

PMP Requirements

- Complete application on-line
- Eligibility letter from PMI
- 1 year from eligibility letter
- Can take 3 times within one year, then wait one year to reapply

PMP Candidate: Choose the appropriate path to your certification:		
Education requirements	Bachelor's degree Or global equivalent	High school diploma Associate's degree Or global equivalent
Experience requirements	Within the last eight years: 36 non-overlapping months of project management experience 4500 hours leading project management tasks	
Exam requirements	35 contact hours of project management education 61% passing score (106 correct questions of 175 questions)	

PMP Exam Fees

- ▶ \$405 per PMI member
- ▶ \$555 per non-PMI member
- ▶ \$129 to join PMI

After the PMP

- ▶ Celebrate
- ▶ Earning PDUs
- ▶ Share your story



1.1 Purpose of the PMBOK Guide

- ▶ Generally recognized approach to project management
- ▶ Describes good practice for project management
- ▶ Common lexicon of project management terms
- ▶ Fundamental for PMI Exams:
 - ▶ PMP
 - ▶ CAPM
 - ▶ PgMP
 - ▶ PMI-ACP
 - ▶ PMI-RMP
 - ▶ PMI-SP



All About The PMBOK Guide

- ▶ Guide to the Project Management Body of Knowledge
- ▶ 13 chapters
- ▶ PMP exam and the PMBOK
- ▶ 5 process groups
- ▶ 47 processes
- ▶ 10 knowledge areas



PMBOK Chapters

- ▶ Chapter 1: Introduction
- ▶ Chapter 2: Organizational Influences and Project Life Cycle
- ▶ Chapter 3: Project Management Processes



PMBOK Chapters

- ▶ Chapter 4: Project Integration Management
- ▶ Chapter 5: Project Scope Management
- ▶ Chapter 6: Project Time Management
- ▶ Chapter 7: Project Cost Management
- ▶ Chapter 8: Project Quality Management



PMBOK Sections

- ▶ Chapter 9: Project Human Resource Management
- ▶ Chapter 10: Project Communications Management
- ▶ Chapter 11: Project Risk Management
- ▶ Chapter 12: Project Procurement Management
- ▶ Chapter 13: Project Stakeholder Management



1.2 What is a Project?

- ▶ Temporary endeavor
 - ▶ Definite beginning and end
- ▶ Creates a unique product, service, or result
- ▶ Projects can involve:
 - ▶ A single person
 - ▶ A single organizational unit
 - ▶ Multiple organizational units

Projects Create...

- ▶ An item, an enhancement, or a component of another item
- ▶ Service or capability to perform a service
- ▶ Improvement in an existing item
- ▶ Result – outcome or document

1.2.1. Relationships Among Portfolios, Programs, and Projects

- ▶ Coordinated, orchestrated effort for organizational goals
- ▶ Strategies and prioritization
- ▶ Common governance
- ▶ Uniform change control
- ▶ Performance measurement

1.3 What is Project Management?

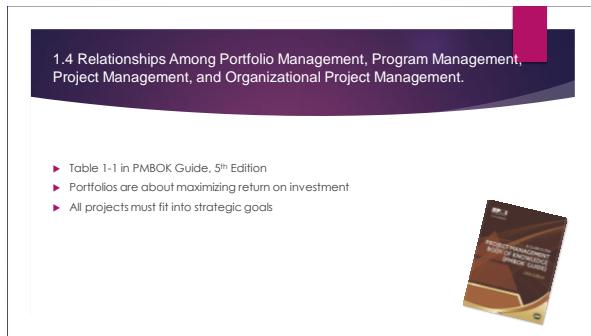
- ▶ Application of knowledge, skills, tools, and techniques to meet the project requirements
- ▶ 47 project management processes
- ▶ Five project management process groups
 - ▶ Initiating
 - ▶ Planning
 - ▶ Executing
 - ▶ Monitoring and Controlling
 - ▶ Closing

Typical Project Management

- ▶ Identify requirements
- ▶ Addressing needs, concerns, and expectations of stakeholders
- ▶ Setting up, maintaining, and carrying out communications
- ▶ Managing stakeholders
- ▶ Balancing competing project constraints
 - ▶ Scope,
 - ▶ Quality,
 - ▶ Schedule,
 - ▶ Budget,
 - ▶ Resources, and
 - ▶ Risks.

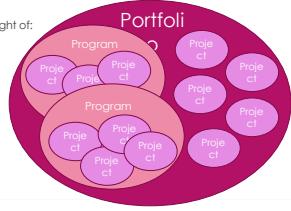


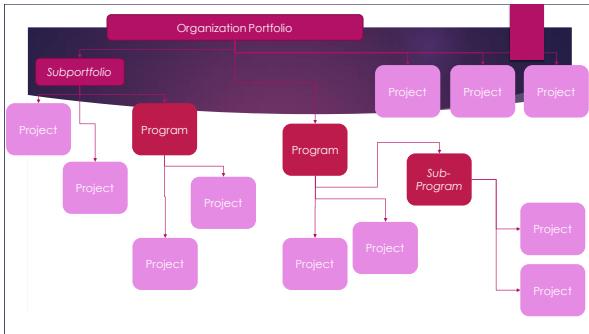




Projects, Programs, and Portfolios

- ▶ Each have management and oversight of:
 - ▶ Scope
 - ▶ Changes
 - ▶ Planning
 - ▶ Management
 - ▶ Success
 - ▶ Monitoring





1.4.1 Program Management

- ▶ Multiple related projects
- ▶ Achieve benefits
- ▶ Program managers and project managers
- ▶ PgMP

1.4.4 Project Management Offices

- ▶ Support project managers
- ▶ Manage share resources across the PMO
- ▶ Coaching, mentoring, and training
- ▶ Conducting project audits
- ▶ Developing and managing processes and procedures
- ▶ Facilitating communications across projects

Project Management Office Types

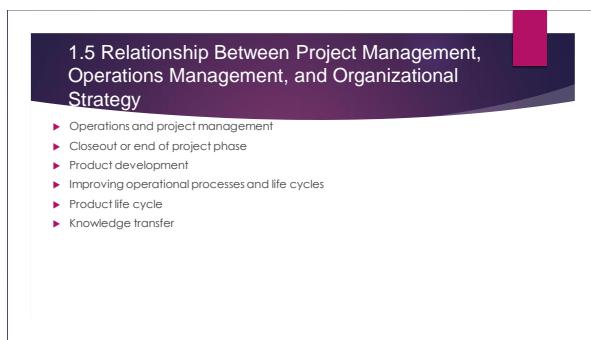
- ▶ Standards project management for an organization
- ▶ Supportive – consultative role, templates, training
- ▶ Controlling – compliance through a framework, specific forms and templates, governance
- ▶ Directive – directly manages the project as the PMO owns and controls the project life cycle

1.4.3 Projects and Strategic Planning

- ▶ Market demands
- ▶ Opportunities
- ▶ Social need
- ▶ Environmental considerations
- ▶ Customer request
- ▶ Technological advance
- ▶ Legal requirements







1.5.2 Organizations and Project Management

- ▶ Project-based organizations
- ▶ Project management and organizational governance
- ▶ Projects and organizational strategy
- ▶ Culture

1.6 Business Value

- ▶ Entire value of the business
- ▶ Tangible elements
 - ▶ Monetary assets
 - ▶ Fixtures and equipment
 - ▶ Equity
- ▶ Intangible elements
 - ▶ Reputation
 - ▶ Brand recognition
 - ▶ Trademarks

1.7 Role of the Project Manager

- ▶ Lead the team to achieve the project objectives
- ▶ Balance the competing objectives of the project
- ▶ Communicate with stakeholders
- ▶ Contribute to business value

1.7.1 Responsibilities and competencies of the Project Manager

- ▶ Satisfy task needs, team needs, and individual needs
- ▶ Liaison between the project team and the business strategy
- ▶ Three values of a project manager:
 - ▶ Knowledge: understanding project management
 - ▶ Performance: accomplish as a project manager
 - ▶ Personal: behavior, effectiveness, character, leadership

General Management Skills



Interpersonal Skills

- ▶ Problem solving
- ▶ Motivating
- ▶ Communicating
- ▶ Influencing the organization
- ▶ Leadership
- ▶ Negotiating



Key terms

- The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

A Guide to the Project Management Body of Knowledge (PMBOK)

- The PMI publication that defines widely accepted project management practices. The CAPM and the PMP exam are based on this book.

Application areas

- The areas of expertise, industry, or function where a project is centered. Examples of application areas include architecture, IT, health care, and manufacturing.

Certified Associate in Project Management (CAPM)

- ▶ A person who has slightly less project management experience than a PMP, but who has qualified for and then passed the CAPM examination.

Cultural and social environment

- ▶ Defines how a project affects people and how those people may affect the project. Cultural and social environments include the economic, educational, ethical, religious, demographic, and ethnic composition of the people affected by the project.

Deliverable

- ▶ A product, service, or result created by a project. Projects can have multiple deliverables.

General management skills

- ▶ These include the application of accounting, procurement, sales and marketing, contracting, manufacturing, logistics, strategic planning, human resource management, standards and regulations, and information technology.

International and political environment

- ▶ The consideration of the local and international laws, languages, communication challenges, time zone differences, and other non-collocated issues that affect a project's ability to progress.

Interpersonal skills

- ▶ The ability to interact, lead, motivate, and manage people.

Iron Triangle of Project Management

- ▶ A triangle with the characteristics of time, cost, and scope. Time, cost, and scope each constitute one side of the triangle; if any side of the Iron Triangle is not in balance with the other sides, the project will suffer. The Iron Triangle of Project Management is also known as the Triple Constraints of Project Management, as all projects are constrained by time, cost, and scope.

Physical environment

- ▶ The physical structure and surroundings that affect a project's work.

Program

- ▶ A collection of related projects working in unison toward a common deliverable.

Progressive elaboration

- ▶ The process of gathering project details. This process uses deductive reasoning, logic, and a series of information-gathering techniques to identify details about a project, product, or solution.

Project

- ▶ A temporary endeavor to create a unique product, service, or result. The end result of a project is also called a deliverable.

Project environment

- ▶ The location and culture of the environment where the project work will reside. The project environment includes the social, economic, and environmental variables the project must work with or around.

Project Management Institute (PMI)

- ▶ An organization of project management professionals from around the world, supporting and promoting the careers, values, and concerns of project managers.

Project management office (PMO)

- ▶ A central office that oversees all projects within an organization or within a functional department. A PMO supports the project manager through software, training, templates, policies, communication, dispute resolution, and other services.

Project Management Professional (PMP)

- ▶ A person who has proven project management experience and has qualified for and then passed the PMP examination.

Project portfolio management

- ▶ The management and selection of projects that support an organization's vision and mission. It is the balance of project priority, risk, reward, and return on investment. This is a senior management process.

Subprojects

- ▶ A smaller project managed within a larger, parent project. Subprojects are often contracted work whose deliverable allows the larger project to progress.

Triple Constraints of Project Management

- ▶ Also known as the Iron Triangle. This theory posits that time, cost, and scope are three constraints that every project has.

Chapter exam

2. ORGANIZATIONAL INFLUENCE AND PROJECT LIFE CYCLE

2.1 Organizational Influences on Project Management

Organizational cultures and styles
Organizational communications
Structure of the organization

Organizational Culture

Values
Business model
Policies, methods, and processes
View of authority
Work ethic and work hours



2.1.3 Organizational Structures

Affects power of project manager
Affects decision-making abilities
Affects communication demands
Affects project team management
Affects stakeholder management

Organizational Structures and Power

- 1 Projectized
- 2 Strong Matrix
- 3 Balanced Matrix
- 4 Weak Matrix
- 5 Functional

Organizational Structures Detail

	Functional	Weak Matrix	Balanced Matrix	Strong Matrix	Projectized
Project Manager's Authority	Little	Limited	Low to Moderate	Moderate to High	High to Almost Total
Resource Availability	Little	Limited	Low to Moderate	Moderate to High	High to Almost Total
Budget Control	Functional	Functional	Mixed	Project Manager	Project Manager
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Admin Staff	Part-time	Part-time	Part-time	Full-time	Full-time

2.1.4 Organizational Process Assets

Come from

- Process and procedures (historical)
- Corporate knowledge base (prepared)

Historical or prepared

- Past projects
- Lessons learned
- Processes and procedures
- Corporate knowledge base
- Guidelines and accepted practices

2.1.4.2 Corporate Knowledge Base

Configuration management knowledge

Financial databases: labor hours, incurred costs, budgets, and any project cost overruns;

Historical information and lessons learned knowledge bases

Issue and defect management databases

Process measurement databases

Project files from previous projects

2.1.5 Enterprise Environmental Factors

Organizational policies
Industry standards and regulations
Rules that the project manager must abide by
Processes that must be followed
Geographic distribution of facilities
Marketplace conditions

Standards and Regulations

Standards are optional
Regulations are not

2.2 Project Stakeholders and Governance

Interested parties in the project's existence
Affected by the project
Can affect the project
Project team
Project manager

Project Stakeholders

Anyone who's affected by the project

Positive stakeholders

Negative stakeholders

Neutral stakeholders

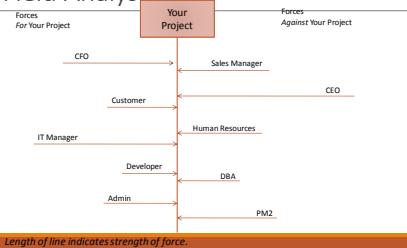


2.2.1 Project Stakeholders

Common stakeholders

- Sponsor
- Customers and users
- Sellers
- Business partners
- Organizational groups
- Functional managers

Force Field Analysis



2.2.2 Project Governance

Deliverable acceptance criteria
Escalation process
Relationship among projects, programs, project team, stakeholders
Process for communicating information
Decision-making process
Project life cycle approach
Process for stage gate or phase reviews
Control and oversight of the project

Establishing ground rules

Once the ground rules have been established, it's the responsibility of the entire project team to enforce the rules.

2.2.3 Project Success

Define what equates to project success first

Meeting project objectives

- Scope
- Costs
- Schedule
- Quality
- Resources
- Risk

2.3 Project team

Dedicated – project team works on the project full time

- Collocated or virtual
- Reports directly to project manager
- Lines of authority are clear

Part-time – project team works part time on the project

- Carries on regular operational work
- Functional manager usually in control of project resources
- Project team could be on multiple projects at one time

2.4 Project Life cycle

Unique to each project

Duration of the project

Phases

Phases of construction versus IT projects



2.4.2 Project Phases

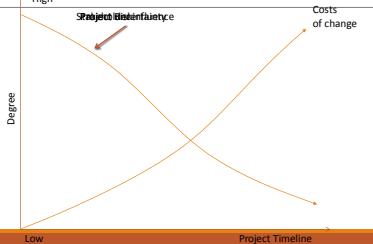
Phases result in key deliverables

Phase names describe work:

- Foundation
- Framing
- Interior
- Exterior

Milestones often linked to phases

Time and Influence



Product and Project Life Cycles

Life of the product

Last product phase is its retirement

Project life cycle creates

- Moving
- Adding
- Changing
- Deleting

2.4.2.1 Project Phase Relationships

Sequential relationship

Overlapping relationship

Iterative relationships



2.4.2.2 Predictive Life Cycles

Plan-drive
Waterfall approach
Predicts the project life cycle
Changes to scope are tightly controlled

2.4.2.3 Iterative and Incremental Life Cycles

Phases repeat through iterations
Iterations create deliverables
Detailed scope is elaborated for each iteration
Changes to the project scope are expected

2.4.2.4 Adaptive Life Cycles

Change-driven
Agile project management
Rapid iterations or project work
Backlog of requirements
Changes to the project scope are expected

Key terms

The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Adaptive life cycle

This is a project life cycle that anticipates many changes to the project scope and demands highly involved project stakeholders. Because change happens often, change control is managed tightly by the project manager. This approach is also known as the agile project management methodology.

Balanced matrix structure

An organization where organizational resources are pooled into one project team, but the functional managers and the project managers share the project power.

Composite structure

An organization that creates a blend of the functional, matrix, and projectized structures.

Customer/user

The person(s) who will pay for and use the project's deliverables.

Deliverable

A verifiable, measurable product or service created by a phase and/or a project.

Functional structure

An organization that is divided into functions, and each employee has one clear functional manager. Each department acts independently of the other departments. A project manager in this structure has little to no power and may be called a project coordinator.

Influencers

Persons who can positively or negatively influence a project's ongoing activities and/or the project's likelihood of success.

Kill point

The review of a phase to determine if it accomplished its requirements. A kill point signals an opportunity to kill the project if it should not continue.

Negative stakeholder

A stakeholder who does not want a project to succeed. He or she may try to negatively influence the project and help it fail.

Performing organization

The organization whose employees or members are most directly involved in the project work.

Phase

The logical division of a project based on the work or deliverable completed within that phase. Common examples include the phases within construction, software development, or manufacturing.

Phase exit

The review of a phase to determine if it accomplished its requirements. It signals the exiting of one phase and the entering of another.

Phase-end review

The review of a phase to determine if it accomplished its requirements. A phase-end review is also called a phase exit, a phase gate, and a kill point.

Positive stakeholder

A stakeholder who wants a project to exist and succeed. He or she may try to positively influence the project and help it succeed.

Predictive life cycle

A predictive life cycle, also called a plan-driven approach, is a life cycle that “predicts” the work that will happen in each phase of the project. The project plan, time, cost, and scope are defined early in the project and predict what is to happen in the project.

Product life cycle

The life cycle of the product a project creates. For example, a project can create a piece of software; the software then has its own life cycle until it becomes defunct.

Project life cycle

The collection of phases from the start of a project to its completion.

Project management office (PMO)

A business unit that centralizes the operations and procedures of all projects within the organization. The PMO supports the project manager through software, templates, and administrative support. A PMO can exist in any organizational structure, but it is most common in matrix and projectized structures.

Project management system

The defined set of rules, policies, and procedures that a project manager follows and utilizes to complete the project.

Project stakeholder

Anyone who has a vested interest in a project's operation and/or its outcome.

Projectized structure

An organization that assigns a project team to one project for the duration of the project life cycle. The project manager has high-to-almost-complete project power.

Strong matrix structure

An organization where organizational resources are pooled into one project team, but the functional managers have less project power than the project manager.

Weak matrix structure

An organization where organizational resources are pooled into one project team, but the functional managers have more project power than the project manager.

Chapter exam

3. PROJECT MANAGEMENT PROCESSES

Project and Product Processes

Project management processes – flow of the project

Product processes – specify and create the project's product

- Vary by application area
- Execution of the project work
- Project scope defines the product
 - Construction
 - Computer programming
 - Network Infrastructure
 - Designing a web site

Project Management Processes

What is a process?

- Set of interrelated actions and activities
- Create a pre-specified result

Five groups of processes

47 project management processes

Inputs, Tools and Techniques, Outputs

Project Success Depends on...



Use the appropriate processes



Use a defined and documented approach



Comply with stakeholder requirements



Balance time, cost, scope, quality, and risk

Project Management Processes

Apply globally across industries

You should not apply every process

Use the appropriate processes

Depth of execution for each process used

Project Management Process Groups

Initiating

Planning

Executing

Monitoring and Controlling

Closing

3.3 Initiating Process Group

Two processes:

- Develop project charter
- Identify stakeholders

3.4 Planning Process Group

24 processes:

- Develop project management plan
- Plan scope management
- Collect requirements
- Define scope
- Create work breakdown structure
- Plan schedule management
- Define activities

3.4 Planning Process Group

24 processes, continued:

- Sequence activities
- Estimate activity resources
- Estimate activity durations
- Develop schedule
- Plan cost management
- Estimate costs
- Determine budget

3.4 Planning Process Group

24 processes, continued:

- Plan quality management
- Plan human resource management
- Plan communications
- Plan risk management
- Identify risks
- Perform qualitative analysis
- Perform quantitative analysis

3.4 Planning Process Group

24 processes, continued:

- Plan risk responses
- Plan procurement management
- Plan stakeholder management

3.5 Executing Process Group

Eight processes

- Direct and manage project work
- Quality assurance
- Acquire project team
- Develop project team
- Manage project team
- Manage communications
- Conduct procurement
- Manage stakeholder engagement

3.6 Monitoring and controlling Process Group

11 processes

- Monitor and control project work
- Integrated change control
- Validate scope
- Control scope
- Control schedule

3.6 Monitoring and controlling Process Group

11 processes, continued

- Control costs
- Control communications
- Control risks
- Control procurements
- Control stakeholder engagement

3.7 Closing Process Group

Two processes

- Close project or phase
- Close procurement

3.8 Project Information

Work performance data – raw observation and measurements

- Percent of work completed
- Actual start and finish dates for activities
- Number of change requests, defects, actual costs

Work performance information – data that has been analyzed

- Status of deliverables
- Implementation status for change requests
- Forecasts for estimate to complete

Work performance reports – reports that communicate the work performance information

3.9 Role of the Knowledge Areas

Ten project management knowledge areas:

- Project integration management
- Project scope management
- Project cost management
- Project schedule management
- Project quality management
- Project human resource management
- Project communications management
- Project risk management
- Project procurement management
- Project stakeholder management

Key terms

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Assumption

A belief that may or may not be true within a project. Weather is an example of an assumption in construction projects.

Change request

A documented request to add to or remove from the project scope. A change request may be initiated to change an organizational process asset, such as a template or a form.

Closing process group

The project management process group that contains the activities to close out a project and project contracts.

Constraint

A condition, rule, or procedure that restricts a project manager's options. A project deadline is an example of a constraint.

Corrective action

A corrective action brings project work back into alignment with the project plan. A corrective action may also address a process that is producing errors.

Cost baseline

The aggregation of the project deliverables and their associated costs. The difference between the cost estimates and the actual cost of the project identifies the cost variance.

Defect repair

The activity to repair a defect within the project.

Deming's PDCA cycle

Standard project management is based on Deming's plan-do-check-act cycle, which describes the logical progression of project management duties.

Enterprise environmental factors

Any external or internal organizational factors that can affect project success. Enterprise environmental factors include the culture, organizational structure, resources, commercial databases the project will use, market conditions, and your project management software.

Executing process group

The project management process group that provides the activities to carry out the project management plan to complete the project work.

Initiating process group

The project management process group that allows a project to be chartered and authorized.

Issue log

A record of the issue, its characteristics, the issue owner, and a target date for resolving the issue.

Manage project team

The project manager must, according to enterprise environmental factors, manage the project team to ensure that they are completing their work assignments with quality and according to plan.

Manage stakeholder expectations

This process is based on what the stakeholders expect from the project and on project communications from the project manager.

Monitoring and controlling process group

The project management process group oversees, measures, and tracks project performance.

Organizational process assets

The methodology an organization uses to perform its business, as well as the guidelines, procedures, and knowledge bases, such as the lessons learned documentation from past projects and any relevant historical information.

Planning process group

The project management process group that creates the project management plan to execute, monitor and control, and close the project.

Preventive action

A risk-related action that avoids risk within the project. A work-around to a problem within your project is an example of a preventive action.

Process

A set of integrated activities to create a product, result, or service. Project management processes allow the project to move toward completion.

Product process

A process that is unique to the type of work creating the product of the project. Product processes can also be unique to the performing organization of the project.

Project calendar

The calendar that documents when the project work can occur.

Project charter

A document that comes from outside of the project boundaries and authorizes the existence of a project.

Project deliverable

The output of the project.

Project scope statement

The project scope defines the project, the project deliverables, product requirements, project boundaries, acceptance procedures, and scope control.

Resource calendar

The calendar that documents which project resources are available for the project work.

Risk register

A central repository of the project risks and their attributes.

Risk

An uncertain event or condition that can have a negative or positive impact on the project.

Rolling wave planning

Iterations of planning throughout the project life cycle.

Schedule baseline

The expected timeline of the project. The difference between the planned schedule and the experience schedule reveals schedule variances within the project.

Scope baseline

The sum of the project deliverables. The project scope statement, the WBS and the WBS dictionary are called the project scope baseline. The differences between the WBS and what is created is a scope variance.

Stakeholder

A person or group that is affected by the project or that may affect the group. Stakeholders can be positive, negative, or neutral in their attitude toward the project success.

Stakeholder engagement

The project manager and project team aim to keep the project stakeholders engaged and involved in the project to ensure that decisions, approvals, and communications are maintained as defined in the stakeholder management plan and the stakeholder management strategy.

WBS dictionary

A document that defines every identified element of the WBS.

Work breakdown structure (WBS)

A breakdown of the project scope.

Work-around

An immediate response to a negative risk within the project. This is an example of a corrective action.

Chapter exam

4. PROJECT INTEGRATION MANAGEMENT

Choosing a Project

Opportunities
Problems
Customer request

Benefits Measurement

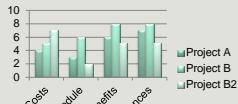
Compare the benefits of the project

Cost-benefits ratio

Scoring Models

Murder Boards

Payback period



Future Value of Money

$FV = PV(1+i)^n$ where:

- FV is future value
- PV is present value
- i is the given interest rate
- n is the number of time periods

Future Value of Money

$FV = PV(1+i)^n$

- PV is \$100,000
- i is .06
- n is five years

Future Value of Money

$$FV = PV(1+i)^n$$

PV is \$100,000

i is .06

n is five years

$$FV = 100,000(1.06)^5$$

$$FV = 100,000(1.338226)$$

$$FV = \$133,822.60$$

Present Value of Money

$$PV = FV / (1+i)^n$$

PV is present value

FV is future value

i is the given interest rate

n is the number of time periods

Present Value of Money

$$PV = FV / (1+i)^n$$

FV is \$160,000

i is .06

n is five years

$$PV = 160,000 / (1.338226)$$

$$PV = \$119,561$$

Net Present Value

Finds the true value of a project
Considers a project with multiple returns
Considers the initial cash outlay

Net Present Value

Calculate the return for each time period
Calculate each time period's present value
Sum the present value
Subtract the investment
NPV greater than zero is good

Net Present Value

Time Period	Cash Flow	Present Value
1	\$15,000	\$14,150.94
2	\$25,000	\$22,249.91
3	\$17,000	\$14,273.53
4	\$25,000	\$19,802.34
5	\$18,000	\$13,450.65
Totals	\$100,000	\$83,927.37
Investments		\$78,000.00
Net Present Value		\$5,927.37

Internal Rate of Return

Present value equals cash inflow

IRR with higher values are good

IRR with lower values *might* be poor

Constrained Optimization

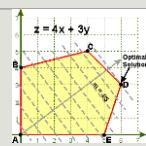
Linear programming

Nonlinear programming

Integer algorithms

Dynamic programming

Multibjective programming



4.1 Develop Project charter

Authorized external to the project

Appropriate power

Portfolio Steering Committee

Develop Project Charter	Inputs	Tools & Techniques	Outputs
Project statement of work	Expert judgment	Project charter	
Business case	Facilitation techniques		
Agreements			
Enterprise environmental factors			
Organizational process assets			

Project Statement of Work

Business need
Product scope description
Strategic plan

Examining the Business Case

Determines worth of the project
Justifies the investment

Created as a result of:

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

4.1.2 Creating the project charter

Expert judgment

- Consultants
- Internal organizational resources
- Stakeholders
- Industry groups
- PMO

Facilitation techniques

- Brainstorming
- Conflict resolution
- Meeting management

Developing the Project Charter**Requirements for satisfaction****Approval requirements****Project manager****Project sponsor****High-level purpose of the project**

Developing the Project Charter**Purpose of the project****Milestone schedule****Stakeholder influence****Risks**

Developing the Project Charter**Functional organizations****Summary budget****Contract**

4.2 Develop Project Management Plan

Develop Project Management Plan	Inputs	Tools & Techniques	Outputs
Project charter	Expert judgment		Project management plan
Outputs from other processes	Facilitation techniques		
Enterprise environmental factors			
Organizational process assets			

4.2 Develop Project Management Plan

Develop Project Management Plan	Inputs	Tools & Techniques	Outputs
Project charter	Expert judgment		Project management plan
Outputs from other processes	Facilitation techniques		
Enterprise environmental factors			
Organizational process assets			

Purpose for the Plan



Communicates intent of the project



Serves as a guide for the project manager



Provides project structure



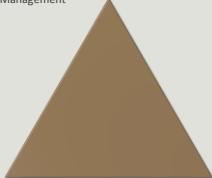
Provides documentation



Provides baselines

Developing the Project Plan

Triple Constraints of Project Management
Iron Triangle



Planning Participants

Participant	Contribution
Project manager	Leadership, facilitation, organization, direction, expert judgment
Project team members	Knowledge of project work, time estimating, schedule, risk assessment, expert judgment
Customers	Objectives, quality requirements, influence on budget and schedule
Management	Budget, resources, project management methodology, quality requirements, project plan approval

Typical Project Management Plan

1. Change management plan	9. Scope baseline
2. Communications management plan	10. Quality management plan
3. Configuration management plan	11. Requirements management plan
4. Cost baseline	12. Risk management plan
5. Cost management plan	13. Schedule baseline
6. HR management plan	14. Schedule management plan
7. Process improvement plan	15. Scope management plan
8. Procurement management plan	16. Stakeholder management plan

Project Documents			
Activity attributes	Activity cost estimates	Activity duration estimates	Activity list
Activity resource requirements	Agreements	Basis of estimates	Change log
Change requests	Change log (includes scheduling)	Procurement documents	Requirements document of work
Issue log	Milestone list	Project funding requirements	Project schedule
Project calendars	Project charter	Project statement of work	Quality checklists
Project schedule network diagrams	Project staff assignments	Requirements documentation	Requirements traceability matrix
Quality control measurements	Quality metrics	Risk register	Schedule data
Resource breakdown structure	Resource calendar	Stakeholder register	Team performance assessments
Seller proposals	Source selection criteria	Work performance reports	Work performance data
Work performance information			

4.3 Direct and Manage Project Work

Doing the work to satisfy the project objectives
Spending funds to satisfy the project objectives
Managing, training, and leading the project team
Completing procurement requirements
Managing sellers
Acquiring, managing, and using resources such as materials, tools, facilities, and equipment to get the project work completed

4.3 Direct and Manage Project Work

Managing risks
Fleshing approved changes into the project
Managing communications
Collecting project data on schedules, costs, quality, and overall project progress—and then reporting on these components
Completing lessons learned documentation
Managing stakeholder engagement

4.3 Direct and Manage Project Work

Direct and Manage Project Work	Inputs	Tools & Techniques	Outputs
	Project management plan	Expert judgment Project management information system	Deliverables
	Approved change requests		Work performance data
	Enterprise environmental factors	Meetings	Change requests Project management plan updates
	Organizational process assets		Project documents updates

Actions in Execution

Corrective action – realigns project performance
Preventive action – ensures future performance
Defect repair – modifies nonconformance to project requirements
These actions require a change request

Corrective Actions



Fixing the project



Defect repair



Defect repair validation

Preventive Actions



Safety



Training



Anticipated problems



Risk management

4.4 Monitor and control project work

Compare actual experiences to project management plan

Assess project performance

Identify new risks

Maintain information about the project's current state

Monitor and control project work	Inputs	Tools & Techniques	Outputs
	Project management plan Schedule forecasts	Expert judgment Analytical techniques Project management information system	Change requests Work performance reports Project management plan updates Project documents updates
Cost forecasts Validated changes Work performance information Enterprise environmental factors Organizational process assets		Meetings	

Enterprise Environmental Factors

Government and industry standards

Company work authorization system

Risk tolerances

PMIS

Organizational Process Assets

- Communication requirements
- Financial control procedures
- Issue and defect management procedures
- Change control procedures
- Risk control procedures
- Process measurement database
- Lessons learned database

Forecasting Project Performance

- Schedule forecasts
 - Estimate to complete
 - Schedule variance
 - Schedule performance index
- Costs forecasts
 - Estimate to complete
 - Estimate at completion
 - Cost variance
 - Cost performance index

4.5 Perform Integrated change control

- Ensure only approved changes
- Review change requests promptly
- Manage approved changes
- Maintain baselines
- Review, approve, or decline change requests
- Coordinate changes across project
- Document change request and impact

4.5 Perform integrated change control

Perform Integrated Change Control	Inputs	Tools & Techniques	Outputs
	Project management plan Work performance reports	Expert judgment Meetings	Approved change requests Change log Project management plan updates
Change requests Enterprise environmental factors Organizational process assets		Change control tools	Project documents updates

Configuration control

Specification the deliverables and the processes

Features and functions

How the project work is completed

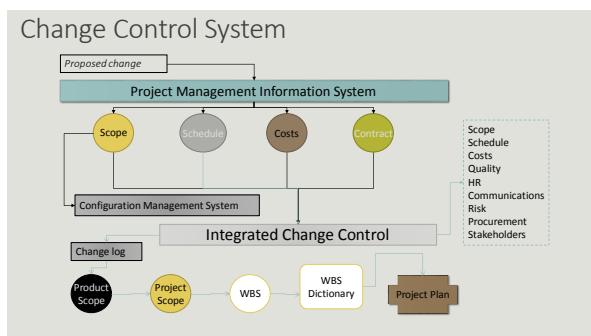
Configuration control

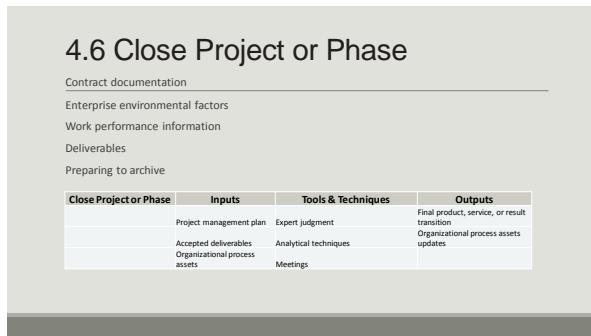
Configuration identification – identification and documentation of the product and its components

Configuration status accounting – includes the documentation of the product information

Configuration verification and auditing – concerned with performance and functional attributes of the product







What happens at project closure

Assembling project records
Project success or failure
Lessons learned documentation
Archiving the records

Key terms

The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Assumption log

An assumption is something that is believed to be true or false, but it has not yet been proven to be true or false. Assumptions that prove wrong can become risks for the project. All identified project assumptions are recorded in the assumption log for testing and analysis, and the outcomes are recorded.

Benefit/cost ratio (BCR) models

This is an example of a benefits comparison model. It examines the benefit-to-cost ratio.

Change control board (CCB)

A committee that evaluates the worthiness of a proposed change and either approves or rejects the proposed change.

Change control system (CCS)

The change control system communicates the process for controlling changes to the project deliverables. This system works with the configuration management system and seeks to control and document proposals to change the project's product.

Change log

All changes that enter into a project are recorded in the change log. The characteristics of the change, such as the time, cost, risk, and scope details, are also recorded.

Change management plan

This plan details the project procedures for entertaining change requests: how change requests are managed, documented, approved, or declined.

Closure processes

This final process group of the project management life cycle is responsible for closing the project phase or project. This is where project documentation is archived and project contracts are also closed.

Communications management plan

This plan defines who will get what information, how they will receive it, and in what modality the communication will take place.

Configuration identification

This includes the labeling of the components, how changes are made to the product, and the accountability of the changes.

Configuration management plan

This plan is an input to the control scope process. It defines how changes to the features and functions of the project deliverable, the product scope, may enter the project.

Configuration management system

This system defines how stakeholders are allowed to submit change requests, the conditions for approving a change request, and how approved change requests are validated in the project scope. Configuration management also documents the characteristics and functions of the project's products and any changes to a product's characteristics.

Configuration status accounting

The organization of the product materials, details, and prior product documentation.

Configuration verification and auditing

The scope verification and completeness auditing of project or phase deliverables to ensure that they are in alignment with the project plan.

Contract closure

The formal verification of the contract completeness by the vendor and the performing organization.

Cost baseline

This is the aggregated costs of all of the work packages within the work breakdown structure (WBS).

Cost management plan

This plan details how the project costs will be planned for, estimated, budgeted, and then monitored and controlled.

Enterprise environmental factors

The culture, structure, standards, regulations, organizational logistics, and other organizational characteristics that influence how a project operates.

Future value

A benefit comparison model to determine a future value of money. The formula to calculate future value is $FV = PV(1 + I)^n$, where PV is present value, I is the given interest rate, and n is the number of periods.

Human resource plan

This plan defines how project team members will be brought onto the project team, managed, and released from the project team. It also defines team training, safety issues, roles and responsibilities, and how the project's reward and recognition system will operate. Chapter 9 defines the human resource plan in detail.

Integrated change control

A process to consider and control the impact of a proposed change on the project's knowledge areas.

Issue log

Issues are points of contention where some question of the project's direction needs to be resolved. All identified issues are documented in the issue log, along with an issue owner and a deadline to resolve the issue. The outcome of the issue is also recorded.

Mathematical model

A project selection method to determine the likelihood of success. These models include linear programming, nonlinear programming, dynamic programming, integer programming, and multiobjective programming.

Milestone

Milestones are significant points or events in the project's progress that represent accomplishment in the project. Projects usually create milestones as the result of completing phases within the project.

Milestone list

This list details the project milestones and their attributes. It is used for several areas of project planning, but also helps determine how quickly the project may be achieving its objectives.

Murder boards

These are committees that ask every conceivable negative question about the proposed project. Their goals are to expose the project's strengths and weaknesses, and to kill the project if it's deemed unworthy for the organization to commit to. Also known as project steering committees or project selection committees.

Net present value

Evaluates the monies returned on a project for each period the project lasts.

Organizational process assets

Anything that an organization has to help a current project succeed. Policies, procedures, documentation of past projects, and plans are part of the organizational process assets.

Payback period

An estimate to predict how long it will take a project to pay back an organization for the project's investment of capital.

Present value

A benefit comparison model to determine the present value of a future amount of money. The formula to calculate present value is $PV = FV \div (1 + I)^n$, where FV is future value, I is the given interest rate, and n is the number of periods.

Process improvement plan

This plan aims to eliminate non-value-added activity, eliminate waste, and to determine how the project work, execution, and management can be made better.

Procurement management plan

The procurement management plan controls how the project will acquire goods and services.

Project charter

This document authorizes the project. It defines the initial requirements of the project stakeholders. The project charter is endorsed by an entity outside of the project boundaries.

Project management plan

The documented approach of how a project will be planned, executed, monitored and controlled, and then closed. This document is a collection of subsidiary management plans and related documents.

Project scope management plan

Defines how the project scope will be planned, managed, and controlled.

Project statement of work (SOW)

This document defines all the products and services the project will provide.

Quality baseline

Documents the quality objectives for the project, including the metrics for stakeholder acceptance of the project deliverable.

Quality management plan

This plan defines what quality means for the project, how the project will achieve quality, and how the project will map to organizational procedures pertaining to quality.

Regression analysis

A mathematical model to examine the relationship among project variables, like cost, time, labor, and other project metrics.

Risk management plan

Risk is an uncertain event or condition that may affect the project outcome. The risk management plan defines how the project will manage risk.

Risk register

The risk register is a centralized database consisting of the outcome of all the other risk management processes, such as the outcome of risk identification, qualitative analysis, and quantitative analysis.

Risk response plan

This subsidiary plan defines the risk responses that are to be used in the project for both positive and negative risks.

Schedule baseline

This is the planned start and finish of the project. The comparison of what was planned and what was experienced is the schedule variance.

Schedule management plan

Defines how the project schedule will be created and managed.

Scope baseline

The scope baseline is a combination of three project documents: the project scope statement, the work breakdown structure, and the WBS dictionary. The creation of the project deliverable will be measured against the scope baseline to show any variances from what was expected and what the project team has created.

Scoring models

These models use a common set of values for all of the projects up for selection. For example, values can be profitability, complexity, customer demand, and so on.

Staffing management plan

This is a component of the human resource management plan. It specifically addresses how the human resource requirements will be met in the project. It can address internal staffing, procurement of resources, or negotiations with other projects for shared resources.

Chapter exam

5. PROJECT SCOPE MANAGEMENT

5.1 Planning Scope Management

Creates the scope management plan to:

- Documents scope definition process
- Scope validation process
- Scope control process

Offer direction for scope management

Helps combat scope creep

5.1 Planning Scope Management

Plan Scope Management	Inputs	Tools & Techniques	Outputs
	Project management plan Project charter Enterprise environmental factors Organizational process assets	Expert judgment Meetings	Scope management plan Requirements management plan

Project and Product Scope

Product scope – features and functions

Project scope – work to be completed



5.2 Collect requirements

Business requirements: higher-level needs of the organization

Stakeholder requirements: needs of a stakeholder or stakeholder group

Solution requirements: features, functions, and characteristics of the product, service

- Functional requirements describe the behaviors of the product.

- Nonfunctional requirements describe the environmental conditions or qualities

Transition requirements: moving from the current state to the future state.

Project requirements: actions, processes, or other conditions

Quality requirements: criteria needed to validate the successful completion of a project deliverable or fulfillment of other project requirements

5.2 Collect requirements

Collect Requirements	Inputs	Tools & Techniques	Outputs
Scope management plan	Interviews	Requirements documentation	
Requirements management plan	Focus groups	Requirements traceability matrix	
Stakeholder management plan			
Project charter	Facilitated workshops		
Stakeholder register	Group creativity techniques		
	Group decision-making techniques		
	Questionnaires and surveys		
	Observations		
	Prototypes		
	Benchmarking		
	Context diagrams		
	Document analysis		

Interviewing Stakeholders

Stakeholder register
One-to-one
One-to-many
Many-to-many



Focus Groups

Moderated event
6-12 people
Neutral moderator
Participant composition

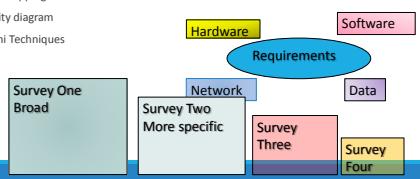


Facilitated Workshop

Requirements workshop
Commonality, consensus, cohesion
Joint application design workshop
Voice of the customer
Quality function deployment

Group Creativity Techniques

Brainstorming
Nominal group technique
Mind mapping
Affinity diagram
Delphi Techniques



Using Group Decisions

Unanimity – everyone agrees
Majority – more than 50 percent agrees
Plurality – largest block agrees
Dictatorship – power decides

Questionnaires and Surveys

Large group
Paper-based
Web-based
Geographical concerns

Stakeholder Observation

Job shadowing
Passive
Active (participant observer)



Prototypes

Throw-away prototypes
Functional prototypes
Storyboarding



Benchmarking the requirements

Comparing two or more system, businesses, approaches

Set an external basis for performance

Comparing organizations for requirements

Utilizing a context diagram

Scope model

Business system working components

- Servers
- Workstations
- Databases
- Workflow
- People (actors)

Analyzing project documents

Project plans

Brochures

Blueprints

Specifications

Managing the project requirements

Requirements Traceability Matrix

- Table of requirements
- Business needs
- Project objectives
- WBS deliverables
- Product components
- Development
- Related test cases

5.3 Define Scope

Detailed description the project and the product

Project boundaries

Project scope statement

Project baseline

- Project scope statement
- Project WBS
- Project WBS dictionary

5.3 Define Scope

Define Scope	Inputs	Tools & Techniques	Outputs
	Scope management plan Project charter Requirements documentation Organizational process assets	Expert judgment Product analysis Alternatives generation Facilitated workshops	Project scope statement Project documents updates

Defining the Project Scope

Expert judgment

- Consultants
- Stakeholders, including customers
- Professional and technical associations
- Industry groups
- Subject matter experts

Product Analysis

Product breakdown

Systems engineering

Value engineering

Value analysis

Function analysis

Quality function deployment

Alternatives generation

Benchmarking

Systems

Vendors

Materials

Resources



Facilitated Workshops

Stakeholder expectations
Documentation
Communication
Verification
Business analysts

Examining a Project Scope Statement

Product scope description
Product acceptance criteria
Project deliverables
Project exclusions
Project constraints
Project assumptions

Project Charter Versus Project Scope

Project Charter
- Project purpose or justification
- Measurable project objectives
- High-level requirements
- High-level project description
- High-level risks
- Summary milestone schedule
- Summary budget
- Stakeholder list
- Project approval requirements
- Assigned project manager, responsibility, and authority level
- Name and authority of the sponsor

Project Scope
- Project scope description
- Acceptance criteria
- Project deliverables
- Project exclusions
- Project constraints
- Project assumptions

Project Scope Statement Updated Docs

Stakeholder register
Requirements documentation
Requirements traceability matrix

5.4 Create WBS

Process of decomposing the project scope
Deliverables-orientated
Not the activities list
Major component of the scope baseline
Project planning tools
Visualizes the project
Defines what's in scope
Deterrent to scope change

5.4 Create WBS

Create WBS	Inputs	Tools & Techniques	Outputs
	Scope management plan Project scope statement Requirements documentation	Decomposition Expert judgment	Scope baseline Project documents updates
	Enterprise environmental factors Organizational process assets		

WBS Purpose

The WBS is an input to five processes

1. Define project activities
2. Cost estimating
3. Cost budgeting
4. Identify project risks
5. Qualitative risk analysis

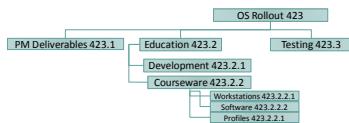
WBS Creation

1. Major project deliverables identified
2. Structure and organize the WBS
3. Decompose upper-level components to lower-level components
4. Assigning identification codes to components
5. Verify the scope decomposition

Finalizing the WBS

Control accounts for work packages

Code of accounts - unique identifier



WBS Templates

Historical information
Pre-populated deliverables
Sometimes called a WBT

Scope baseline

Project scope statement
WBS
WBS Dictionary

WBS Dictionary

Defines all elements of the WBS
Defines work package attributes
Time, cost, requirements, resources
Follows WBS usage

WBS Dictionary includes:

- Code of account identifier
 - Description of work
 - Assumptions and constraints
 - Responsible organization
 - List of schedule milestone
 - Associated schedule activities
- Resources required
 - Cost estimates
 - Quality requirements
 - Acceptance criteria
 - Technical references
 - Contract information

5.5 Validate Scope

Inspection-driven process
Customer inspects the project work
Phase and project completion
Review, audits, walkthroughs
Leads to formal project acceptance

5.5 Validate Scope

Validate Scope	Inputs	Tools & Techniques	Outputs
	Project management plan Requirements documentation Requirements traceability matrix Verified deliverables Work performance data	Inspection Group decision-making techniques	Accepted deliverables Change requests Work performance information Project documents updates.

Inspecting the project work

Measuring
Examining
Testing
Validating
Reviews
Walk-throughs
Audits

Formally accepting the project work

Accepted deliverables for phases and the project
Sign-off of deliverables
Change requests are a possible output
Scope verification and quality control

5.6 Control Scope

Are changes agreed upon?
Has the change already happened?
How to manage the existing change?
How to incorporate approved changes?
What baselines are affected by the change?

5.6 Control Scope

Control Scope	Inputs	Tools & Techniques	Outputs
Project management plan		Variance analysis	Work performance information
Requirements documentation			Change requests
Requirements traceability matrix			Project management plan updates
Work performance data			Project documents updates
Organizational process assets			Organizational process assets updates

Variance Analysis

Performance measurements

Magnitude of variation

Determine cause and degree

Corrective or preventive action



Updating the Scope Statement

Change affects the project scope statement

Versioning is appropriate

Approved changes affect the scope baseline

Could affect cost and schedule baselines

Key terms

The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

8/80 Rule

A planning heuristic for creating the WBS. This rule states that the work package in a WBS must take no more than 80 hours of labor to create and no fewer than 8 hours of labor to create.

Active observation

The observer interacts with the worker to ask questions and understand each step of the work being completed. In some instances, the observer could serve as an assistant in doing the work.

Affinity diagrams

When stakeholders create a large number of ideas, you can use an affinity diagram to cluster similar ideas together for further analysis.

Alternatives generation

A scope definition process of finding alternative solutions for the project customer while considering the customer's satisfaction, the cost of the solution, and how the customer may use the product in operations.

Brainstorming

This approach encourages participants to generate as many ideas as possible about the project requirements. No idea is judged or dismissed during the brainstorming session.

Change control system (CCS)

Documented in the scope management plan, this system defines how changes to the project scope are managed and controlled.

Change management plan

This subsidiary plan defines how changes will be allowed and managed within the project.

Code of accounts

A numbering system for each item in the WBS. The PMBOK is a good example of a code of accounts, as each chapter and its subheadings follow a logical numbering scheme. For example, PMBOK 5.3.3.2 identifies an exact paragraph in the PMBOK.

Configuration management plan

This subsidiary plan defines how changes to the features and functions of the project deliverables will be monitored and controlled within the project.

Context diagram

These diagrams show the relationship between elements of an environment. For example, a context diagram would illustrate the networks, servers, workstations, and people that interact with the elements of the environment.

Delphi Technique

This approach uses rounds of anonymous surveys to build consensus. Because the surveys are anonymous, participants are more likely to be honest with their requirements, opinions, and statements. The project manager organizes these comments and inputs and then sends them back to the participant for another round of anonymous input.

Dictatorship

A decision method where only one individual makes the decision for the group.

Focus groups

A moderator-led requirements collection method to elicit requirements from stakeholders.

Functional analysis

This is the study of the functions within a system, project, or, what's more likely in the project scope statement, the product the project will be creating. Functional analysis studies the goals of the product, how the product will be used, and the expectations the customer has of the product once it leaves the project and moves into operations. Functional analysis may also consider the cost of the product in operations, which is known as life-cycle costing.

Funding limit

Most projects have a determined budget in relation to the project scope. There may be a qualifier on this budget, such as plus or minus 10 percent based on the type of cost estimate created.

Initial project organization

The project scope statement identifies the project team and the key stakeholders. In some organizations, especially on larger projects, the team organization and structure are also documented.

Interviews

A requirements collection method used to elicit requirements from stakeholders in a one-on-one conversation.

Majority

A group decision method where more than 50 percent of the group must be in agreement.

Mind mapping

This approach maps ideas to show the relationship among requirements and the differences between requirements. The map can be reviewed to identify new solutions or to rank the identified requirements.

Nominal group technique

As with brainstorming, participants are encouraged to generate as many ideas as possible, but the suggested ideas are ranked by a voting process.

Passive observation

The observer records information about the work being completed without interrupting the process; sometimes called the invisible observer.

Plurality

A group-decision method where the largest part of the group makes the decision when it's less than 50 percent of the total.
(Consider three or four factions within the stakeholders.)

Product acceptance criteria

This project scope statement component works with the project requirements, but focuses specifically on the product and what the conditions and processes are for formal acceptance of the product.

Product breakdown

A scope definition technique that breaks down a product into a hierarchical structure, much like a WBS breaks down a project scope.

Product scope description

This is a narrative description of what the project is creating as a deliverable for the project customer.

Product scope

Defines the product or service that will come about as a result of completing the project. It defines the features and functions that characterize the product.

Project assumptions

A project assumption is a factor in the planning process that is held to be true but not proven to be true.

Project boundaries

A project boundary clearly states what is included with the project and what's excluded from the project. This helps to eliminate assumptions between the project management team and the project customer.

Project constraints

A constraint is anything that limits the project manager's options. Consider a predetermined budget, deadline, resources, or materials the project manager must use within the project—these are all examples of project constraints.

Project objectives

These are the measurable goals that determine a project's acceptability to the project customer and the overall success of the project. Objectives often include the cost, schedule, technical requirements, and quality demands.

Project requirements

These are the demands set by the customer, regulations, or the performing organization that must exist for the project deliverables to be acceptable. Requirements are often prioritized in a number of ways, from "must have" to "should have" to "would like to have."

Project scope

This defines all of the work, and only the required work, to complete the project objectives.

Project scope management plan

This project management subsidiary plan controls how the scope will be defined, how the project scope statement will be created, how the WBS will be created, how scope validation will proceed, and how the project scope will be controlled throughout the project.

Prototype

A model of the finished deliverable that allows the stakeholder to see how the final project deliverable may operate.

Requirements documentation

This documentation of what the stakeholders expected in the project defines all of the requirements that must be present for the work to be accepted by the stakeholders.

Requirements management plan

This subsidiary plan defines how changes to the project requirements will be permitted, how requirements will be tracked, and how changes to the requirements will be approved.

Requirements traceability matrix (RTM)

This is a table that maps the requirements throughout the project all the way to their completion.

Schedule milestones

The project customer may have specific dates when phases of the project should be completed. These milestones are often treated as project constraints.

Scope creep

Undocumented, unapproved changes to the project scope.

Scope validation

The formal inspection of the project deliverables, which leads to project acceptance.

Stakeholder analysis

A scope definition process where the project management team interviews the stakeholders and categorizes, prioritizes, and documents what the project customer wants and needs. The analysis is to determine, quantify, and prioritize the interests of the stakeholders. Stakeholder analysis demands quantification of stakeholder objectives; goals such as "good," "satisfaction," and "speedy" aren't quantifiable.

Systems analysis

A scope definition approach that studies and analyzes a system, its components, and the relationship of the components within the system.

Systems engineering

This project scope statement creation process studies how a system should work, designs and creates a system model, and then enacts the working system based on the project's goals and the customer's expectations. Systems engineering aims to balance the time and cost of the project in relation to the scope of the project.

Unanimity

A group decision method where everyone must be in agreement.

Value analysis

As with value engineering, this approach examines the functions of the project's product in relation to the cost of the features and functions. This is where, to some extent, the grade of the product is in relationship to the cost of the product.

Value engineering

This approach to project scope statement creation attempts to find the correct level of quality in relation to a reasonable budget for the project deliverable while still achieving an acceptable level of performance of the product.

WBS dictionary

A WBS companion document that defines all of the characteristics of each element within the WBS.

WBS template

A prepopulated WBS for repetitive projects.
Previous projects' WBSs are often used as
templates for current similar projects.

Work breakdown structure (WBS)

A deliverables-oriented breakdown of the
project scope.

Work package

The smallest item in the WBS.

Work performance information

Status of the deliverables: the work that's been started, finished, or has yet to begin.

Chapter exam

PROJECT TIME MANAGEMENT

6.1 Plan Schedule Management

Defines how the schedule will be:

- Developed
- Managed
- Executed
- Controlled

Defines schedule management approach for entire project

6.1 Plan Schedule Management

Plan Schedule Management	Inputs	Tools & Techniques	Outputs
Project management plan Project charter Enterprise environmental factors Organizational process assets	Expert judgment Analytical techniques		Schedule management plan
	Meetings		

What's in the Schedule Management Plan?

Schedule management plan includes:

- Project schedule model development
- Level of accuracy
- Units of measure (hours, days, weeks)
- Organizational procedure links
- Project schedule model maintenance
- Control thresholds
- Rules for performance measurements
- Reporting formats
- Process descriptions

6.2 Define Activities

Activities associated with work packages
Basis for estimating, scheduling, and controlling work
Activities list
Activity attributes
Milestone list

6.2 Define Activities

Define Activities	Inputs	Tools & Techniques	Outputs
	Schedule management plan Scope baseline Enterprise environmental factors Organizational process assets	Decomposition Rolling wave planning Expert judgment	Activity list Activity attributes Milestone list

Defining the Project Activities

Project work and project manager work
Planning processes
Sequence of activities
Procurement time
Internal and external events
Known and unknown events

Decomposing Project Activities

Activity list and work packages

8/80 Rule

Requires three inputs:

- Scope baseline
- Enterprise environmental factors
- Organizational process assets

Activity List

Separate document

Lists all project activities

Activity identifier

Scope of work description

Rolling Wave Planning

Imminent work versus distant work

Phase gate planning

Iterations of planning



Templates

Historical information
Pre-populated forms and plans
Organizational process assets

Planning Components

Control accounts
▪ Management control point
▪ Scope, cost, and schedule
▪ Performance measurement
Planning packages
▪ Decisions to be completed
▪ Issues

Activity attributes

Activity name and description
Activity ID
WBS identifier
Relationships
Leads and lags

Activity attributes

Resource requirements
Imposed dates
Constraints and assumptions
Additional information

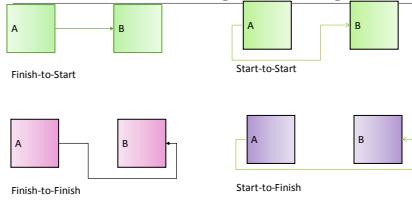
6.3 Sequence Activities

Computer-driven
Manual process
Blended approach
Predecessors and successors
Milestone list

6.3 Sequence Activities

Sequence Activities	Inputs	Tools & Techniques	Outputs
Schedule management plan	Precedence diagramming method (PDM)	Project schedule network diagram	
Activity list	Dependency determination		Project documents updates
Activity attributes	Leads and lags		
Milestone list			
Project scope statement			
Enterprise environmental factors			
Organizational process assets			

Precedence Diagramming Method

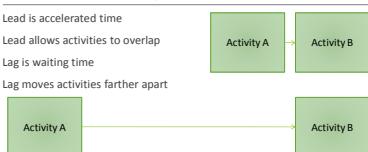


Dependency Determination

- Mandatory dependencies – hard logic
- Discretionary dependencies – soft logic
- External dependencies – external constraint
- Internal dependencies – type of hard logic

Leads and Lags

- Lead is accelerated time
- Lead allows activities to overlap
- Lag is waiting time
- Lag moves activities farther apart



Network templates

Previous projects
Pre-populated templates
Organizational process assets

Sequencing Outputs

Required work should be scheduled
Finish-to-start relationship most common
Activity sequence is not the schedule
PERT charts aren't PNDs

Updating the PND

Changes to the project scope
Updates to the scope baseline
Updates to the activities list
Updates to the PND

6.4 Estimate Activity resources

- Resources to complete activities

- People
- Equipment
- Materials
- Facilities



6.4 Estimate activity resources

Estimate Activity Resources	Inputs	Tools & Techniques	Outputs
Schedule management plan	Expert judgment	Activity resource requirements	
Activity list	Alternative analysis	Resource breakdown structure	
Activity attributes	Published estimating data	Project documents updates	
Resource calendars	Bottom-up estimating		
Risk register	Project management software		
Activity cost estimates			
Enterprise environmental factors			
Organizational process assets			

Resource Availability

- Resource calendar
- Negotiate for resources
- Move the related activity
- Delay the activity or project
- Find alternative resources

Activity Resource Needs

- Effort-driven activities
- Fixed-duration activities
- Effort can affect completion date
- Law of Diminishing Returns

Examining the project calendars

- Project calendar
- Resource calendar

Creating a resource breakdown structure

- Like the WBS
- Utilization of resources
- Expose resource constraints
- Identify resource needs

6.5 Estimate Activity durations

Level of detail leads to accuracy
Activity lists
Activity resource requirements
Activity attributes
Resource capabilities
Organizational process assets

6.5 Estimate activity durations

Estimate Activity Durations	Inputs	Tools & Techniques	Outputs
Schedule management plan	Expert judgment	Activity duration estimates	
Activity list	Analogous estimating	Project documents updates	
Activity attributes	Parametric estimating		
Activity resource requirements	Three-point estimating		
Resource calendars	Group decision-making techniques		
Project scope statement	Reserve analysis		
Risk register			
Resource breakdown structure			
Enterprise environmental factors			
Organizational process assets			

Analogous Estimating

Creates an analogy
Similar project work
Historical information
Top-down estimating



Parametric Estimating

Parameter for estimating

Repetitive work

Learning curve

Three-Point Estimates

Finds an average of

- Optimistic
- Most likely
- Pessimistic
- Also called triangular distribution

$(O+ML+P)/3=\text{estimate}$

$(25+45+75)/3=48.33 \text{ hours}$

PERT Estimates

Program Evaluation and Review Technique

Also called beta distribution

$(O+(4ML)+P)/6=\text{estimate}$

$(25+(4x45)+75)/6=46.66 \text{ hours}$

Reserve Time

Parkinson's Law
10-15 percent of project duration
Allotted to time overruns

6.6 Develop Schedule

Defines the sequence of events
Durations of the activities and project
Determines when resources are needed
Establishes logical relationships between activities

6.6 Develop Schedule

Develop Schedule	Inputs	Tools & Techniques	Outputs
Schedule management plan	Schedule network analysis	Schedule baseline	
Activity list	Critical path method	Project schedule	
Activity attributes	Critical chain method	Schedule data	
Project schedule network diagrams	Resource optimization techniques	Project calendars	
Activity resource requirements	Modeling techniques	Project management plan updates	
Resource calendar	Leads and lags	Project documents updates	
Activity duration estimates	Schedule compression		
Project scope statement	Scheduling tool		
Risk register			
Project staff assignments			
Resource breakdown structure			
Enterprise environmental factors			
Organizational process assets			

Project Constraints

Must start on
Must finish on
Start no earlier than
Start no later than
Finish no earlier than
Finish no later than



Assumptions and the Schedule

New work
Risks
Force majeure
Labor
Effort

Risks and the Schedule

Risk is an uncertain event or condition
Knowns and unknowns
Risk analysis affects completion
Risk affects costs and time

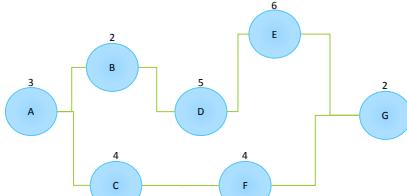
Determining the Project Timeline

PERT charts

Project calendar

Effort and Alternative	Task Name	Duration	Start Date	End Date
1	Establish the vision	1d	7 Aug '10	8 Aug '10
2	Set target date	1d	8 Aug '10	9 Aug '10
3	Define project requirements	1d	9 Aug '10	10 Aug '10
4	Book venue	1d	10 Aug '10	11 Aug '10
5	Choose event location	1d	11 Aug '10	12 Aug '10
6	Book speakers	2d	12 Aug '10	14 Aug '10
7	Devise agenda	5d	14 Aug '10	19 Aug '10
8	Site decoration	2d	19 Aug '10	21 Aug '10
9	Print materials	1d	21 Aug '10	22 Aug '10
10	Write speech	2d	22 Aug '10	24 Aug '10
11	Plan outfit	1d	24 Aug '10	25 Aug '10
12	Print invites	3d	25 Aug '10	28 Aug '10
13	Write invitations	1d	28 Aug '10	29 Aug '10
14	Print programs	2d	29 Aug '10	31 Aug '10
15	Final decor	1d	31 Aug '10	1 Sep '10
16	Final check	1d	1 Sep '10	2 Sep '10
17				

Project Network Diagram



Schedule Network Analysis

Find earliest completion date

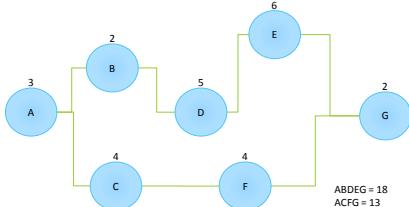
Find latest completion date

Find opportunities to shift resources

Find opportunities to delay

SWOT

Project Network Diagram

ABDEG = 18
ACFG = 13

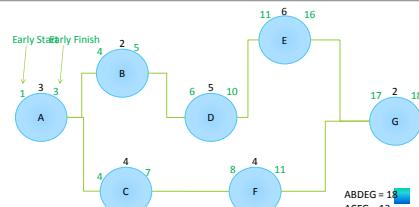
Finding Float

Free float An activity can be delayed without delaying the early start of any successor activities

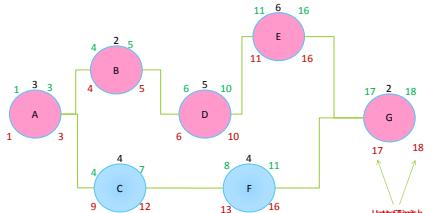
Total float An activity can be delayed without delaying project completion

Project float A project can be delayed without passing the customer-expected completion date

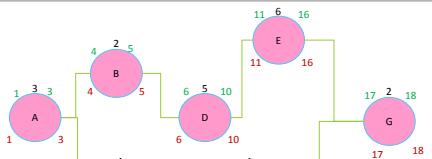
Forward Pass: ES+du-1=EF

ABDEG = 18
ACFG = 13

Backward Pass: LF-du+1=LS



Backward Pass: LF-du+1=LS



Practicing Float

Float Exercise worksheet
Create your own samples
Only a few questions on float

Finding Float

Free float An activity can be delayed without delaying the early start of any successor activities

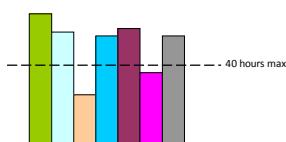
Total float An activity can be delayed without delaying project completion

Project float A project can be delayed without passing the customer-expected completion date

Using Resource Leveling Heuristics

Limits labor in time period

Often extends the project schedule



Using the Critical Chain Method

Focuses on project delivery date

Considers the availability of resources

Adds buffer on activities to account for unknowns and resources

Critical path doesn't consider if resources are available CCM does

Schedule Compression

Crashing adds people and costs
Fast tracking adds risk and overlaps
Monte Carlo Simulation

Develop Schedule Process

Milestone charts
Bar charts
Project schedule network diagrams
Visualize the project work

6.7 Control schedule

Schedule Change Control System
Measuring project performance
Examining schedule variance
Updating the project schedule
Corrective actions
Lessons learned

6.7 Control schedule

Control Schedule	Inputs	Tools & Techniques	Outputs
Project management plan	Performance reviews	Work performance information	
Project schedule	Project management software	Schedule forecasts	
Work performance data	Resource optimization techniques	Change requests	

Measuring project performance

Value tied to percentage of work completed
Planned value – what the project should be worth
Estimate to complete
Estimate at completion
Milestones
Key deliverables

Performance reviews

Trend analysis
Critical path analysis
Critical chain method
Earned value management
Schedule forecasting

Key terms

The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Activity list

The primary output of breaking down the WBS work packages.

Alternative analysis

The identification of more than one solution. Consider roles, materials, tools, and approaches to the project work.

Analogous estimating

A somewhat unreliable estimating approach that relies on historical information to predict what current activity durations should be. Analogous estimating is more reliable, however, than team member recollections. Analogous estimating is also known as top-down estimating and is a form of expert judgment.

Bottom-up estimating

The most accurate time-and-cost estimating approach a project manager can use. This estimating approach starts at “the bottom” of the project and considers every activity, its predecessor and successor activities, and the exact amount of resources needed to complete each activity.

Control account

A WBS entry that considers the time, cost, and scope measurements for that deliverable within the WBS. The estimated performance is compared against the actual performance to measure overall performance for the deliverables within that control account. The specifics of a control account are documented in a control account plan.

Control threshold

A predetermined range of acceptable variances, such as +/-10 percent off schedule. Should the variance exceed the threshold, then project control processes and corrected actions will be enacted.

Crashing

A schedule compression approach that adds more resources to activities on the critical path to complete the project earlier. When crashing a project, costs are added because the associated labor and sometimes resources (such as faster equipment) cause costs to increase.

Critical chain method

A network analysis approach where the deadlines associated with individual tasks are removed and the only date that matters is the promised due date of the project deliverable. CCM works to modify the project schedule based on the availability of project resources rather than on the pure sequence of events, as in the critical path method.

Critical path

The path in the project network diagram that cannot be delayed, otherwise the project completion date will be late. There can be more than one critical path. Activities in the critical path have no float.

Discretionary dependencies

These dependencies are the preferred order of activities. Project managers should use these relationships at their discretion and should document the logic behind the decision. Discretionary dependencies allow activities to happen in a preferred order because of best practices, conditions unique to the project work, or because of external events. Also known as preferential or soft logic.

Early finish

The earliest a project activity can finish. Used in the forward pass procedure to discover the critical path and the project float.

Early start

The earliest a project activity can begin. Used in the forward pass procedure to discover the critical path and the project float.

External dependencies

As the name implies, these are dependencies outside of the project's control. Examples include the delivery of equipment from a vendor, the deliverable of another project, or the decision of a committee, lawsuit, or expected new law.

Fast tracking

A schedule compression method that changes the relationship of activities. With fast tracking, activities that would normally be done in sequence are allowed to be done in parallel or with some overlap. Fast tracking can be accomplished by changing the relation of activities from FS to SS or even FF or by adding lead time to downstream activities. However, fast tracking does add risk to the project.

Finish-to-finish

An activity relationship type that requires the current activity be finished before its successor can finish.

Finish-to-start

An activity relationship type that requires the current activity be finished before its successor can start.

Fragnet

A representation of a project network diagram that is often used for outsourced portions of a project, repetitive work within a project, or a subproject. Also called a subnet.

Free float

This is the total time a single activity can be delayed without affecting the early start of its immediately following successor activities.

Hard logic

Logic that describes activities that must happen in a particular order. For example, the dirt must be excavated before the foundation can be built. The foundation must be in place before the framing can begin. Also known as a mandatory dependency.

Internal dependencies

Internal relationships to the project or the organization. For example, the project team must create the software as part of the project's deliverable before the software can be tested for quality control.

Lag time

Positive time that moves two or more activities farther apart.

Late finish

The latest a project activity can finish. Used in the backward pass procedure to discover the critical path and the project float.

Late start

The latest a project activity can begin. Used in the backward pass procedure to discover the critical path and the project float.

Lead time

Negative time that allows two or more activities to overlap where ordinarily these activities would be sequential.

Management reserve

A percentage of the project duration to combat Parkinson's Law. When project activities become late, their lateness is subtracted from the management reserve.

Mandatory dependencies

These dependencies are the natural order of activities. For example, you can't begin building your house until your foundation is in place. These relationships are called hard logic.

Monte Carlo analysis

A project simulation approach named after the world-famous gambling district in Monaco. This predicts how scenarios may work out, given any number of variables. The process doesn't actually churn out a specific answer, but a range of possible answers. When Monte Carlo analysis is applied to a schedule, it can examine, for example, the optimistic completion date, the pessimistic completion date, and the most likely completion date for each activity in the project and then predict a mean for the project schedule.

Parametric estimate

A quantitatively based duration estimate that uses mathematical formulas to predict how long an activity will take based on the quantities of work to be completed.

Parkinson's Law

A theory that states: "Work expands so as to fill the time available for its completion." It is considered with time estimating, because bloated or padded activity estimates will fill the amount of time allotted to the activity.

Planning package

A WBS entry located below a control account and above the work packages. A planning package signifies that there is more planning that needs to be completed for this specific deliverable.

Precedence diagramming method

A network diagram that shows activities in nodes and the relationship between each activity. Predecessors come before the current activity, and successors come after the current activity.

Project calendars

Calendars that identify when the project work will occur.

Project float

This is the total time the project can be delayed without passing the customer-expected completion date.

Project network diagram

A diagram that visualizes the flow of the project activities and their relationships to other project activities.

Refinement

An update to the work breakdown structure.

Resource breakdown structure (RBS)

This is a hierarchical breakdown of the project resources by category and resource type. For example, you could have a category of equipment, a category of human resources, and a category of materials. Within each category, you could identify the types of equipment your project will use, the types of human resources, and the types of materials.

Resource calendars

Calendars that identify when project resources are available for the project work.

Resource-leveling heuristic

A method to flatten the schedule when resources are overallocated. Resource leveling can be applied using different methods to accomplish different goals. One of the most common methods is to ensure that workers are not overextended on activities.

Rolling wave planning

The imminent work is planned in detail, while the work in the future is planned at a high level. This is a form of progressive elaboration.

Schedule management plan

A subsidiary plan in the project management plan. It defines how the project schedule will be created, estimated, controlled, and managed.

Soft logic

The order of the activities doesn't necessarily have to happen in a specific order. For example, you could install the light fixtures first, then the carpet, and then paint the room. The project manager could use soft logic to change the order of the activities if so desired.

Start-to-finish

An activity relationship that requires an activity to start so that its successor can finish. This is the most unusual of all the activity relationship types.

Start-to-start

An activity relationship type that requires the current activity to start before its successor can start.

Subnet

A representation of a project network diagram that is often used for outsourced portions of projects, repetitive work within a project, or a subproject. Also called a fragnet.

Template

A previous project that can be adapted for the current project and forms that are pre-populated with organizational-specific information.

Three-point estimate

An estimating technique for each activity that requires optimistic, most likely, and pessimistic estimates to be created. Based on these three estimates, an average can be created to predict how long the activity should take.

Total float

This is the total time an activity can be delayed without delaying project completion.

Work package

The smallest item in the work breakdown structure.

Chapter exam

7. PROJECT COST MANAGEMENT

7.1 Plan cost Management

- Subsidiary plan of the project management plan
- Addresses three cost management processes:
 - How costs are estimates
 - How the project budget is managed
 - How costs will be controlled

7.1 Plan cost management

Plan Cost Management	Inputs	Tools & Techniques	Outputs
	Project management plan Project charter Enterprise environmental factors Organizational process assets	Expert judgment Analytical techniques Meetings	Cost management plan

Cost Management Plan

- Cost estimating approach
- Budgeting approach
- Cost control measures
- Level of precision
- Units of measure
- Organizational procedure links
- Control thresholds
- Rules of performance measurement
- Reporting formats
- Process descriptions

7.2 Estimate costs

Estimate Costs	Inputs	Tools & Techniques	Outputs
Cost management plan	Expert judgment	Activity cost estimates	
Risk management plan	Analogous estimating	Basis of estimates	
Scope baseline	Parametric estimating	Project documents updates	
Project schedule	Bottom-up estimating		
Risk register	Three-point estimating		
Enterprise environmental factors	Reserve analysis		
Organizational process assets	Cost of quality		
	Project management software		
	Vendor bid analysis		
	Group decision-making techniques		

Estimating the Project Costs

- Predictions based on current information
- Cost tradeoffs and risks considered
 - Cost versus buy
 - Cost versus lease
 - Sharing resources
- Level of accuracy
 - Rough order of magnitude estimate
 - Budget estimate
 - Definitive estimate
- All categories of costs estimated



Creating a Cost Estimate

- Rough order of magnitude
 - +25% to +75%
- Budget estimate
 - +10% to +25%
- Definitive estimate
 - +5% to +10%

Four Cost Categories

- Direct costs
- Indirect costs
- Variable costs
- Fixed costs



Project Schedule and Cost Estimating

- Resource availability
- Timing of procurement of resources
- Cost of project financing
- Time-sensitive costs
- Seasonal cost variations

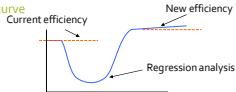
Analogous Estimating

- Top down approach
- Quick, but unreliable
- Historical information



Parametric Estimating

- Based on a cost parameter
- \$329 per software license
- \$4500 per metric ton
- Consider the learning curve



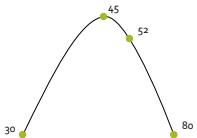
Bottom-Up Estimating

- Based on WBS creation
- Also called a definitive estimate
- Cost of each work package
- Cost of work packages are rolled-up

Three-Point Cost Estimates

- Average of cost
- $(\text{Optimistic} + \text{Most Likely} + \text{Pessimistic})/3$
- PERT
• $(O+(4M)+P)/6$

(Three-point) - Triangular
(PERT) - Beta



Vendor Bid Analysis

- Should cost estimates (Third party estimates)
- Statement of Work (SOW)
- Bidders conference
- Vendor selection
 - Screening system
 - Scoring model
 - Price selection
- Chapter 12, procurement

Cost Estimate Results

- Activity cost estimates
- Basis of estimates
 - Supporting detail
 - Assumptions and constraints
 - Range of variance
 - Confidence level of estimate

7.3 Determine Budget

- Aggregating the estimated costs
- Cost of work packages and activities
- Authorized cost baseline
- Excludes management reserves
- Performance measured against budget

7.3 Determine Budget

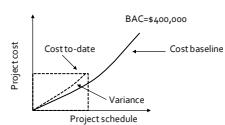
Determine Budget	Inputs	Tools & Techniques	Outputs
Cost management plan	Cost estimation	Cost baseline	Project funding requirements
Scope baseline	Reserve analysis	Expert judgment	Project documents updates
Activity cost estimates		Historical relationships	
Basis of estimates		Funding limit reconciliation	
Project schedule			
Resource calendars			
Risk register			
Agreements			
Organizational process assets			

Reserve Analysis

- Contingency reserve
- Management reserve
- Unknown unknowns
- Not part of the cost baseline, but part of the project budget

Creating the Project Budget

- Actual cost of the project



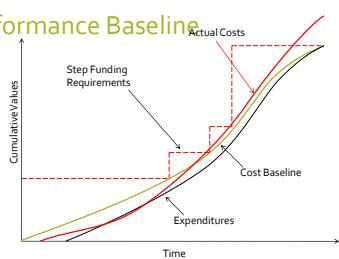
Relying on Historical Relationships

- Both parametric and analogous are historical-based estimates
- The historical information affects the estimates
 - Accuracy of historical information
 - Quantifiable parameters
 - Models are scalable for any size project

Funding Limit Reconciliation

- Reconcile planned and actual costs
- Cost variances
- Corrective actions

Cost Performance Baseline



Project Funding Requirements

- Total funding requirements
- Periodic funding requirements
- Anticipated liabilities
- Management reserves

7.4 Control costs

- Monitoring status of the project
- Managing changes to the cost baseline
- Variance management and corrective actions
- Balancing project risk and reward

7.4 Control costs

Control Costs	Inputs	Tools & Techniques	Outputs
	Project management plan Project funding requirements Work performance data	Earned value management Forecasting To-complete performance index (TCPi)	Work performance information Cost forecasts Change requests Project management plan updates Project documents updates Organizational process assets updates
Organizational process assets	Performance reviews Project management software Reserve analysis		

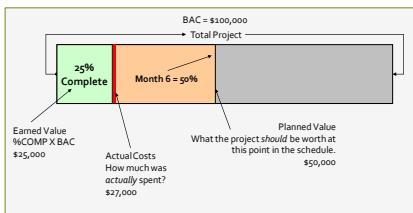
Cost Control

- Influence change factors
- Change requests
- Managing changes (approved/unapproved)
- Tracking costs
- Isolate variances for study
- Earned value management
- Communicating cost status
- Cost overruns and allowed variances

Measuring Project Performance

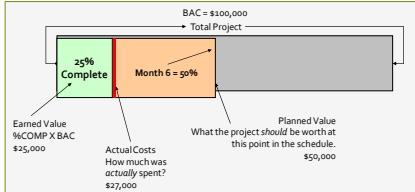
- Earned Value Management
- Forecast
- Measure performance
- Suite of formulas
- A few PMP questions

EVM Foundation



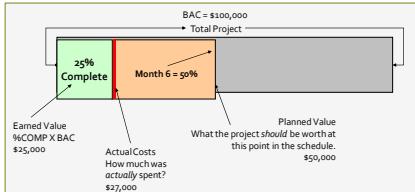
Finding the Variances

- Cost variance = EV - AC
- Schedule variance = EV - PV



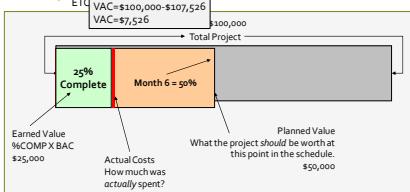
Measuring Performance

- CPI = EV/AC CPI = \$25,000 / \$27,000
CPI = .93
- SPI = EV/PV SPI = \$25,000 / \$50,000
SPI = .50



Predicting the Future

- Estimate at Completion EAC = \$100,000 / .93
- Estimate to Completion ETC = \$107,526 / .93

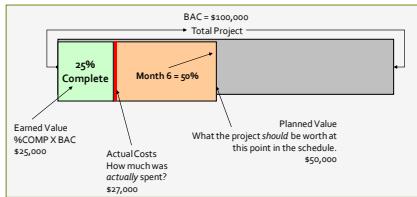


To-Complete Performance Index

- Can you meet the BAC?
- Can you meet the EAC?
- $TCPI = (BAC-EV)/(BAC-AC)$
- $TCPI = (BAC-EV)/(EAC-AC)$

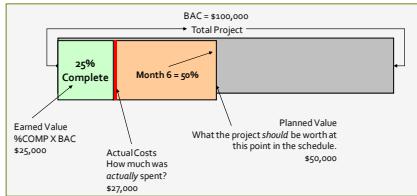
$$TCPI = (BAC-EV)/(BAC-AC)$$

- $TCPI = (\$100,000 - \$25,000)/(\$100,000 - \$27,000)$
- $TCPI = 75,000/73,000$
- $TCPI = 1.0273$



$$TCPI = (BAC-EV)/(EAC-AC)$$

- $TCPI = (\$100,000 - \$25,000)/(\$107,526 - \$27,000)$
- $TCPI = 75,000/80,526$
- $TCPI = .93$



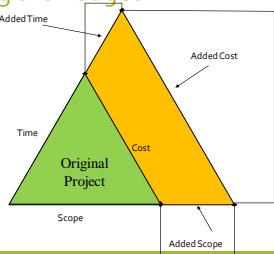
Five EVM Rules

- EV is first
- Variance means subtract
- Index means division
- Less than one is bad in an index
- Negative is bad in a variance

Controlling Project Costs

- Additional Planning
- Change control
- Tracking cost slippage
- Immediately go to the problem

Updating the Budget



Key terms

- The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Actual cost (AC)

- The actual amount of monies the project has spent to date.

Analogous estimating

- An approach that relies on historical information to predict the cost of the current project. It is also known as top-down estimating and is the least reliable of all the cost-estimating approaches.

Bottom-up estimating

- An estimating approach that starts from zero, accounts for each component of the WBS, and arrives at a sum for the project. It is completed with the project team and can be one of the most time-consuming and most reliable methods to predict project costs.

Budget estimate

- This estimate is also somewhat broad and is used early in the planning processes and also in top-down estimates. The range of variance for the estimate can be from -10 percent to +25 percent.

Commercial database

- A cost-estimating approach that uses a database, typically software-driven, to create the cost estimate for a project.

Contingency reserve

- A contingency allowance to account for overruns in costs. Contingency allowances are used at the project manager's discretion and with management's approval to counteract cost overruns for scheduled activities and risk events.

Cost aggregation

- Costs are parallel to each WBS work package. The costs of each work package are aggregated to their corresponding control accounts. Each control account then is aggregated to the sum of the project costs.

Cost baseline

- A time-lapse exposure of when the project monies are to be spent in relation to cumulative values of the work completed in the project.

Cost budgeting

- The cost aggregation achieved by assigning specific dollar amounts for each of the scheduled activities or, more likely, for each of the work packages in the WBS. Cost budgeting applies the cost estimates over time.

Cost change control system

- A system that examines any changes associated with scope changes, the cost of materials, and the cost of any other resources, and the associated impact on the overall project cost.

Cost management plan

- The cost management plan dictates how cost variances will be managed.

Cost of poor quality

- The monies spent to recover from not adhering to the expected level of quality. Examples may include rework, defect repair, loss of life or limb because safety precautions were not taken, loss of sales, and loss of customers. This is also known as the cost of nonconformance to quality.

Cost of quality

- The monies spent to attain the expected level of quality within a project. Examples include training, testing, and safety precautions.

Cost performance index (CPI)

- Measures the project based on its financial performance. The formula is $CPI = EV/AC$.

Cost variance (CV)

- The difference of the earned value amount and the cumulative actual costs of the project. The formula is $CV = EV - AC$.

Definitive estimate

- This estimate type is one of the most accurate. It's used late in the planning processes and is associated with bottom-up estimating. You need the WBS in order to create the definitive estimate. The range of variance for the estimate can be from -5 percent to +10 percent.

Direct costs

- Costs are attributed directly to the project work and cannot be shared among projects (for example, airfare, hotels, long-distance phone charges, and so on).

Earned value (EV)

- Earned value is the physical work completed to date and the authorized budget for that work. It is the percentage of the BAC that represents the actual work completed in the project.

Estimate at completion (EAC)

- These forecasting formulas predict the likely completed costs of the project based on current scenarios within the project.

Estimate to complete (ETC)

- An earned value management formula that predicts how much funding the project will require to be completed. Three variations of this formula are based on conditions the project may be experiencing.

Fixed costs

- Costs that remain constant throughout the life of the project (the cost of a piece of rented equipment for the project, the cost of a consultant brought on to the project, and so on).

Funding limit reconciliation

- An organization's approach to managing cash flow against the project deliverables based on a schedule, milestone accomplishment, or data constraints.

Indirect costs

- Costs that are representative of more than one project (for example, utilities for the performing organization, access to a training room, project management software license, and so on).

Known unknown

- An event that will likely happen within the project, but when it will happen and to what degree is unknown. These events, such as delays, are usually risk-related.

Learning curve

- An approach that assumes the cost per unit decreases the more units workers complete, because workers learn as they complete the required work.

Oligopoly

- A market condition where the market is so tight that the actions of one vendor affect the actions of all the others.

Opportunity cost

- The total cost of the opportunity that is refused to realize an opposing opportunity.

Parametric estimating

- An approach using a parametric model to extrapolate what costs will be needed for a project (for example, cost per hour and cost per unit). It can include variables and points based on conditions.

Planned value (PV)

- Planned value is the work scheduled and the budget authorized to accomplish that work. It is the percentage of the BAC that reflects where the project should be at this point in time.

Project variance

- The final variance, which is discovered only at the project's completion. The formula is $\text{VAR} = \text{BAC} - \text{AC}$.

Regression analysis

- This is a statistical approach to predicting what future values may be, based on historical values. Regression analysis creates quantitative predictions based on variables within one value to predict variables in another. This form of estimating relies solely on pure statistical math to reveal relationships between variables and to predict future values.

Reserve analysis

- Cost reserves are for unknown unknowns within a project. The management reserve is not part of the project cost baseline, but is included as part of the project budget.

Rough order of magnitude

- This rough estimate is used during the initiating processes and in top-down estimates. The range of variance for the estimate can be from -25 percent to +75 percent.

Schedule performance index (SPI)

- Measures the project based on its schedule performance. The formula is $SPI = EV/PV$.

Schedule variance (SV)

- The difference between the earned value and the planned value. The formula is $SV = EV - PV$.

Single source

- Many vendors can provide what your project needs to purchase, but you prefer to work with a specific vendor.

Sole source

- Only one vendor can provide what your project needs to purchase. Examples include a specific consultant, specialized service, or unique type of material.

Sunk costs

- Monies that have already been invested in a project.

To-Complete Performance Index

- A formula to forecast the likelihood of a project to achieve its goals based on what's happening in the project right now. There are two different flavors for the TCPI, depending on what you want to accomplish. If you want to see if your project can meet the budget at completion, you'll use this formula: $TCPI = (BAC - EV)/(BAC - AC)$. If you want to see if your project can meet the newly created estimate at completion, you'll use this version of the formula: $TCPI = (BAC - EV)/(EAC - AC)$.

Variable costs

- Costs that change based on the conditions applied in the project (the number of meeting participants, the supply of and demand for materials, and so on).

Variance

- The difference between what was expected and what was experienced.

Variance at completion (VAC)

- A forecasting formula that predicts how much of a variance the project will likely have based on current conditions within the project. The formula is $VAC = BAC - EAC$.

Chapter exam

8. PROJECT QUALITY MANAGEMENT

8.1 Plan Quality Management

- Defines quality policy for the project
- Defines quality assurance requirements
- Defines how quality control activities will occur

8.1 Plan Quality Management

Plan Quality Management	Inputs	Tools & Techniques	Outputs
Project management plan	Cost-benefit analysis	Quality management plan	
Stakeholder register	Cost of quality	Process improvement plan	
Risk register	Control chart quality tools	Quality metrics	
Requirements documentation	Benchmarking	Quality checklists	
Enterprise environmental factors	Design of experiments	Project documents updates	
Organizational process assets	Statistical sampling		
	Additional quality planning tools		
	Averages		

Quality Management Approach

- Top-down quality
- Beware of:
 - Overworking the project team
 - Speeding through quality inspections

Quality v. Grade

- Quality is about fulfilling requirements
 - Project scope
 - Product scope
 - Implied needs
- Grade is a category or rank
 - Class of services
 - Types of materials

Quality and Grade

Low quality is always a problem, low grade may not be.



Accuracy and Precision and Quality

- Precision is a measure of exactness.
- Accuracy is an assessment of correctness.
- Precise measurements aren't necessarily accurate measurements.
- Accurate measurements aren't necessarily precise measurements.



Quality Project Management

- Customer satisfaction
 - Conformance to requirements
 - Fitness for use
- Prevention
 - "Quality is planned into a project, not inspected in."
- Management responsibility
- Deming's "Plan-Do-Check-Act"



Quality Project Management

- Kaizen technologies
 - Continuous small improvements to reduce costs and ensure consistency
- Marginal analysis
 - Study of the cost of improvements to a product or service and how the costs contribute to an increase in revenue
 - Marginal costs to create one more unit

Determining the Quality Policy

- Formal quality approaches
 - ISO programs
 - Six Sigma
 - Total Quality Management
- If a quality policy doesn't exist, the project manager must create one for the project.

Standards and Regulations

- Standards are optional
- Regulations are requirements

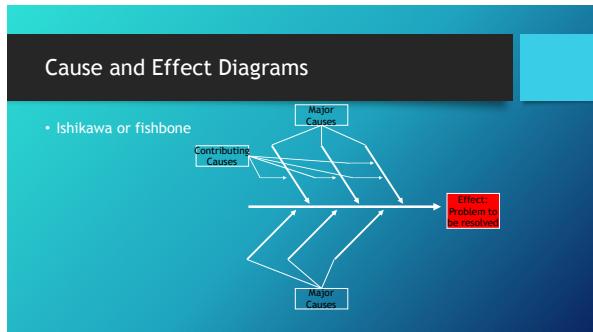


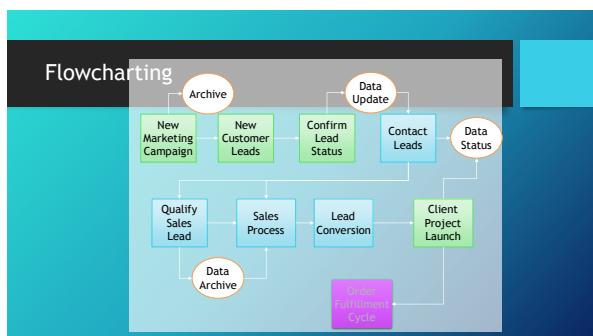
Cost of Quality

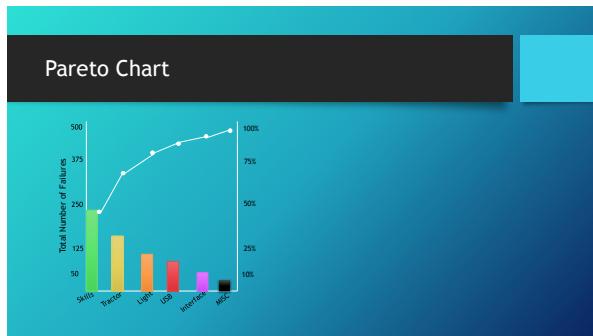
- Cost of conformance to requirements
 - Safety measures
 - Team development and training
 - Proper materials and processes
- Cost of non-conformance to requirements
 - Liabilities, loss of life or limb
 - Rework/scrap
 - Lost business

Seven Basic Quality Tools

- Cause and effect diagrams
- Flowcharts
- Checksheets
- Pareto Diagrams
- Histograms
- Control charts
- Scatter diagrams





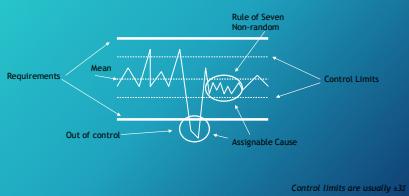


Histograms

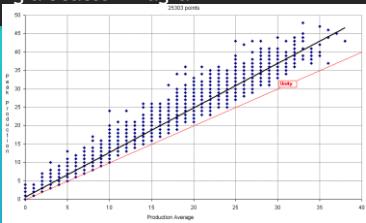
- Vertical bar chart show frequency



Control Charts



Creating a Scatter Diagram



Benchmarking the Project

- Comparing two systems
- Technology
- Materials
- Projects

Design of Experiments

- Examines variables to determine the best outcome
- One million postcards
- *The best results win*



Quality Planning Tools

- Brainstorming - generate ideas
- Affinity diagrams - logical grouping of ideas
- Force field analysis - forces for and against
- Nominal group technique - small groups of brainstorming then ideas reviewed by a larger group

Quality Management Plan

- Quality assurance
- Quality control
- Continuous process improvement
- Operational definitions
 - Terminology
 - Metrics
 - Lexicon/glossary



Process Improvement Plan

- Process boundaries
- Process configuration
- Process metrics
- Targets for improvement



8.2 Perform Quality Assurance

- Auditing the quality requirements
- Auditing results of quality control
- Facilitates improvement of quality processes
- QA is prevention driven
- Being certain about quality in the product

8.2 Perform Quality Assurance

Perform Quality Assurance	Inputs	Tools & Techniques	Outputs
Quality management plan	Quality management and control tools	Change requests	
Process Improvement plan	Quality audits	Project management plan updates	
Quality metrics	Process analysis	Project documents updates	
Quality control measurements		Organizational process assets updates	
Project documents			

Quality Management and Control Tools

- Affinity diagrams
- Process decision program charts
- Interrelationship digraphs
- Tree diagrams
- Prioritization matrices
- Activity network diagrams
- Matrix diagrams

Completing a quality audit

- Determine if project complies with organizational policies
 - Best practices implemented?
 - What nonconforming policies? What shortcomings?
 - Share good practices with others?
 - Offer assistance to improve processes?
 - Highlight contributions?
 - Lessons learned?

8.3 Control Quality

- Inspection-driven activity
- Keep mistakes out of the customers' hands
- Causal identification of poor quality
- Validate quality for customer acceptance

8.3 Control Quality

Control Quality	Inputs	Tools & Techniques	Outputs
Project management plan	Seven basic quality tools	Quality control measurements	
Quality metrics	Statistical sampling	Validated changes	
Quality checklists	Inspection	Validated deliverables	
Work performance data review	Approved change requests	Work performance information	
Approved change requests		Change requests	
Deliverables		Project management plan	
Project documents		Project documents updates	
Organizational process assets		Organizational process assets updates	

How to do quality control

- Inspect the project deliverables
- Measure the work
- Utilize the seven basic quality tools
- Try statistical sampling

Key terms

- The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Activity network diagram

- These diagrams, such as the project network diagram, show the flow of the project work.

Affinity diagram

- This diagram breaks down ideas, solutions, causes, and project components and groups them together with other similar ideas and components.

Benchmarking

- Comparing any two similar entities to measure their performance.

Cause-and-effect diagrams

- Diagrams that show the relationship between variables within a process and how those relationships may contribute to inadequate quality. The diagrams can help organize both the process and team opinions, as well as generate discussion on finding a solution to ensure quality.

Checklist

- A simple approach to ensure that work is completed according to the quality policy.

Control chart

- A quality control chart that maps the performance of project work over time.

Cost of conformance

- This is the cost associated with the monies spent to attain the expected level of quality. It is also known as the cost of quality.

Cost of nonconformance to quality

- The cost associated with not satisfying quality expectations. This is also known as the cost of poor quality.

Cost-benefit analysis

- A process to study the trade-offs between costs and the benefits realized from those costs.

Design of experiments

- An approach that relies on statistical scenarios to determine what variables within a project will result in the best outcome.

External QA

- Assurance provided to the external customers of the project.

Flowchart

- A diagram illustrating how components within a system are related. Flowcharts show the relation between components, as well as help the project team determine where quality issues may be present and, once done, plan accordingly.

Internal QA

- Assurance provided to management and the project team.

Interrelationship diagrams

Used for complex solutions where the causes and effects of problems and benefits are intertwined with one another.

ISO

- The abbreviation for the International Organization for Standardization. ISO is Greek for “equal,” while “International Organization for Standardization” in a different language would be abbreviated differently. The organization elected to use “ISO” for all languages.

Matrix diagram

- A data analysis table that shows the strength between variables and relationships in the matrix.

Pareto diagram

- A histogram that illustrates and ranks categories of failure within a project.

Prioritization matrices

A table to rank and score project decisions and alternatives to determine the best solution for the project.

Process decision program chart (PDPC)

- Helps the project team define all of the steps to get from the current state to a desired goal. It facilitates a conversation about what must be completed to reach the goal.

Process improvement plan

- A project management subsidiary plan that aims to improve the project, not just the end result of the project. It strives to identify and eliminate waste and non-value-added activities.

Quality

- According to ASQ, the degree to which a set of inherent characteristics fulfills requirements.

Quality assurance

- A management process that defines the quality system or quality policy that a project must adhere to. QA aims to plan quality into the project rather than to inspect quality into a deliverable.

Quality control

- An inspection-driven process that measures work results to confirm that the project is meeting the relevant quality standards.

Quality management plan

- This plan defines how the project team will implement and fulfill the quality policy of the performing organization.

Quality metrics

- The operational definitions that specify the measurements within a project and the expected targets for quality and performance.

Quality planning

- The process of first determining which quality standards are relevant to your project and then finding out the best methods of adhering to those quality standards.

Rule of Seven

- A component of a control chart that illustrates the results of seven measurements on one side of the mean, which is considered "out of control" in the project.

Run chart

- A quality control tool that shows the results of inspection in the order in which they've occurred. The goal of a run chart is first to demonstrate the results of a process over time and then to use trend analysis to predict when certain trends may reemerge.

Scatter diagram

- A quality control tool that tracks the relationship between two variables over time. The two variables are considered related the closer they track against a diagonal line.

Seven basic quality tools

- These seven tools are used in quality planning and in quality control: cause-and-effect diagrams, flowcharts, checklists, Pareto diagrams, histograms, control charts, and scatter diagrams.

Statistical sampling

- A process of choosing a percentage of results at random. For example, a project creating a medical device may have 20 percent of all units randomly selected to check for quality.

System or process flowcharts

- Flowcharts that illustrate the flow of a process through a system, such as a project change request through the change control system, or work authorization through a quality control process.

Tree diagram

- Tree diagrams show the hierarchies and decomposition of a solution, an organization, or a project team. The WBS and an org chart are examples of tree diagrams.

Trend analysis

- The science of using past results to predict future performance.

Work performance information

- The results of the project work as needed. This includes technical performance measures, project status, information on what the project has created to date, corrective actions, and performance reports.

Chapter exam

9. PROJECT HUMAN RESOURCE MANAGEMENT

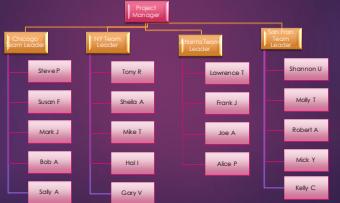
9.1 Plan Human resource Management

- ▶ Identifying project team needs
- ▶ Reporting relationships
- ▶ Assigning roles and responsibilities
- ▶ Staffing management plan
 - ▶ Staff acquisition
 - ▶ Release of staff
 - ▶ Consideration of organizational policies and structure

9.1 Plan Human resource Management

Plan Human Resource Management	Inputs	Tools & Techniques	Outputs
Project management plan	Organization charts and position descriptions	Human resource management plan	
Activity resource requirements	Networking		
Enterprise environmental factors	Organizational theory		
Organizational process assets	Expert judgment		
	Meetings		

Organization Charts



Matrix Chart

Activity	Team Member					
	Sam	Shelly	Ben	Frank	Lloyd	Mark
Web content	R	A		C	I	
Web design	A	R				
App development	I		A		R	
Security	I		R	I	I	A
Proofing				A		
Testing			R			
Payment system	•RACI Chart			I	I	R
	•Responsibility Assignment Matrix					
	•Roles and Responsibilities					

Maslow's Hierarchy of Needs

Self-actualization

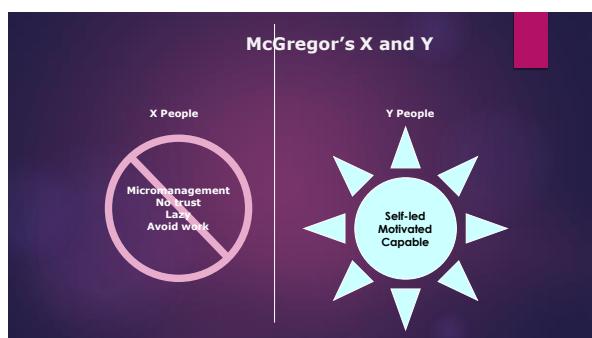
Esteem

Social

Safety

Physiological







Other Theories

- ▶ Ouchi's Theory Z
 - ▶ Japanese Management Style
 - ▶ Lifelong employment
- ▶ Expectancy Theory
 - ▶ People behave based on what they believe their behavior will bring them
- ▶ Halo effect
 - ▶ False belief based on a person's experiences

Organizational Planning



Roles and Responsibilities

- ▶ Role – the label describing the portion of the project the person is accountable.
- ▶ Authority – apply resources, make decisions, sign approvals.
- ▶ Responsibility – the work that a project team member is expected to perform.
- ▶ Competency – the skill and capacity required to complete project activities

Examining the Staff Management Plan

- ▶ Part of the human resource management plan
- ▶ Staff acquisition
- ▶ Resource calendars
- ▶ Resource histogram
- ▶ Staff release plan
- ▶ Training needs
- ▶ Recognition and rewards
- ▶ Compliance and safety

9.2 Acquire Project team

Acquire Project Team	Inputs	Tools & Techniques	Outputs
Human resource management plan	Pre-assignment	Project staff assignments	
Enterprise environmental factors	Negotiation	Resource calendars	
Organizational process assets	Acquisition Virtual teams Multi-criteria decision analysis	Project management plan updates	

Acquiring the Project Team

- ▶ Negotiate and influence
- ▶ Wrong resources affect project's success
- ▶ Alternate resources
 - ▶ Costs
 - ▶ Competency
 - ▶ Training
 - ▶ Legal, regulatory, or mandatory criteria

Acquiring the Project Team

- ▶ Pre-assignment
- ▶ Negotiation
- ▶ Acquisition



Working With Virtual Teams

- ▶ Geographically dispersed individuals
- ▶ Experts in different geographical areas
- ▶ Inclusion of workers from home offices
- ▶ Project members with varying schedules
- ▶ People with mobility handicaps
- ▶ The deletion or reduction of travel expenses

Multi-Criteria Decision Analysis for Team

- ▶ Availability
- ▶ Costs
- ▶ Experience
- ▶ Ability
- ▶ Knowledge
- ▶ Skills
- ▶ Attitude
- ▶ International factors

Results of team acquisition

- ▶ Project staff assignments
- ▶ Resource calendars
- ▶ Project management plan updates

9.3 Develop Project team

- ▶ Process to improve competencies
- ▶ Promote team member interaction
- ▶ Enhance overall project performance
- ▶ Overall goals of this process:
 - ▶ Improve teamwork
 - ▶ Motivate employees
 - ▶ Reduce turnover rate
 - ▶ Improve overall project performance

9.3 Develop Project team

Develop Project Team	Inputs	Tools & Techniques	Outputs
Human resource management plan	Interpersonal skills	Team performance assessments	
Project staff assignments	Training	Enterprise environmental factors updates	
Resource calendars	Team-building activities Ground rules Colocation Recognition and rewards		
	Personnel assessment tools		

Leading Team Development

- ▶ Interpersonal skills – soft skills
 - ▶ Communication
 - ▶ Emotional intelligence
 - ▶ Conflict resolution
 - ▶ Influence
- ▶ Training the project team
- ▶ Team building activities
- ▶ Forming, storming, norming, performing, and adjourning

Team Development, continued

- ▶ Ground rules
- ▶ Colocation – tight matrix
- ▶ Recognition and rewards
 - ▶ Money
 - ▶ Throughout the project
 - ▶ Avoid zero sum rewards
- ▶ Personal assessment tools
 - ▶ Attitudinal surveys
 - ▶ Structured interviews

Team Performance Assessments

- ▶ Improvements in skills
- ▶ Team competency
- ▶ Reduced staff turn over rate
- ▶ Team cohesiveness

9.4 Manage Project team

- ▶ Tracking team member performance
- ▶ Offering feedback to team members
- ▶ Managing team changes
- ▶ Influencing team behavior
- ▶ Resolving conflict

9.4 Manage project team

Manage Project Team	Inputs	Tools & Techniques	Outputs
Human resource management plan	Observation and conversation	Change requests	
Project staff assignments	Project performance appraisals	Conflict management	Project documents
Team performance assessments	Conflict management	updates	
Issue log	Interpersonal skills	Environmental factors updates	
Work performance reports		Organizational process assets updates	
Organizational process assets			

Utilizing Organizational process assets

- ▶ Organizational process assets can help manage the project team:
 - ▶ Certificates of appreciation
 - ▶ Newsletters
 - ▶ Project websites
 - ▶ Bonus structures
 - ▶ Corporate apparel

Conflict Management

- ▶ Conflict is natural
- ▶ Team issue
- ▶ Openness resolves conflict
- ▶ Focus on issues, not personalities
- ▶ Focus on present, not past



Managing Conflict

- ▶ Relative importance of the conflict
- ▶ Time pressure for conflict resolution
- ▶ Positions of each person involved
- ▶ Motivation to resolve conflict for short-term or long-term

Solving Problems

- ▶ Withdrawal (avoiding)
- ▶ Smoothing (accommodating)
- ▶ Compromising
- ▶ Forcing
- ▶ Collaborating
- ▶ Problem solving (confronting)

Relying on Interpersonal Skills

- ▶ Leadership – aligning, motivating, inspiring
- ▶ Influencing – organizational structure and authority
 - ▶ Persuasive
 - ▶ Active and effective listening
 - ▶ Aware of project team interactions and issues
 - ▶ Maintaining trust while also managing the project team

Making Effective Decisions

- ▶ Focus on project goals
- ▶ Follow a decision-making process
- ▶ Study environmental factors
- ▶ Analyze information
- ▶ Develop personal qualities of project team members
- ▶ Stimulate team creativity
- ▶ Manage risk
- ▶ Be approachable

Management Styles

- ▶ Autocratic: The project manager makes all decisions
- ▶ Democratic: The project team is involved with the decisions
- ▶ Laissez Faire: the project manager allows the team to lead and make decisions
- ▶ Exceptional: the project manager manages by exception (reactive)

Five Project Management Powers

- ▶ Expert - experienced
- ▶ Reward - incentive
- ▶ Formal - positional
- ▶ Coercive - threatened
- ▶ Referent – references

Key terms

- ▶ The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Adjourning

- ▶ Once the project is done, the team either moves onto other assignments as a unit, or the project team is disbanded and individual team members go on to other work.

Authority power

- ▶ Project management team members may have authority over other project team members, may have the ability to make decisions, and perhaps even sign approvals for project work and purchases.

Coercive power

- ▶ The project manager has the authority to discipline the project team members. This is also known as penalty power.

Collaborate/Problem solving

- ▶ This approach confronts the problem head-on and is the preferred method of conflict resolution. Multiple viewpoints and perspectives contribute to the solution.

Collective bargaining agreement constraints

- ▶ Contracts and agreements with unions or other employee groups may serve as constraints on the project.

Competency

- ▶ This attribute defines what talents, skills, and capabilities are needed to complete the project work.

Compromising

- ▶ This approach requires that both parties give up something.

Vroom's Expectancy Theory

- ▶ This theory states that people will behave based on what they expect as a result of their behavior. In other words, people will work in relation to the expected reward.

Expert power

- ▶ The project manager's authority comes both from experience with the technology the project focuses on and from expertise in managing projects.

Forcing power

- ▶ The person with the power makes the decision.

Formal power

- ▶ The project manager has been assigned the role of project manager by senior management and is in charge of the project.

Forming

- ▶ The project team meets and learns about their roles and responsibilities on the project. Little interaction among the project team happens in this stage as the team is learning about the project and project manager.

Herzberg's Theory of Motivation

- ▶ Frederick Herzberg's theory of the motivating agents and hygiene agents that affect a person's willingness to excel in his career.

Hierarchical organizational chart

- ▶ A chart showing the relationship between superior and subordinate employees, groups, disciplines, and even departments.

Human resource plan

- ▶ This plan defines staff acquisition, the timetable for staff acquisition, the staff release plan, training needs for the project team, any organizational compliance issues, rewards and recognitions, and safety concerns for the project team doing the project work.

Interpersonal interfaces

- ▶ This organizational interface considers the formal and informal reporting relationships that may exist among the project team members. The interpersonal interface also considers the job descriptions of the project team members, existing reporting structures between supervisors and subordinates, and existing relationships, if any, that may affect the project work. This interface also considers any cultural or language differences among the project team that may need to be addressed.

Issue log

- ▶ A logbook of the issues the project team has identified and dates as to when the issues must be resolved by. The issue log may also include team members or stakeholders who are responsible for finding a solution to the identified issues.

Logistical interfaces

- ▶ The logistics of the team locale, time zones, geographical boundaries, and travel requirements within a project.

Maslow's Hierarchy of Needs

- ▶ Abraham Maslow's theory of the five needs all humans have and work toward.

McClelland's Theory of Needs

- ▶ David McClelland developed this theory, which states our needs are acquired and developed by our experiences over time. All people are, according to this theory, driven by one of three needs: achievement, affiliation, or power.

McGregor's Theory of X and Y

- ▶ Douglas McGregor's theory that states management views workers in the Y category as competent and self-led and workers in the X category as incompetent and needing to be micromanaged.

Multicriteria Decision Analysis

- ▶ A method to rate potential project team members based on criterion such as education, experience, skills, knowledge, and more.

Norming

- ▶ Project team members go about getting the project work, begin to rely on one another, and generally complete their project assignments.

Organization chart

- ▶ Traditional chart that depicts how the organization is broken down by department and disciplines. This chart is sometimes called the organizational breakdown structure (OBS) and is arranged by departments, units, or teams.

Organizational interfaces

- ▶ The project management team needs to identify which departments are going to be involved in the project.

Organizational structure constraint

- ▶ The structure of the organization has a direct correlation to the amount of power a project manager has within a project.

Ouchi's Theory Z

- ▶ William Ouchi's theory is based on the participative management style of the Japanese. This theory states that workers are motivated by a sense of commitment, opportunity, and advancement.

Performing

- ▶ If a project team can reach the performing stage of team development, they trust one another, work well together, and issues and problems get resolved quickly and effectively.

Political interfaces

- ▶ The hidden goals, personal agendas, and alliances among the project team members and the stakeholders.

RACI chart

- ▶ A RACI chart is a matrix chart that only uses the activities of responsible, accountable, consult, and inform.

Referent power

- ▶ The project team personally knows the project manager. Referent can also mean that the project manager refers to the person who assigned him the position.

Resource breakdown structure (RBS)

- ▶ This hierarchical chart can decompose the project by the type of resources used throughout it.

Responsibility assignment matrix (RAM)

- ▶ A RAM chart shows the correlation between project team members and the work they've been assigned to complete.

Responsibility

- ▶ A responsibility is the work that a role performs.

Reward

- ▶ The project manager has the authority to reward the project team.

Role

- ▶ This denotes what a person is specifically responsible for in a project. Roles are usually tied to job titles, such as network engineer, mechanical engineer, and electrician.

Smoothing

- ▶ This approach smoothes out the conflict by minimizing the perceived size of the problem. It is a temporary solution, but can calm team relations and belligerent discussions.

Staffing management plan

- ▶ A subsidiary plan of the project management plan that defines staff acquisition, timetables, release criteria, training needs, reward and recognition systems, compliance issues, and safety concerns for the project.

Storming

- ▶ The project team struggles for project positions, leadership, and project direction. The project team can become hostile toward the project leader, challenge ideas, and try to establish and claim positions about the project work. The amount of debate and fury can vary depending on if the project team is willing to work together, the nature of the project, and the control of the project manager.

Technical interfaces

- ▶ The project team identifies the disciplines and specialties that the project will require to complete the project scope statement. The technical interfaces are the resources that will be doing the project work.

Withdrawal

- ▶ This conflict resolution method sees one side of the argument walking away from the problem, usually in disgust.

Chapter exam

10. PROJECT COMMUNICATIONS MANAGEMENT

10.1 Plan communications Management

Communication is paramount in project management
Creates project communications management plan
Defines how communication will be managed and controlled
Linked to stakeholder management and engagement

10.1 Plan communications Management

Plan Communications Management	Inputs	Tools & Techniques	Outputs
Project management plan	Communication requirements analysis	Communications management plan	
Stakeholder register	Communication technology	Project documents updates	
Enterprise environmental factors	Communication models		
Organizational process assets	Communication methods		
	Meetings		

Who are stakeholders?

Persons and organizations
Involved in the project
Affected positively or negatively by project
Some can exert influence over the project



Stakeholder Register

Identification information

Assessment information

Stakeholder classification



Project Communications Management Planning

Who needs what information?

Who is authorized to access the information?

Who will provide the information?

When do they need it?

What modality?

Where will the information be stored?

Will time zones, language barriers, or cross-cultural issues affect the communication?

Communications Channel Formula

$N(N-1)/2$

$10(10-1)/2$

$90/2=45$

How many more communication channels?

Communication Requirements

Organization charts
Stakeholder responsibility relationships
Disciplines, departments, and specialties
Logistics of involvement
Internal and external communication needs
Stakeholder information

Communication Technology

Urgency of the need for information
Availability of technology
Ease of use
Project environment
Sensitivity and confidentiality of the information

Communication Model

Sender
Encoder
Medium
Decoder
Receiver
Noise
Barriers
Acknowledgements
Feedback/Response



Communication Methods

Interactive communication

Push communication

Pull communication



Communications Management Plan

Stakeholder communication requirements

Information to be communicated

Reason for the distribution

Time frame and frequency for the distribution

Person responsible for communicating the information

Person responsible for authorizing release of confidential information

Communications Management Plan

Methods or technologies

Resources allocated for communication activities

Escalation process

Method for updating and refining the communications management plan

Glossary of common terminology

Flow charts of the information flow in the project

Communication constraints

10.2 Manage communications

Following the communications management plan to:

- Create
- Collect
- Store
- Distribute
- Retrieve

Ensures flow of communication among project stakeholders

10.2 Manage communications

Manage Communications	Inputs	Tools & Techniques	Outputs
Communications management plan	Communication technology	Project communications Project management plan updates	
Work performance reports Enterprise environmental factors Organizational process assets	Communication models Communication methods Information management systems Performance reporting	Project documents updates Organizational process assets updates	

Information Distribution Techniques

- Sender-receiver models
- Choice of media
- Writing style
- Meeting management techniques
- Facilitation techniques

Using an information management system

Hard copy documents: memos, letters, reports, press releases

Electronic communications: email, fax, voice, video and web conferences, websites, web publishing

Electronic project management tools: web software, project management software, virtual office support, collaborative tools

Performance Reports

Prior to project meetings

Forecasting

- Estimate to Complete
- Estimate at Completion

Analogy to other projects (benchmarking)

Work re-estimation

External events impact

Results of Information Distribution

Stakeholder notifications

Project reports

Project presentations

Project records

Feedback from stakeholders

Lessons learned

10.3 Control communications

Right information, right parties, at the right time
Follows and enforces communications management plan
Ensures optimal information flow among the parties

10.3 Control communications

Control Communications	Inputs	Tools & Techniques	Outputs
Project management plan	Information management systems	Work performance information	
Project communications	Expert judgment	Change requests	
Issue log	Meetings	Project management plan updates	
Work performance data		Project documents updates	
Organizational process assets		Organizational process assets updates	

Controlling Communications

Information management systems
Relying on expert judgment
- Leaders in the organization
- Consultants
- Subject matter experts
- PMO
Meetings

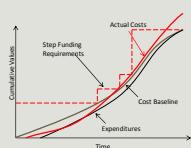
Performance Reports

Status reports

Progress measurements

Forecasts

Baseline to actual comparisons



Forecasting Methods

Time series method

- Earned value
- Moving average
- Extrapolation
- Linear prediction
- Trend estimation
- Growth curve

Judgmental methods

- Intuitive judgments
- Opinions
- Probability

Forecasting Methods

Causal/econometric methods

- Causal factors for experiences
- Linear regression
- Autoregressive moving average (ARMA)
- Econometrics

Other methods...

- Simulation
- Probabilistic forecasting
- Ensemble forecasting

Key terms

The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Acknowledgment

The receiver signals that the message has been received. An acknowledgment shows receipt of the message, but not necessarily agreement with the message.

Active listening

The receiver confirms that the message is being received through feedback, questions, prompts for clarity, and other signs of confirmation.

Choice of media

The best modality to use when communicating that is relevant to the information being communicated.

Communication assumptions

Anything that the project management team believes to be true but hasn't proven to be true. For example, the project management team may assume that all of the project team can be reached via cell phone, but parts of the world, as of this writing, don't have a cell signal.

Communication barrier

Anything that prohibits communication from occurring.

Communication channels formula

$N(N - 1)/2$, where N represents the number of identified stakeholders. This formula reveals the total number of communication channels within a project.

Communication constraints

Anything that limits the project management team's options. When it comes to communication constraints, geographical locales, incompatible communications software, and even limited communications technology can constrain the project team.

Communications management plan

A project management subsidiary plan that defines the stakeholders who need specific information, the person who will supply the information, the schedule for the information to be supplied, and the approved modality to provide the information.

Cost reporting system

A system to record the actual costs of the project activities.

Decoder

The device that decodes a message as it is being received.

Effective listening

The receiver is involved in the listening experience by paying attention to visual clues from the speaker and paralingual characteristics, and by asking relevant questions.

Encoder

The device that encodes the message being sent.

Feedback

The sender confirms that the receiver understands the message by directly asking for a response, questions for clarification, or other confirmation.

Influence/impact grid

Stakeholders are mapped on a grid based on their influence over the project in relation to their influence over the project execution.

Information presentation tools

A software package that allows the project management team to present the project's health through graphics, spreadsheets, and text. (Think of Microsoft Project.)

Information retrieval system

A system to quickly and effectively store, archive, and access project information.

Interactive communication

This is the most common and most effective approach to communication. It's where two or more people exchange information. Consider status meetings, ad-hoc meetings, phone calls, and videoconferences.

Lessons learned

This is documentation of what did and did not work in the project implementation. Lessons learned documentation is created throughout the project by the entire project team. When lessons learned sessions are completed, they're available to be used and applied by the entire organization. They are now part of the organizational process assets.

Medium

The device or technology that transports a message.

Noise

Anything that interferes with or disrupts a message.

Nonverbal

Facial expressions, hand gestures, and body language are nonverbal cues that contribute to a message. Approximately 55 percent of communication is nonverbal.

Paralingual

The pitch, tone, and inflections in the sender's voice affecting the message being sent.

Performance report

A report that depicts how well a project is performing. Often, the performance report is based on earned value management and may include cost or schedule variance reports.

Project presentations

Presentations are useful in providing information to customers, management, the project team, and other stakeholders.

Project records

All the business of the project communications are also part of the organizational process assets. This includes e-mails, memos, letters, and faxes.

Project reports

Reports are formal communications on project activities, their status, and conditions.

Pull communication

This approach pulls the information from a central repository, like a database of information. Pull communications are good for large groups of stakeholders who want to access project information at their discretion. Consider a project web site where stakeholders can periodically drop by for a quick update on the project status.

Push communication

This approach pushes the information from the sender to the receiver without any real acknowledgment that the information was really received or understood. Consider letters, faxes, voicemail messages, e-mails, and other communications modalities that the sender packages and sends to receivers through some intermediary network.

Receiver

The person who receives the message.

Sender

The person who is sending the message.

Sender-receiver models

Feedback loops and barriers to communications.

Stakeholder notifications

Notices to the stakeholders about resolved issues, approved changes, and the overall health of the project.

Status review meeting

A regularly scheduled meeting to discuss the status of the project and its progress toward completing the project scope statement.

Time reporting system

A system to record the actual time to complete project activities.

Chapter exam

11. PROJECT RISK MANAGEMENT



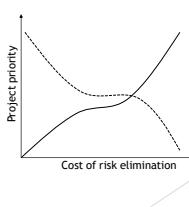
What is risk?

- ▶ Risk and reward
- ▶ Risk is not always bad
- ▶ Business risks
- ▶ Pure risks



Planning for Risk Management

- ▶ Risk appetite
- ▶ Risk tolerance
- ▶ Risk threshold
- ▶ Stakeholder tolerance
- ▶ Utility function



11.1 Plan Risk Management

- ▶ Defines how risk management activities will occur
- ▶ Risk activities in relation to project importance
- ▶ Defines how the key stakeholders will:
 - ▶ Identify risks
 - ▶ Analyze risks
 - ▶ Create risk responses
 - ▶ Control risks



11.1 Plan Risk Management

Plan Risk Management	Inputs	Tools & Techniques	Outputs
Project management plan		Analytical techniques	Risk management plan
Project charter		Expert judgment	
Stakeholder register		Meetings	
Enterprise environmental factors			
Organizational process assets			



Planning Meetings and Analysis

- ▶ Project manager, project team, stakeholders
- ▶ Cost elements
- ▶ Schedule activities
- ▶ Risk management plan



Relying on Risk Management Policies

- ▶ Enterprise environmental factors
- ▶ Nature of the work
- ▶ Industry standards
- ▶ Regulated policies



Creating a Risk Management Plan

- ▶ Methodology
- ▶ Roles and responsibilities
- ▶ Budgeting
- ▶ Timing
- ▶ Risk categories



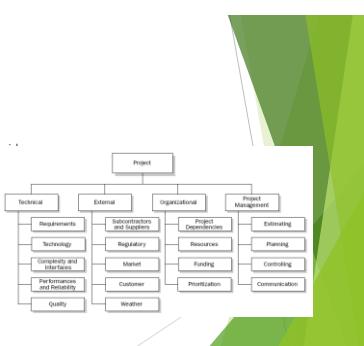
Creating a Risk Management Plan

- ▶ Definitions of risk probability and impact
- ▶ Probability and impact matrix
- ▶ Stakeholder tolerances
- ▶ Reporting formats
- ▶ Tracking



Risk Categories

- ▶ Risk Breakdown Structure
- ▶ Technical, quality, or performance
- ▶ Project management risks
- ▶ Organization risks
- ▶ External risks



11.2 Identify risks

- ▶ Identifying and documenting risks
- ▶ Creates a risk register
- ▶ Ongoing activity throughout the project



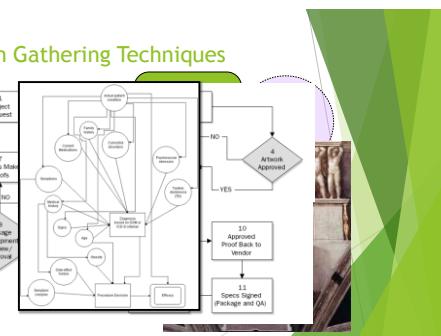
11.2 Identify risks

Identify Risks	Inputs	Tools & Techniques	Outputs
Risk management plan	Documentation reviews	Risk register	
Cost management plan	Information gathering techniques		
Schedule management plan	Checklists		
Quality management plan	Assumptions analysis		
Human resource management plan	Diagramming techniques		
Scope baseline	SWOT analysis		
Activity cost estimates	Expert judgment		
Activity duration estimates			
Stakeholder register			
Project documents			
Procurement documents			
Enterprise environmental factors			
Organizational process assets			



Information Gathering Techniques

- ▶ Brains
- ▶ Delphi
- ▶ Check
- ▶ Assum
- ▶ Diagra
- ▶ SWOT
- ▶ Expert



Creating a Risk Register

- ▶ Central risk repository
- ▶ Identified risks
- ▶ Potential responses
- ▶ Root cause
- ▶ Risk categories
- ▶ Risk status



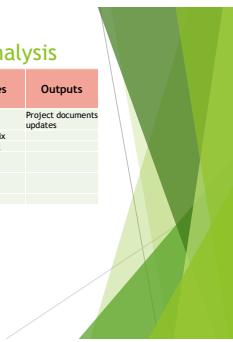
11.3 Perform Qualitative Risk Analysis

- ▶ Fast, subjective approach to analysis
- ▶ Qualify the risk for more analysis
- ▶ Can be done as risks are identified
- ▶ Cardinal or ordinal scale



11.3 Perform Qualitative Risk Analysis

Perform Qualitative Risk Analysis	Inputs	Tools & Techniques	Outputs
Risk management plan	Risk probability and impact assessment	Project documents updates	
Scope baseline	Probability and Impact matrix		
Risk register	Risk data quality assessment		
Enterprise environmental factors	Risk categorization		
Organizational process assets	Risk urgency assessment		
	Expert judgment		



Probability-Impact Matrix

Odds and Impact			
Risk	Probability	Impact	Risk Score
Data loss	Low	High	Moderate
Network speed	Moderate	Moderate	Moderate
Server downtime	High	Low	Moderate
Email service down	Low	Low	Low

Each identified risk Subjective score



Other Qualitative Tools

- ▶ Risk Data Quality Assessment
- ▶ Risk Categorization
- ▶ Risk Urgency Assessment
- ▶ Expert judgment



11.4 Perform Quantitative risk Analysis

- ▶ Quantifying the identified risks
- ▶ Usually for the more serious risks
 - ▶ Probability
 - ▶ Impact
- ▶ Helps with decision-making for risk response

11.4 Perform Quantitative risk Analysis

Perform Quantitative Risk Analysis	Inputs	Tools & Techniques	Outputs
Risk management plan	Data gathering and representation techniques	Quantitative risk analysis and modeling techniques	Project documents updates
Cost management plan		Expert judgment	
Schedule management plan			
Risk register			
Enterprise environmental factors			
Organizational process assets			

Goals of Quantitative Analysis

- ▶ Likelihood of reaching project success
- ▶ Likelihood of reaching a project objective
- ▶ Project's risk exposure
- ▶ Contingency reserve
- ▶ Identify the risks with the largest impact
- ▶ Determine realistic time, cost, and scope targets

Performing Quantitative Analysis

- ▶ Interviewing stakeholders and experts
- ▶ Risk distributions
- ▶ Sensitivity analysis
- ▶ Expected Monetary Value
- ▶ Modeling and simulation
- ▶ Expert judgment



Using sensitivity analysis

- ▶ Identifies the risks with most potential impact on the project
- ▶ Measures and examines uncertainties
- ▶ Tornado diagram often used with sensitivity analysis



Probability-Impact Matrix

- ▶ Cardinal scale
- ▶ Risk exposure
- ▶ Sum of contingency reserve
- ▶ "Hedging bets"



Probability-Impact Matrix

Risk event	Probability	Impact	Ex\$V
A	.60	-10,000	-6,000
B	.20	-75,000	-15,000
C	.10	25,000	2,500
D	.40	-85,000	-34,000

Contingency reserve = \$52,500



Examining the results of quantitative risk analysis

- ▶ Probabilistic analysis of the project
- ▶ Probability of achieving time and cost objectives
- ▶ Prioritized list of quantified risks
- ▶ Trends in quantitative risk analysis results



11.5 Plan risk responses

- ▶ Enhance opportunities
- ▶ Reduce risks
- ▶ Documents risk responses
- ▶ Tracks outcomes for lessons learned



11.5 Plan risk responses

Plan Risk Responses	Inputs	Tools & Techniques	Outputs
Risk management plan	Risk management plan	Strategies for negative risks or threats	Project management plan updates
Risk register	Risk register	Strategies for positive risks or opportunities Contingent response strategies Expert Judgment	Project documents updates

Responding to Negative Risks

- ▶ Avoidance
- ▶ Transference
- ▶ Mitigation



Managing Positive Risks

- ▶ Exploiting
- ▶ Sharing
- ▶ Enhancing



Managing Positive and Negative Risks

- ▶ Acceptance
 - ▶ Laws
 - ▶ Constraints
 - ▶ Discounts
 - ▶ Weather
 - ▶ Force Majeure



Contingent Responses

- ▶ When certain events occur
- ▶ Certain predefined conditions
- ▶ Triggers
- ▶ Risk registers



Risk Register Updates

- ▶ Risks, owners, responsibilities
- ▶ Response strategies
- ▶ Triggers, warning signs, conditions
- ▶ Contingency plans
- ▶ Fallback plans



Managing Risks

- ▶ Residual risks
- ▶ Secondary risks
- ▶ Risk response contracts
- ▶ Justifying risk reduction



11.6 Control risks

- ▶ Implementing risk response plans
- ▶ Tracking identified risks
- ▶ Monitoring residual risks
- ▶ Evaluating risk process effectiveness



11.6 Control risks

Control Risks	Inputs	Tools & Techniques	Outputs
Project management plan Risk register	Risk reassessment Risk audits	Work performance information Change requests Project management plan updates	
Work performance data Work performance reports	Variance and trend analysis Technical performance measurement Reserve analysis Meetings		Project documents updates Organizational process assets updates



Risk Monitoring and Control

- ▶ Risk reassessment
- ▶ Risk audits
- ▶ Variance and trend analysis
- ▶ Technical performance information
- ▶ Reserve analysis
- ▶ Status meetings



Results of Monitoring and Control

- ▶ Work performance information
- ▶ Change requests
 - ▶ Corrective actions
 - ▶ Preventive actions
- ▶ Project management plan updates
- ▶ Project document updates
- ▶ Organizational process assets



Key terms

- ▶ The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.



Acceptance

- ▶ A risk response appropriate for both positive and negative risks, but often used for smaller risks within a project.



Avoidance

- ▶ A risk response to avoid the risk.



Brainstorming

- ▶ The most common approach to risk identification; usually completed by a project team with subject matter experts to identify the risks within the project.



Business risks

- ▶ These risks may have negative or positive outcomes. Examples include using a less experienced worker to complete a task, allowing phases or activities to overlap, or foregoing the expense of formal training for on-the-job education.



Cardinal scales

- ▶ A ranking approach to identify the probability and impact by using a numerical value, from .01 (very low) to 1.0 (certain).



Checklists

- ▶ A quick and cost-effective risk identification approach.



Data precision

- The consideration of the risk ranking scores that takes into account any bias, the accuracy of the data submitted, and the reliability of the nature of the data submitted.



Decision tree

- A method to determine which of two or more decisions is the best one. The model examines the cost and benefits of each decision's outcome and weighs the probability of success for each of the decisions.



Delphi Technique

- An anonymous method of querying experts about foreseeable risks within a project, phase, or component of a project. The results of the survey are analyzed by a third party, optimized, and then circulated to the experts. There can be several rounds of anonymous discussion with the Delphi Technique, without fear of backlash or offending other participants in the process. The goal is to gain consensus on project risks within the project.



Enhancing

- ▶ A risk response that attempts to enhance the conditions to ensure that a positive risk event will likely happen.



Expected monetary value (EMV)

- ▶ The monetary value of a risk exposure based on the risk's probability and impact in the risk matrix. This approach is typically used in quantitative risk analysis because it quantifies the risk exposure.



Exploit

- ▶ A risk response that takes advantage of the positive risks within a project.



External risks

- ▶ These risks are outside of the project, but directly affect it—for example, legal issues, labor issues, a shift in project priorities, or weather. “Force majeure” risks call for disaster recovery rather than project management. These are risks caused by earthquakes, tornadoes, floods, civil unrest, and other disasters.



Flowcharts

- ▶ System or process flowcharts show the relationship between components and how the overall process works. These are useful for identifying risks between system components.



Influence diagrams

- ▶ An influence diagram charts out a decision problem. It identifies all of the elements, variables, decisions, and objectives and also how each factor may influence another.



Ishikawa diagrams

- ▶ These cause-and-effect diagrams are also called fishbone diagrams and are used to find the root cause of factors that are causing risks within the project.



Low-priority risk watch list

- ▶ Low-priority risks are identified and assigned to a watch list for periodic monitoring.



Mitigation

- ▶ A risk response effort to reduce the probability and/or impact of an identified risk in the project.



Monte Carlo technique

- ▶ A simulation technique that got its name from the casinos of Monte Carlo, Monaco. The simulation is completed using a computer software program that can simulate a project, using values for all possible variables, to predict the most likely model.



Ordinal scales

- ▶ A ranking approach that identifies and ranks the risks from very high to very unlikely or to some other ordinary value.



Organizational risks

- ▶ The performing organization can contribute to the project's risks through unreasonable cost, time, and scope expectations; poor project prioritization; inadequate funding or the disruption of funding; and competition with other projects for internal resources.



Probability and impact matrix

- ▶ A matrix that ranks the probability of a risk event occurring and its impact on the project if the event does happen; used in qualitative and quantitative risk analyses.



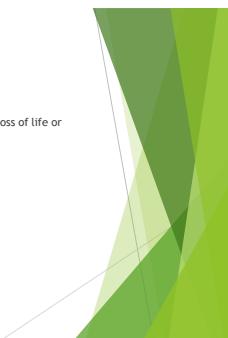
Project management risks

- ▶ These risks deal with faults in the management of the project: the unsuccessful allocation of time, resources, and scheduling; unacceptable work results; and poor project management.



Pure risks

- ▶ These risks have only a negative outcome. Examples include loss of life or limb, fire, theft, natural disasters, and the like.



Qualitative risk analysis

- This approach "qualifies" the risks that have been identified in the project. Specifically, qualitative risk analysis examines and prioritizes risks based on their probability of occurring and their impact on the project should they occur.



Quantitative risk analysis

- This approach attempts to numerically assess the probability and impact of the identified risks. It also creates an overall risk score for the project. This method is more in-depth than qualitative risk analysis and relies on several different tools to accomplish its goal.



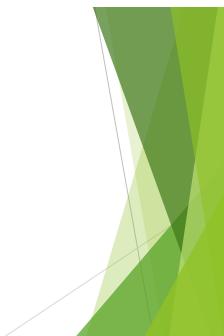
RAG rating

- An ordinal scale that uses red, amber, and green (RAG) to capture the probability, impact, and risk score.



Residual risks

- ▶ Risks that are expected to remain after a risk response.



Risk

- ▶ A project risk is an uncertain event or condition that can have a positive or negative impact on the project.



Risk identification

- ▶ The systematic process of combing through the project, the project plan, the work breakdown structure, and all supporting documentation to identify as many risks that may affect the project as possible.



Risk management plan

- ▶ A project management subsidiary plan that defines how risks will be identified, analyzed, responded to, and monitored within the project. The plan also defines the iterative risk management process that the project is expected to adhere to.



Risk management planning

- ▶ The agreed-upon approach to the management of the project risk processes.



Risk owners

- ▶ The individuals or entities that are responsible for monitoring and responding to an identified risk within the project.



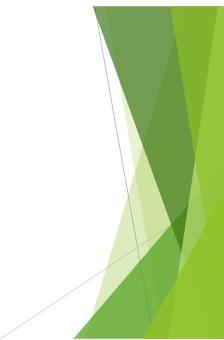
Risk register

- ▶ The risk register is a project plan component that contains all of the information related to the risk management activities. It's updated as risk management activities are conducted to reflect the status, progress, and nature of the project risks.



Risk response audit

- ▶ An audit to test the validity of the established risk responses.



Risk responsibilities

- ▶ The level of ownership an individual or entity has over a project risk.



Risk score

- The calculated score based on each risk's probability and impact. The approach can be used in both qualitative and quantitative risk analysis.



Root cause identification

- Root cause identification aims to find out why a risk event may be occurring, the causal factors for the risk events, and then, eventually, how the events can be mitigated or eliminated.



Secondary risks

- New risks that are created as a result of a risk response.



Sensitivity analysis

- ▶ A quantitative risk analysis tool that examines each risk to determine which one has the largest impact on the project's success.



Sharing

- ▶ A risk response that shares the advantages of a positive risk within a project.



SWOT analysis

- ▶ SWOT analysis is the process of examining the project from the perspective of each characteristic: strengths, weaknesses, opportunities, and threats.



Technical, quality, or performance risks

- ▶ Technical risks are associated with new, unproven, or complex technologies being used on the project. Changes to the technology during the project implementation can also be a risk. Quality risks are the levels set for expectations of impractical quality and performance.



Transference

- ▶ A risk response that transfers the ownership of the risk to another party. Insurance, licensed contractors, or other project teams are good examples of transference. A fee and contractual relationships are typically involved with the transference of a risk.



Chapter exam



12. PROJECT PROCUREMENT MANAGEMENT

12.1 Plan Procurement Management

- Documents the procurement approach
- Defines the procurement decisions
- Identifies potential sellers
- Approach for acquiring resources and services

12.1 Plan Procurement Management

Plan Procurement Management	Inputs	Tools & Techniques	Outputs
Project management plan	Make-or-buy analysis	Procurement management plan	
Requirements documentation	Expert judgment	Procurement statement of work	
Risk register	Market research	Procurement documents	
Activity resource requirements			
Project schedule	Meetings	Source selection criteria	
Activity cost estimates		Make-or-buy decisions	
Stakeholder register			
Enterprise environmental factors		Change requests	
Organizational process assets		Project documents updates	

Procurement Overview

- Buyer is a stakeholder for seller
- Seller is the project management team
- Terms and conditions of contract for seller
- External and internal "contracts"

Evaluating the Market Conditions

- Sole source
- Single source
- Oligopoly



Planning for Purchases

- Decision to procure
- What to procure
- How much to procure
- When to procure



All About Contracts

- A contract is a formal agreement
- The United States backs all contracts through the court system
- Contracts state all requirements for product acceptance
- Changes to the contract must be formally approved, controlled, and documented
- Contracts can be used as a risk mitigation tool

Contract Legalities

- Fixed Price or Cost Reimbursable
- Contain an offer
- Have been accepted
- Provide for a consideration (payment)
- Be for a legal purpose
- Be executed by someone with capacity and authority

Firm Fixed-Price Contracts (FFP)

- Most common contract
- Seller carries risk of cost overruns
- Buyer specifies what's to be purchased
- Changes to the scope



Fixed-Price Incentive Fee Contracts (FPIF)

- Financial incentives for performance
- Cost, schedule, technical performance
- Price ceiling
- Seller carries risk of overruns



Fixed Price with Economic Price Adjustment Contracts (FP-EPA)

- Long-term contracts
- Pre-defined financial adjustments
- Inflation, cost increases, decreases
- External conditions



Cost Reimbursable Overview

- Cost plus a fee
- Scope of work can't be defined early
- High risks may exists in the project
- Buyer carries risk of overruns



Cost Plus Fixed Fee Contracts (CPFF)

- All allowable costs
- Fixed fee of the initial estimated costs
- Fee paid for completed work
- Fee is constant unless scope changes



Cost Plus Incentive Fee (CPIF)

- All allowable costs
- Fee based on performance goals
- Incentive sharing (often 80/20)
- Contract defines measurements



Cost Plus Award Fee Contract (CPAF)

- All allowable costs
- Performance criteria for fee to seller
- Subjective review by buyer
- Award is determined by the buyer



Time and Materials Contract (T&M)

- Seller is paid an hourly fee
- Seller is paid for materials
- Not-to-exceed clause
- Time limits for contract



Reasons to Buy or Build

- Less costly
- Use in-house skills
- Control of work
- Control of intellectual property
- Learn new skills
- Available staff
- Focus on core project work

Build v. Buy Decisions

Build \$65,000	Buy \$52,000	Difference Buy v. Build \$13,000
Build Monthly Fees \$8,500	Buy Monthly Fees \$10,500	Difference Monthly Fees \$2,000
Divide Differences $\$13,000 / \$2,000 = 6.5 \text{ months}$		

Procurement Management Plan

- Type of contracts to be used
- Risk management issues
- Independent estimates
- Organizational procurement procedures
- Procurement documents
- Managing multiple suppliers

Procurement Management Plan

- Coordinating procurement activities
- Constraints and assumptions
- Required procurement lead time
- Make or buy decisions
- Scheduling deliverables in the contract
- Performance bonds, insurance

Procurement Management Plan

- WBS provided by seller
- Form and format for SOW documents
- Identifying pre-qualified sellers
- Procurement metrics for evaluations



Source Selection Criteria

- Understanding of need
- Life cycle cost
- Technical capability
- Risk
- Management approach
- Technical approach
- Warranty
- Financial capacity
- Production capacity and interest
- Business size and type
- Past performance of sellers
- References
- Intellectual property rights
- Proprietary rights



12.2 Conduct Procurements

- Obtaining seller responses
- Selecting the seller
- Award a contract



12.2 Conduct Procurements

Conduct Procurements	Inputs	Tools & Techniques	Outputs
Procurement management plan	Bidder conference Proposal evaluation Techniques Independent estimates Expert judgment	Selected sellers	
Procurement documents Source selection criteria Seller proposals	Advertising	Agreements Resource calendars Change requests Project management plan updates Project documents updates	
Project documents	Analytical techniques		
Make-or-buy decisions Procurement statement of work	Procurement negotiations		
Organizational process assets			

Procurement Details

- Qualified seller lists
- Bidder conferences
- Advertising
- SOW updates

From the Buyer

- SOW
- Request for Quote
- Invitation for Bid
- Request for Proposal
- Request for Information

From the Seller

- Quote
- Bid
- Information
- Proposal

Seller Selection

- Weighting system
- Independent estimates
- Screening systems
- Contract negotiation
- Seller rating systems
- Expert judgment
- Proposal evaluation

Category	Seller 1	Seller 2	Seller 3	Seller 4
Cost	85	75	65	70
Experience	60	55	50	65
Schedule	70	65	75	70
Staffing	60	55	65	60
Certifications	80	75	85	80

Getting to the Deal...

```

graph TD
    subgraph Buyer [Buyer]
        SOW[SOW]
        RFP[RFP]
        BEQ[BEQ]
        INF[INF]
    end
    SOW --> Sellers
    RFP --> Sellers
    BEQ --> Sellers
    INF --> Sellers
    Sellers --> BiddersConference[Bidders Conference]
    BiddersConference --> SOWUpdates[SOW Updates]
    SOWUpdates --> Sellers
    Sellers --> SellerResponses[Seller Responses]
    SellerResponses --> BidQuoteProposal[Bid, Quote, Proposal]
    BidQuoteProposal --> Buyer
    Buyer --> SourceSelection[Source Selection]
    SourceSelection --> Contract[Contract]
    
```

Contract Details (Agreement)

- SOW and/or deliverables
- Schedule baseline
- Performance reporting
- Period of performance
- Roles and Responsibilities
- Where work is to occur
- Pricing
- Payment terms
- Inspection and acceptance criteria
- Warranty
- Product support
- Limitation of liability
- Fees and retainage
- Penalties
- Incentives
- Insurance and performance bonds
- Subordinate subcontractor approvals
- Change request handling
- Termination/alternative dispute resolution

12.3 Control Procurements

- Managing procurement relationships
- Monitoring contract performance
- Making changes and corrections to contract as needed
- You could be the buyer or seller on the exam...

12.3 Control Procurements

Control Procurements	Inputs	Tools & Techniques	Outputs
Project management plan	Contract change control system	Procurement performance	Work performance information
Procurement documents/reviews			Change requests
Agreements	Inspections and audits		Project management plan updates
Approved change requests			Project documents updates
Work performance reports	Payment systems		Organizational process assets updates
Work performance data	Claims administration		
	Records management system		
	Performance reporting		

Procurement and Processes

- Direct and manage project execution
- Report performance
- Perform quality control
- Perform integrated change control
- Monitor and control risks

Administer Procurement Details

- Payments to the seller
- Seller compensation linked to progress
- Seller performance review
- Consideration for future assignments

Performing Contract Administration

- Contract change control system
- Buyer-conducted performance reviews and audits
- Performance reporting
- Payment system
- Records management system

Claims Administration

- Claims, disputes, or appeals
- Contested changes
- Disagreements
- Terms of the contract
- Alternative dispute resolution (ADR)
- Negotiation is preferred method

12.4 Close Procurements

- Completing the procurement
- Updating records to show results
- Archiving contract information
- Unresolved claims and litigation
- Early termination
 - Mutual agreement
 - Default of one party
 - Convenience of buyer (contractual)

12.4 Close Procurements

Close Procurements	Inputs	Tools & Techniques	Outputs
Project management plan	Procurement audits	Closed procurements	Organizational process assets updates
Procurement documents	Procurement negotiations	Records management system	

Negotiated Settlements

- Equitable settlement of all outstanding
 - Issues
 - Disputes
 - Claims
 - Difference of opinion
- Mediation or arbitration
- Litigation in the courts

Close Procurement Outputs

- Formal written notice
- Procurement file
- Deliverable acceptance and signoff
- Lessons learned documentation

Key terms

- The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

Alternative dispute resolution

- When there is an issue or claim that must be settled before the contract can be closed, the parties involved in the issue or claim will try to reach a settlement through mediation or arbitration.

Bid

- From seller to buyer. Price is the determining factor in the decision-making process.

Bidder conference

- A meeting of all the project's potential vendors to clarify the contract statement of work and the details of the contracted work.

Claims

- These are disagreements between the buyer and the seller, usually centering on a change, who did the change, and even whether a change has occurred. Claims are also called disputes and appeals, and are monitored and controlled through the project in accordance with the contract terms.

Contract

- A contract is a formal agreement between the buyer and the seller. Contracts can be oral or written—though written is preferred.

Contract change control system

- This defines the procedures for how the contract may be changed. The process for changing the contract includes the forms; documented communications; tracking; conditions within the project, business, or marketplace that justify the needed change; dispute resolution procedures; and the procedures for getting the changes approved within the performing organization.

Contract statement of work (SOW also CSOW)

- This document requires that the seller fully describe the work to be completed and/or the product to be supplied. The SOW becomes part of the contract between the buyer and the seller.

Cost plus award fee contract

- A contract that pays the vendor all costs for the project, but also includes a buyer-determined award fee for the project work.

Cost plus fixed fee contract

- A contract that requires the buyer to pay for the cost of the goods and services procured plus a fixed fee for the contracted work. The buyer assumes the risk of a cost overrun.

Cost plus incentive fee

- A contract type that requires the buyer to pay a cost for the procured work, plus an incentive fee, or a bonus, for the work if terms and conditions are met.

Cost plus percentage of costs

- A contract that requires the buyer to pay for the costs of the goods and services procured plus a percentage of the costs. The buyer assumes all of the risks for cost overruns.

Direct costs

- These are costs incurred by the project in order for the project to exist. Examples include the equipment needed to complete the project work, salaries of the project team, and other expenses tied directly to the project's existence.

Fixed-price contracts

- Also known as firm fixed-price and lump-sum contracts, these are agreements that define a total price for the product the seller is to provide.

Fixed-price incentive fee

- A fixed-price contract with opportunities for bonuses for meeting goals on costs, schedule, and other objectives. These contracts usually have a price ceiling for costs and associated bonuses.

Fixed-price with economic price adjustments

- A fixed-price contract with a special allowance for price increases based on economic reasons such as inflation or the cost of raw materials.

Force majeure

- An "act of God" that may have a negative impact on the project. Examples include fire, hurricanes, tornadoes, and earthquakes.

Independent estimates

- These estimates are often referred to as "should cost" estimates. They are created by the performing organization or outside experts to predict what the cost of the procured product should be.

Indirect costs

- These are costs attributed to the cost of doing business. Examples include utilities, office space, and other overhead costs.

Invitation for Bid (IFB)

- From buyer to seller. Requests the seller to provide a price for the procured product or service.

Letter contract

- A letter contract allows the vendor to begin working on the project immediately. It is often used as a stopgap solution.

Letter of intent

- A letter of intent is not a contract, but a letter stating that the buyer is intending to create a contractual relationship with the seller.

Make-or-buy decision

- A process in which the project management team determines the cost-effectiveness, benefits, and feasibility of making a product or buying it from a vendor.

Privity

- The contractual relationship between the buyer and the seller is often considered confidential and secret.

Procurement management plan

- A project management subsidiary plan that documents the decisions made in the procurement planning processes.

Procurement planning

- A process to identify which parts of the project warrant procurement from a vendor by the buyer.

Proposal

- A document the seller provides to the buyer. The proposal includes more than just a fee for the proposed work. It also includes information on the vendor's skills, the vendor's reputation, and ideas on how the vendor can complete the contracted work for the buyer.

Purchase order (PO)

- A purchase order is a form of unilateral contract that the buyer provides to the vendor showing that the purchase has been approved by the buyer's organization.

Quotation

- From seller to buyer. Price is the determining factor in the decision-making process.

Request for Proposal (RFP)

- From buyer to seller. Requests the seller to provide a proposal to complete the procured work or to provide the procured product.

Request for Quote (RFQ)

- From buyer to seller. Requests the seller to provide a price for the procured product or service.

Risk-related contractual agreements

- When the project management team decides to use transference to respond to a risk, a risk-related contractual agreement is created between the buyer and the seller.

Screening system

- A tool that filters or screens out vendors that don't qualify for the contract.

Seller rating systems

- These are used by organizations to rate prior experience with each vendor that they have worked with in the past. The seller rating system can track performance, quality ratings, delivery, and even contract compliance.

Time and materials contract

- A contract type in which the buyer pays for the time and materials for the procured work. This is a simple contract, usually for smaller procurement conditions. These contract types require a not-to-exceed clause, or the buyer assumes the risk for cost overruns.

Weighting system

- This takes out the personal preferences of the decision maker in the organization to ensure that the best seller is awarded the contract. Weights are assigned to the values of the proposals, and each proposal is scored.

Chapter exam

13. PROJECT STAKEHOLDER MANAGEMENT

13.1 IDENTIFY STAKEHOLDERS

- Identifying the people, groups, organizations
- Documenting stakeholder information
- Defining how the stakeholders could affect the project
- New knowledge area in PMBOK V

IDENTIFY PROJECT STAKEHOLDERS

Identify Stakeholders	Inputs	Tools & Techniques	Outputs
Project charter	Stakeholder analysis	Stakeholder register	
Procurement documents	Expert judgment		
Enterprise environmental factors	Meetings		
Organizational process assets			

WHO ARE STAKEHOLDERS?

- Persons and organizations
- Involved in the project
- Affected positively or negatively by project
- Some can exert influence over the project



IDENTIFYING PROJECT STAKEHOLDERS

- People and groups affected by the project
- Stakeholder exert influence over the project
- Identify early in the project
- Stakeholder management strategy
- Classify stakeholders according to:
 - Interest
 - Influence
 - Involvement



STAKEHOLDER ANALYSIS

- Identify all potential stakeholders and info
- Key stakeholders are
 - Decision-making role
 - Management role
 - Primary customer
- Interview stakeholders to identify stakeholders



STAKEHOLDER ANALYSIS

- Power/Interest Grid
- Power/Influence Grid
- Influence/Impact Grid
- Salience model
 - Power
 - Urgency
 - Legitimacy



STAKEHOLDER REGISTER

- Identification information
- Assessment information
- Stakeholder classification



13.2 PLAN STAKEHOLDER MANAGEMENT

- Developing management strategies for stakeholder engagement
- Analysis of stakeholder needs
- Creates a clear plan for managing the stakeholders

PLAN STAKEHOLDER MANAGEMENT

Plan Stakeholder Management	Inputs	Tools & Techniques	Outputs
Project management plan		Expert judgment	Stakeholder management plan
Stakeholder register	Meetings		Project documents updates
Enterprise environmental factors			
Organizational process assets	Analytical techniques		

PLANNING STAKEHOLDER MANAGEMENT

- Expert judgment for stakeholder management planning
 - Senior management
 - Project team members
 - Organizational resources
 - Identified key stakeholders
 - Project managers
 - Subject matter experts
 - Regulatory bodies and nongovernmental agencies

STAKEHOLDER ENGAGEMENT LEVELS

- Unaware
- Resistant
- Neutral
- Supportive
- Leading

REVIEWING THE STAKEHOLDER MANAGEMENT PLAN

- Desired and current engagement levels
- Scope and impact of change to stakeholders
- Identified interrelationships and potential overlap
- Stakeholder communication requirements
- Information to be distributed
- Reason for the distribution of that information
- Time frame and frequency for the distribution of required information

13.3 MANAGE STAKEHOLDER ENGAGEMENT

- Engaging stakeholders as needed in the project
- Obtain, confirm, maintain stakeholder commitment to project
- Manage stakeholder expectations
- Address potential concerns
- Clarifying and resolving issues

MANAGE STAKEHOLDER ENGAGEMENT

Manage Stakeholder Engagement	Inputs	Tools & Techniques	Outputs
Stakeholder management plan	Communication methods	Issue log	
Communications management plan	Interpersonal skills	Change requests Project management plan updates	
Change log	Management skills		
Organizational process assets		Project documents updates Organizational process assets updates	

METHODS TO ENGAGE STAKEHOLDERS

- Communication methods
- Interpersonal skills
 - Building trust
 - Resolving conflict
 - Active listening
 - Overcoming resistance to change
- Management skills
 - Facilitate consensus
 - Influence people
 - Negotiate agreements
 - "Modify organizational behavior to accept the project outcomes"

13.4 CONTROL STAKEHOLDER ENGAGEMENT

- Monitoring overall stakeholder relationships
- Adjusting stakeholder management strategies
- Updating stakeholder management plan as needed
- Approach evolves as project continues

CONTROL STAKEHOLDER ENGAGEMENT

Control Stakeholder Engagement	Inputs	Tools & Techniques	Outputs
Project management plan Issue log	Information management systems Expert judgment		Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates
Work performance data Project documents	Meetings		

ACTIVELY ENGAGING STAKEHOLDERS

- Relying on information management system
- Using expert judgment
- Meeting with stakeholders
- Being honest and direct with project news

KEYTERMS

- The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

INTERACTIVE COMMUNICATIONS

- This type of communication means that information is happening among stakeholders, like in a forum. Examples of interactive communications are meetings, videoconferences, phone calls, and ad-hoc conversations. Interactive communications means that the participants are actively communicating with one another.

KEY STAKEHOLDER

- Stakeholders—such as management, the project manager, program manager, or customers—that have the authority to make decisions in the project.

LEADING STAKEHOLDER STATUS

- Part of stakeholder analysis classification. A leading stakeholder is aware of your project, they want your project to be successful, and the stakeholder is working to make certain the project is a success.

NEGATIVE STAKEHOLDER

- A stakeholder who does not want the project to exist and is opposed to the project.

NEUTRAL STAKEHOLDER

- A stakeholder who has neither a positive nor negative attitude about the project's existence.

NEUTRAL STAKEHOLDER STATUS

- Part of stakeholder analysis classification. A neutral stakeholder is aware of your project and is not concerned if the project succeeds or fails.

POSITIVE STAKEHOLDER

- A stakeholder who sees the benefits of the project and is in favor of the change the project is to bring about.

PROFILE ANALYSIS MEETING

- This is an analysis meeting to examine and document the roles in the project. The role's interests, concerns, influence, project knowledge, and attitude are documented.

PULL COMMUNICATIONS

- This type of communication pulls information from a central repository. Pull communications allow stakeholders to retrieve information from a central source as needed.

PUSH COMMUNICATIONS

- This type of communication happens when the sender pushes the same message to multiple people. Good examples of push communications are broadcast text messages, faxes, press releases, and group e-mails.

REPORTING SYSTEM

- A reporting system is a software program to store and analyze project data for reporting. A common reporting system will take project data, allow the project manager to pass the data through earned value management, for example, and then create forecasting reports about the project costs and schedule.

RESISTANT STAKEHOLDER STATUS

- Part of stakeholder analysis classification. A resistant stakeholder is aware of your project, but they do support the changes your project will create.

STAKEHOLDER

- Anyone who is affected by the existence of the project or who can affect the project's existence. Stakeholders can enter and exit the project as conditions change within the project.

STAKEHOLDER ANALYSIS

- An activity that ranks stakeholders based on their influence, interests, and expectations of the project. Stakeholders are identified and ranked, and then their needs and expectations are documented and addressed.

STAKEHOLDER CLASSIFICATION MODELS

- These are charts and diagrams that help the project manager determine the influence of stakeholders in relation to their interest in the project. Common classification models include the power/interest grid, the power/influence grid, the influence/impact grid, and the salience model.

STAKEHOLDER ENGAGEMENT

- The project manager works to keep the project stakeholders interested, involved, and supportive of the project. Through communication, management skills, and interpersonal skills, the project manager can work to keep the project stakeholders engaged and interested in the project.

STAKEHOLDER IDENTIFICATION

- A project initiation activity to identify, document, and classify the project stakeholders as early as possible in the project.

STAKEHOLDER MANAGEMENT

- The project management knowledge area that focuses on the management and engagement of the project stakeholders. There are four processes in this knowledge area: identify stakeholders, plan stakeholder management, manage stakeholder engagement, and control stakeholder engagement.

STAKEHOLDER MANAGEMENT PLAN

- The stakeholder management plan documents a strategy for managing the project stakeholders. The stakeholder management plan establishes stakeholder engagement and defines how the project manager can increase and improve stakeholder engagement.

STAKEHOLDER MANAGEMENT PLANNING

- The project manager works with the project team and subject matter experts to create a strategy to manage the project stakeholders.

STAKEHOLDER REGISTER

- A documentation of each stakeholder's contact information, position, concerns, interests, and attitude toward the project. The project manager updates the register as new stakeholders are identified and when stakeholders leave the project.

SUPPORTIVE STAKEHOLDER STATUS

- This is part of stakeholder analysis classification. A supportive stakeholder is aware of your project and is supportive and hopeful that the project will be successful.

UNAWARE STAKEHOLDER STATUS

- Part of stakeholder analysis classification. An unaware status means the stakeholder doesn't know about the project and the effect the project may create on the stakeholder.

CHAPTER EXAM

MODULE FOURTEENPMI Code of Ethics
and Professional Conduct

- ▶ Six-page document
- ▶ Must agree to its terms
- ▶ Available through www.pmi.org
- ▶ 16 questions on the exam

PMI CODE OF ETHICS AND
PROFESSIONAL CONDUCT

- ▶ Organizational rules and policies
 - ▶ Exam application
 - ▶ Test items
 - ▶ Answer sheets
 - ▶ Continuing certification reporting (PDUs)

RESPONSIBILITIES TO THE PROFESSION

- ▶ Clear and factual evidence:
 - ▶ Report violations
 - ▶ Cooperate with PMI on their queries
 - ▶ Disclose appearance of conflict of interest

RESPONSIBILITIES TO THE PROFESSION

- ▶ Truth in advertising and sales
- ▶ Comply with laws, regulations, ethical standards of country where project management is held

PROFESSIONAL PRACTICE

- ▶ Intellectual property
- ▶ Disperse the code

ADVANCEMENT OF PROFESSION

- ▶ Qualifications and experience
 - ▶ Truthful in experience
 - ▶ Truthful in estimates (no sandbagging)
- ▶ Customer is in charge
- ▶ Confidentiality (privacy)

RESPONSIBILITY TO CUSTOMERS AND TO THE PUBLIC

- ▶ Avoid Conflict of Interest
- ▶ Refrain from accepting inappropriate compensation
 - ▶ Follow the laws and customs of the country

RESPONSIBILITY TO CUSTOMERS AND TO THE PUBLIC

- ▶ Sapir-Whorf Hypotheses
 - ▶ understand the language
- ▶ Culture shock
 - ▶ Initial reaction to foreign environment
- ▶ Ethnocentrism
 - ▶ Measure other cultures by your own

CODE OF CONDUCT EXTRAS

- ▶ Laws of the country
- ▶ Company policies
- ▶ Customs
- ▶ Ethics
- ▶ Be an angel

EXAM TIPS

- ▶ The following slides are the key terms from this chapter. You can also find all of the key terms in the course glossary from the home page.

KEY TERMS

- Treating others with conduct that may result in harm, fear, humiliation, manipulation, or exploitation. For example, berating a project team member because they've taken longer than expected to complete a project assignment may be considered humiliation.

ABUSIVE MANNER

- A situation where a project manager may have two competing duties of loyalty. For example, purchasing software from a relative may benefit the relative, but it may do harm to the performing organization.

CONFLICT OF INTEREST

- A project manager's responsibility to be loyal to another person, organization, or vendor. For example, a project manager has a duty of loyalty to promote the best interests of an employer rather than the best interests of a vendor.

DUTY OF LOYALTY

- ▶ Anyone, whether certified as a project manager or not, who has joined the Project Management Institute.

PMI MEMBER

- ▶ A person who is serving in the capacity of a project manager or contributing to the management of a project, portfolio of projects, or program. For example, a program manager is considered to be a project practitioner under this definition.

PRACTITIONER

CHAPTER EXAM
