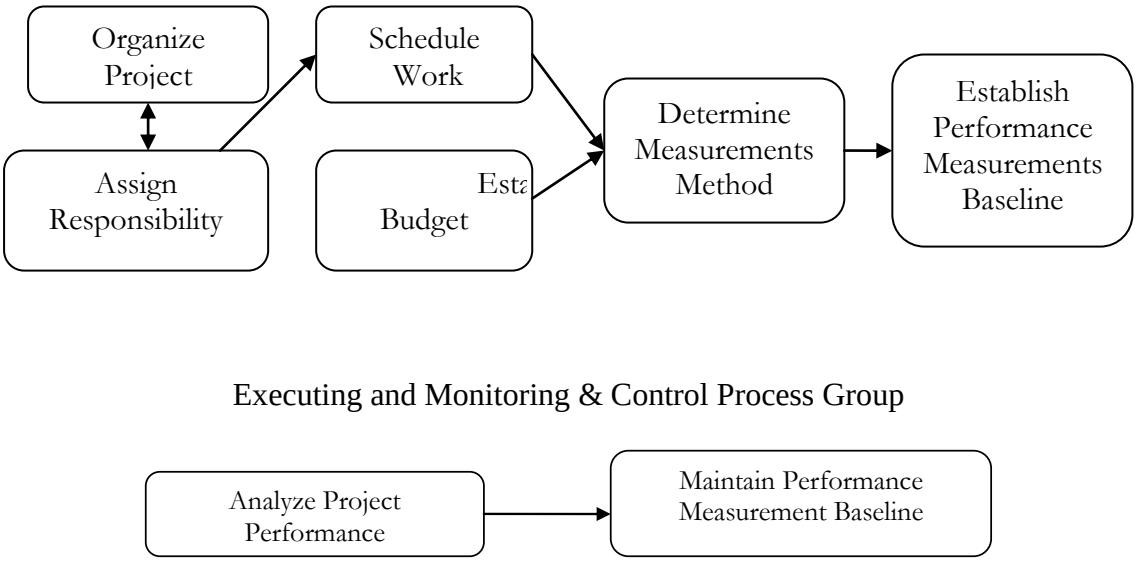
Knowledge Areas	Process Group				
	Initiation	Planning	Executing	Monitoring and Control	Closing
Project Integration management	X	X	X	X	X
Project Scope Management		X	X	X	X
Project Time Management		X		X	
Project Cost Management		X		X	
Project Quality Management		X	X	X	
Project HR Management		X	X		
Project Communication Management		X	X	X	
Project Risk Management		X		X	
Project Procurement Management		X	X	X	X

EVM and the Project Management

Project control focuses mostly on monitoring and reporting the execution of project management plans. Project control is a process for keeping work performance ad results within a specified tolerance range of the work plan.

EVM practices occur primarily in the areas of project planning, execution, and control and are related to the goal of measuring, analyzing, forecasting, and reporting cost and schedule performance dare for evaluation and action by the project team and other key stakeholders.

The practice standard for earned value management will focus on processes. For these purpose of this practice standard, it is assumed that a project has been initiated, stakeholders have been identified, and the project and product requirements have been collected. Therefore, this standard begins with defining the scope after the requirements have been collected.



Basic EVM Terminology
Throughout this practice standard, core terminology is used frequently and is fairly unique to earned value management.

- **Actual Cost (AC)**: the realized cost incurred for the work performed on an activity during a specific time period.
- **Budget at Completion (BAC)**: the sum of all the budgets established for the work to be performed on a project., work breakdown structure, control account, or work package. BAC is the sum of all work packages BACs
- **Contingency Reserve**: budget within the performance management baseline that is allocated for the identified risks that are accepted or for which contingent responses are advised. The contingency reserves can fund contingency plans, fall back plans, or address the residual risk that remains after the risk response.
- **Control Account**: A management control point where scope, budget, actual cost and schedule are integrated and compared to earned value for performance measurements. Each point may be further decomposed into work packages or planning packages in the WBS.
- **Planning Package**: Work and budget that have identified to a control account but are not yet identified into work packages. This is a future for which detailed planning may not have been accomplished. The efforts within a planning package work and budget must convert to one or more work packages.

- **Distributed Budget**: the budget for project scope that has been identified to work breakdown structure WBS control accounts. The distributed budget forms the basis for the planned values PVs.

- **Planned Value:** the authorized budget assigned to scheduled work as of a given reporting date. It defines the work that should have been accomplished.

- **Earned Value:** The measure of the work performed, expressed in terms of the budget authorized for the work. It can be reported for cumulative to date or for a specific reporting period.

- **Estimate at Completion:** The expected total cost of completing all work expressed as sum of actual cost to date and the estimate to complete ETC.

- **Estimate to Complete ETC:** the estimated cost to finish all the remaining work.

- **Management Reserve MR:** An amount of the project budget base withheld for management control purpose. These budgets are reserves for unforeseen that within the scope of the project. Its used in a special circumstances where the project manager see the need to change the performance measurement baselines but doesn't change the project's budgets as defined in the contract or project charter.

- **Performance Measurement Baseline:** An approved integrated scope-schedule- cost plan for the project work against which project execution is compared to measure and manage performance. The PMB is the equal to the distributed budget plus the undistributed budget.

- **Project Budget Base:** This represents the total budget for the project, including any management reserve and estimated cost for work that has been authorized but is not yet fully defined. When the project is chartered by contract, this is known as contact budget base.

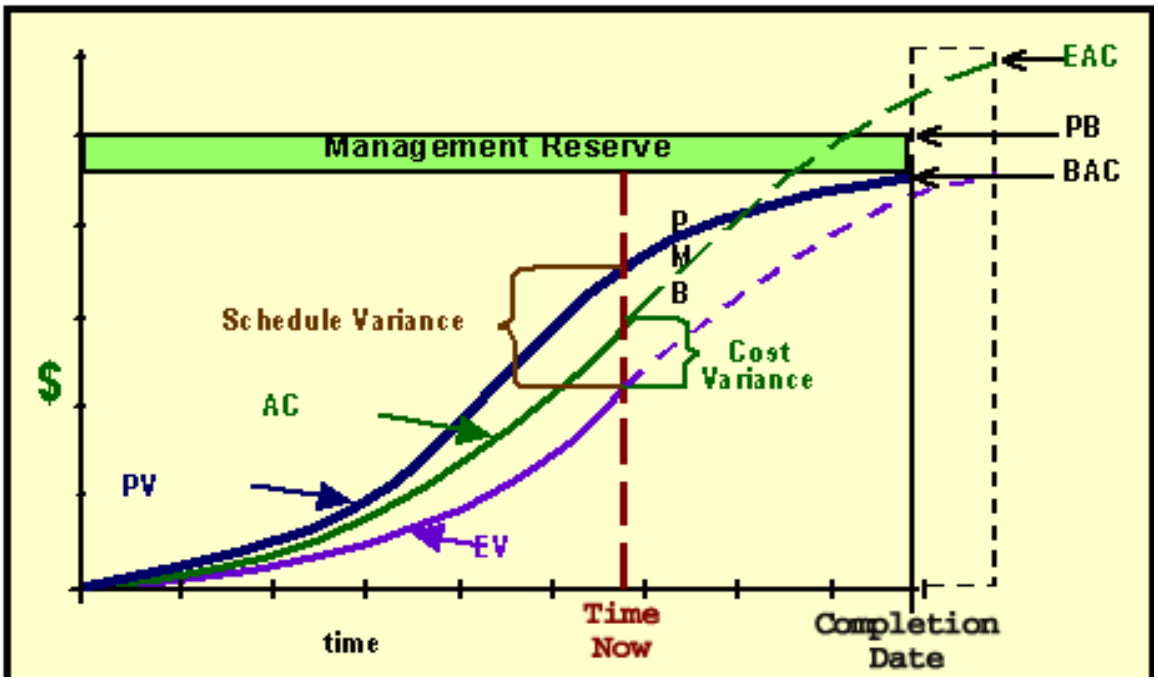
- **Summary level Planning Budget:** Time-Phased budget for future work that cannot be planned down to control account, Budget and scope held in SLPB should be moved to control account as soon as practical, but before the work within them begins.

- **Undistributed Budget:** the budget for the scope that has not been identified to WBS elements and to control account. This budget has not been distributed to reasonable CA.

The chart below depict many of these terms. Another depiction of the relationship between the budget elements is illustrated in the figure 2.

<table>
<tr><th colspan="5">Project Budget Base</th></tr>
<tr><td>MR</td><td colspan="4">Performance Measurement Baseline</td></tr>
<tr><td></td><td>UB</td><td colspan="3">Distributed Budget</td></tr>
<tr><td></td><td></td><td>SLPB</td><td colspan="2">Cotrol Account</td></tr>
<tr><td></td><td></td><td></td><td>Work Packages</td><td>Planning Packages</td></tr>
</table>

EVM Budget Element



EVM Basic Concepts: Chart Form

Basic Earned Value Concept

Planning:

- Scope: during the planning process, emphasis is placed on gaining agreement among the key stakeholders regarding the project objectives. At this point, the scope of the project needs to be further elaborated, using WBS, into executable and manageable elements called work packages. The work packages are organized in control accounts according to the project organization breakdown structure and responsibility assignment matrix.

    1. Define product and project scope and decompose work to manageable level.

- Schedule and Resources: Project needs to be logically scheduled through the completion the project, including the identification of the critical milestones. The schedule will show the timing of key accomplishments and interface. Schedule cannot be executed without knowledge of availability resources.

    1. Assign clear management responsibility for discrete work elements.
    2. Plan the activities of the project into logical schedule

- Cost: Once he work is logically scheduled and resources are identified, the work scope, schedule, and cost need to be integrated and recorded in a time-phased budget known as the performance measurement baseline.

    1. Develop a time-phased budget for each element.
    2. Select EV measurement techniques for each work package prior to execution.
    3. Establish performance measurement baseline based on the points above.
    4. Develop a structure for collecting costs into the same accounts and time periods where performance is being measured.

Execution:

In this process, EVM requires the recording if resources utilization (labor, material, work performed within each of the work elements in the project management plan. Actual cost need to be captured in both WBS and the calendar to be compared with the performance measurement baseline.

Monitoring and Control:

Requires physical work progress assessment and assessing earned value using the selected earned value measurement methods. With this earned value EV, the planned value PV data from the measurement baseline, and the actual cost AC form tracking system, the project team can perform EVM analysis at control account to develop corrective action plans for any discover issue and update the forecast of expected cost.

1. Determine earned value by objectively measuring the physical work progress according to the earned value techniques.
2. Analyze cost/ schedule performance.
3. Forecasting cost/ Schedule performance.
4. Estimate at completion
5. Report performance problems and take appropriate corrective actions

Changes:

Either driven by stakeholders external to the project or by the project team themselves, are implemented into the project baseline in a timely accurate fashion using a change control system.

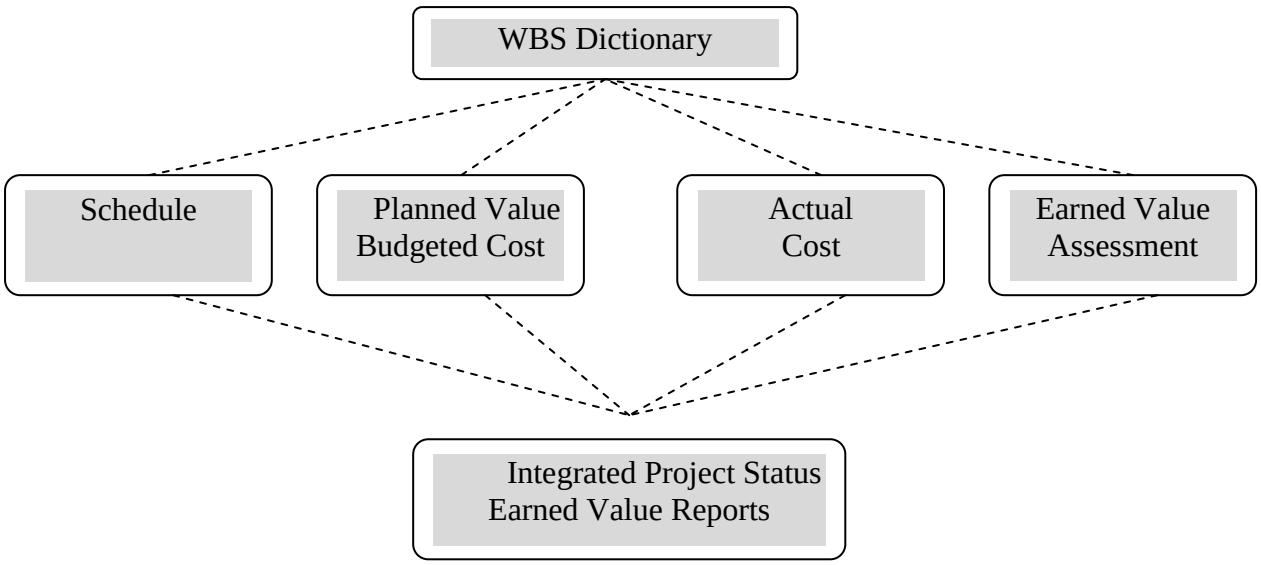
1. Maintain the integrity of the PMB

Consideration:

While this practice standards assumes the implementation of EVM on a large project in order to provide all necessary information on EVM, this practice standards may be applicable to smaller scale projects as well. EVM is scalable, and implementing the approach depicting in the EVM system diagram enables the basic concept of EVM to be implemented on project of any size.

Alignment of the activities defined in the WBS into the project cost and scheduling subsystem is a project management practice. This also enables the project to undertake the following EVM core concepts:

- Measuring and comparing the value of the work performed (earned value) with the value planned and actual costs expended to accomplish that work
- Developing forecast, EAC, ETC, VAC, etc.



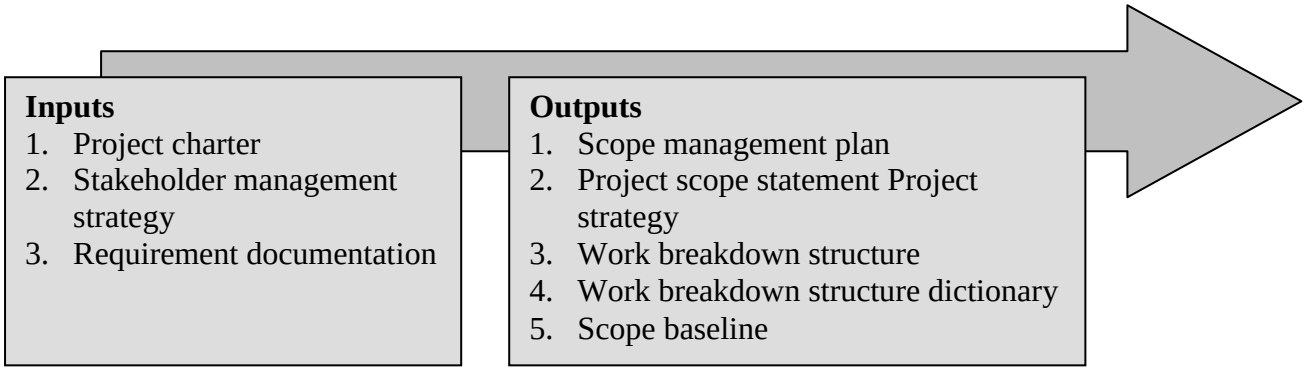
EVM System Diagram

Chapter 2

Organize Project

Introduction

Organize the project is the process of developing a detailed description of the project and products subdividing the project deliverables into a hierarchy of defined work packages. This chapter provides a process to define the project scope and discuss the key elements that comprise that process.



Organize Project: Inputs and Outputs

Inputs

Project Charter

The project charter provides the high-level project requirements and high- level product or service description of the project. The charter contains typically the project purpose, the objectives, and related success criteria and critical milestone schedule.

Stakeholder Management Strategy

The stakeholder management strategy is designed to engage the project stakeholders in the success of the project. For each stakeholder, it includes areas of interest, type and degree of influence on the project, and strategies to increase support of the project.

Requirement Documentation

The project requirements include information on business requirements, project management requirements, and delivery requirement. In other word the requirements documentation defines the condition or capability that must be present in a product or service, or result to satisfy a contract.

Description:

1. **Product Analysis**
   A method used to translate product and service description and requirement into deliverables. A cross-functional group of stakeholders take information about the features and functions and determine the deliverable and components necessary to meet the product or service requirements.

2. **Alternative Analysis:**
   Is a method which is used to ensure the best approach for meeting project objectives and stakeholder requirements. Performing cost, schedule, and performance analysis on each of these alternatives will help to better define the must efficient and effective solution t meet the stake holder's expectation.

3. **Decomposing**
   Decomposing starts with the end deliverables and continuously breaks them into smaller component. The upper levels typically reflect the major deliverable work area of the project pr major phases. The upper levels may vary and depending on the project and the industry involved. The lower level WBS elements provide focus for project management processes such a scope and schedule development, cost estimating and budgeting, and risk assessment.

Requirements
Product specification
2-story building
3-master rooms
1-dining room
Basement
Landscaping
Garage
X
X

Scope
The new residence will be constructed on 200 m^2 with all requirements. The home is scheduled for completion in …... 2014. There is advantage from using the latest building materials and codes to minimize energy consumptions.

WBS
Design
Exterior finishing
Interior finishing
Engineering works
Foundations
Management System
X
X
X
X

Integrating Requirements with Work Activities

Outputs

1. **Scope Management Plan**

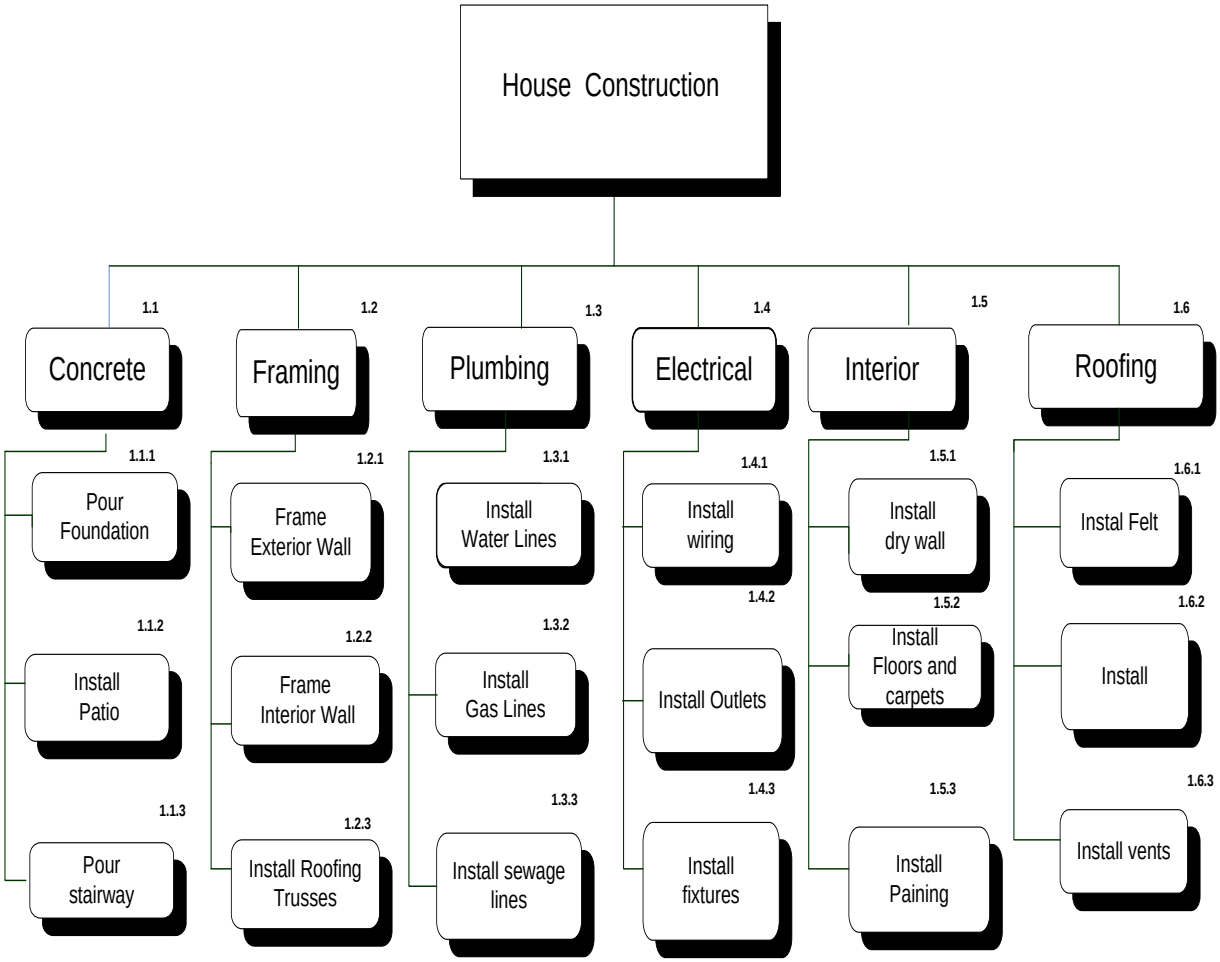
   Scope management plan is a component of the project or program management plan that describes how the project scope will be defined, developed, monitored, controlled and verified.

2. **Project Scope Statement**

   It describes the project scope, major, deliverables, assumptions, and constraints, and descriptions of the work that provides a documented basis for making future decision. With clear project scope statement, responsible and performing organizations can better plan, organize, and execute the work and deliver the desired product.

3. **Work Breakdown Structure**

   The work breakdown structure WBS is a deliverable-oriented hierarchical decomposing of the work to be executed by the project team to accomplish the project objectives**.** The work translates requirements into elements of work, product, and deliverables. The WBS includes the project management work necessary for communications and meetings required for effective integration management to ensure all deliverables are explicitly identified.



WBS for construction of a house

4. Work Breakdown Structure Dictionary

The work breakdown structure provides deliverables, activity, and scheduling information. Other information includes; responsible organization, resources required, cost estimate, assumptions, constraints, acceptance criteria.

WBS Level	WBS Code	Element Name	Definition	Start/ End Date	Responsible Organization
1		House construction			
2					
3					
4					
5					

5. **Scope Baseline**

   The scope baseline is a document or plan officially signed at the sponsor level against which delivery will be compared. The scope baseline includes the scope statement, the WBS, and the WBS dictionary.

Consideration:

Constructed with Technical Expertise

Understanding and organizing the project work is the first step in developing a realistic project management plan so that earned value can be deployed as a planning, executing, and monitoring and controlling techniques. The WBS is the foundation for all other planning processes, it is must be a collaborative effort with participation by all appropriate stakeholders.

Summary:

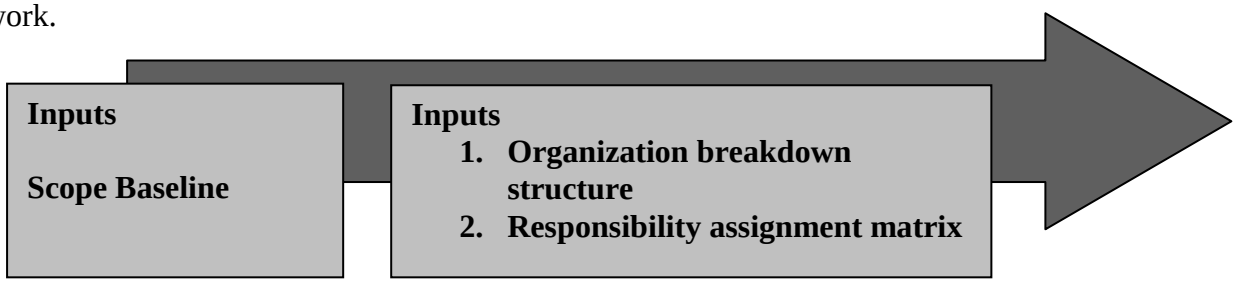
In order to plan, manage, and control a project effectively, there must be clear description and understanding of the project and product service scope. The project charter or customer contract, stakeholder needs, and the project requirements are the foundation for defining and elaborating the project scope. The scope statement, WBs and WBS dictionary comprise the scope baseline and will be used enormously in other processes.

Chapter 3:

Assign Responsibility

Introduction

Is the process of appointing, designating, and documenting and documenting the single person responsible for conducting the execution of the project work. The initial organizational structure will be integrated with the WBS. Each element of work has an individual who is responsible and accountable for the scope, schedule, and cost of work.



Inputs

Scope Baseline

The scope baseline contains the entire project work against which delivery will be compared.

Description

Create Organizational Structure

The organizational structure for the project itself needs to be documented to reflect the lines of authority and communication with the project. The project structure can reflect the organization's structure or some other structure depending on the needs of the project and the organization's policies.

Integrate WBS and Organizational Structure

Integrating the WBS on one axis of a matrix, and the organizational structure on the other, shows how work and responsibility are matched up. At this stage, the individual who is assigned the responsibility for any given element of work may or may not be identified.

The project manager collaborates with the line managers to identify the individual who is to be assigned responsibility and authority for performing the work to be done. That individual then determines and develops the budget and schedule to accomplish the work.

Outputs

Organizational Breakdown Structure:

The Organizational breakdown structure is a hierarchical representation of the project organization that illustrates the relationship between project activities and the responsible organizational unit that will perform those activities.

Responsibilities Assignment Matrix

Responsibility assignment matrix shows the integration between the work in the WBS and the OBS and helps ensure each element of the project scope is assigned to a person or team. The RAM delineates levels of control and responsibility and indicates the authority and responsibility levels for the project. The intersection point of the OBS and WBS is the control account. The individual responsible and accountable for the successful delivery of the scope, schedule and budget in control account is the control account manager.

Considerations

- **Level of details**

  While no specific level of details is appropriate for all projects, the project manager needs to recognize the dangers of keeping that level too high or too low. At too high level, the size of the control account in budget, schedule, and scope will overwhelm the control account manager CAMs. At the too low level, the sheer number of control account will be distracting but most likely detrimental to the successful accomplishment of the work within the parameters of the control account. Driving the level of control account down increases the amount of management oversight and intervention required by stakeholders. The level of details should consistent with control account manager capability and span of control.

- **Maintenance**

  Whenever work and budget moves into, out of, or within the project, one or more control account will change. The change should be always reflected in the RAM. This will give the project manager a continuously updated picture of all the work and budget that is associated with project.

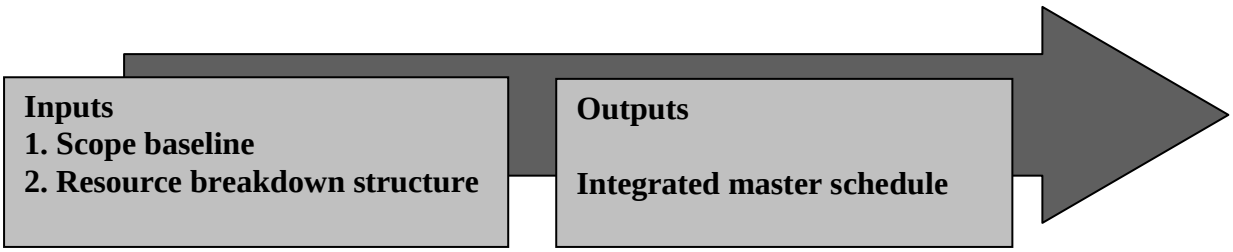
Summary:

The project organization is documented in a hierarchical format called an organization breakdown structure OBS. The OBS is matrixed with the WBS to create RAM. The intersection if the WBS and the OBS elements determine the control account. The control account manager is responsible and accountable or the scope, schedule, and budget for the work.

Chapter4
Develop Schedule

Introduction

It's the process of translation all the WBS elements into a sequential, time-phased model for project execution. The project schedule integrates the activities associated with each WBS element and identifies dependencies between project activities as well as the dependencies that are external to the project. The schedule model can be decomposed and presented at various levels of details.



Scope Baseline

The scope baseline should include sufficient information to allow project team members to decompose work into the activities needed to completer the scope of work

Resource Breakdown Structure

All resources required to complete the activities are identified including people, equipment, materials, supplies, and any other item direct or indirect item required to execute the project. Sites and locations are also resources that may need to be considered for scheduling and cost estimating purpose.

Description:

Schedule Tool:

A schedule tool, in combination with a specific scheduling method such as critical path, critical chain method, convergence and divergence paths, is used to enter project specific data including activities, logic sequence, duration estimates, and other useful information. The schedule tool processes and dynamically reacts to the project specific data entered into the tool to create a schedule model.

Schedule Structure:

The schedule model should be structured to reflect the logic of the WBS. The hierarchy may include:

- Higher levels of the WBS
- Control account
- Work packages and planning packages

- Activities.

Schedule and Budget Relationship:

The relationship between the schedule and the budgeting system is maintained throughout the life of the project. The planned value is derived using the same assumptions as the scheduling model. The same WBS and set of other budget elements (control account, work packages, and planning packages) will likely exist in both systems. Start and finish dates, budgets, and organizational responsibility, should always consistent between the budget and schedule.
Once the project schedule model has been reviewed and agreed by all the stakeholders, it is saved and stored as the project schedule baseline which forms the time-phased performance measurement baseline.
The same control and discipline implemented to manage the budget baseline should be in place for the schedule baseline. For example, adjusting the budget baseline because of cost overrun or under condition is discouraged, adjusting the schedule baseline due to an a head or behind schedule condition is also not good practice and is discouraged.

Outputs

Integrated Master Schedule:

The integrated master schedule represents the time phasing for execution of the project's scope of work. The project schedule should reflect the total project scope of work as defined in the WBS. Both high level master schedule and the highest level of WBS represent the overall project scope. Lower levels of the WBS correspond to equivalent level of the schedule, with the concept extending to control accounts, work packages and planning packages.

Consideration

Schedule Evolution

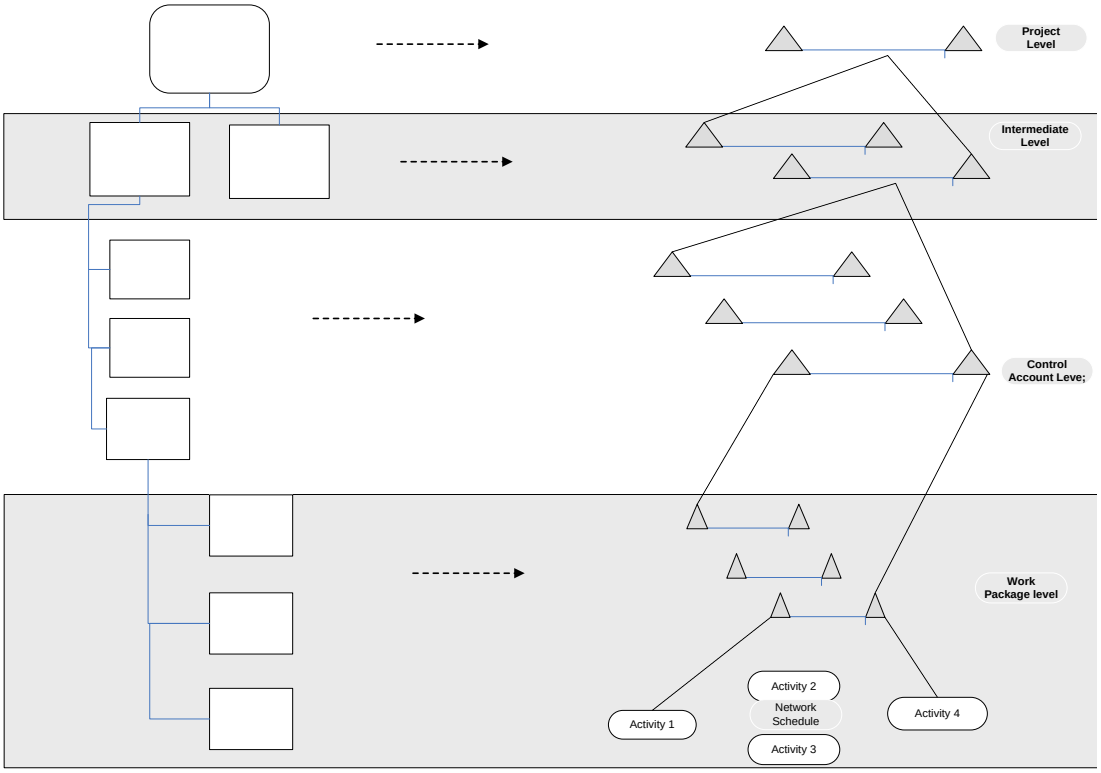
Project budgeting and scheduling are iterative processes involving the negotiation of the project constraints until consensus estimates are achieved among the stakeholders. Therefore the schedule will continue to evolve until such time as the project manager establishes the performance measurement baseline.

Summary

A properly structured integrated master schedule depicts the project team's plan for work accomplishment it provides the underlying logic for the performance measurement baseline, against which accomplishments will be measured and expected future outcomes, will be forecasted.

Scheduling form an EVM perspective includes:

- A logic-driven schedule that reflects the scope of work
- Schedule activities aligned to the WBS elements.

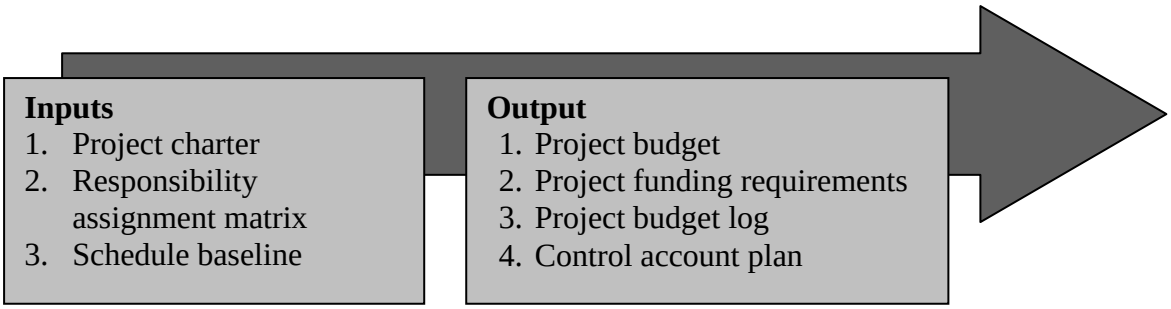

Project Level
Intermediate Level
Control Account Leve;
Work Package level
Activity 1
Activity 2
Network Schedule
Activity 3
Activity 4

Chapter 5

Establish Budget

Introduction

Establish budget is the process of converting external requirements and constraints, such as the project charter, resources availability, cost estimates and scheduling limitation, into cost budget which supports the planned execution of the project.



Input

Project Charter

The project charter provides the high-level project requirements and high level product or service description of the project.

Responsibility Assignment Matrix

The RAM integrates the work breakdown structure WBS and organizational breakdown structure OBS identifying controls accounts and precisely who is assigned responsibility and accountability for WBS. From those key management control points, all earned value data can be summarized.

Schedule Baseline

The schedule baseline is the approved version of a schedule model that is used as a basis for comparison to actual results. The process for establishing a budget baseline is iterative with that of creating the schedule baseline; the two must reconcile and support each other before the performance measurement baseline can be finalized.

Description

Establish a Budget Structure.

Budget elements are tracked throughout the life of the project. The components of the project budget are listed here:

- Project or contract budget base PBB or CBB
- Managements reserve MR

- Performance measurement baseline PMB
- Undistributed budget UB
- Contingency reserve
- Distributed budget
- Summary level planning budget SLPB
- Control account
- Work package
- Planning package

Develop the Cost Estimate:

The cost estimate provides the basis for establishing the budget. Estimates are developing for each work package, planning package, and summary level planning budget. The estimates for work package must be robust enough to support the establishment of the performance measurement baseline, while those for planning packages and summary level planning budget may have a lower level of details until enough information is available to support the conversion to work packages. All the cost estimates within the control account must be developed within the time frame established for that work in the scheduled baseline.

Once the cost estimates for work packages and planning packages within control account are completed, they are reviewed by the project manager and the control account manager. The project manager may decide to authorize budget for an amount more, less, or equal to the cost estimates as follows:

- More budgets may be authorized if the project manager is aware of likely future events, such as a change in rates, processes or customers.
- Less budget may be authorized if the project manager is giving the control account manager a stretch goal or holding back reserves
- Budget equal to the cost estimate may be authorized, particularly if risk analysis and reserve are handled outside of the control account

Authorize the work

Authorization is formal permission and direction, to begin a specific project effort, typically a control account. It is a method for sanctioning project work to ensure that the work is done by the identified organization, at the right time, in the proper sequence and within the allotted budget. In this simplest form, the work authorization process follows these steps.

1. The project manger receives authorization to proceed with the project by means of the project charter or customer contract. This authorization may include limits on the fund available to the project manager and thus the amount of the budget that may be authorized.
2. The project manager authorizes the next tier of management to proceed with the assigned work, usually by issuing a work authorization document WAD. Typically this next level is the control account level, but sometimes there may be one or more additional levels between the total project accounts. If so, each

level can receive its own authorization and then continue the authorization within its prescribed unbroken chain of authorization.

3. Should be organization's system call for it, there may be a step that includes functional manager concurrence or possibly authorization.
4. The control account manager may issue authorization to specific individuals including that they should begin work notifying them of the scope, planned budget often in hours and the charge numbers required to be used.

Update the Project Budget Log

As work is authorized for control account, entries are made in the project budget log to show the movement of budget from undistributed budget to distributed budget. If the entire project is authorized into control account (or control account and summary level budgets), then the value of undistributed budget will be zero. Within control accounts, the budget will be authorized to work packages or planning packages. A typical project budget log might be structured in a similar fashion.

Budget Log				
Date	**From Account**	**To Account**	**Amount**	**Description**
1/1/2011		UB	$50,000	Initial funding per contract award
1/3/2011	UB	CA001	$25,000	Authorize CA001
1/3/2011	UB	CA002	$20,000	Authorize CA002
1/3/2011	UB	MR	$5,000	Transfer $5k to MR
1/5/2011	CA001	WPA023	$5,000	Authorize WPA023

Output

Project Budget:

The project budget is the authorized time-phased representation of how and when the project budgets be distributed.

Project funding Requirements:

Total funding requirements and periodic funding requirements are determined based on the project cost estimates**.** If the funding available and the funding required are not consistent, the project may have to be replanned to meet funding constraints.

Project Budget Log

The project budget log is the central repository for all project budgets. At any time, the project manager should be able to review the project budget log and obtain a complete knowledge of the value and classification for every element of the project budget throughout the life the project

Control Account Plans:

The detailed plan for a control account is called control account plan CAP. The CAP contains all element and aspects of the control account, some of which include:

- Name of responsible control account manager
- Description of the work to be done
- Specific milestones to be accomplished
- Work packages that delineate the scope, schedule, and budget (incrementally, cumulative-to-date, and at completion) for specific future tasks within the control account.
- Planning packages that delineate the scope, schedule, and budget (incrementally, cumulative-to-date, and at completion) for specific future tasks within the control account.
- Estimate to complete, which should be time-phased and may lead to an up-to-date representation of the total expected funding needed the (estimate at completion)

Control Account				March	April	May	June	Total	Start	Finish
1.6.3		PV	Hours							
			Dollar							
		EV	Hours							
			Dollar							
		AV	Hours							
			Dollar							
		ETC	Hours							
			Dollar							

Work Package										
1.6.3		PV	Hours							
			Dollar							
		EV	Hours							
			Dollar							
		AV	Hours							
			Dollar							
		ETC	Hours							
			Dollar							

Sample Control Account Plan

Consideration:

Budget versus Funding

One of the key aspects of earned value management is the very specific terminology related to budget and fund. Budget is a work planning element that is earned when the corresponding work is done. Funds are the amount of money that is available to accomplish the work. One benefits of work authorization is that if it allows the project manager to manage situation when full funding is not provides.

Summary

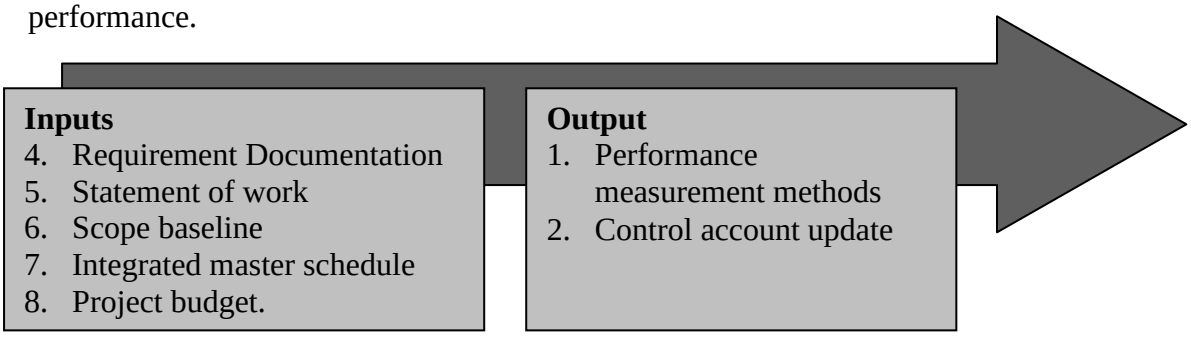
Budgeting process establishes the plan for creating a budget structure, developing the cost estimate, authorizing the work. Determining funding requirement and establish budget logs and control account plan.

Chapter 6

DETERMINE MEASUREMENT METHODS

Introduction:

Determine Measurement Methods is the process used to select the appropriate method of progress evaluation for each work package. During the planning process, the project manager and control account manager determine an approach to the measurement of scope accomplishment for each WBS element assigned to the control account manager. This chapter introduces the principal methods used to determine performance.



Inputs
Requirements Documentation

Requirements can include contract requirements, business requirements, standards, technical requirements, performance requirements, legal/regulatory requirements, and any other applicable requirements.

Statement of Work

The statement of work is a description of products, results, or services to be delivered by the project.

Scope Baseline

The scope baseline is the approved version of a scope statement, work breakdown structure, and its associated WBS dictionary, that is used for a basis of comparison. The WBS, as part of the scope baseline, identifies all of the deliverables for the project. The WBS dictionary supports the WBS and provides more detailed descriptions of the WBS components. The WBS dictionary will likely include a description of the control accounts and it may include a description of work packages.

Integrated Master Schedule

The integrated master schedule provides the planned dates for performing activities included in the schedule. As a minimum, the project schedule includes a baselined planned start and a finish date for each activity.

Project Budget

The project budget illustrates the time-phased distribution of funds for the planned work. Thus the project budget and the integrated master schedule are key elements to develop the performance measurement baseline (PMB). PMB is established through a process of selecting and applying an appropriate performance measurement method to each work package.

Description

The methods for measuring work performed are selected during project planning prior to commencing the work, and are the basis for performance measurement during project execution.

The earned value methods are generally assigned and applied to work packages. Each work package has its own unique characteristics. There are three classes of work, as follows:

- Discrete effort
- Apportioned effort
- Level of effort

Each of these classes has one or more measurement methods available, and each method has its own specific characteristics that determine how it is applied to the work.

Discrete Effort

Discrete effort is an activity that can be planned and measured and that yields a specific output. Discrete effort is directly related to specific end products or services with distinct and measurable points, and outputs that result directly from the discrete effort. Four principal measurement methods are available for assignment to work packages classified as discrete effort. The measurement methods used for discrete effort enable accurate measurement of work accomplished. The four discrete effort measurement methods are:

- Fixed formula
- Weighted milestone
- Percent complete
- Physical measurement

Each of these earned value methods has strengths and weaknesses. The specific circumstances and type of project, phase of the project, or type of work package will determine which method is best suited for the measurement method.

1. Fixed Formula

A fixed formula assigns a specified percentage of the budget value of the work package to the start milestone of the work packages. The remaining budget value percentage is assigned when the work package is completed. The 50/50 method and the 25/75 method are typical and effective methods for detailed, small and short-duration work. A critical point, necessary to ensure correct usage of any fixed-formula method, is that the sum of the milestones in a work package in any given time period must equal the budget value, that is, the PV, in that time period. The choice of a fixed formula should be made based on the nature of the work being accomplished so that the resulting PV and EV is representative of how the work will be executed.

Another important point is to note is that this method is only used on smaller work packages that are planned to start and end within two reporting time periods. The use of fixed formula makes it easy to plan and measure performance but the arbitrary percentage may not accurately represent work performance.

The Figure below shows a work package with a budget at completion (BAC) of $4,400. Using the 50/50 fixed-formula method shows earned value (EV) of $2,200 or 50% of the work planned and credited for the measurement period in which the work begins, regardless of how much work has actually been accomplished. The remaining EV of $2,200 or 50% is credited when the work is completed. The start and finish milestone values summarize to the work package BAC of $4,400.

The same example using the 25/75 fixed formula method credits EV of $1,100 or 25% of $4,400 when the work begins and remaining EV of $3,300 or 75% when the work is completed,

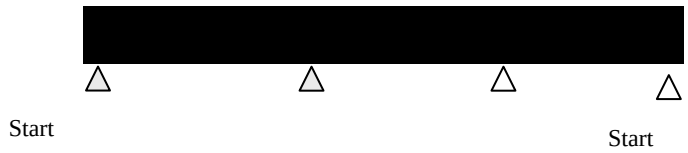
Method	Percent of Measurement Point PV &EV		Total (BAC)
	Start	Finish	
0/100	0% ($0)	100% ($4,400)	100% ($4,400)
50/50	50% ($2,200)	50% ($2,200)	100% ($4,400)
25/75	25% ($1,100)	%75 ($3,300)	100% ($4,400)

Fixed Formula Methods

Within the fixed-formula method, the 0/100 technique is different from the other techniques. The 0/100 method does not allow any credit to be earned until the work is actually completed. This method is commonly used for receipt of materials and only used on work packages that are planned to start and end within one reporting time period. The CAM and the project manager may agree to any formula to calculate the EV as long as it produces verifiable results that meet the objectives of the project.

2. Weighted Milestone

A milestone is a significant point or event in the project. The weighted milestone method divides the work package into measurable segments, each ending with an observable milestone; it then assigns a weighted value to the achievement of each milestone. The weighted milestone method is more suitable for longer duration work packages (i.e., those longer than two time periods) that have intermediate and tangible results, or milestones. To be used most effectively, the weighted milestone technique requires at least one interim milestone for each reporting period and does not permit partial credit for incomplete milestones.

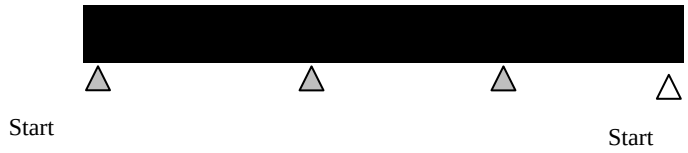


	Weighted Milestone	Weighted Value of Each Milestone		
		1st	2ed	3rd
Planned Value	Weekly Value	$3.920	$3,920	$3,000
	Cumulative Values	$3,920	$7,840	$11,440
Earned Value	Weekly Values	$3,920		
	Cumulative Values	$3,920 _		

Weighted Milestone Method

3. Percent Complete

The percent complete method shows an estimate of the percentage of work that is complete at the end of each measurement period. This method should be based on objective and quantifiable work completion. The planned value is determined by the time-phased resources required to accomplish the work package. The earned value (EV) is determined by multiplying the work package BAC by the percent complete. Percent complete should be determined in as objective a manner as possible. For example, specifying set criteria, agreed to by relevant stakeholders, for establishing a given percent complete. The Figure below shows a work package with a budget of $15,600, when selecting this method. At the end of the second measurement point. 67% of the work (two-thirds of the work) is planned to be completed. Therefore $15,600 multiplied by 67% (2/3) equates to $10,400 for the cumulative PV. In actuality, the organization accomplished 70% of the work at the end of the second measurement point, thus resulting in an earned value of $10,920. It is important to note that of effort expended on a work package planned for 100 hours does not mean that 50% of the work has been accomplished.



	Weighted Milestone	Percent Complete Assessment on Measurement Point		
		1st	2ed	3rd
Planned Value	Cumulative % complete	33 (1/3)	67 (2/3)	100
Planned Value	Cumulative Values	$5,200	$10,400	$15,600
Earned Value	Cumulative % complete	20	70	
Earned Value	Cumulative Values	$3,120	10,920$	
Percent Complete				

4. Physical Measurement

The physical measurement, unlike the weighted milestone and the percent complete, can be related more explicitly to the completion of the work. Measurement can include any units that can be explicitly related to the completion of the work. Examples may include the length of cable laid, the area and quantity of concrete poured, and the quantity of spokes in the case of the bicycle's wheel. The method of measurement and specific measurement with the cost or efforts spent should be defined and agreed upon in advance.

Apportioned Effort

Apportioned effort is used for work with a direct, supportive relationship to discrete work. The value for the support task is determined based on the earned value of the referenced base activity. Apportioned effort can include such work as quality assurance, inspection, and testing activities. An apportioned work effort is estimated as a percentage of the referenced discrete work effort. The percent allocation to discrete effort is used when there are sufficient performance records and knowledge of the interrelationship between the apportioned effort and the discrete effort. In the Figure

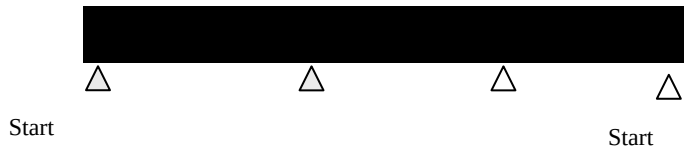
below, the discrete effort at the second measurement point is 5,200. The apportioned effort is 10% of the discrete effort, Therefore the apportioned value at the second measurement point is 10% of 5,200 of 520. In actuality, the actual discrete effort accomplished at the end of the second period was 7,800; therefore the apportioned earned value at the second measurement point is 10% of 7,800 of 780.

	Proportioned	Measurement Point		
		1st	2ed	3rd
Planned Value	Relevant Discrete Effort	$5,200	$ 5,200	$ 5,200
	Apportioned Effort 10%	$520	$520	$520
Earned Value	Relevant Discrete Effort	$3,120	$7,800	
	Apportioned Effort 10%	$312 _	780$	

Level of Effort (LOE)

Level-of-effort (LOE) activities do not directly produce definitive end products that can be delivered or measured objectively. LOE work, such as project or program management and contract management, consume project resources and should be included in the EMV Planning, Executing, and Monitoring and Controlling Process Groups. LOE effort is not necessarily characterized by a uniform rate of work over a period of time. A planned value is assigned to each LOE task for each measurement period, and this planned value is credited as EV at the end of the measurement period. EV is incurred in line with PV which means LOE activities will not have a schedule variance. However cost variance can be incurred because the actual cost (AC) is usually different from EV It is also important to note that LOE activities can accrue EV in the absence of

AC. See Chapter 9 for more information on SV and CV.



	Level of Effort	Measurement Points		
		1st	2ed	3rd
Planned Value	Weekly Value	$4,000	$4,000	$4,000
	Cumulative Values	$4,000	$8,000	$12,4000
Earned Value	Weekly Values	$4,000	$4,000	$4,000
	Cumulative Values	$4,000	$8,000	$12,4000

Level of Effort

Outputs

Performance Measurement Methods

The performance measurement method for each work package is selected with careful consideration to the specific characteristics for the type of work, The major drivers to determine the method are duration and the tangibility of the deliverables. Table 7-1 includes guidelines for selecting appropriate measurement methods.

Control Account Plan Updates

Control account plans are established when defining the scope of the project. They are updated with the measurement method information such as:

- Performance measurement method per work package

- Measurement period (e.g., weekly, monthly)
- Measurement unit (e.g., hours, currency, and other measurable unit).

Considerations

Select the Method

The performance measurement method is selected and determined for each work package based on the duration and physical qualities of the work. A guideline for selecting a method is outlined in the table below.

To select an appropriate method for each unit, several aspects must be considered. Key points for consideration when selecting a measurement method are as follows:

- Characteristics of work (duration and measurability)
- Requirements
- Measurement units (hours, currency, and other measurable units)
- Risk
- Level of accuracy to measure (cost, schedule, and performance)

Rules of Measurement

Organizations may have explicit guidelines or processes for selecting measurement methods. The guidelines should include method selection, measurement accuracy, measurement period, measurement unit, data collection, and reporting.

Measurement of Procurements

The EV for procured materials may be recorded as of the date of receipt, inspection, or installation. When accounting system actual amounts are not available, an estimate of actual costs may be used. The key is to ensure that actual cost is recorded in the same reporting period as the corresponding earned value. The EV for materials should be recorded as close as possible to the point of consumption, but not earlier than receipt

Type of Work/ Tasks		**Characteristics**	
		Tangible (Measurable)	Intangible (Immeasurable)
Duration	Short (1-2 Periods)	Fixed Formula	Apportioned Effort

	Longer (Exceeds 2 Periods)		Level of Effort

Measurement Method		Key Points to Consider on Determining the Method
Discrete Effort	**Fixed Formula**	50/50, 25/75, etc. — Using the 50/50 and 25/75 methods, work is credited for EV as soon as it starts. However, the real progress is invisible and can give a false sense of accomplishment. This measurement method should only be used for work that spans less than two reporting periods.
		0/100 — The 0/100 method does not incrementally credit EV for partial work. Therefore the start of the work is not explicitly reported. This measurement method should only be used for work that is scheduled to start and complete within one reporting period.
	Weighted Milestone	The weighted milestone method has one or more milestones in the measurement period. Each milestone has an objective, verifiable accomplishment that is associated with it. The milestones are weighted to reflect the relative accomplishment of the milestones against the whole.

	Percent Complete	The percent complete method entails an estimate of the percent complete of the BAC at each measurement point. There should be measurable criteria associated with the percent complete measurements, or they can be too subjective and inaccurate.
	Physical Measurement	The evaluation of work progress in the project work packages is related to the physical nature. Whereas testing, measurement procedures, and/or its specifications should be explicit and be agreed upon in advance.
Apportioned Effort (73,2)		To use apportioned effort, the project manager must have pragmatic knowledge and validated performance records to create the percent of apportioned effort pertaining to the discrete work package.

Summary:

The primary goal in choosing the performance measurement method is to have the most objective, accurate and timely assessment possible of work, schedule, and cost status. There are three classes of work: discrete effort (measurable work), apportioned effort (work is factored to measurable work). And level of effort (non-measurable work. There is only one method for determining earned value within each of the apportioned efforts and level of effort classes. Selecting the appropriate method depends on the nature of the work, the duration of the work, and whether or not there are tangible outputs.

CHAPTER 7
ESTABLISH PERFORMANCE MEASUREMENT BASELINE

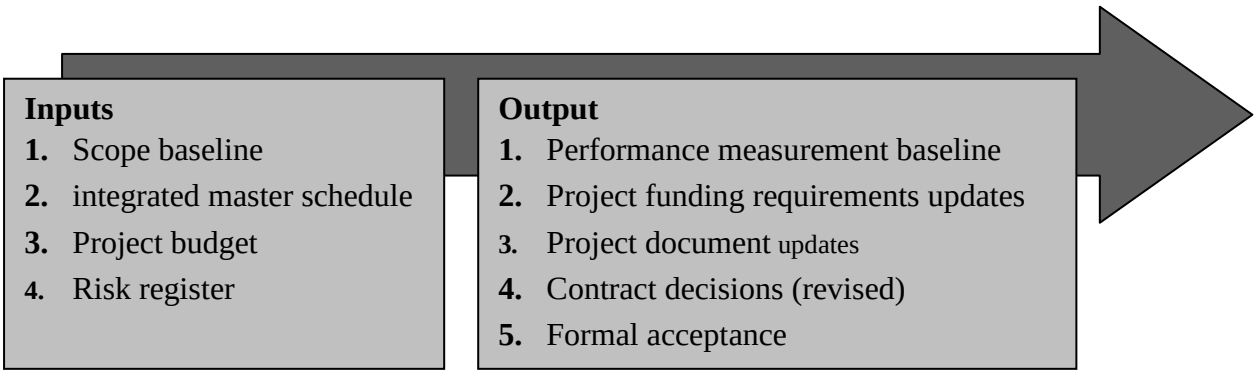
Introduction

Establish Performance Measurement Baseline is the process of integrating the scope, schedule, and cost baselines into a single project baseline from which to manage and control project performance throughout execution, In addition to the scope, cost, and schedule elements, the performance measurement baseline (PMB) also incorporates undistributed budget (along with its corresponding work) and contingency reserves (alongside with the corresponding risks). The PMB does not include the management reserve.

The PMB is the basis for project control and, therefore, it should model, as accurately as possible, how the project work and corresponding budget is planned to be executed and earned over time. A poor quality PMB will lead to performance

indicators with values that bear no useful relationship to the real status of the project and to the causes of performance variance.

For example, if the work is planned as a gross linear progression over a long period of time, but the physical execution follows an "S-shaped" curve reflecting a varying work rate, the schedule performance metrics are likely to produce a "behind schedule" status in the early stages of the work, even if it is being accomplished at a normal work rate. Likewise, it would produce a false "ahead of schedule" status in the later stages of execution.



Inputs

Scope Baseline

The scope baseline includes the project scope statement, the WBS, and the WBS dictionary, against which delivery will be compared.

Integrated Master Schedule

The integrated master schedule establishes the schedule start and finish dates for the project activities to be executed in the project.

Project Budget

The cost performance baseline is the authorized time-phased budget, that is, the planned value (PV). It represents the expected rate at which the project work is to be accomplished. The time-phased budget baseline should not be mistaken for financial information, for example, when invoices are issued or accepted, and payments are authorized and issued. The budget and funding distributions often differ throughout the life of the project.

Risk Register

The project management plan incorporates risk responses in various forms according to risk response plans. Some responses may require updating the project plan upfront, while others may require changing the plan according to specific emerging

circumstances (or risk triggers). For example, a contingency plan may only be implemented when the probability of a high-impact risk increases significantly.

The implementation of risk responses, upfront or later in the project, will affect the expected rate at which the project work will be executed: therefore the PMB must account for this factor. Information from the risk register, which may end up in the PMB includes the following:

1. **Agreed-Upon Response Strategies**

   Risk responses for both negative and positive risks can impact the scope, schedule, and cost of the project.

2. **Contingency Reserves**

   Contingency reserves are for identified risks that are accepted or for which contingent responses are devised. These reserves can fund contingency plans should they need to be implemented or can fund a necessary reaction to a risk after it occurs. Contingency reserves may be global to the overall project or can be allocated by life-cycle phase or other methods. Other types of risk response strategies (i.e., avoid/exploit, mitigate/enhance, and transfer/share) lead to changes to the project management plan and the PMB, and will already be part of the project scope and corresponding budget. Contingency reserves must be incorporated into the PMB.

   The use of contingency reserves is a project risk management practice that is not explicitly applied in all existing EVM standards worldwide. Unlike management reserve (MR), which is not in the PMB but is a part of the project budget base (PBB), contingency reserves are considered to within the PMB. While in commercial environments the only budget within the PMB that is outside of the WBS and is not time-phased is the undistributed budget (UB). In this case, contingency reserve can be treated as a special application of UB with the difference that that it will only be distributed when a risk occurs or a contingency plan is implemented

   It should be noted that, in any case, contingency reserves are not to be used for the purpose of masking overruns. Instead, these reserves are determined as a result of responding to specific identified risks and therefore are to be applied only toward those risks.

3. **Contract Decisions**

   Transferring or sharing risk via a contract, as a form of risk response, will lead to the involvement of third parties. This will have an impact on how the project work will be accomplished and how the budget consumption will occur and be monitored. The use of EVM to monitor the performance of subcontracted work requires proper consideration in the PMB. For example, the visibility of work accomplishments and budget consumption will depend on the type of contract and the terms agreed upon with the suppliers.

Description

Project Management Plan Integration

The project management team analyzes, consolidates, and integrates the information from the scope, schedule; and cost baselines. The information from the risk registers and risk response plans are incorporated into the baseline information, as appropriate.

The granularity of the PMB can be progressively elaborated throughout project execution in an iterative process as the project scope, schedule, and cost estimates are refined into greater detail.

The Project Budget Base (PBB)

The project budget base is defined, established and maintained by project management and it is revised only by appropriately authorized changes and with the concurrence of the customer and other relevant stakeholders as established for the project.

Management Reserve

In most projects, and certainly in major projects, there is considerable uncertainty regarding the magnitude at future events or difficulties, beyond project management team responsibility. To accommodate this uncertainty, a certain amount of the PBB can be identified as management reserve (MR).

The management reserve is part of the PBB, but it is not time-phased and is not part of the performance measurement baseline (PMB). As for contingency reserve, management reserve should not be used to mask performance-related overrun conditions. Rather, it is intended to budget responses to unforeseen risks within the project charter's statement of work.

Performance Measurement Baseline

The performance measurement baseline (PMB) is the budget and schedule against which project performance is measured. It is formed by budgets and is assigned to control accounts, summary level planning budgets, and undistributed budgets. It equals the PBB minus the management reserve. The PMB is maintained by project management, and all changes within the PMB are approved by the project manager.

1. **Undistributed Budget**

   Undistributed budget (UB) refers to project work that has not yet been incorporated into the WBS during planning (and therefore not yet time-phased). It is a temporary holding account for authorized work and budget. In practice, this means that the UB is budget that has not yet assigned to a control

account or to an SLPB. At all times, it must be possible to identify the work that is associated with the UB.

2. Summary Level Planning Budgets

Desirably, all planned resources, including the resources issued from the undistributed budget to the PMB, should be distributed to control accounts if at all practicable. However, because of the size, criticality, or multiple phases of the project budgets may be authorized to a higher WBS element level (i.e., above the control account), with corresponding work scope and schedule identified on a project work authorization document—these are the summary level planning budgets (SLPB).
These summary level planning budgets and their corresponding high-level tasks in the WBS (i.e., the summary level planning packages), are assigned to control accounts as soon as sufficient definition of the work is available.

3. Control Account Budgets

Control account budgets and their corresponding work are assigned and time-phased in accordance with an approved schedule and within control accounts, and may include both direct and indirect costs. Control accounts are time-phased according to the rolling wave concept, which requires detailed planning of work packages for as specified number of EV reporting time periods before the scheduled start of the work.
The sum of the budgets in a control account is the budget at completion (BAC) for that control account. The time-phased budget spread of all the resources required to accomplish the control account scope of work is called the planned value (PV). Therefore, the sum of all work package budgets plus the sum of all planning package budgets must equal the control account total budget, in each EV reporting period (typically one month) both incrementally and at completion.

Rolling Wave Planning

Rolling wave planning is an iterative planning technique in which the work to be accomplished in the near term is planned in detail, while the work in the future is planned at a more general level. To accomplish this, a planning window is established during which all planning packages are decomposed into detailed work packages (or summary planning budgets into control accounts). This process continues throughout the project until all planning packages are eventually decomposed into work packages.

Outputs

Performance Measurement Baseline

The performance measurement baseline (PMB) must include, but is not limited to the following elements:

- Schedule start and completion dates for each work package and planning package in the WBS

- Budget for each work package and planning package. and its time-phased distribution, decomposed by the resources allocated
- Time-phased distribution of the quantities of the resources allocated to each work package and planning package
- Description of the risks covered, including: their value, the time period to which they refer and possibly the resource types considered (for example, a cost reserve may include separate limited amounts for external services and for internal resources)
- List of constraints and assumptions regarding work progress, corresponding budget, and resource consumption.

The time-phased information in the PMB should be consistent with the detailed project schedule information - at the activity level (for example, the expected time-phased consumption of a specific resource in a work package can be derived from the sequence of its interrelated activities where that resource is allocated).

Project Funding Requirements Updates

The project funding requirements may need to be updated in line with the budgetary decisions made to establish the PMB. This is accomplished in many different ways, and often the funding methodology quite different in a government versus a commercial environment.

Project Document Updates

Project documents that may be updated include, but are not limited to the following:

- Scope-related documentation
- Project schedule and time estimates
- Project budget and resource estimates
- Risk register
- Stakeholder register
- Communications management plan

Contract Decisions (Revised)

Establish Performance Measurement Baseline requires agreements with suppliers to ensure that progress, cost, and time results are properly monitored for the purpose of the earned value management calculations. For example, assessing the physical progress of subcontracted work requires an adequate level visibility (how and with what frequency) of the supplier's activities. The supplier must adhere to these requirements and may negotiate extra resources or support from the buyer and this must be reflected in the contract.

Formal Acceptance

There must be only one shared vision of how the project is expected to evolve throughout the life cycle until completion—that is, the performance measurement baseline. A commitment from all stakeholders to this shared vision is a key factor for the success of a project

Considerations

Method for Scheduling Level of Effort Work

A project often requires that a certain type of work is executed continuously over a long period of time in a predictable recurring manner, for example, weekly management meetings. Other types of work may also be expected to occur over a reasonably long period of time. but in a less predictable manner, for example, technical support executed "on demand."
This type of ongoing work needs to be planned for in a way that does not distort the earned value performance indicators, and allows for proper monitoring of progress. For less predictable ongoing work, special care must be taken in any attempt to distribute the resources in a nonuniform manner, which often requires further decomposition of the scope.

Method for Allocating Indirect Costs

Organizational indirect costs (sometimes referred to as "overheads") are often aimed at supporting the execution of various projects within a portfolio or program, especially in project-oriented organizations. In this type of environment, allocating the correct amount of indirect costs to a project is important for the purpose of controlling the organization's efficiency, profitability, and competitiveness. For example, an underestimated amount of indirect costs may lead to a project that appears to generate a profit to the organization, whereas a loss is being incurred. Likewise, an overestimated overhead may lead to prices that are not competitive, thereby leading to a loss of feasible business opportunities. Reducing the amount of unallocated indirect costs to a residual level in a project-based business model is essential for the effective management of each project and of the organization's overall business.
Indirect costs should be properly allocated and budgeted as appropriate within the PMB. These indirect budgets may be held separately or allocated within each control account, per organizational policies.

Impact of Different Types of Resources and Costs

When the PMB is established, it is important to take into consideration the measurement methods selected, as these will affect when EV performance is taken. The time phasing of PV in turn will be reflected in the PMB. Comparison between the EV and PV will determine the schedule performance and any misalignment may impact this metric.

Method for Incorporating Contingency Reserves into the PMB

When developing the PMB, the amount of contingency reserves needed, and where it will be held, must be determined. There are various methods and alternatives specific to organizations and project types. However; as discussed earlier, contingency reserve is a common management tool in many environments. Contingency reserve is a reserve based on a risk analysis of the baseline, contingency reserve is considered a 'funding reserve" owned by the customer for allowance of a project's cost growth in a

cost plus contracting environment. However, in this practice standard, contingency reserve is a reserve within the PMB managed by the project manager for the incorporation of realized risks. The value of contingency reserve may be established by identification of discrete risks within the PMB or may be based on a statistical risk assessment. Regardless, the contingency reserve allows for adjusting the PMB, that is, it provides additional flexibility due to the realization of project risks. Like management reserve, it is permissible for there to be remaining contingency reserve at project completion. In this case, it is unused, removed from the PMB, and the budget at completion is set to the cumulative EV (PV), When the decision is made by the project manager to utilize contingency reserve during the project's execution, it is added to future baseline periods in response to realized risks. The establishment of contingency reserve should be made under the cognizance of the project manager, and, subsequently, the application of contingency reserve to control accounts should follow a disciplined process under the control of the project manager (much like the application of management reserve).

Integration of Subcontractor Baselines

As referred to proper contractual agreements with suppliers are essential to ensure that subcontracted work is reflected appropriately in the PMB. The PMB must be aligned with the way in which information will be used to monitor progress and measure actual costs for the subcontracted work. The supplier's level of maturity, culture, and expertise in using earned value management will impact the contract. The contractual requirements for earned value must be feasible, discourage resistance, encourage supplier to provide accurate information about progress, and stimulate the supplier's performance. The suppliers may or may not use EVM to control the internal performance of their work, but they must provide the necessary information for EVM to be implemented at the project level.

Summary

Establishing the performance measurement baseline PMB provides the reference against which performance is measured. The PMB must be an accurate model of how the project is expected to be implemented over time, integrating scope, cost, time, and risk-planning elements. The PMB must also incorporate subcontracted work, requiring adequate contractual agreements with suppliers with regard to the collection and use of earned value management information.

CHAPTER 8

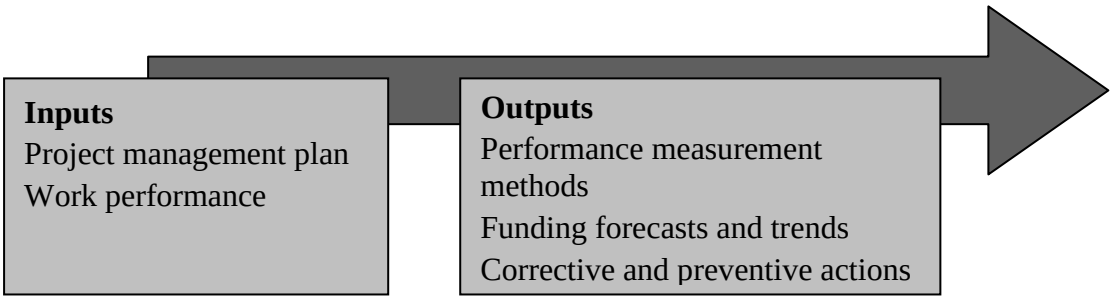
ANALYZE PROJECT PERFORMANCE

Introduction

Analyze Project Performance is the process of comparing actual project cost and schedule performance to the performance measurement baseline for the purposes of analyzing the current status of a project. The primary purpose of EVM is to provide management with a rigorous and complete understanding of the project's cost and schedule performance, and a rational forecast of an anticipated end state for each. This understanding is essential for making good decisions while analyzing the project,

exploring opportunities, and mitigating undesired variances.

By deploying an EVM system on the project, various metrics can be produced that address the project's cost and schedule for past, current, and future conditions. These metrics may be represented in many data forms and graphics.



Inputs

Project Management Plan

Following components in the project management plan are used to analyze project performance:

- **Performance measurement baseline (PMB)**. The performance measurement baseline is used to compare planned performance with actual performance to determine project status.
- **Variance thresholds**. This indicates the acceptable range of variances.
- **Subsidiary management plans.** The cost management plan, schedule management plan, scope management plan, and any other management plans that are used to provide guidance in managing and controlling the project.

Work Performance Information

Work performance information includes information about project progress, such as which deliverables have started, what the progress of the deliverables is, and which deliverables have finished. This information is used to determine earned value, It also includes information on costs that have been authorized and incurred. This information is used to determine actual cost.

Earned value management (EVM) relies on four key data points:

- Planned value
- Earned value
- Actual cost

- Budget at completion

The planned value is represented in the performance measurement baseline, as is the budget at completion. The earned value and actual costs are updated as the project progresses.

1. **Planned Value**

   Planned value (PV) is the authorized, time-phased budget assigned to accomplish the scheduled work. At any given point on a time line, PV describes how much of the project work was planned to be performed.

2. **Earned Value**

   Earned value (EV) is the measure of work performed at a specific point in time, expressed in terms of the approved budget authorized for that work.

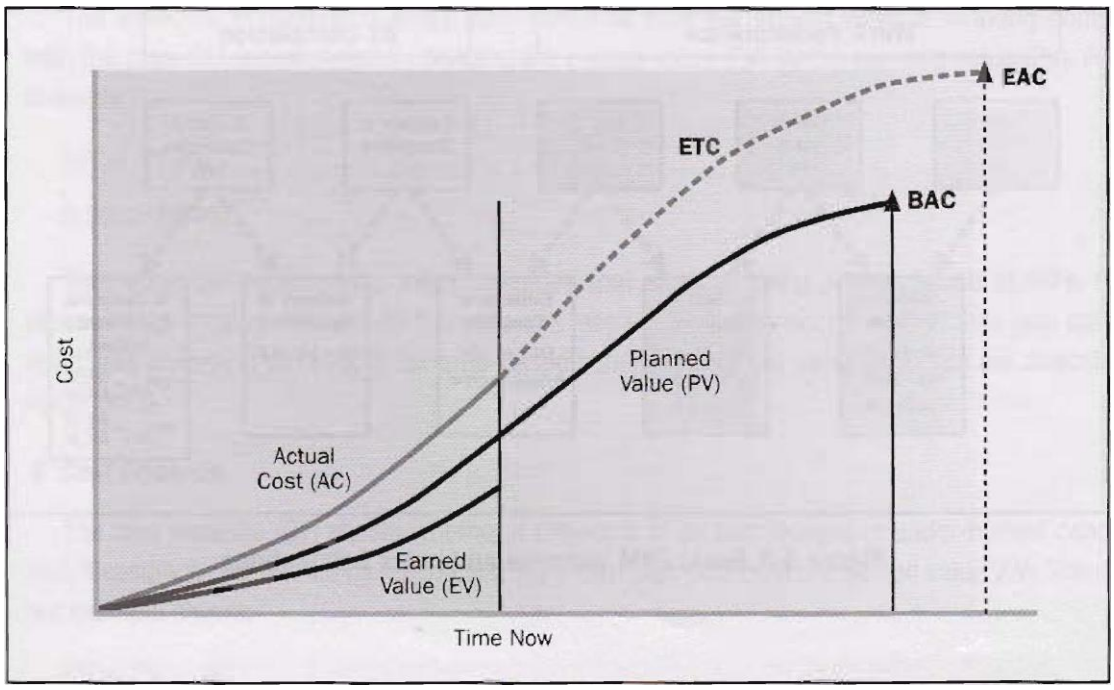
   The earned value of a project can be determined by various methods. The earned value methodology used to plan the baseline should be used consistently to determine the earned value. Figure 9-2 shows the earned value at 'time now," and indicates that less work than planned has been accomplished.

3. **Actual Cost**

   Actual cost (AC) is the realized cost incurred for the work performed during a specific time period. In order for EVM analysis to be reliable, AC must be recorded in the same time period as EV and for the same activity or work breakdown structure component as EV. For example, recording AC for accomplished work several months after EV has been recorded for the same work could significantly distort the EVM data.

4. **Budget At Completion**

   Budget at completion (BAC) is the sum of all the budgets established for the work to be performed



Description

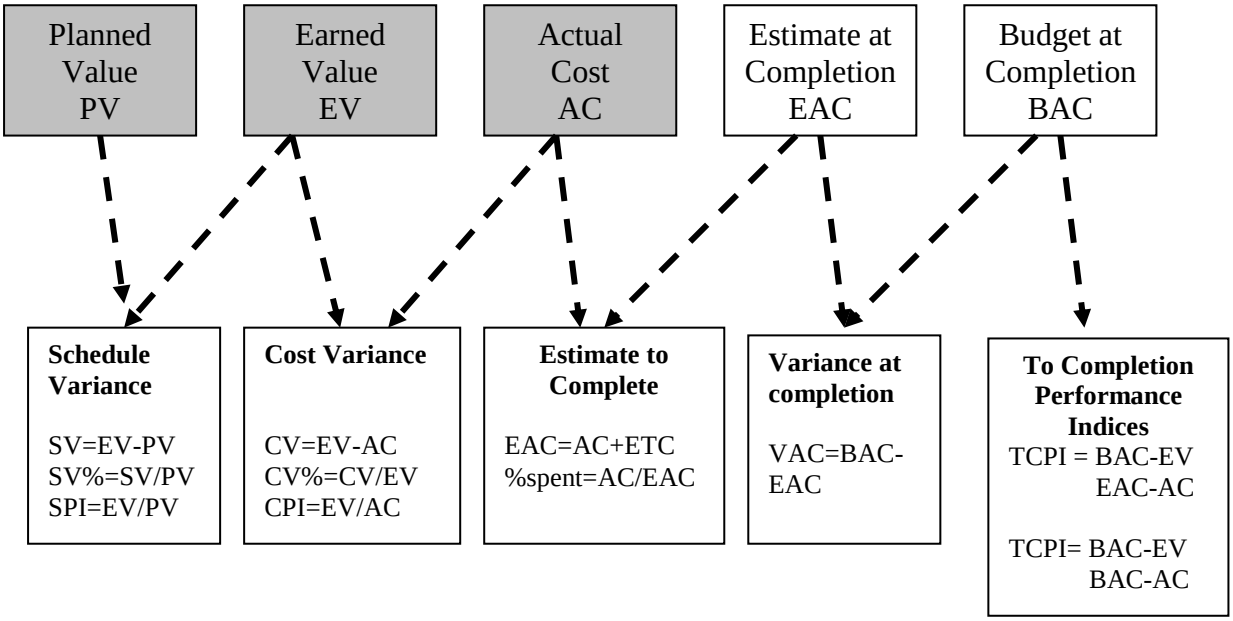
Performance Analysis

Earned value analyzes project performance by calculating performance variances and performance indices. Common variances include:

- Schedule variance (SV)
- Cost variance (CV)

Common indices include:

- Schedule performance index (SPI)
- Cost performance index (CPI)
- To complete performance index (TCPI)



Basic EVM Variance and Index Calculations

1. Schedule Analysis

Schedule variance is very often misinterpreted as a time-based indicator, for example, are we early or late and by how much? It is not a time -based indicator, but rather an indication of the physical status (how much of the work has been accomplished).

The schedule variance (SV) determines whether a project is ahead of or behind schedule in accomplishing work. It is calculated by subtracting the planned value (PV) from the earned value (EV). A positive value indicates more work has been accomplished than planned: a negative value indicates that less work has been accomplished than planned. For our example:

SPI=EV/PV

SV% =SV/PV

2. Cost Analysis

The cost variance (CV) shows whether a project is in an over-budget or under-budget condition. This measure is determined by subtracting the actual cost (AC) from the earned value (EV). The CV for our example shows:

CV = EV — AC

The CV can be expressed as a percentage by dividing the cost variance (CV) by the earned value (EV).

CV% = C V/EV

In other words, to date, the project is 50% over budget for the work performed.

Earned value and actual cost can also be used to calculate the cost performance index (CPI), which is one of the clearest indicators of the cost efficiency of a project. CPI gages how cost efficient the team is in using its resources. it is determined by dividing the earned value (EV) by the actual cost (AC). With regard to our example, the CPI is:

CPI = EV/AC

Forecasting

As the project progresses forecasts can be developed for cost and schedule performance. Comma- forecasting data includes:

- Estimate to complete
- Estimate at completion
- Variance at completion
- To-complete performance index
- These forecasts are summarized in Figure 9-3.

1. **Estimate to Complete**

   The estimate to complete (ETC) is the expected cost needed to complete all of the remaining for a control account, work package, or the project. There are two ways to develop the estimate to complete (ETC). The most accurate method is to develop a new, detailed, bottom-up estimate based on analysis of the remaining work.

   ETC = (BAC — EV)/CPI

2. **Estimates at Completion**

   Estimate at completion (EAC), is the expected total cost of a control account, work package, or the project when the defined scope of work will be completed. The formal EAC for a project should be estimated by the project team; however EACs may also be calculated based on performance to date. The EAC is typically based on the actual cost incurred for work completed (AC) to complete (ETC) for the remaining work, There are two distinct methods for deriving an EAC value: analytical and statistical.

   The management ETC can be added to the actual cost (AC) to derive the management estimate at completion (EAC).

EAC = AG + ETC

EAC = BAC/CPI

3. Variance at Completion

The cost variance at completion (VAC), derived by subtracting the EAC from the BAC, forecasts the amount of budget deficit or surplus at the end of the project. The VAC shows the team whether the project is forecasted to finish under or over budget.

VAC = BAC — EAC

VAC% = VAC/BAC

4. To-Complete Performance Index

The TCPI is a comparative measure. It compares work completed to date with budget required to complete the remaining work. The performance efficiency needed to complete the project is often more. Sometimes much more than any previous level of performance achieved. The TCPI data can be used as the basis for a discussion which explores whether the performance required is realistically achievable.

The to-complete performance index (TCPI) is the calculated projection of cost efficiency that must be achieved on the remaining work to meet a specified management goal, such as the BAC or EAC. It is the ratio of remaining work to the remaining budget.

The TCPI for achieving the EAC is calculated by dividing the budget for the remaining work by the estimate to complete:

$TCPI_{EAc}$ = (BAC — EV)/ (EAC — AC)

The TCPI for achieving the BAC is calculated by dividing the budget for the remaining work by the total budget less cumulative AC:

$TCPI_{BAC}$ = (BAC — EV)/(BAC — AC)

Percentage Comparisons

Comparing the percent complete to the percent spent is another way of analyzing the project status. The percent complete is the percent of scope accomplished as compared to the total scope of the project.

$$\%Complete=EV/BAC$$

The percent complete is compared to the percent spent, which is the amount of actual costs compared to the total forecast of costs on a project, that is, the EAC.

$$\%\ Spent_{BAC} = AC/EAC$$

However, similar to the TCPI calculation and the acceptance of all of the limitations therein, it is sometimes useful to compare the actual costs to the total budget for the project.

$$\%\ Spents_{BAC} = AC/BAC$$

Trend Analysis

Identifying trends in the performance metrics can help a project manager decipher or anticipate a potential performance problem.

Outputs

Performance Measurement Methods

Performance measurements include the calculated CV. SV, CPI, and SPI values for the various WBS to control accounts.

Funding Forecasts and Trends

Funding forecasts can include a management EAC and a comparison of a range of calculated EACs.

Corrective and Preventive Actions

Based on the analysis of project performance and trends, it may be appropriate to conduct a root cause analysis and recommend preventive actions to keep the project from crossing a performance threshold, or recommend corrective actions to bring performance back in line with expected performance.

Considerations

Management by Exception

EVM provides an organization with the capability of practicing "management-by-exception" on its projects. This practice contributes greatly to the efficiency and effectiveness of project management, by allowing managers and others to focus on project execution and invoke control actions only when and where they are needed. EVM performance measures, used in conjunction with the project work breakdown structure (WBS), provide the objective data needed to practice 'management-by-exception."

Communication with Earned Value Data

The project team is frequently held accountable for explaining the status of the project using earned value data, and making forecasts as to the probable project outcomes. Often this entails explaining the cost, schedule, and at-completion variances. When communicating variances, it is important that the team describes the cause, impact and any corrective actions associated with these variances.

Earned value management can provide a great deal of useful information to key stakeholders about a project. The client, owner, or upper management may simply need a top-line report that indicates whether a project is on time and within budget. By contrast, the project manager will need much more detail in order to make any necessary adjustments to the project.

A number of different methods have evolved for presenting EVM data. Several of these methods may be used on a given project to meet the needs of different stakeholder audiences. The most commonly used methods include:

- Tables
- Bar charts
- S-curves

1. **Tables**

   A tabular format can be an effective method for displaying the EVM results by project component. A table format provides the project manager and other top- level stakeholders with a complete, concise picture of what is happening with each major component of the project. It can be used as a logical follow-up to an S-curve to provide more detail on where the project is at a given point in time,

2. Bar Charts

Bar charts can be a useful tool for comparing data such as PV to EV, or AC to EV, etc.

3. S-Curves

S-curves, like the ones used earlier in this section, illustrate the cumulative performance metrics of EVM. The typical S-curve is displayed on an X-Yaxis with time shown on the X axis and resources shown on the Yaxis. This type of display can be very effective for providing a quick look at the overall performance of an activity. a control account, or a project.

Summary

The data on project performance is compared measurement baseline. The project management team can use PV, EV, AC and BAC to measure current performance and predict future performance.

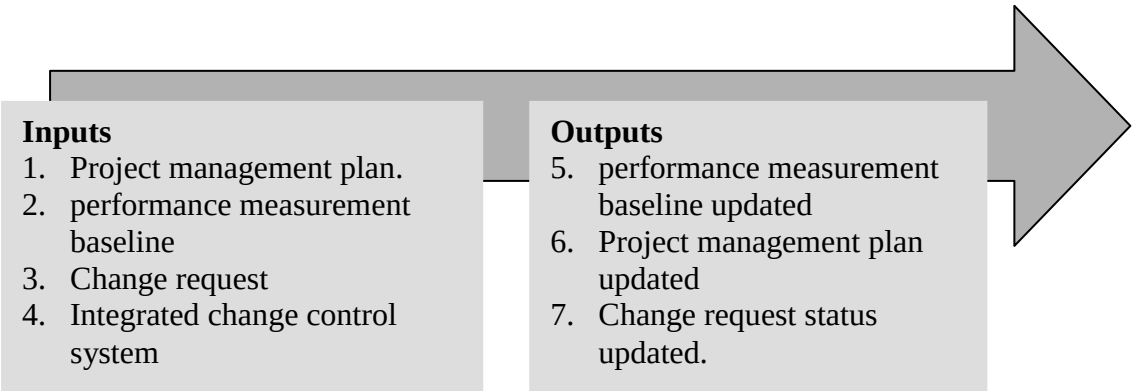
Chapter 10

Maintain Performance Measurement Baseline

Introduction

Maintain performance measurement baseline is the process of managing changes to the project scope and maintaining the integrity of the performance measurement baseline.

Change in the project is inevitable and most projects will incorporate changes to the PMB at some point. Established rules exist within the context of earned value management EVM for dealing with these changes to the PMB.



Maintain Performance Measurement Baseline

Inputs

Project Management Plan

The project management plan defines the processes used to execute, monitor, control, and close the project. Two important elements of the project management plan are the performance measurement baseline and the integrated change control.

Performance Measurement Baseline

The performance measurement baseline PMB is the budget against which project performance is measured. It's formed by combining the budget assigned to control account, summary level planning budget, and undistributed budget. It equals the PBB minus the management reserve. The PMB is maintained by project management and all changes within the PMB are approved by the project manager.

Change Request

Change request can be the result of project performance, an error in defining the scope of the project or the product, evolving requirements, a customer request, a change to a contract, a shift in the regulatory environment, or a change in the market.

Changes to the PMB may occur because the existing budget or schedule is no longer realistic.

Integrated change Control System

The integrated change control system is a formal process for evaluating project changes. Changes must be authorized, implemented and communicated in a timely manner.

Description

Change Control Board Meeting

A change control board CCB is frequently used to analyze the impact of scope, schedule, cost, and other types of changes on the project and performance measurement baseline PMB. The only changes that are implemented are those that are approves by the CCB. On small projects, the project manger may act as a CCB.

Scope Change Analysis

All scope changes must be analyzed, the scope defined, and the impact on the control accounts assessed, including the need to add new control account or delete existing control account.

When new scope is added to the project, the PMB must be changed at the WBS level where the scope change will occur.

If new work is added to the control account, the new work should be placed into one or more new work packages, if an existing work package needs to be modified, it should first be closed, with the remaining budget plus the new budget placed in new work package. In the latter case, when closing the control account, make the current budget equal to the earned value. This eliminates the schedule variance, no work remaining to be accomplished in the control account, but the cost variance is maintained at whatever value it has. Actual cost should not be hanged for a control account that has begun and then is closed due to a scope change.

Cost and Schedule Rebaselining

The desired results from rebaseliend of he PMB is to improve the correlation of the planned work to the budget baseline, scope and schedule. The rebaselined takes one of two forms, listed below:

- Preplanning involves a realignment of the remaining schedule and realignment of the remaining budget to meet the original target.
- Reprogramming is a comprehensive effort to revamp the PMB. The result of this activity is an over target baseline OTB or over target schedule OTS. An OTS occurs when the schedules work and the associated budgets are time-phased beyond the original completion.

Outputs

Performance Measurement Baseline Updates

Once rebaselined is competed, it needs to be formally accepted.

Project Management Plan Updates

When scope is added or deleted, the WBS and WBS dictionary need to be updated to reflect the change in scope. The risk register, cost management plan, and scope management plan may need to be examined and update accordingly.

Change Request Status Updates.

Changes that are approved are implemented and corresponding project management plan components, PMB, and project documents are updated. Changes that are deferred or not approved are recorded in the change log along with the reason for the decision.

Consideration

Baseline changes occur and need to be dealt with in a timely manner in order to make EVM effective over the span of the entire project. The goal is to maintain the integrity of the performance measurement baseline PMB so the measurements are meaningful. Change to the PMB will cause change to some unopened control accounts.

Work scope and budget, if moved form one control account to another, are always moved together. Budget must never be transferred simply to eliminate variance.

Summary

This chapter provides detailed information with regard to the reasons why a baseline may change, the process for dealing with changes, and the project outputs once the changes take place.