Chapter 1

Chapter Summary:

There is a new or renewed interest in project management today as the number of projects continues to grow and their complexity continues to increase. The success rate of information technology projects has more than doubled since 1995, but still only about a third are successful in meeting ***scope***, ***time***, and ***cost*** goals. Using a more disciplined approach to managing projects can help projects and organizations succeed.

A *project* is a temporary endeavor undertaken to create a unique product, service, or result.

An information technology project involves the use of ***hardware***, ***software***, and/or ***networks***. Projects are **unique**, **temporary**, and **developed incrementally**; they *require* **resources**, *have* a **sponsor**, and *involve* **uncertainty**. The triple *constraint* of project management refers to **managing the scope, time, and cost dimensions of a project**.

Project management is the application of ***knowledge***, ***skills***, ***tools***, and ***techniques*** to project activities to meet project requirements. ***Stakeholders*** are the **people involved in or affected by project activities**. A framework for project management includes the project **stakeholders**, **project management knowledge areas**, and **project management tools and techniques**. *The nine knowledge areas are project integration management*, ***scope***, ***time***, ***cost***, ***quality***, ***human resource***, ***communications***, ***risk***, and ***procurement management***. There are many tools and techniques in each knowledge area. There are different ways to define project success, and project managers must understand the success criteria for their unique projects.

A *program* is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually.

Project portfolio management involves organizing and managing projects and programs as a portfolio of investments that contribute to the entire enterprise s success. *Portfolio management emphasizes* **meeting strategic goals while project management focuses on tactical goals**.

Studies show that **executive support** is *crucial to project success*, as are other factors like **user involvement**, an **experienced project manager**, and **clear business objectives**.

Project managers play a key role in helping projects and organizations succeed. They must *perform various job duties*, *possess many skills*, and *continue to develop skills in project management, general management, and their application area*, such as information technology. **Soft skills, especially leadership**, are *particularly important for project managers*.

The profession of project management continues to grow and mature. In the U.S., the military took the lead in project management and developed many tools such as **Gantt charts** and **network diagrams**, but today people use project management in virtually every industry around the globe.

***The Project Management Institute (PMI)* is an international professional society that provides certification as a Project Management Professional (PMP) and upholds a code of ethics.** Today, hundreds of project management software products are available to assist people in managing projects.

Key Terms:

***Best practice*:** An optimal way recognized by industry to achieve a stated goal or objective

***Critical path*:** The longest path through a network diagram that determines the earliest completion of a project

***Enterprise** or **project management software*:** Software that integrates information from multiple projects to show the status of active, approved, and future projects across an entire organization; also called portfolio project management software

***Ethics*:** A set of principles that guide our decision making based on personal values of what is right and wrong

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

***Green IT** or **green computing*:** Developing and using computer resources in an efficient way to improve economic viability, social responsibility, and environmental impact

***Leader*:** A person who focuses on long-term goals and big-picture objectives, while inspiring people to reach those goals

***Manager*:** A person who deals with the day-to-day details of meeting specific goals

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

***Program manager*:** A person who provides leadership and direction for the project managers heading the projects within a program

***Project*:** A temporary endeavor undertaken to create a unique product, service, or result

***Project management*:** The application of knowledge, skills, tools, and techniques to project activities to meet project requirements

Project Management Institute (PMI): An international professional society for project managers

***Project management knowledge areas*:** Project integration management, scope, time, cost, quality, human resource, communications, risk, and procurement management

Project Management Office (PMO): An organizational group responsible for coordinating the project management functions throughout an organization

Project Management Professional (PMP): Certification provided by PMI that requires documenting project experience and education, agreeing to follow the PMI code of ethics, and passing a comprehensive exam

***Project management tools and techniques*:** Methods available to assist project managers and their teams; some popular tools in the time management knowledge area include Gantt charts, network diagrams, and critical path analysis

***Project manager*:** The person responsible for working with the project sponsor, the project team, and the other people involved in a project to meet project goals

***Project portfolio management** or **portfolio management*:** When organizations group and manage projects as a portfolio of investments that contribute to the entire enterprise's success

***Project sponsor*:** The person who provides the direction and funding for a project

***Stakeholders*:** People involved in or affected by project activities

***Triple constraint*:** Balancing scope, time, and cost goals

***Virtualization*:** Hiding the physical characteristics of computing resources from their users, such as making a single server, operating system, application, or storage device appear to function as multiple virtual resources

Quick Quiz:

1. Approximately what percentage of the world's gross domestic product is spent on projects?
a. 10 percent b. 25 percent c. 50 percent d. 75 percent

2. which of the following is a not a potential advantage of using good project management?
a. Shorter development times
b. Higher worker morale
c. Lower cost of capital
d. Higher profit margins

3. A _____ is a temporary endeavor undertaken to create a unique product, service, or result.
a. program b. process c. project d. portfolio

4. Which of the following is not an attribute of a project?
a. projects are unique
b. projects are developed using progressive elaboration
c. projects have a primary customer or sponsor
d. projects involve little uncertainty

5. Which of the following is not part of the triple constraint of project management?
a. meeting scope goals
b. meeting time goals
c. meeting communications goals
d. meeting cost goals

6. _____ is the application of knowledge, skills, tools and techniques to project activities to meet project requirements.
a. Project management
b. Program management
c. Project portfolio management
d. Requirements management

7. Project portfolio management addresses _____ goals of an organization, while project management addresses _____ goals.
a. strategic, tactical
b. tactical, strategic
c. internal, external
d. external, internal

8. Several application development projects done for the same functional group might best be managed as part of a _____.
a. portfolio b. program c. investment d. collaborative

9. Which of the following is not one of the top ten skills or competencies of an effective project manager?
a. people skills b. leadership c. integrity d. technical skills

10. What is the certification program called that the Project Management Institute provides?
a. Certified Project Manager (CPM)
b. Project Management Professional (PMP)
c. Project Management Expert (PME)
d. Project Management Mentor (PMM)

Chapter 2

Chapter Summary:

Projects operate in an environment broader than the project itself. Project managers need to take a systems approach when working on projects; they need to consider projects within the greater organizational context.

Organizations have four different frames: structural, human resources, political, and symbolic.

Project managers need to understand all of these aspects of organizations to be successful. The structural frame focuses on different groups' roles and responsibilities to meet the goals and policies set by top management. The human resources frame focuses on producing harmony between the needs of the organization and the needs of people. The political frame addresses organizational and personal politics. The symbolic frame focuses on symbols and meanings.

The structure of an organization has strong implications for project managers, especially in terms of the amount of authority the project manager has. The three basic organizational structures include functional, matrix, and project. Project managers have the most authority in a pure project organization, an intermediate amount of authority in a matrix organization, and the least amount of authority in a pure functional organization.

Organizational culture also affects project management. A culture where employees have a strong identity with the organization, where work activities emphasize groups, where there is strong unit integration, high risk tolerance, performance-based rewards, high conflict tolerance, an open-systems focus, and a balance on the dimensions of people focus, control, and means-orientation is more conducive to project work.

Project stakeholders are individuals and organizations who are actively involved in the project or whose interests may be positively or negatively affected because of project execution or successful project completion. Project managers must identify and understand the different needs of all stakeholders on their projects.

Top management commitment is crucial for project success. Since projects often affect many areas in an organization, top management must assist project managers if they are to do a good job of project integration. Organizational commitment to information technology is also important to the success of information technology projects. Development standards and guidelines assist most organizations in managing projects.

A project life cycle is a collection of project phases. Traditional project phases include concept, development, implementation, and close-out phases. Projects often produce products, which follow product life cycles. Examples of product life cycles for software development include the waterfall, spiral, incremental build, prototyping, RAD, and the adaptive software development models. Project managers must understand the specific life cycle of the products they are producing as well as the general project life cycle model.

A project should successfully pass through each of the project phases in order to continue to the next phase. A management review should occur at the end of each project phase, and more frequent management inputs are often needed. These management reviews and inputs are important for keeping projects on track and determining if projects should be continued, redirected, or terminated.

Project managers need to consider several factors due to the unique context of information technology projects. The diverse nature of these projects and the wide range of business areas and technologies involved make information technology projects especially challenging to manage.

Leading project team members with a wide variety of specialized skills and understanding rapidly changing technologies are also important considerations.

Several recent trends have affected information technology project management. Increased globalization, outsourcing, and virtual teams have changed the way many IT projects are staffed and managed. Project managers must stay abreast of these and other trends and discover ways to use them to their advantage

Key Terms:

Adaptive software development (ASD): A software development approach used when requirements cannot be clearly expressed early in the life cycle

***Agile software development*:** A method for software development that uses new approaches, focusing on close collaboration between programming teams and business experts

***Champion*:** A senior manager who acts as a key proponent for a project

***Deliverable*:** A product or service, such as a technical report, a training session, a piece of hardware, or a segment of software code, produced or provided as part of a project

***Executive steering committee*:** A group of senior executives from various parts of the organization who regularly review important corporate projects and issues

***Functional organizational structure*:** An organizational structure that groups people by functional areas such as information technology, manufacturing, engineering, and human resources

***Human resources (HR) frame*:** Focuses on producing harmony between the needs of the organization and the needs of people

***IT governance*:** Addresses the authority and control for key IT activities in organizations, including IT infrastructure, IT use, and project management

***Matrix organizational structure*:** An organizational structure in which employees are assigned to both functional and project managers

***Offshoring*:** Outsourcing from another country

***Organizational culture*:** A set of shared assumptions, values, and behaviors that characterize the functioning of an organization

***Outsourcing*:** When an organization acquires goods and/or sources from an outside source

***Phase exit* or *Kill point*:** Management review that should occur after each project phase to determine if projects should be continued, redirected, or terminated; also called a kill point

***Political frame*:** Addresses organizational and personal politics

***Politics*:** Competition between groups or individuals for power and leadership

***Predictive life cycle*:** A software development approach used when the scope of the project can be clearly articulated and the schedule and cost can be accurately predicted

***Project acquisition*:** The last two phases in a project (implementation and close-out) that focus on delivering the actual work

***Project feasibility*:** The first two phases in a project (concept and development) that focus on planning

***Project life cycle*:** A collection of project phases, such as concept, development, implementation, and close-out

***Project organizational structure*:** An organizational structure that groups people by major projects, such as specific aircraft programs

***Structural frame*:** Deals with how the organization is structured (usually depicted in an organizational chart) and focuses on different groups' roles and responsibilities to meet the goals and policies set by top management

***Symbolic frame*:** Focuses on the symbols, meanings, and culture of an organization

***Systems*:** Sets of interacting components working within an environment to fulfill some purpose

***Systems analysis*:** A problem-solving approach that requires defining the scope of the system to be studied, and then dividing it into its component parts for identifying and evaluating its problems, opportunities, constraints, and needs

***Systems approach*:** A holistic and analytical approach to solving complex problems that

Includes using a systems philosophy, systems analysis, and systems management

Systems development life cycle (SDLC): A framework for describing the phases involved in developing and maintaining information systems

***Systems management*:** Addressing the business, technological, and organizational issues associated with creating, maintaining, and making changes to a system

***Systems philosophy*:** An overall model for thinking about things as systems

***Systems thinking*:** Taking a holistic view of an organization to effectively handle complex situations

***Virtual team*:** A group of individuals who work across time and space using communication technologies

Quick Quiz:

1. Which of the following is not part of the three-sphere model for systems management?
a. business b. information c. technology d. organization

2. Which of the four frames of organizations addresses how meetings are run, employee dress codes, and expected work hours?
a. structural
b. human resources
c. political
d. symbolic

3. Personnel in a _____ organizational structure often report to two or more bosses.
a. functional b. project c. matrix d. hybrid

4. Project work is most successful in an organizational culture where all of the following characteristics are high except _____.
a. member identity
b. group emphasis
c. risk tolerance
d. control

5. A _____ is a product or service, such as a technical report, a training session, or hardware, produced or provided as part of a project.
a. deliverable
b. product
c. work package
d. tangible goal

6. Which of the following is not a phase of the traditional project life cycle?
a. systems analysis
b. concept
c. development
d. implementation

7. What is the term used to describe a framework of the phases involved in developing information systems?
a. systems development life cycle
b. rapid application development
c. predictive life cycle
d. extreme programming

8. Another name for a phase exit is a _____ point.
a. review b. stage c. meeting d. kill

9. The nature of information technology projects is different from projects in many other industries because they are very _____.
a. expensive b. technical c. diverse d. challenging

10. What term is used to describe when an organization acquires goods and/or sources from an outside source in another country?
a. globalization
b. offshoring
c. exporting
d. global sourcing

Chapter 3

Chapter Summary:

Project management involves a number of interlinked processes. The five project management process groups are initiating, planning, executing, monitoring and controlling, and closing. These processes occur at varying levels of intensity throughout each phase of a project, and specific outcomes are produced as a result of each process. Normally the executing processes require the most resources and time, followed by the planning processes.

Mapping the main activities of each project management process group into the nine project management knowledge areas provides a big picture of what activities are involved in project management.

Some organizations develop their own information technology project management methodologies, often using the standards found in the *PMBOK® Guide* as a foundation. It is important to tailor project management methodologies to meet the organization s particular needs. Popular methodologies like PRINCE2, agile methodologies, RUP, and Six Sigma include project management processes.

The JWD Consulting case study demonstrates how one organization managed an information technology project from its initiation through its closure. The case study provides several samples of outputs produced for initiating (including pre-initiating), planning, executing, monitoring and controlling, and closing as follows:

- Business case
- Stakeholder register
- Stakeholder management strategy
- Project charter
- Kick-off meeting agenda
- Team contract
- Work breakdown structure
- Gantt chart
- List of prioritized risks
- Milestone report
- Progress report
- Lessons-learned report
- Final project report

Later chapters in this text provide detailed information on creating these and other project management documents and using several of the tools and techniques described in this case study.

Key Terms:

Closing processes: formalizing acceptance of the project or project phase and ending it efficiently

Executing processes: coordinating people and other resources to carry out the project plans and produce the products, services, or results of the project or project phase initiating processes — defining and authorizing a project or project phase

***Initiating processes*:** include defining and authorizing a project or project phase. Initiating processes take place during *each* phase of a project.

***Kick-off meeting*:** 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

***Methodology*:** describes how things should be done

***Monitoring and controlling processes*:** regularly measuring and monitoring progress to ensure that the project team meets the project objectives

***Planning processes*:** devising and maintaining a workable scheme to ensure that the project addresses the organization's needs

Process: a series of actions directed toward a particular result

***Project management process groups*:** the progression of project activities from initiation to planning, executing, monitoring and controlling, and closing

***PRojects IN Controlled Environments (PRINCE2)*:** a project management methodology developed in the U.K. that defines 45 separate sub-processes and organizes these into eight process groups

Rational Unified Process (RUP): an iterative software development process that focuses on team productivity and delivers software best practices to all team members

***Six Sigma methodologies*:** DMAIC (Define, Measure, Analyze, Improve, and Control) is used to improve an existing business process and DMADV (Define, Measure, Analyze, Design, and Verify) is used to create new product or process designs

***Stakeholder register*:** a document that includes details related to the identified project stakeholders

***Standard*:** describes best practices for what should be done

Quick Quiz:

1. A _____ is a series of actions directed toward a particular result.
a. goal b. process c. plan d. project

2. _____ processes include coordinating people and other resources to carry out the project plans and produce the products, services, or results of the project or phase.
a. Initiating
b. Planning
c. Executing
d. Monitoring and controlling
e. Closing

3. Which process group normally requires the most resources and time?
a. Initiating
b. Planning
c. Executing
d. Monitoring and controlling
e. Closing

4. What methodology was developed in the U.K., defines 45 separate sub-processes, and organizes these into eight process groups?
a. Six Sigma
b. RUP
c. *PMBOK® Guide*
d. PRINCE2

5. Which of the following outputs is often completed before initiating a project?
a. stakeholder register
b. business case
c. project charter
d. kick-off meeting

6. A work breakdown structure, project schedule, and cost estimates are outputs of the _____ process.
a. initiating
b. planning
c. executing
d. monitoring and controlling
e. closing

7. Initiating involves developing a project charter, which is part of the project _____ management knowledge area.
a. integration b. scope c. communications d. risk

8. _____ involves measuring progress toward project objectives and taking corrective actions.
a. Initiating
b. Planning
c. Executing
d. Monitoring and controlling
e. Closing

9. What type of report do project teams create to reflect on what went right and what went wrong with the project?
a. lessons-learned report
b. progress report
c. final project report
d. business case

10. Many people use _____ to have a standard format for preparing various project management documents.
a. methodologies
b. templates
c. project management software
d. standards

Chapter 4

Chapter Summary:

Project integration management is usually the most important project management knowledge area, since it ties together all the other areas of project management. A project manager s primary focus should be on project integration management.

Before selecting projects to pursue, it is important for organizations to follow a strategic planning process. Many organizations perform a SWOT analysis to help identify potential projects based on their strengths, weaknesses, opportunities, and threats. Information technology projects should support the organization s overall business strategy. Common techniques for selecting projects include focusing on broad organizational needs, categorizing projects, performing financial analyses, developing weighted scoring models, and using balanced scorecards.

Project integration management includes the following processes:

- Developing the project charter involves working with stakeholders to create the document that formally authorizes a project. Project charters can have different formats, but they should include basic project information and signatures of key stakeholders.
- Developing the project management plan involves coordinating all planning efforts to create a consistent, coherent document the project management plan. The main purpose of project plans is to facilitate action.
- Directing and managing project execution involves carrying out the project plans by performing the activities included in it. Project plan execution should require the majority of a project s budget.
- Monitoring and controlling project work is needed to meet the performance objectives of the project. The project team should continuously monitor project performance to assess the overall health of the project.
- Performing integrated change control involves identifying, evaluating, and managing changes throughout the project life cycle. A change control system often includes a change control board (CCB), configuration management, and a process for communicating changes.
- Closing the project or phase involves finalizing all project activities. It is important to follow good procedures to ensure that all project activities are completed and that the project sponsor accepts delivery of the final products, services, or results of the project.

There are several types of software products available to assist in project integration management. There are also several tools to assist in project selection and to ensure that projects align with business strategy

Key Terms:

Balanced scorecard: a methodology that converts an organization's value drivers to a series of defined metrics

Baseline: the approved project management plan plus approved changes

Business service management (BSM) tools: tools that help track the execution of business process flows and expose how the state of supporting IT systems and resources is impacting end-to-end business process performance in real time

Capitalization rate: the rate used in discounting future cash flow; also called the discount rate or opportunity cost of capital

Cash flow: benefits minus costs or income minus expenses

Change control board (CCB): a formal group of people responsible for approving or rejecting changes on a project

Change control system: a formal, documented process that describes when and how official project documents may be changed

Configuration management: a process that ensures that the descriptions of the project's products are correct and complete

Cost of capital: the return available by investing the capital elsewhere

Directives: new requirements imposed by management, government, or some external influence

Discount factor: a multiplier for each year based on the discount rate and year

Discount rate: the rate used in discounting future cash flow; also called the capitalization rate or opportunity cost of capital

Integrated change control: identifying, evaluating, and managing changes throughout the project life cycle

Interface management: identifying and managing the points of interaction between various elements of a project

Internal rate of return (IRR): the discount rate that results in an NPV of zero for a project

Mind mapping: a technique that uses branches radiating out from a core idea to structure thoughts and ideas

Net present value (NPV) analysis: 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

Opportunities: chances to improve the organization

Opportunity cost of capital: the rate used in discounting future cash flow; also called the capitalization rate or discount rate

Organizational process assets: formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information that can be used to influence a project's success

Payback period: the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project

Problems: undesirable situations that prevent the organization from achieving its goals

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

Project integration management: processes that coordinate all project management knowledge areas throughout a project's life, including developing the project charter, developing the preliminary project scope statement, developing the project management plan, directing and managing the project, monitoring and controlling the project, providing integrated change control, and closing the project

Project management plan: a document used to coordinate all project planning documents and guide project execution and control

Required rate of return: the minimum acceptable rate of return on an investment

Return on investment (ROI): (benefits minus costs) divided by costs

Strategic planning: determining long-term objectives by analyzing the strengths and weaknesses of an organization, studying opportunities and threats in the business environment, predicting future trends, and projecting the need for new products and services

SWOT analysis: analyzing **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats; used to aid in strategic planning

Weighted scoring model: a technique that provides a systematic process for basing project selection on numerous criteria

Quick Quiz:

1. Which of the following processes is not part of project integration management?
a. develop the project business case
b. develop the project charter
c. develop the project management plan
d. close the project or phase

2. What is the last step in the four-stage planning process for selecting information technology projects?
a. information technology strategy planning
b. business area analysis
c. mind mapping
d. resource allocation

3. Which of the following is not a best practice for new product development projects?
a. align projects and resources with business strategy
b. select projects that will take less than two years to provide payback
c. focus on customer needs in identifying projects
d. assign project managers to lead projects

4. A new government law requires an organization to report data in a new way. Under which category would a new information system project to provide this data fall?
a. problem
b. opportunity
c. directive
d. regulation

5. If estimates for total discounted benefits for a project are $120,000 and total discounted costs are $100,000, what is the estimated return on investment (ROI)?
a. $20,000
b. $120,000
c. 20 percent
d. 120 percent

6. A _____ is a document that formally recognizes the existence of a project and provides direction on the project s objectives and management.
a. project charter
b. contract
c. business case
d. project management plan

7. Which of the following items is not normally included in a project charter?
a. the name of the project manager
b. budget information
c. stakeholder signatures
d. a Gantt chart

8. _____ ensures that the descriptions of the project s products are correct and complete.
a. Configuration management
b. Integrated change control
c. Integration management
d. A change control board

9. Which of the following is not a suggestion for performing integrated change control?
a. use good configuration management
b. minimize change
c. establish a formal change control system
d. view project management as a process of constant communication and negotiation

10. What tool and technique is used for all of the other project integration management processes?
a. project management software
b. templates
c. expert judgment
d. all of the above

Chapter 5

Chapter Summary:

Project scope management includes the processes required to ensure that the project addresses all the work required, and only the work required, to complete the project successfully. The main processes include collecting requirements, defining scope, creating the WBS, verifying scope, and controlling scope.

The first step in project scope management is collecting requirements, a crucial part of many IT projects. It is important to review the project charter and meet with key stakeholders listed in the stakeholder register when collecting requirements. The main outputs of this process are requirements documentation, a requirements management plan, and a requirements traceability matrix.

A project scope statement is created in the scope definition process. This document often includes a product scope description, product user acceptance criteria, detailed information on all project deliverables, and information on project boundaries, constraints, and assumptions. There are often several versions of the project scope statement to keep scope information detailed and up-to-date.

A work breakdown structure (WBS) is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project. The WBS forms the basis for planning and managing project schedules, costs, resources, and changes. You cannot use project management software without first creating a good WBS. A WBS dictionary is a document that describes detailed information about each WBS item. A good WBS is often difficult to create because of the complexity of the project. There are several approaches for developing a WBS, including using guidelines, the analogy approach, the top-down approach, the bottom-up approach, and mind mapping.

Verifying scope involves formal acceptance of the project scope by the stakeholders. Controlling scope involves controlling changes to the project scope.

Poor project scope management is one of the key reasons projects fail. For information technology projects, it is important for good project scope management to have strong user involvement, a clear statement of requirements, and a process for managing scope changes.

There are many software products available to assist in project scope management. The WBS is a key concept in properly using project management software since it provides the basis for entering tasks

Key Terms:

Analogy approach: creating a WBS by using a similar project's WBS as a starting point

Bottom-up approach: creating a WBS by having team members identify as many specific tasks related to the project as possible and then grouping them into higher level categories

Decomposition: subdividing project deliverables into smaller pieces

Deliverable: a product, such as a report or segment of software code, produced as part of a project

Joint Application Design (JAD): using highly organized and intensive workshops to bring together project stakeholders the sponsor, users, business analysts, programmers, and so on to jointly define and design information systems

Project scope management: the processes involved in defining and controlling what work is or is not included in a project

Project scope statement: a document that includes, at a minimum, a description of the project, including its overall objectives and justification, detailed descriptions of all project deliverables, and the characteristics and requirements of products and services produced as part of the project

Prototyping: developing a working replica of the system or some aspect of the system to help define user requirements

Requirement: a condition or capability that must be met or possessed by a system, product, service, result, or component to satisfy a contract, standard, specification, or other formal document

Requirements management plan: a plan that describes how project requirements will be analyzed, documented, and managed

Requirements traceability matrix (RTM): a table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed

Scope: all the work involved in creating the products of the project and the processes used to create them

Scope baseline: the approved project scope statement and its associated WBS and WBS dictionary

Scope creep: the tendency for project scope to keep getting bigger

Top-down approach: creating a WBS by starting with the largest items of the project and breaking them into their subordinate items

Use case modeling: a process for identifying and modeling business events, who initiated them, and how the system should respond to them

Variance: the difference between planned and actual performance

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

Work breakdown structure (WBS): a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project

Work package: a task at the lowest level of the WBS

Quick Quiz:

1. _____ refer(s) to all the work involved in creating the products of the project and the processes used to create them.
a. Deliverables
b. Milestones
c. Scope
d. Product development

2. Which tool or technique for collecting requirements is often the most expensive and time consuming?
a. interviews
b. focus groups
c. surveys
d. observation

3. A _____ is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project.
a. scope statement
b. WBS
c. WBS dictionary
d. work package

4. What approach to developing a WBS involves writing down or drawing ideas in a nonlinear format?
a. top-down
b. bottom-up
c. analogy
d. mind mapping

5. Assume you have a project with major categories called planning, analysis, design, and testing. What level of the WBS would these items fall under?
a. 0
b. 1
c. 2
d. 3

6. Which of the following is not a best practice that can help in avoiding scope problems on information technology projects?
a. Keep the scope realistic
b. Use off-the-shelf hardware and software whenever possible
c. Follow good project management processes
d. Don t involve too many users in scope management

7. What major restaurant chain terminated a large project after spending $170 million on it, primarily because they realized the project scope was too much to handle?
a. Burger King
b. Pizza Hut
c. McDonald's
d. Taco Bell

8. Scope _____ is often achieved by a customer inspection and then sign-off on key deliverables.
a. verification
b. validation
c. completion
d. close-out

9. Which of the following is not a suggestion for improving user input?
a. Develop a good project selection process for information technology projects
b. Have users on the project team
c. Co-locate users with developers
d. Only have meetings as needed, not on a regular basis

10. Project management software helps you develop a _____, which serves as a basis for creating Gantt charts, assigning resources, and allocating costs.
a. project plan
b. schedule
c. WBS
d. deliverable

Chapter 6

Chapter Summary:

Project time management is often cited as the main source of conflict on projects. Most information technology projects exceed time estimates. The main processes involved in project time management include defining activities, sequencing activities, estimating activity resources, estimating activity durations, developing the schedule, and controlling the schedule.

Defining activities involves identifying the specific activities that must be done to produce the project deliverables. It usually results in a more detailed WBS.

Sequencing activities determines the relationships or dependencies between activities. Three reasons for creating relationships are that they are mandatory based on the nature of the work, discretionary based on the project team's experience, or external based on non-project activities.

Activity sequencing must be done in order to use critical path analysis.

Network diagrams are the preferred technique for showing activity sequencing. The two methods used for creating these diagrams are the arrow diagramming method and the precedence diagramming method. There are four types of relationships between tasks: finish-to-start, finish-to-finish, start-to-start, and start-to-finish.

Estimating activity resources involves determining the quantity and type of resources (people, equipment, and materials) that will be assigned to each activity. The nature of the project and the organization will affect resource estimating.

Estimating activity durations creates estimates for the amount of time it will take to complete each activity. These time estimates include the actual amount of time worked plus elapsed time.

Developing the schedule uses results from all of the other project time management processes to determine the start and end dates for the project. Project managers often use Gantt charts to display the project schedule. Tracking Gantt charts show planned and actual schedule information.

The critical path method predicts total project duration. The critical path for a project is the series of activities that determines the earliest completion date for the project. It is the longest path through a network diagram. If any activity on the critical path slips, the whole project will slip unless the project manager takes corrective action.

Crashing and fast tracking are two techniques for shortening project schedules. Project managers and their team members must be careful about accepting unreasonable schedules, especially for information technology projects.

Critical chain scheduling is an application of the Theory of Constraints (TOC) that uses critical path analysis, resource constraints, and buffers to help meet project completion dates.

The Program Evaluation and Review Technique (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. It uses optimistic, most likely, and pessimistic estimates of activity durations. PERT is seldom used today.

Controlling the schedule is the final process in project time management. Even though scheduling techniques are very important, most projects fail because of people issues, not from a poor network

diagram. Project managers must involve all stakeholders in the schedule development process. It is critical to set realistic project schedules and use discipline to meet schedule goals.

Project management software can assist in project scheduling if used properly. With project management software, you can avoid the need to perform cumbersome calculations manually and perform what if analysis as activity duration estimates or dependencies change. Many people misuse project management software because they do not understand the concepts behind creating a network diagram, determining the critical path, or setting a schedule baseline. Project managers must also avoid over-relying on sample files or templates when creating their unique project schedules

Key Terms:

Activity: an element of work, normally found on the WBS, that has an expected duration and cost, and expected resource requirements; also called a task

Activity attributes: information about each activity, such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity

Activity list: a tabulation of activities to be included on a project schedule

Activity-on-arrow (AOA): a network diagramming technique in which activities are represented by arrows and connected at points called nodes to illustrate the sequence of activities; also called arrow diagramming method (ADM)

Arrow diagramming method (ADM): a network diagramming technique in which activities are represented by arrows and connected at points called nodes to illustrate the sequence of activities; also called activity-on-arrow (AOA)

Backward pass: a project network diagramming technique that determines the late start and late finish dates for each activity in a similar fashion

Baseline dates: the planned schedule dates for activities in a Tracking Gantt chart

Buffer: additional time to complete a task, added to an estimate to account for various factors

Burst: when a single node is followed by two or more activities on a network diagram

Crashing: a technique for making cost and schedule trade-offs to obtain the greatest amount of schedule compression for the least incremental cost

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

Critical path: the series of activities in a network diagram that determines the earliest completion of the project; it is the longest path through the network diagram and has the least amount of slack or float

Critical path method (CPM) or **critical path analysis:** a project network analysis technique used to predict total project duration

Dependency: the sequencing of project activities or tasks; also called a relationship

Discretionary dependencies: sequencing of project activities or tasks defined by the project team and used with care since they may limit later scheduling options

Dummy activities: activities with no duration and no resources used to show a logical relationship between two activities in the arrow diagramming method of project network diagrams

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

Early finish date: the earliest possible time an activity can finish based on the project network logic

Early start date: the earliest possible time an activity can start based on the project network logic

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

External dependencies: sequencing of project activities or tasks that involve relationships between project and non-project activities

Fast tracking: a schedule compression technique in which you do activities in parallel that you would normally do in sequence

Feeding buffers: additional time added before tasks on the critical path that are preceded by non-critical-path tasks

Finish-to-finish dependency: a relationship on a project network diagram where the from activity must be finished before the "to" activity can be finished

Finish-to-start dependency: a relationship on a project network diagram where the from activity must be finished before the "to" activity can be started

Float: the amount of time a project activity may be delayed without delaying a succeeding activity or the project finish date; also called slack

Forward pass: a network diagramming technique that determines the early start and early finish dates for each activity

Free slack (free float): the amount of time an activity can be delayed without delaying the early start of any immediately following activities

Gantt chart: a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format; sometimes referred to as bar charts

Late finish date: the latest possible time an activity can be completed without delaying the project finish date

Late start date: the latest possible time an activity may begin without delaying the project finish date

Mandatory dependencies: sequencing of project activities or tasks that are inherent in the nature of the work being done on the project

Merge: when two or more nodes precede a single node on a network diagram

Milestone: a significant event that normally has no duration on a project; serves as a marker to help in identifying necessary activities, setting schedule goals, and monitoring progress

Multitasking: when a resource works on more than one task at a time

Murphy's Law: principle that if something can go wrong, it will

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

Node: the starting and ending point of an activity on an activity-on-arrow diagram

Parkinson's Law: principle that work expands to fill the time allowed

PERT weighted average: $$\frac{\text{optimistic time} + (4 * \text{most likely time}) + \text{pessimistic time}}{6}$$

Precedence Diagramming Method (PDM): a network diagramming technique in which boxes represent activities

Probabilistic time estimates: duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations instead of using one specific or discrete estimate

Program Evaluation and Review Technique (PERT): a project network analysis technique used to estimate project duration when there is a high degree of uncertainty with the individual activity duration estimates

Project buffer: additional time added before the project s due date

Project time management: the processes required to ensure timely completion of a project

Relationship: the sequencing of project activities or tasks; also called a dependency

Resource breakdown structure: a hierarchical structure that identifies the project s resources by category and type

Resources: people, equipment, and materials

Schedule baseline: the approved planned schedule for the project

Slack: the amount of time a project activity may be delayed without delaying a succeeding activity or the project finish date; also called float

Slipped milestone: a milestone activity that is completed later than planned

SMART criteria: guidelines to help define milestones that are **s**pecific, **m**easurable, **a**ssignable, **r**ealistic, and **t**ime-framed

Start-to-finish dependency: a relationship on a project network diagram where the from activity cannot start before the to activity is finished

Start-to-start dependency: a relationship on a project network diagram in which the from activity cannot start until the to activity starts

Task: an element of work, normally found on the WBS, that has an expected duration and cost, and expected resource requirements; also called an activity

Theory of Constraints (TOC): a management philosophy that states that any complex system at any point in time often has only one aspect or constraint that is limiting its ability to achieve more of its goal

Three-point estimate: an estimate that includes an optimistic, most likely, and pessimistic estimate

Total slack (total float): the amount of time an activity may be delayed from its early start without delaying the planned project finish date

Tracking Gantt chart: a Gantt chart that compares planned and actual project schedule information

Quick Quiz:

1. What is the first process in planning a project schedule?
a. defining milestones
b. defining activities
c. estimating activity resources
d. sequencing activity sequencing

2. Predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions are all examples of _____ .
a. items in an activity list
b. items on a Gantt chart
c. milestone attributes
d. activity attributes

3. As the project manager for a software development project, you are helping to develop the project schedule. You decide that writing code for a system should not start until users sign off on the analysis work. What type of dependency is this?
a. technical
b. mandatory
c. discretionary
d. external

4. You cannot start editing a technical report until someone else completes the first draft. What type of dependency does this represent?
a. finish-to-start
b. start-to-start
c. finish-to-finish
d. start-to-finish

5. Which of the following statements is false?
a. A resource breakdown structure is a hierarchical structure that identifies the project s resources by category and type.
b. Duration and effort are synonymous terms.
c. A three-point estimate is an estimate that includes an optimistic, most likely, and pessimistic estimate.
d. A Gantt chart is a common tool for displaying project schedule information.

6. What symbol on a Gantt chart represents a slipped milestone?
a. a black arrow
b. a white arrow
c. a black diamond
d. a white diamond

7. What type of diagram shows planned and actual project schedule information?
a. a network diagram
b. a Gantt chart
c. a Tracking Gantt chart
d. a milestone chart

8. _____ is a network diagramming technique used to predict total project duration.
a. PERT
b. A Gantt chart
c. Critical path method
d. Crashing

9. Which of the following statements is false?
a. Growing grass was on the critical path for a large theme park project.
b. The critical path is the series of activities that determine the earliest time by which a project can be completed.
c. A forward pass through a project network diagram determines the early start and early finish dates for each activity.
d. Fast tracking is a technique for making cost and schedule trade-offs to obtain the greatest amount of schedule compression for the least incremental cost.

10. _____ is a method of scheduling that considers limited resources when creating a project schedule and includes buffers to protect the project completion date.
a. Parkinson s Law
b. Murphy s Law
c. Critical path analysis
d. Critical chain scheduling