Chapter-1

Project: is a temporary endeavor undertaken to create a unique product, service, or result.

Project Attributes:

- Project Has a unique purpose
- Project Is temporary
- Project Is developed using progressive elaboration
- Project Requires resources, often from various areas
- Project Should have a primary customer or sponsor
- Project Involves uncertainty

Project managers work with project sponsors, the project team, and other people involved in a project to meet project goals

Program: group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually

Program managers oversee programs; often act as bosses for project managers, provides leadership and direction for the project managers heading the projects within the program

The Triple Constraint of Project Management: Successful project management means meeting all three **goals** (**scope, time, and cost**) – and satisfying the project's sponsor!

Project management: is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.

Project managers strive to meet the **triple constraint** by balancing project scope, time, and cost goals

Project Management Framework (Project Management Knowledge Areas):

- 4 **core** knowledge areas lead to specific project objectives (**scope, time, cost, and quality**)
- 4 **facilitating** knowledge areas are the means through which the project objectives are achieved (**human resources, communication, risk, and procurement management**
- 1 knowledge area (**project integration management)** affects and is affected by all of the other knowledge areas

Stakeholders: are the people involved in or affected by project activities

Stakeholders include:

- The project sponsor
- The project team
- Customers
- Suppliers
- The project manager
- Support staff
- Users
- Opponents to the project

Project portfolio management, organizations group and manage projects and programs as a portfolio of investments that contribute to the entire enterprise's success

Portfolio managers help their organizations make wise investment decisions by helping to select and analyze projects from a strategic perspective

Project Management Compared to Project Portfolio Management:

Project Management (Tactical Goals)	Project Portfolio Management (Strategic Goals)
▪ Are we carrying out projects well? ▪ Are projects on time and on budget?	▪ Are we working on the right projects? ▪ Are we investing in the right areas?

▪ Do project stakeholders know what they should be doing?	▪ Do we have the right resources to be competitive?

Ten Most Important Skills and Competencies for Project Managers:

- People skills
- Listening
- Strong at building trust
- Strong at building teams
- Critical thinking, problem solving
- Leadership
- Integrity, ethical behavior, consistent
- Verbal communication
- Conflict resolution, conflict management
- Understands, balances priorities

Importance of Leadership Skills:

- **Effective project managers** provide leadership by example
- A **leader** focuses on long-term goals and big-picture objectives while inspiring people to reach those goals
- A **manager** deals with the day-to-day details of meeting specific goals
- Project managers often take on the role of **both leader and manager**

Project Management Software:

- **Low-end tools:** handle single or smaller projects well, cost under $200 per user
- **Midrange tools:** handle multiple projects and users, cost $200-600 per user, Project 2007 most popular
- **High-end tools:** also called enterprise project management software, often licensed on a per-user basis, like VPMi Enterprise Online.

Chapter-2

System View Of Project Management:

systems approach emerged in the 1950s to describe a more analytical approach to management and problem solving, three parts include:

- **Systems philosophy:** an overall model for thinking about things as systems
- **Systems analysis:** problem-solving approach
- **Systems management:** address business, technological, and organizational issues before making changes to systems

The Three-Sphere Model for Systems Management:

1. **Business**
   a. What will the laptop project cost the college?
   b. What will it cost students?
2. **Organization**
   a. How will the project affect students who already have PCs or laptops?
   b. Who will train students, faculty, and staff?
3. **Technology**
   a. Should the laptops use Macintosh, Windows, or both types of operating systems?
   b. What applications software will be loaded?

The Four Frames of Organizations:

1. **Structural Frame:** Focuses on roles and responsibilities, coordination and control. Organization chart help define this frame.
2. **Human Resources (HR) Frame:** Focuses on providing harmony between needs of the organization and needs of people.
3. **Political Frame:** Assumes organizations are coalitions composed of varied individuals and interest groups. Conflict and power are key issues.
4. **Symbolic Frame:** Focuses on symbols and meanings related to events. Culture is important.

3 basic organization structures:

- **Functional:** functional managers' report to the CEO
- **Project:** program managers report to the CEO
- **Matrix:** middle ground between functional and project structures; personnel often report to two or more bosses; structure can be weak, balanced, or strong matrix

Organizational culture is a set of shared assumptions, values, and behaviors that characterize the functioning of an organization

Ten characteristics of organizational culture:

- Member identity*
- Unit integration*
- Reward criteria*
- Open-systems focus*
- Group emphasis*
- Control
- Conflict tolerance*
- People focus
- Risk tolerance*
- Means-ends orientation

project life cycle is a collection of project phases such as concept, development, implementation, and close-out that defines:

A deliverable is a product or service produced or provided as part of a project

Project Phases:

Early phases	• Resource needs are usually lowest • The level of uncertainty (risk) is highest • Project stakeholders have the greatest opportunity to influence the project
Middle phases	• The certainty of completing a project improves • More resources are needed
Final phase	• Ensuring that project requirements were met • The sponsor approves completion of the project

Systems Development Life Cycle (SDLC) is a framework for describing the phases involved in developing and maintaining information systems

Systems development projects can follow

- **Predictive life cycle:** the scope of the project can be clearly articulated and the schedule and cost can be predicted

- **Adaptive Software Development (ASD) life cycle:** requirements cannot be clearly expressed, projects are mission driven and component based, using time-based cycles to meet target dates

Predictive life cycle:

- **Waterfall model:** has well-defined, linear stages of systems development and support
- **Spiral model:** shows that software is developed using an iterative or spiral approach rather than a linear approach
- **Incremental build model:** provides for progressive development of operational software
- **Prototyping model:** used for developing prototypes to clarify user requirements
- **Rapid Application Development (RAD) model**: used to produce systems quickly without sacrificing quality

Recent trends affecting IT project management:

- **Globalization: lower trade and political barriers and the digital revolution have made it possible to interact almost instantaneously with billions of other people across the planet**
- **Outsourcing: outsourcing is when an organization acquires goods and/or sources from an outside source; offshoring is sometimes used to describe outsourcing from another country**
- **Virtual teams: a virtual team is a group of individuals who work across time and space using communication technologies**

Virtual Teams Advantages:

- Increasing completeness and responsiveness by having a team of workers available 24/7
- Lowering costs because many virtual workers do not require office space or support beyond their home offices
- Providing more expertise and flexibility by having team members from across the globe working any time of day or night
- Increasing the work/life balance for team members by eliminating fixed office hours and the need to travel to work

Virtual Teams Disadvantages:

- Isolating team members
- Increasing the potential for communications problems
- Reducing the ability for team members to network and transfer information informally
- Increasing the dependence on technology to accomplish work

Chapter-3

process is a series of actions directed toward a particular result

- Project management can be viewed as a **number of interlinked processes**

The project management process groups include:

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

- ❖ A methodology describes how things should be done
- ❖ a standard describes what should be done

kick-off meeting is a meeting held at the beginning of a project so that stakeholders can meet each other, review the goals of the project, and discuss future plans. The kick-off meeting is often held after the business case and project charter are completed, but it could be held sooner, as needed

Project Planning key output:

- team contract
- A project scope statement
- A work breakdown structure (WBS)
- A project schedule, in the form of a Gantt chart with all dependencies and resources entered
- A list of prioritized risks

Chapter-4

Project Integration Management Processes:

- Develop the project charter: working with stakeholders to create the document that formally authorizes a project
- Develop the project management plan: coordinating all planning efforts to create a consistent, coherent document
- Direct and manage project execution: carrying out the project management plan by performing the activities included in it
- Monitor and control the project work: overseeing project work to meet the performance objectives of the project
- Perform integrated change control: coordinating changes that affect the project's deliverables and organizational process assets
- Close the project or phase: finalizing all project activities to formally close the project or phase

Strategic planning: involves determining long-term objectives, predicting future trends, and projecting the need for new products and services

- Identify potential projects
- Use realistic methods to select which projects to work on
- Formalize project initiation by issuing a project charter

SWOT analysis: Analyzing Strengths, Weaknesses, Opportunities, and Threats

Methods for Selecting Projects:

- Focusing on broad organizational needs
- Categorizing information technology projects
- Using a weighted scoring model
- Implementing a balanced scorecard
- Performing net present value or other financial analyses

Three important criteria for projects:

- There is a **need** for the project
- There are **funds** available
- There's a strong **will** to make the project succeed

Financial Analysis of Projects:

- Net present value (NPV) analysis: analysis is a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time
- Return on investment (ROI
- Payback analysis: The payback period is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project

balanced scorecard: Is a methodology that converts an organization's value drivers, such as customer service, innovation, operational efficiency, and financial performance, to a series of defined metrics

project charter: is a document that formally recognizes the existence of a project and provides direction on the project's objectives and management

project management plan: is a document used to coordinate all project planning documents and help guide a project's execution and control

Project Execution Tools and Techniques:

- Expert judgment: experts can help project managers and their teams make many decisions related to project execution
- Project management information systems: there are hundreds of project management software products available on the market today, and many organizations are moving toward powerful enterprise project management systems that are accessible via the Internet

Baseline: is the approved project management plan plus approved changes.

closing project or phase:

- To close a project or phase, you must finalize all activities and transfer the completed or cancelled work to the appropriate people
- Main outputs include:
  - Final product, service, or result transition
  - Organizational process asset updates

USING SOFTWARE TO ASSIST IN PROJECT INTEGRATION MANAGEMENT:

- **Documents** can be created with word processing software
- **Presentations** are created with presentation software
- **Tracking** can be done with spreadsheets or databases
- **Communication software** like e-mail and Web authoring tools facilitate communications
- Project management software can pull everything together and show detailed and summarized information
- **Business Service Management** (BSM) tools track the execution of business process flows

Chapter-5

What is Project Scope Management?

- Scope refers to *all* the work involved in creating the products of the project and the processes used to create them
- A deliverable is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes.
- Project scope management includes the processes involved in defining and controlling what is or is not included in a project

Project Scope Management Processes:

- Collecting requirements: defining and documenting the features and functions of the products produced
- Defining scope: reviewing the project charter, requirements documents, and organizational process assets to create a scope statement
- Creating the WBS: subdividing the major project deliverables into smaller
- Verifying scope: formalizing acceptance of the project deliverables
- Controlling scope: controlling changes to project scope throughout the life of the project

Methods for Collecting Requirements:

- Interviewing
- Focus groups and facilitated workshops
- Using group creativity and decision-making techniques
- Questionnaires and surveys
- Observation
- Prototyping
- Software tools

Decomposition **is subdividing project deliverables into smaller pieces**

A work package **is a task at the lowest level of the WBS**

Approaches to Developing WBSs:

- Using guidelines: some organizations, like the DOD, provide guidelines for preparing WBSs
- The analogy approach: review WBSs of similar projects and tailor to your project
- The top-down approach: start with the largest items of the project and break them down
- The bottom-up approach: start with the specific tasks and roll them up
- Mind-mapping approach: mind mapping is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

WBS dictionary is a document that describes detailed information about each WBS item

Scope baseline is a part of the project management plan and acts as the reference point through the project life. It has several components. These include project **scope** document, the WBS itself and the WBS dictionary. **Scope Baseline** Document

Scope creep: In project management refers to changes, continuous or uncontrolled growth in a project's scope, at any point after the project begins. This can occur when the scope of a project is not properly defined, documented, or controlled. It is generally considered harmful. It is related to but distinct from feature creep.

Scope creep can be a result of:

- poor change control
- lack of proper initial identification of what is required to bring about the project objectives
- weak project manager or executive sponsor
- poor communication between parties
- lack of initial product versatility

Variance is the difference between planned and actual performance

Chapter-6

Project time management processes: (مهم)

- **Defining activities:** identifying the specific activities that the project team members and stakeholders must perform to produce the project deliverables
- **Sequencing activities:** identifying and documenting the relationships between project activities
- **Estimating activity resources:** estimating how many **resources** a project team should use to perform project activities
- **Estimating activity durations:** estimating the number of work periods that are needed to complete individual activities
- **Developing the schedule:** analyzing activity sequences, activity resource estimates, and activity duration estimates to create the project schedule
- **Controlling the schedule:** controlling and managing changes to the project schedule

Activity: or **task** is an element of work normally found on the work breakdown structure (WBS) that has an expected **duration, a cost, and resource requirements**

- **activity list:** is a tabulation of activities to be included on a project schedule that includes:
  - The activity names
  - An activity identifier or number
  - A brief description of the activity
- **Activity attributes:** provide more information such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity
- **Milestone:** is a significant event that normally has **no duration**
  - It often takes several activities and a lot of work to complete a milestone
  - They're useful tools for setting schedule goals and monitoring progress
  - Examples include obtaining customer sign-off on key documents or completion of specific products

Sequencing activities: Involves reviewing activities and determining dependencies

Dependency: or **relationship** is the sequencing of project activities or tasks

Types of dependencies: (مهم)

- **Mandatory dependencies:** inherent the work being performed on a project, sometimes referred to as hard logic
- **Discretionary dependencies:** defined by the project team; sometimes referred to as soft logic and should be used with care since they may limit later scheduling options
- **External dependencies:** involve relationships between project and non-project activities

Network diagram: is a schematic display of the logical relationships among, or sequencing of, project activities

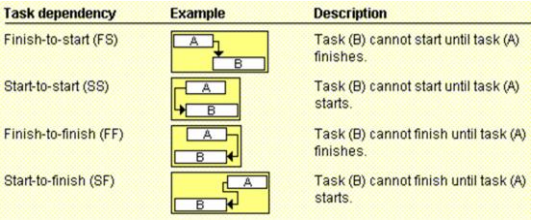
Arrow diagramming method (ADM): Also called **activity-on-arrow (AOA)** network diagrams

- Activities are represented by arrows
- Nodes or circles are the starting and ending points of activities
- Can only show finish-to-start dependencies

precedence diagramming method (PDM): is a network diagramming technique in which boxes represent activities.

Task dependency Types:

- **Finish-to-start dependency:** a relationship where the from activity or predecessor must finish before the to activity or successor can start.
- **Start-to-start dependency:** a relationship in which the from activity cannot start until the to activity or successor is started.
- **Finish-to-finish dependency:** a relationship where the from activity must be finished before the to activity can be finished.
- **Start-to-finish dependency:** a relationship where the from activity must start before the to activity can be finished.



Important issues in estimating resources

- How difficult will it be to do specific activities on this project?
- What is the organization's history in doing similar activities?
- Are the required resources available?

resource breakdown structure: is a hierarchical structure that identifies the project's resources by category and type

Duration: includes the actual amount of time worked on an activity *plus* elapsed time

Effort: is the number of workdays or work hours required to complete a task

- Effort does **not** normally **equal** duration
- People doing the work should help create estimates, and an expert should review them

Three-point estimate: is an estimate that includes an **optimistic**, **most likely**, and **pessimistic estimate**, such as three weeks for the optimistic, four weeks for the most likely, and five weeks for the pessimistic estimate. The **optimistic** estimate is based on a **best-case scenario**, while the **pessimistic** estimate is based on a **worst-case scenario**. The **most likely** estimate, as it sounds, is an estimate based on a **most likely or expected scenario**.

Gantt charts: provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format

Gantt charts Symbols include:

- **Black diamonds:** milestones
- **Thick black bars:** summary tasks
- **Lighter horizontal bars:** durations of tasks
- **Arrows:** dependencies between tasks

SMART criteria: Milestones should be:

- **Specific**
- **Measurable**
- **Assignable**
- **Realistic**
- **Time-framed**

Critical Path Method (CPM): is a network diagramming technique used to predict total project duration

- A critical path for a project is the series of activities that determines the *earliest time* by which the project can be completed
- The critical path is the **longest path** through the network diagram and has the least amount of slack or float
- Slack or **float** is the amount of time an activity may be delayed without delaying a succeeding activity or the project finish date

Using Critical Path Analysis to Make Schedule Trade-Offs:

- Free slack or free float is the amount of time an activity can be delayed without delaying the early start of any immediately following activities
- Total slack or total float is the amount of time an activity may be delayed from its early start without delaying the planned project finish date
- A forward pass through the network diagram determines the early start and finish dates
- A backward pass determines the late start and finish dates

Three main techniques for shortening schedules

- Shortening durations of critical activities/tasks by adding more resources or changing their scope
- Crashing activities by obtaining the greatest amount of schedule compression for the least incremental cost
- Fast tracking activities by doing them in parallel or overlapping them

Critical chain scheduling: A method of scheduling that considers limited resources when creating a project schedule and includes buffers to protect the project completion date

A buffer is additional time to complete a task

Critical chain scheduling removes buffers from individual tasks and instead creates:

- Project buffers or additional time added before the project's due date
- Feeding buffers or additional time added before tasks on the critical path

PERT is a network analysis technique used to estimate project duration when there is a high degree of uncertainty about the individual activity duration estimates (مهم العملية الحسابيه)

- PERT uses **probabilistic time estimates**: Duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations, or a three-point estimate

Chapter-7

Cost: is a resource sacrificed or foregone to achieve specific objective or something given up in exchange

- Costs are usually measured in **monetary** units like dollars

Project cost management includes the processes required to ensure that the project is completed within an approved budget

Project Cost Management processes:

- **Estimating costs:** developing an approximation or estimate of the costs of the resources needed to complete a project
- **Determining the budget:** allocating the overall cost estimate to individual work items to establish a baseline for measuring performance
- **Controlling costs:** controlling changes to the project budget

Basic principles of cost Management: (مهم)

- **Profits:** are revenues minus expenditures
- **Profit margin:** is the ratio of revenues to profits
- **Life cycle costing:** considers the total cost of ownership, or development plus support costs, for a project
- **Cash flow analysis:** determines the estimated annual costs and benefits for a project and the resulting annual cash flow
- **Tangible costs** or **benefits** are those costs or benefits that an organization can easily measure in dollars
- **Intangible costs** or **benefits** are costs or benefits that are difficult to measure in monetary terms
- **Direct costs** are costs that can be directly related to producing the products and services of the project
- **Indirect costs** are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project
- **Sunk cost** is money that has been spent in the past; when deciding what projects to invest in or continue, you should *not* include sunk costs
- **Learning curve theory** states that when many items are produced repetitively, the unit cost of those items decreases in a regular pattern as more units are produced
- **Reserves** are dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predict
    - **Contingency reserves** allow for future situations that may be partially planned for (sometimes called **known unknowns**) and are included in the project cost baseline
    - **Management reserves** allow for future situations that are unpredictable (sometimes called **unknown unknowns**)

Cost management plan is a document that describes how the organization will manage cost variances on the project

- A large percentage of total project costs are often **labor costs**, so project managers must develop and track estimates for labor

Cost Estimation Tools and Techniques:

- **Analogous or top-down estimates:** use the actual cost of a previous, similar project as the basis for estimating the cost of the current project
- **Bottom-up estimates:** involve estimating individual work items or activities and summing them to get a project total
- **Parametric modeling** uses project characteristics (parameters) in a mathematical model to estimate project costs

Typical Problems with IT Cost Estimates:

- Estimates are done too quickly
- Lack of estimating experience
- Human beings are biased toward underestimation
- Management desires accuracy

Every cost estimate is **unique**, just as every project is unique

cost baseline is a time-phased budget that project managers use to measure and monitor cost performance.

Project cost control:

- ❖ Monitoring cost performance
- ❖ Ensuring that only appropriate project changes are included in a revised cost baseline
- ❖ Informing project stakeholders of authorized changes to the project that will affect costs

Earned value management (EVM): is a project performance measurement technique that integrates scope, time, and cost data.

- Given a **baseline** (original plan plus approved changes), you can determine how well the project is meeting its goals

Rate of performance (RP) is the ratio of actual work completed to the percentage of work planned to have been completed at any given time during the life of the project or activity

Levels for project portfolio management:

- Put all your projects in one database
- Prioritize the projects in your database
- Divide your projects into two or three budgets based on type of investment
- Automate the repository
- Apply modern portfolio theory, including risk-return tools that map project risk on a curve

Chapter-8

Quality: the degree to which a set of inherent characteristics fulfils requirements
Project quality management ensures that the project will satisfy the needs for which it was undertaken
Project quality management processes:

- **Planning quality:** identifying which quality standards are relevant to the project and how to satisfy them; a metric is a standard of measurement
- **Performing quality assurance:** periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards
- **Performing quality control:** monitoring specific project results to ensure that they comply with the relevant quality standards

Quality planning: Implies the ability to anticipate situations and prepare actions to bring about the desired outcome
Important to prevent defects by:

- Selecting proper materials
- Training and indoctrinating people in quality
- Planning a process that ensures the appropriate outcome

Design of experiments is a quality planning technique that helps identify which variables have the most influence on the overall outcome of a process
Scope aspects of IT projects that affect quality:

- **Functionality** is the degree to which a system performs its intended function
- **Features** are the system's special characteristics that appeal to users
- **System outputs** are the screens and reports the system generates
- **Performance** addresses how well a product or service performs the customer's intended use
- **Reliability** is the ability of a product or service to perform as expected under normal conditions
- **Maintainability** addresses the ease of performing maintenance on a product

Project managers are ultimately **responsible** for quality management on their projects
Quality assurance includes all the activities related to satisfying the relevant quality standards for a project
Benchmarking generates ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organization
Quality audit is a structured review of specific quality management activities that help identify lessons learned that could improve performance on current or future projects
Main outputs of quality control are:

- Acceptance decisions
- Rework
- Process adjustments

Seven Basic Tools of Quality:

1. **Cause-and-effect diagrams** trace complaints about quality problems back to the responsible production operations
    - They help you find the root cause of a problem
    - Also known as **fishbone** or **Ishikawa diagrams**
2. **Control chart** is a graphic display of data that illustrates the results of a process over time
    - The main use of control charts is to prevent defects, rather than to detect or reject them
    - Quality control charts allow you to determine whether a process is in control or out of control
3. **Run chart** displays the history and pattern of variation of a process over time
    - Can be used to perform trend analysis to forecast future outcomes based on historical patterns
4. **Scatter diagram** helps to show if there is a relationship between two variables
5. **Histogram** is a bar graph of a distribution of variables
6. **Pareto chart** is a histogram that can help you identify and prioritize problem areas
    - **Pareto analysis** is also called the **80-20 rule**, meaning that 80 percent of problems are often due to 20 percent of the causes
7. **Flowcharts** are graphic displays of the logic and flow of processes that help you analyze how problems occur and how processes can be improved
    - They show activities, decision points, and the order of how information is processed

Seven run rule states that if seven data points in a row are all below the mean, above the mean, or are all increasing or decreasing, then the process needs to be examined for non-random problems

Statistical sampling involves choosing part of a population of interest for inspection

Six Sigma is a comprehensive and flexible system for achieving, sustaining, and maximizing business success. Six Sigma is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes.

DMAIC is a systematic, closed-loop process for continued improvement that is scientific and fact based

- DMAIC stands for:
    - **D**efine: define the problem/opportunity, process, and customer requirements
    - **M**easure: define measures, then collect, compile, and display data
    - **A**nalyze: scrutinize process details to find improvement opportunities
    - **I**mprove: generate solutions and ideas for improving the problem
    - **C**ontrol: track and verify the stability of the improvements and the predictability of the solution

How Is Six Sigma Quality Control Unique?

- It requires an organization-wide commitment
- Training follows the "Belt" system
- Six Sigma organizations have the ability and willingness to adopt contrary objectives, such as reducing errors and getting things done faster

The term **sigma** means standard deviation

Six 9s of quality is a measure of quality control equal to 1 fault in 1 million opportunities

Types of Testing: (مهم)

- Unit testing tests each individual component (often a program) to ensure it is as defect-free as possible
- Integration testing occurs between unit and system testing to test functionally grouped components
- System testing tests the entire system as one entity
- User acceptance testing is an independent test performed by end users prior to accepting the delivered system

Modern quality management:

- Requires customer satisfaction
- Prefers prevention to inspection
- Recognizes management responsibility for quality

Suggestions for improving quality for IT projects include:

- Establish leadership that promotes quality
- Understand the cost of quality
- Focus on organizational influences and workplace factors that affect quality
- Follow maturity models

cost of quality is the cost of conformance plus the cost of nonconformance

- Conformance means delivering products that meet requirements and fitness for use
- Cost of nonconformance means taking responsibility for failures or not meeting quality expectations

Five major cost categories related to quality include: (مهم)

1. Prevention cost: cost of planning and executing a project so it is error-free or within an acceptable error range
2. Appraisal cost: cost of evaluating processes and their outputs to ensure quality
3. Internal failure cost: cost incurred to correct an identified defect before the customer receives the product
4. External failure cost: cost that relates to all errors not detected and corrected before delivery to the customer
5. Measurement and test equipment costs: capital cost of equipment used to perform prevention and appraisal activities

Maturity models are frameworks for helping organizations improve their processes and systems

Software Quality Function Deployment Model focuses on defining user requirements and planning software projects

Capability Maturity Model Integration is a process improvement approach that provides organizations with the essential elements of effective processes,

- CMMI levels, from lowest to highest are:

❖ Incomplete
❖ Defined
❖ Performed
❖ Quantitatively Managed
❖ Managed
❖ Optimizing

Chapter-9

People are our most important asset
People determine the success and failure of organizations and projects
Project human resource management: Making the most effective use of the people involved with a project
Human resource management includes all project stakeholders: sponsors, customers, project team members, support staff, suppliers supporting the project
Human resource management processes:

- Developing the human resource plan: identifying and documenting project roles, responsibilities, and reporting relationships
- Acquiring the project team: getting the needed personnel assigned to and working on the project
- Developing the project team: building individual and group skills to enhance project performance
- Managing the project team: tracking team member performance, motivating team members, providing timely feedback, resolving issues and conflicts, and coordinating changes to help enhance project performance

Important areas related to project management include: (Key to Managing People)

- Motivation theories
- Influence and power
- Effectiveness

❖ **Intrinsic motivation** causes people to participate in an activity for their own enjoyment
❖ **Extrinsic motivation** causes people to do something for a reward or to avoid a penalty

McGregor s Theory X and Theory Y: (مهم)

} Theory X: assumes workers dislike and avoid work, so managers must use coercion, threats, and various control schemes to get workers to meet objectives
} Theory Y: assumes individuals consider work as natural as play or rest and enjoy the satisfaction of esteem and self-actualization needs
} Theory Z: introduced in 1981 by William Ouchi and is based on the Japanese approach to motivating workers, emphasizing trust, quality, collective decision making, and cultural values

Thamhain and Wilemon's Influence and Power:

1. Authority: the legitimate hierarchical right to issue orders
2. Assignment: the project manager's perceived ability to influence a worker's later work assignments
3. Budget: the project manager's perceived ability to authorize others' use of discretionary funds
4. Promotion: the ability to improve a worker's position
5. Money: the ability to increase a worker's pay and benefits
6. Penalty: the project manager's ability to cause punishment
7. Work challenge: the ability to assign work that capitalizes on a worker's enjoyment of doing a particular task
8. Expertise: the project manager's perceived special knowledge that others deem important
9. Friendship: the ability to establish friendly personal relationships between the project manager and others

Projects are more likely to succeed when project managers influence with:

- Expertise
- Work challenge

Projects are more likely to fail when project managers rely too heavily on:

- Authority
- Money
- Penalty

Power is the potential ability to influence behavior to get people to do things they would not otherwise do **(مهم)**

Types of power include:

- Coercive
- Legitimate
- Expert
- Reward
- Referent

Covey and Improving Effectiveness: Project managers can apply Covey's 7 habits to improve effectiveness on projects

- Be proactive
- Begin with the end in mind
- Put first things first
- Think win/win
- Seek first to understand, then to be understood
- Synergize
- Sharpen the saw

Good project managers are **empathic listeners**; they listen with the intent to understand Before you can communicate with others, you have to have **rapport**, a relation of harmony, conformity, accord, or affinity

Mirroring is the matching of certain behaviors of the other person, a technique to help establish rapport

- IT professionals need to develop empathic listening and other people skills to improve relationships with users and other stakeholders

developing a human resource plan:

- Involves identifying and documenting project roles, responsibilities, and reporting relationships
- Contents include:
  - Project organizational charts
  - Staffing management plan
  - Responsibility assignment matrixes
  - Resource histograms

responsibility assignment matrix (RAM) (مهم) is a matrix that maps the work of the project as described in the WBS to the people responsible for performing the work as described in the OBS

Staffing management plan describes when and how people will be added to and taken off the project team

Resource histogram is a column chart that shows the number of resources assigned to a project over time

Resource loading refers to the amount of individual resources an existing schedule requires during specific time periods

Overallocation means that more resources than are available are assigned to perform work at a given time

Resource leveling is a technique for resolving resource conflicts by delaying tasks, the main purpose of resource leveling is to create a smoother distribution of resource usage and reduce overallocation.

Benefits of Resource leveling:

- When resources are used on a more constant basis, they require less management
- It may enable project managers to use a just-in-time inventory type of policy for using subcontractors or other expensive resources
- It results in fewer problems for project personnel and accounting department
- It often improves morale

The main goal of team development is to help people work together more effectively to improve project performance

Tuckman model of team development:

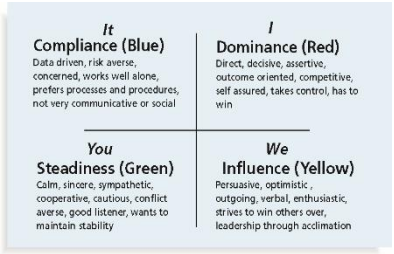
- ❖ Forming
- ❖ Storming
- ❖ Norming
- ❖ Performing
- ❖ Adjourning

Training: can help people understand themselves, each other, and how to work better in teams

- Team building activities include:
  - Physical challenges
  - Psychological preference indicator tools

Four dimensions of the DISC Profile model:

- Dominance
- Influence
- Steadiness
- Compliance



Reward and Recognition Systems:

- Team-based reward and recognition systems can promote teamwork
- Focus on rewarding teams for achieving specific goals
- Allow time for team members to mentor and help each other to meet project goals and develop HR

Managing the project team:

- Project managers must lead their teams in performing various project activities
- After assessing team performance and related information, the project manager must decide:
  - If changes should be requested to the project
  - If corrective or preventive actions should be recommended
  - If updates are needed to the project management plan or organizational process assets

Tools and Techniques for Managing Project Teams:

- Observation and conversation
- Project performance appraisals
- Conflict management
- Issue logs
- Interpersonal skills

Five Dysfunctions of teams are: (مهم)

1. Absence of trust
2. Fear of conflict
3. Lack of commitment
4. Avoidance of accountability
5. Inattention to results

Project management software includes several features related to human resource management such as:

- Assigning resources
- Identifying potential resource shortages or underutilization
- Leveling resources

Project managers must:

- Treat people with consideration and respect
- Understand what motivates them
- Communicate carefully with them

Focus on your goal of enabling project team members to deliver their best work

Chapter-10

Project Communications management processes:

- Identifying stakeholders: identifying everyone involved in or affected by the project and determining the best ways to manage relationships with them
- Planning communications: determining the information and communications needs of the stakeholders
- Distributing information: making needed information available to project stakeholders in a timely manner
- Managing stakeholder expectations: managing communications to satisfy the needs and expectations of project stakeholders and to resolve issues
- Reporting performance: collecting and disseminating performance information, including status reports, progress measurement, and forecasting

Identifying stakeholder: identifying everyone involved in or affected by the project and determining the best ways to manage relationships with them **Two key outputs of this process include:**

- Stakeholder register: a public document that includes details related to the identified project stakeholders
- Stakeholder management strategy: an approach to help increase the support of stakeholders throughout the project; often includes sensitive information

communications management plan: a document that guides project communications. This plan should be part of the overall project management plan

communications management plan contents(items):

- Stakeholder communications requirements
- Information to be communicated, including format, content, and level of detail
- The people who will receive the information and who will produce it
- Suggested methods or technologies for conveying the information
- Frequency of communication
- Escalation procedures for resolving issues
- Revision procedures for updating the communications management plan
- A glossary of common terminology

Stand-up meetings force people to focus on what they really need to communicate

Geographic location and cultural background affect the **complexity** of project communications

- Different working hours
- Language barriers
- Different cultural norms

Performance Reporting keeps stakeholders informed about how resources are being used to achieve project objectives:

- Status reports describe where the project stands at a specific point in time
- Progress reports describe what the project team has accomplished during a certain period of time
- Forecasts predict future project status and progress based on past information and trends

improve project communication

- Manage conflicts effectively
- Develop better communication skills
- Run effective meetings
- Use e-mail and other technologies effectively
- Use templates for project communications

conflict handling modes: (مهم)

1. Confrontation: directly face a conflict using a problem-solving approach
2. Compromise: use a give-and-take approach
3. Smoothing: de-emphasize areas of difference and emphasize areas of agreement
4. Forcing: the win-lose approach
5. Withdrawal: retreat or withdraw from an actual or potential disagreement
6. Collaborating: decision makers incorporate different viewpoints and insights to develop consensus and commitment

Groupthink: conformance to the values or ethical standards of a group; groupthink can develop if there are no conflicting viewpoints

Running Effective Meetings:

- Determine if a meeting can be avoided
- Define the purpose and intended outcome of the meeting
- Determine who should attend the meeting
- Provide an agenda to participants before the meeting
- Prepare handouts and visual aids, and make logistical arrangements ahead of time
- Run the meeting professionally
- Build relationships

lessons-learned report: A reflective statement that documents important things an individual learned from working on the project **(مهم)**

Project archives are a complete set of organized project records that provide an accurate history of the project

Sample Collaborative Tools:

- SharePoint portal
- Google Docs
- wiki

Chapter-11

Negative risk: the possibility of loss or injury

- Negative risk involves understanding potential problems that might occur in the project and how they might impede project success
- Negative risk management is like a form of insurance; it is an investment

Positive risks: are risks that result in good things happening; sometimes called opportunities

- A general definition of project risk is an uncertainty that can have a negative or positive effect on meeting project objectives

The goal of project risk management is to minimize potential negative risks while maximizing potential positive risks

Risk utility or risk tolerance is the amount of satisfaction or pleasure received from a potential payoff

Risk Management Processes: (مهم)

- Planning risk management: deciding how to approach and plan the risk management activities for the project
- Identifying risks: determining which risks are likely to affect a project and documenting the characteristics of each
- Performing qualitative risk analysis: prioritizing risks based on their probability and impact of occurrence
- Performing quantitative risk analysis: numerically estimating the effects of risks on project objectives
- Planning risk responses: taking steps to enhance opportunities and reduce threats to meeting project objectives
- Monitoring and controlling risks: monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project

risk management plan, a plan that documents the procedures for managing risk throughout a project

Topics addressed in a risk management plan:

Methodology	Roles and responsibilities	Budget and schedule
Risk categories	Risk probability and impact	Risk documentation

Contingency plans are predefined actions that the project team will take if an identified risk event occurs

Fallback plans are developed for risks that have a high impact on meeting project objectives and are put into effect if attempts to reduce the risk are not effective

Contingency reserves or allowances are provisions held by the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level

Broad categories of risks:

- Market risk
- Financial risk
- Technology risk
- People risk
- Structure/process risk

Risk breakdown structure is a hierarchy of potential risk categories for a project

Identifying risks is the process of understanding what potential events might hurt or enhance a particular project

Risk identification tools and techniques include: (مهم)

- Brainstorming is a technique by which a group attempts to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment
- Delphi Technique is used to derive a consensus among a panel of experts who make predictions about future developments
- Interviewing is a fact-finding technique for collecting information in face-to-face, phone, e-mail, or instant-messaging discussions
- SWOT analysis (strengths, weaknesses, opportunities, and threats) can also be used during risk identification

risk register is: A document that contains the results of various risk management processes and that is often displayed in a table or spreadsheet format**(مهم)**

risk register Contents(items): (مهم)

- An identification number for each risk event
- A rank for each risk event
- The name of each risk event
- A description of each risk event
- The category under which each risk event falls
- The root cause of each risk
- Triggers for each risk; **triggers** are indicators or symptoms of actual risk events
- Potential responses to each risk
- The **risk owner** or person who will own or take responsibility for each risk
- The probability and impact of each risk occurring
- The status of each risk

Risk events refer to specific, uncertain events that may occur to the detriment or enhancement of the project

Performing Qualitative risk analysis: Assess the likelihood and impact of identified risks to determine their magnitude and priority

Risk Qualitative tools and techniques include:

- Probability/impact matrixes: or **chart** lists the relative probability of a risk occurring on one side of a matrix or axis on a chart and the relative impact of the risk occurring on the other.
- The Top Ten Risk Item Tracking: is a qualitative risk analysis tool that helps to identify risks and maintain an awareness of risks throughout the life of a project.
- Expert judgment

Performing Quantitative risk analysis: Large, complex projects involving leading edge technologies often require extensive quantitative risk analysis

Risk Quantitative tools and techniques include: (مهم)

- Decision tree analysis: is a diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain
  - **Estimated monetary value (EMV)** is the product of a risk event probability and the risk event's monetary value
- Simulation: uses a representation or model of a system to analyze the expected behavior or performance of the system
- Sensitivity analysis: is a technique used to show the effects of changing one or more variables on an outcome

watch list is a list of risks that are low priority but are still identified as potential risks

Monte Carlo analysis simulates a model's outcome many times to provide a statistical distribution of the calculated results

steps of a Monte Carlo analysis:

1. Assess the range for the variables being considered
2. Determine the probability distribution of each variable
3. For each variable, select a random value based on the probability distribution
4. Run a deterministic analysis or one pass through the model
5. Repeat steps 3 and 4 many times to obtain the probability distribution of the model's results

main response strategies for negative risks

1. Risk avoidance
2. Risk acceptance
3. Risk transference
4. Risk mitigation

main response strategies for Positive risks:

1. Risk exploitation
2. Risk sharing
3. Risk enhancement
4. Risk acceptance

- **Residual risks** are risks that remain after all of the response strategies have been implemented
- **Secondary risks** are a direct result of implementing a risk response

Workarounds are unplanned responses to risk events that must be done when there are no contingency plans

Main outputs of risk monitoring and control are:

- Risk register updates
- Organizational process assets updates
- Change requests
- Updates to the project management plan and other project documents

Chapter-12

Procurement means acquiring goods and/or services from an outside source

Why Outsource?

- To reduce both fixed and recurrent costs
- To allow the client organization to focus on its core business
- To access skills and technologies
- To provide flexibility
- To increase accountability

A contract: is a mutually binding agreement that obligates the seller to provide the specified products or services and obligates the buyer to pay for them

Project Procurement Management Processes:

- Planning procurements: determining what to procure, when, and how
- Conducting procurements: obtaining seller responses, selecting sellers, and awarding contracts
- Administering procurements: managing relationships with sellers, monitoring contract performance, and making changes as needed
- Closing procurements: completing and settling each contract, including resolving of any open items

Tools and Techniques for Planning Purchases and Acquisitions:

- Make-or-buy analysis: general management technique used to determine whether an organization should make or perform a particular product or service inside the organization or buy from someone else
- Often involves financial analysis
- Experts, both internal and external, can provide valuable inputs in procurement decisions

Types of Contracts:

- Fixed price or lump sum contracts: involve a fixed total price for a well-defined product or service
- Cost reimbursable contracts: involve payment to the seller for direct and indirect costs
- Time and material contracts: hybrid of both fixed price and cost reimbursable contracts, often used by consultants
- Unit price contracts: require the buyer to pay the seller a predetermined amount per unit of service

Point of Total Assumption (PTA) is the cost at which the contractor assumes total responsibility for each additional dollar of contract cost

Cost Reimbursable Contracts: (مهم)

- Cost plus incentive fee (CPIF): the buyer pays the supplier for allowable performance costs plus a predetermined fee and an incentive bonus
- Cost plus fixed fee (CPFF): the buyer pays the supplier for allowable performance costs plus a fixed fee payment usually based on a percentage of estimated costs
- Cost plus percentage of costs (CPPC): the buyer pays the supplier for allowable performance costs plus a predetermined percentage based on total costs

A termination clause is a contract clause that allows the buyer or supplier to end the contract

Contract Statement of Work (SOW): is a description of the work required for the procurement

Procurement Documents:

- Request for Proposals: used to solicit proposals from prospective sellers
  - A proposal is a document prepared by a seller when there are different approaches for meeting buyer needs
- Requests for Quotes: used to solicit quotes or bids from prospective suppliers
  - A bid, also called a tender or quote (short for quotation), is a document prepared by sellers providing pricing for standard items that have been clearly defined by the buyer

Conducting Procurements:

- Deciding whom to ask to do the work
- Sending appropriate documentation to potential sellers
- Obtaining proposals or bids
- Selecting a seller
- Awarding a contract

Approaches for Procurement: Organizations can advertise to procure goods and services in several ways:

- **Approaching the preferred vendor**
- **Approaching several potential vendors**
- **Advertising to anyone interested**

Source Selection:

- **Evaluating proposals or bids from sellers**
- **Choosing the best one**
- **Negotiating the contract**
- **Awarding the contract**