CHAPTER 1 – INTRODUCTION TO THE PMBOK® GUIDE

PROJECT BASICS

Project – Temporary endeavor to create a unique product or service (e.g. upgrade invoice system).
Operations – Repeatable, ongoing process (e.g. enter invoices each day).
Program – A group of related projects managed in a coordinated way (will always have projects).
Portfolio – A group of programs/projects/operations with common goals (but may NOT be related).
Project Management – Apply knowledge, skills, and tools to increase the chance of project success.
Project Manager (PM) – Leads the team responsible for achieving project objectives.
PMBOK® Guide – Subset of PM knowledge that is "generally recognized" and "good practice.

REASONS FOR PROJECT INITIATION

Meet legal or social requirements (e.g. adhering to a new law on the handling of toxic material)
Satisfy stakeholder needs (e.g. filming a sequel to a film that was incredibly popular)
Implement or change business or tech strategies (e.g. a new mayor funding a promised road project)
Create or improve products or processes (e.g. using Six Sigma to improve our online order process)

PROCESS GROUPS

Initiating – Define a new project or phase by obtaining authorization to start.
Planning – Establish the scope of the project and define the course of action required.
Executing – Complete the work defined in the project management plan.
Monitoring & Controlling – Track, review, and regulate the progress of the project.
Closing – Finalize all activities to formally close the project or phase.
(Process groups often overlap and are rarely one-time events.)

PROCESS TYPES

Project Processes – Help manage the project (e.g. estimating costs, creating schedules).
Product Processes – Create the project's product (e.g. pouring concrete, painting walls).

PROJECT PHASES & LIFECYCLES

Project Phase – A collection of related project activities that results in completed deliverables.
Project Phase Gate – A review at the end of a phase before moving on to the next.
Project Lifecycle – The series of phases that a project goes through.
- Predictive ("waterfall") – Scope, cost, and schedule is determined early; changes managed closely.
- Iterative – Scope determined early; time and cost may change; increments add functionality.
- Incremental – Deliverables created through iterations; only complete after final iteration.
- Adaptive – Agile, iterative, or incremental; scope approved before the start of an iteration.
- Hybrid – Combines predictive and agile; fixed reqt's use predictive; evolving reqt's use agile.

PROJECT TAILORING

As each project is unique; not all inputs, outputs, tools, and techniques will be required.
The tailoring process involves selecting those things which are appropriate for a given project.

PROJECT INFORMATION

Work Performance Data – The raw observations and measurements generated during activities.
- Examples: start and finish dates of schedule activities, actual costs, actual durations, etc.

Work Performance Information – The performance data collected, analyzed and integrated.
- Examples: status of deliverables and forecasted estimates to complete.

Work Performance Reports – The physical or electronic representation of work performance info.
- Examples: status reports, memos, and dashboards.

CHAPTER 2 – PROJECT ENVIRONMENT

ORGANIZATIONAL STRUCTURES

	PM's Authority	PM's Role	Resources	Controls Budget	PM Admin Staff
Organic/Simple	Little/None	Part-Time	Little/None	Owner	Little/None
Functional	Little/None	Part-Time	Little/None	Func. Mgr.	Part-Time
Multi-Divisional	Little/None	Part-Time	Little/None	Func. Mgr.	Part-Time
Matrix–Strong	Mod./High	Full-Time	Mod./High	PM	Full-Time
Matrix–Weak	Low	Part-Time	Low	Func. Mgr.	Part-Time
Matrix–Balanced	Low/Mod.	Part-Time	Low/Mod.	Mixed	Part-Time
Project-Oriented	High	Full-Time	High	PM	Full-Time
Virtual	Low/Mod.	Mixed	Low/Mod.	Mixed	Mixed
Hybrid	Mixed	Mixed	Mixed	Mixed	Mixed
PMO	High	Full-Time	High	PM	Full-Time

PROJECT INFLUENCES – MAJOR CATEGORIES

Enterprise Environmental Factors – Conditions (external/internal) NOT under control of the team.
- Examples (external): marketplace conditions, legal restrictions, cultural influences, etc.
- Examples (internal): organizational structure, organizational culture, employee capability, etc.

Organizational Process Assets – Plans, policies, and knowledge bases internal to the organization.
- Examples: company hiring policies, schedule templates, financial databases.

PROJECT MANAGEMENT OFFICE (PMO) TYPES

Project Management Office (PMO) – Standardizes project "governance" across an organization.
- Supporting – Provide consulting by supplying templates, best practices, and coaching/training.
- Controlling – Provide support and require compliance to standards.
- Directive – Take control of projects by directly managing them.

CHAPTER 3 – THE ROLE OF THE PROJECT MANAGER (PM)

PROJECT MANAGER – "SPHERE OF INFLUENCE"

Sphere of Influence – The areas where a project manager has impact and can affect events.
- Project – Leads the team to achieve project objectives and stakeholder expectations.
- Organization – Interacts with other PMs; helps address issues of alignment, priorities, resources.
- Industry – Stays current with industry trends; identifies where to apply them on current projects.
- Professional Discipline – Shares knowledge with others in the profession; continues education.

PMI TALENT TRIANGLE® - SKILLS NEEDED

Technical Project Management – Skills to successfully manage projects, programs, and portfolios.
Leadership – Skills to direct and motivate a team to achieve business goals.
Strategic & Business Management – Skills in strategy and expertise in their industry/organization.

LEADERSHIP VS. MANAGEMENT

Management – Directing someone to get work done using their position of power.
- Focuses on systems, relies on power/control, has near-term goals, strives to "do things right."

Leadership – Guiding and influencing others to accomplish something.
- Focuses on relationships, inspires trust, has a long-term vision, strives to "do the right things."

CHAPTER 4 – PROJECT INTEGRATION MANAGEMENT

KEY CONCEPTS

Integration Management – Helps to combine and unify other project management processes.
Project Charter – Authorizes the project; provides the PM with authority to use resources..
Project Management Plan – Outlines how a project will get done; integrates various plans.

PROCESSES

Develop Project Charter (I) - Authorizing the project; providing the PM with authority.
Develop Project Mgmt. Plan (P) - Integrating subsidiary plans into a comprehensive project plan.
Direct & Manage Project Work (E) - Performing project work; implementing approved changes.
Manage Project Knowledge (E) - Using and creating knowledge to support the project/organization.
Monitor and Control Project Work (M) – Reviewing/reporting project progress against objectives.
Perform Integrated Change Control (M) – Reviewing change requests; communicating decisions.
Close Project or Phase (C) - Formally completing the project or a phase of the project.

CHANGE MANGEMENT

Integrated Change Control – Managing changes within the context of the overall project plans.
- It can be conducted at anytime and requested by any stakeholder. (PM has ultimate responsibility.)
- It should be written and include estimated impacts to cost and schedule.
- Before baselines are set, changes do NOT need to undergo formal change control.

Change Control – Managing changes to documents, deliverables, or baselines of the project.
Configuration Control – Managing changes to the physical characteristics of a product.
Change Control Board (CCB) – Formal group that reviews changes and communicates decisions.

"DEVELOP PROJECT CHARTER" – KEY INPUTS

Agreements – Defines initial project intentions; could be a contract, verbal agreement, email, etc.
Business Documents – Helps us understand how the project will support business goals/objectives.
- Business Case – Includes a justification for the project (cost-benefit analysis).
- Benefits Management Plan – Outlines how benefits from the project will be captured/sustained.

CHAPTER 5 – PROJECT SCOPE MANAGEMENT

KEY CONCEPTS

Scope Management – Ensuring the project accounts for all required work (nothing more).
- On agile projects, scope evolves over time; the project team uses prototypes to refine requirements.

PROCESSES

Plan Scope Mgmt. (P) - Documenting how scope will be defined and controlled.
Collect Requirements (P) - Documenting stakeholders needs.
Define Scope (P) - Developing a detailed project and product description.
Create WBS (P) - Decomposing project work into smaller components.
Validate Scope (M) - Formalizing acceptance of completed deliverables.
Control Scope (M) - Monitoring project scope and managing changes to the scope baseline.

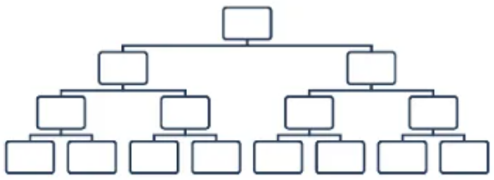
PROJECT DECOMPOSITION

Project

Deliverable

Work Package (Ch. 5)

Activity (Ch. 6)



"COLLECT REQUIREMENTS" – KEY TOOLS

Brainstorming (data gathering) – Used to generate multiple ideas about requirements.
Interviews (data gathering) – A formal or informal approach to gather information from stakeholders.
Focus Groups (data gathering) – Brings together stakeholders and SMEs to learn about their needs.
Surveys (data gathering) – Written questions to gather information from many respondents.
Benchmarking (data gathering) – Comparing to other organizations to find ways to improve.
Document Analysis (data analysis) – Reviewing docs to identify information relevant to requirements.
Voting (decision making) – Voting on requirements; outcome could be unanimity, majority, plurality.
Multi-Criteria Decision Analysis (decision making) – Using a matrix to evaluate/score requirements.
Affinity Diagrams (data representation) – Classifying many requirements into groups for analysis.
Mind-Mapping (data representation) – Consolidating/evaluating ideas from brainstorming sessions.
Nominal Group Technique (interpersonal skills) – Mix of brainstorming/voting; best ideas go forward.
Observations/Conversations (interpersonal skills) – Viewing people in their environment to get ideas.
Facilitation (interpersonal skills) – Focused workshops with key stakeholders (e.g. used in JAD).
Context Diagrams – An illustration of scope showing a system and how people interact with it.
Prototypes – Used to gather early feedback on product requirements by sharing a working version

"COLLECT REQUIREMENTS" – KEY OUTPUTS

Requirements Traceability Matrix – Links requirements to the deliverables that satisfy them
Requirements Documentation – Describe requirements; which should be written, clear, traceable.
- Business Requirements – Address the needs of the overall organization.
- Stakeholder Requirements – Address the needs of stakeholders (those affected by the project).
- Project Requirements – Address things the project must meet (e.g. milestone dates).
- Transition Requirements – Address temporary capabilities (e.g. initial training upon "handoff").
- Quality Requirements – Address quality expectations (e.g. the use of tests and certifications).
- Solution Requirements – Address project or service functionality.
  * Functional – behaviors of a product (e.g. process an order).
  * Non-Functional – conditions that support those behaviors (e.g. security, performance)

SCOPE BASELINE – COMPONENTS

1. **Project Scope Statement –** Description of project scope, deliverables, assumptions, constraints.
2. **WBS –** Decomposition of the total scope of work to be carried out by the project team.
3. **Work Package** – The lowest level of the WBS; includes a unique ID; is part of a control account.
4. **Planning Package** – Above the work package in a WBS, but below a control account (i.e. between).
5. **WBS Dictionary –** Detailed information about WBS components.

CHAPTER 6 – PROJECT SCHEDULE MANAGEMENT

PROCESSES

Plan Schedule Mgmt. (P) - Documenting how the schedule will be developed and controlled.
Define Activities (P) - Identifying the steps required to produce project deliverables.
Sequence Activities (P) - Identifying relationships (or order) of project activities.
Estimate Activity Durations (P) - Approximating the number of work periods to complete activities.
Develop Schedule (P) - Analyzing activities sequences and estimates to create the schedule.
Control Schedule (M) - Monitoring activity progress; managing changes to the schedule baseline.

"DEFINE ACTIVITIES" – KEY OUTPUTS

Activity List – A list of activities with identifiers and scope; in agile, this is updated periodically.
Activity Attributes – More info about activities (e.g. identifiers, predecessors, leads/lags, etc.).
Milestone List – A list of major points in the project; indicates whether they are mandatory/optional.

"SEQUENCE ACTIVITIES" – KEY CONCEPTS

Sequence Activities – Documenting activity relationships. (Not everything can be at the same time!)
- Predecessor – A task that comes before another.
- Successor – A task that comes after another.

"SEQUENCE ACTIVITIES" – KEY TOOLS

Dependency Determination & Integration
- Mandatory Dependencies – Legally required or inherent in the nature of the work.
- Discretionary Dependencies – Based on knowledge of best practices.
- External Dependencies – Outside the project team's control.
- Internal Dependencies – Inside the project team's control.

Precedence Diagramming Method (PDM)
- Finish-to-Start (FS) – A predecessor must finish before a successor can start..
- Finish-to-Finish (FF) – A predecessor must finish before a successor can finish.
- Start-to-Start (SS) – A predecessor must start before a successor can start.
- Start-to-Finish (SF) – A predecessor must start before a successor can finish.

Leads & Lags
- Lead – The amount of time that a successor activity can be advanced (start early).
- Lag – The amount of time a successor activity will be delayed.

"DEVELOP SCHEDULE" – KEY TOOLS

Schedule Network Analysis – Identifying early and late start/finish dates.
Critical Path Method – Estimating minimum project duration and amount of scheduling flexibility.
Resource Optimization – Adjusting activities so resources are appropriately allocated.
Schedule Compression – Shortening schedule without reducing scope.
Agile Release Planning – A timeline of the release schedule based on the product roadmap/vision.

"DEVELOP SCHEDULE" – KEY OUTPUTS

Schedule Baseline - Approved version of the schedule; under change control; compared to actuals.
Project Schedule - Includes linked activities with planned dates, durations, milestones, resources.
Schedule Data – Supporting detail for the schedule (e.g. alternative schedule, cash-flow projections).
Project Calendars - Identifies the project's working days and shifts.

"ESTIMATE ACTIVITY DURATIONS" – ESTIMATING TECHNIQUES

Bottom-Up Estimating – Aggregating estimates of lower-level components of the WBS.
Analogous Estimating – Using historical data from a similar project or activity.
Parametric Estimating – Using an algorithm built on historical data to generate an estimate.
Three-Point Estimating – Averaging optimistic, pessimistic, and most likely estimates.

"ESTIMATE ACTIVITY DURATIONS" – KEY OUTPUTS

Duration Estimates – Estimated number of time periods to complete the work.
Basis of Estimates – Details supporting the duration estimates. (e.g. method, assumptions, etc.)

CHAPTER 7 – PROJECT COST MANAGEMENT

PROCESSES

Plan Cost Mgmt. (P) - Documenting how to estimate and control costs.
Estimate Costs (P) - Calculating the finances needed to complete project activities.
Determine Budget (P) - Summing the costs of individual activities to generate the cost baseline.
Control Costs (M) - Monitoring project costs and managing changes to the cost baseline.

"ESTIMATE COSTS" – KEY OUTPUTS

Cost Estimates – Probable costs required to complete project work (labor, materials, etc.)
Basis of Estimates – Details supporting the cost estimates. (e.g. method, assumptions, etc.)

"DETERMINE BUDGET" – KEY OUTPUTS

Cost Baseline – The approved budget; excludes management reserves; compared to the actuals.
Project Funding Requirements – Outlines when costs must be paid (as funding may be incremental).

"DETERMINE BUDGET" – KEY TOOLS

Cost Aggregation – Adding estimates for work packages, then control accounts, and then the project.
Data Analysis – Can include using "reserve analysis" (i.e. adding funds for unexpected events).
Historical Information Review – Reviewing historical information to help estimate total project cost.
Funding Limit Reconciliation – Determining if funding will be available when expenses must be paid.
Financing – Acquiring funds for the project, which may come from external sources.

"CONTROL COSTS" – DATA ANALYSIS

Earned Value Analysis (EVA)
- Planned Value (PV) – The authorized budget assigned to an activity, not including reserve.
- Earned Value (EV) – The budget associated with the work that has been completed ("earned").
- Actual Cost (AC) – The total cost incurred to accomplish the work that EV measured.

Variance Analysis

- Schedule Variance (SV)	SV = EV - PV	The amount you are ahead or behind schedule.
- Cost Variance (CV)	CV = EV – AC	The amount you are under or over budget.
- Schedule Perf. Index (SPI)	SPI = EV / PV	Your schedule efficiency ratio.
- Cost Perf. Index (CPI)	CPI = EV / AC	Your cost efficiency ratio.

Trend Analysis
- Budget at Completion (BAC) – The total planned value (PV) for the project.
- Estimate to Completion (ETC) – The forecasted amount needed to finish remaining project work.
- Estimate at Completion (EAC) – The forecasted amount spent on the entire project.
  (EAC=AC+ETC… EAC=AC+(BAC–EV)… EAC=BAC/CPI… EAC=AC+[(BAC–EV)/(CPIxSPI)]

To-Complete Performance Index (TCPI)
- The cost performance (CPI) needed to meet your goal
- Considers the cost to finish the outstanding work and your remaining budget.

CHAPTER 8 – PROJECT QUALITY MANAGEMENT

PROCESSES

Plan Quality Mgmt. (P) - Identifying quality requirements and documenting how to comply with them.
Manage Quality (E) - Converting the quality mgmt. plan into actionable quality activities.
Control Quality (M) - Monitoring outcomes of quality activities to evaluate performance.

TRENDS IN QUALITY MANAGEMENT

Customer Satisfaction – Meeting requirements and fitness for use (satisfies the real need).
Continual Improvement – Using the PDCA (plan-do-check-act) cycle to improve our processes.
Management Responsibility – Management is responsible for providing the necessary resources.
Mutually Beneficial Partnerships with Suppliers – Build long-term relationships with suppliers.

COST OF QUALITY – "QUALITY PLANNING"

Cost of Quality – Efforts to ensure good quality and address cases of poor quality.
Cost of Conformance – Money spend to avoid failures during the project.
- Prevention – Design and build quality products (e.g. training, equipment, and process documents).
- Appraisal – Assess quality (e.g. inspection and testing).

Cost of Non-Conformance – Money spent to fix failures.
- Internal Failure – Errors found by the project team (e.g. rework and scrap).
- External Failure – Errors found by the customer (e.g. warranties, recalls, and lost business).

"PLAN QUALITY MANAGEMENT" – KEY OUTPUTS

Quality Management Plan – Describes how an organization's quality policies will be implemented.
Quality Metrics – Description of a project or product attribute and how to measure it.

A SELECTION OF QUALITY MANAGEMENT TOOLS

Data Representation
- Affinity Diagram – A mind-mapping technique used to organize causes of defects into categories.
- Cause and Effect Diagram – Helps to organize and display the origins of a quality problem.
- Flowchart – Depicts the sequence of process steps that results in a defect.
- Logical Data Model – Shows how data flows in a company; helps diagnose data quality issues.
- Histogram – Displays data about defects in a statistical distribution.
- Matrix Diagram – Shows the strength of relationships that exist between variables.
- Scatter Diagrams – Displays how the amount of defects are related to other variables.
- Control Chart – Displays process data over time and against control limits (+/- 3 std. deviations).

Data Gathering
- Benchmarking – Comparing our organization with others to identify areas for improvement.
- Check Sheets – Used for counting ("tallying") when gathering data about quality problems.
- Statistical Sampling – Collecting data about a portion of the population for use in quality analysis.
- Questionnaires/Surveys – Used to gather feedback about customer satisfaction.

Data Analysis
- Cost of Quality – Efforts to ensure good quality and address cases of poor quality.
- Cost-Benefit Analysis – Compares the cost of quality against the benefit (e.g. less rework).
- Root Cause Analysis (RCA) – Working to determine the underlying causes of an issue.
- Process Analysis – Identify opportunities for process improvements.

Audits – Checking if the project is following policy/process; usually performed by external team.
Design for X (DfX) – Optimizing a specific aspect of a product's design (e.g. reliability, safety, etc.).
Inspection – Determining if work conforms to documented standards.
Testing & Product Evaluations – Testing a product to find errors or defects.

CHAPTER 9 – PROJECT RESOURCE MANAGEMENT

PROCESSES

Plan Resource Mgmt. (P) - Documenting how to estimate, acquire, and manage project resources.
Estimate Activity Resources (P) - Estimating the labor/materials needed to complete the project.
Acquire Resources (E) - Obtaining the labor/materials to complete the project.
Develop Team (E) - Improving team skills and relations to enhance project performance.
Manage Team (E) - Tracking team member performance, providing feedback, and resolving issues.
Control Resources (M) - Monitoring planned versus actual resource usage.

"PLAN RESOURCE MANAGEMENT" – KEY TOOLS

Organizational Theory – Explains how people, teams, and organizational units behave.
Data Representation Techniques
- Organization Chart (hierarchical) – Shows positions graphically; sometimes called OBS or RBS
- Responsibility Chart (matrix) – Shows resources assigned to work packages (e.g. RACI)
- Role Description (text) – Detailed role descriptions (qualifications, responsibilities, authority…)

"PLAN RESOURCE MANAGEMENT" – KEY OUTPUTS

Resource Management Plan - Describes how to manage your human resources/physical resources.
- Outlines how you identify, acquire, assign, train, develop, reward, and control those resources.

Team Charter – Outlines the team's values, communication guidelines, decision process, etc.

"ESTIMATE ACTIVITY RESOURCES" – KEY OUTPUTS

Resource Requirements – The types/quantities of resources required for each activity.
Resource Breakdown Structure (RBS) – A hierarchical view of resources by category/type.
Basis of Estimates – Details supporting the resource estimates. (e.g. method, assumptions, etc.)

"ACQUIRE RESOURCES" – KEY TOOLS

Pre-Assignment – When physical resources or team members are selected in advance.
Virtual Teams – Teams with little or no face-to-face interaction.
Multi-Criteria Decision Analysis – Ranking potential team members (e.g. by cost, experience, etc.)
Negotiation –Negotiations with managers (and external teams and organizations) for resources.

"ACQUIRE RESOURCES" – KEY OUTPUTS

Physical Resource Assignments – Describes material, equipment, and supplies that will be needed.
Project Team Assignments – Outlines who will do what on the project.
Resource Calendar – Shows the working days and shifts on which each specific resource is available.

"DEVELOP TEAM" – KEY TOOLS

Co-Location – Team positioned close to each other to improve communication and productivity.
Virtual Teams – Teams with little or no face-to-face interaction; can help cut costs (e.g. for travel).
Communication Technology – Could include video conferencing, e-mail, shared repositories, etc.
Interpersonal Skills – Could include conflict management, influencing, motivation, negotiation, etc.
Recognition & Rewards – Motivating team members to achieve desired behavior.
Training – Activities to improve the skills of the team (e.g. classroom training, informal coaching.)
Individual & Team Assessments – Assesses the teams strengths and weaknesses.

STAGES OF TEAM DEVELOPMENT – "TUCKMAN LADDER"

Forming – Team members are introduced to the project and their roles and responsibilities.
Storming – Team members begin to encounter potential conflict.
Norming – The team begins to work together and trust each other.
Performing – The team is functioning at a high level and working collaboratively to address issues.
Adjourning – The team finishes the current project and moves onto another.

CONFLICT RESOLUTION TECHNIQUES

Withdraw/Avoid – Evade or delay the conflict in order to be better prepared to address it.
Smooth/Accommodate – Focus on areas of agreement or yielding to others to maintain harmony.
Compromise/Reconcile – Seek a solution that only partially satisfies all parties.
Force/Direct – Push a viewpoint on another – typically by using a position of power.
Collaborate/Problem Solve – Work together constructively to incorporate multiple viewpoints.

CHAPTER 10 – PROJECT COMMUNICATIONS MANAGEMENT

PROCESSES

Plan Communications Mgmt. (P) - Developing a plan for comms. based on stakeholder needs.
Manage Communications (E) - Creating and distributing project information.
Monitor Communications (M) - Monitoring communications to ensure stakeholders needs are met.

COMMUNICATION DIMENSIONS

Internal – inside the project
Formal – reports and presentations
Vertical – with management
Official – "on the record"
Written/Verbal – the use of words

External – outside groups
Informal – emails and conversations
Horizontal – with peers
Unofficial – "off the record"
Nonverbal – the use of body language

COMMUNICATION METHODS

Push Communication – Involves sending ("pushing") messages, such as emails, to those who need it.
Pull Communication – Requires recipients to access it on their own time ("pulling"), when needed.
Interactive Communication – Bi-directional communication between people (e.g. video chats).

COMMUNICATIONS MANAGEMENT PLAN – KEY COMPONENTS

What needs to be communicated, also why and when (e.g. each Friday during the project).
Who will authorize the distribution, and who will communicate the information.
Who will receive the information (e.g. the sponsor, internal stakeholders, the public, etc.).
How will the information be sent (e.g. e-mail, conference call).
What resources will be allocated or communication activities.
How will be an issue be escalated, if one arises.

COMMUNICATION MODEL STEPS

Encode – A sender translates (encodes) a message into language.
Transmit – The encoded message is sent (by the sender) using a communication medium.
Noise – Various factors may compromise the message (e.g. distance, cultural differences, etc.).
Decode – The receiver translates the encoded message into meaningful thoughts.
Acknowledge – The receiver may acknowledge that they received the message.
Feedback/Response – The receiver may encode a response and transmit it to the sender.

COMMUNICATION CHANNELS CALCULATION

of stakeholders = n
# of communication channels = n(n-1)/2
# of communication channels = 9(9-1)/2… 9(8)/2… 72/2… 36

CHAPTER 11 – PROJECT RISK MANAGEMENT

PROCESSES

Plan Risk Mgmt. (P) - Defining how to conduct risk mgmt. on the project.
Identify Risks (P) - Detecting risks that may affect the project.
Perform Qualitative Risk Analysis (P) - Prioritizing risks by evaluating their probability and impact.
Perform Quantitative Risk Analysis (P) - Numerically analyzing the effect of risks on objectives.
Plan Risk Responses (P) - Defining strategies and actions to address project risks.
Implement Risk Responses (E) - Implementing planned risk responses.
Monitor Risks (M) - Tracking risks; identifying and analyzing new ones.

KEY CONCEPTS

Risk – An uncertain event that, if occurs, has a positive or negative effect on the project.
Probability – How likely is the risk to happen?
Impact – If the risk does happen, how good or bad will the effects be?
Risk Register – Includes identified risks and response plans. Updated throughout risk planning.

"IDENTIFY RISKS" – KEY TOOLS

Data Gathering
- Brainstorming – General technique for identifying risks.
- Checklists – Used to determine if risks on past projects apply to our new project.
- Interviewing – Interviewing experienced stakeholders and experts to identify risks.

Data Analysis
- SWOT Analysis – Helps identify potential risks; stands for strength, weakness, opportunity, threat.
- Root Cause Analysis (RCA) – Working to determine the underlying causes of an issue.
- Document Analysis – Reviewing document inputs to identify possible risks.
- Assumption Analysis – Identifying risks to the project from inaccuracy of assumptions.

"PERFORM QUANTITATIVE RISK ANALYSIS" – "DATA ANALYSIS" TOOLS

Simulations – Simulates ("iterates") the effect of risks on project outcomes (Monte Carlo)
Sensitivity Analysis – Assessing which risk could have the biggest impact on project outcomes.
Decision Tree Analysis – Shows alternate paths through a project to support decision-making.
Influence Diagrams – Shows effects between project variables (S-curves, tornado diagrams).

NEGATIVE RISK REPONSES (THREATS)

Avoid – Eliminate the threat or protect the project from its impact.
Transfer – Shift the impact of a threat to a third party.
Mitigate – Reduce the probability of occurrence or impact of a risk.
Accept – Acknowledge the risk and not take any action unless the risk occurs.
Escalate – For risks beyond the project's scope/authority, communicate them to the proper parties.

POSITIVE RISK RESPONSES (OPPORTUNITIES)

Exploit – Eliminate the uncertainty by ensuring the opportunity definitely happens.
Enhance – Increase the probability and/or positive impacts of an opportunity.
Share – Allocating ownership to a third party who is best able to capture the benefit.
Accept – Take advantage of the opportunity if it arises, but do not actively pursue it.
Escalate – For risks beyond the project's scope/authority, communicate them to the proper parties.

CHAPTER 12 – PROJECT PROCUREMENT MANAGEMENT

PROCESSES

Plan Procurement Mgmt. (P) - Documenting the procurement method; identifying potential sellers.
Conduct Procurements (E) - Collecting seller responses, choosing a seller, and awarding a contract.
Control Procurements (M) - Managing procurement relationships and monitor contract performance.

"PLAN PROCUREMENT MANAGEMENT" – KEY OUTPUTS

Procurement Management Plan – Describes how to acquire goods/services from external orgs.
Procurement Strategy – Outlines delivery methods, contract types, and procurement phases.
Procurement Statement of Work (SOW) – The portion of the scope baseline to include in a contract.
Bid Documents – Used to solicit proposals from prospective sellers (e.g. RFI, RFP, RFQ).
Make-or-Buy Decisions – Decisions about whether or not work needs to be purchased externally.
Source Selection Criteria – The criteria used to rate or score sellers. (Such as overall cost.)
Independent Cost Estimates – Generating our own cost estimate to use as a benchmark for bids.

"CONDUCT PROCUREMENTS" – KEY TOOLS

Advertising – Using advertising to draw more potential sellers.
Bidder Conferences – Meetings between the buyer and possible sellers prior to submittal of bids.
Data Analysis– Using a formal proposal evaluation review process.
Interpersonal Skills (Negotiation) – Used to clarify the structure and terms of a contract.

"CONTROL PROCUREMENTS" – KEY TOOLS

Data Analysis
- Performance Reviews – A structured review of the seller's progress.
- Earned Value Analysis (EVA) – Assess the cost/schedule variance and performance of the seller.
- Trend Analysis – Forecasting the estimated costs at completion (EAC).

Claims Administration – Handling contested changes where the buyer/seller don't agree (ADR).
Audits – A review of the procurement process to identify successes and failures.

CONTRACT TYPES

Fixed Price
- Firm Fixed Price (FFP) – The price is determined at the start and is not subject to change.
- Fixed Price Incentive Fee (FPIF) – Bonuses may be given if certain objectives are achieved.
- Fixed Price w/ Economic Price Adjustment (FP-EPA) – May adjust based on economic indices.

Cost-Reimbursable
- Cost Plus Fixed Fee (CFPP) – The seller is reimbursed for costs and given a fixed payment.
- Cost Plus Incentive Fee (CPIF) – Bonuses may be given if certain objectives are achieved.
- Cost Plus Award Fee (CPAF) – A fee is earned if broad subjective performance criteria are met.

Time & Materials (T&M) – Cost may not be fully defined at the start and scope may be open-ended.

CHAPTER 13 – PROJECT STAKEHOLDER MANAGEMENT

KEY CONCEPTS

Project Stakeholders – Anyone who may be affected by the project.
- May be actively involved; may have differing expectations; may be positively/negatively impacted.

Stakeholder Register – Documents the following (sensitive) information about your stakeholders:
- Identification Information – Name, organization, location, role, etc.
- Assessment Information – Major requirements, expectations, influence, etc.
- Stakeholder Classification – Internal/external, impact/influence/power/interest, etc.

PROCESSES

Identify Stakeholders (I) - Determining who will be affected by the project.
Plan Stakeholder Engagement (P) - Developing strategies to engage stakeholders during the project.
Manage Stakeholder Engagement (E) - Communicating with stakeholders and addressing issues.
Monitor Stakeholder Engagement (M) - Monitoring and adjusting plans for engaging stakeholders

STAKEHOLDER CLASSIFICATION MODELS

Power/Interest Grid – by (1) level of authority (power); (2) level or concern (interest).
Power/Influence Grid – by (1) level of authority (power); (2) active involvement (influence).
Influence/Impact Grid – by (1) active involvement (influence); (2) ability to effect change (impact).
Stakeholder Cube – Combines the grids above into a 3D model.
Salience Model – by (1) power, (2) urgency, and (3) legitimacy.
Directions of Influence – Classifies according to how they can influence the work.

EXAMPLES OF STAKEHOLDERS

INTERNAL
- Sponsors – Provides the resources.
- Project Team – Create the deliverables.
- PM – Perform PM functions (budgeting).
- PMO – Standardize project governance.

External
- Customers – Approve/manage the outcomes.
- Users – Use the outcomes of the project.
- Suppliers – Under contract to provide things.

OTHER TIPS

PROCESS GROUP TIPS

Initiating – Only two processes. (Develop Project Charter, Identify Stakeholders)
Planning – Usually includes "plan", "estimate", or "define". (e.g. Define Activities)
Executing – Usually includes "manage", "conduct", or "acquire". (e.g. Conduct Procurements)
Monitoring & Controlling – Always includes "monitor", "control", or "validate". (e.g. Control Costs)
Closing – Only one process. (Close Project or Phase)

ITTO PATTERNS

1. Outputs of one process often become inputs to later processes.
2. Inputs and outputs are often documents. Tools and techniques are often actions.
3. The "Project Management Plan" is an input to nearly every process.
4. "Org. Process Assets" and "Enterprise Environmental Factors" are inputs to most processes.
5. "Expert Judgment", "Data Analysis", and "Meetings" are tools/techniques on many processes.
6. "Project Documents Updates" and "PMP Updates" are outputs of many processes.
7. Anything that includes "updates" will always be an output (never an input or tool).
8. Anything that includes "system" will always be a tool (never an input or output).
9. Individual plans (e.g. "Risk Mgmt. Plan") are almost always an output of "Plan …" processes.
10. "Work Performance Data" is an input on "Monitoring" processes. (Except in "Integration")
11. "Changes Requests" are an output on "Monitoring" processes. (Except in "Integration")
12. "Work Performance Info." is an output on "Monitoring" processes. (Except in "Integration")

Earned Value Management

BAC	No Formula.
PV	No Formula. It is sometimes expressed as a %age of BAC.
EV	No Formula. It is sometimes shown as a %age of BAC or PV.
AC	No Formula.
SV	SV = EV – PV
CV	CV = EV – AC
SPI	SPI = EV / PV
SPI_C	$SPI_C = \sum EV / \sum PV$
CPI	CPI = EV / AC
CPI_C	$CPI_C = \sum EV / \sum AC$
Budget % Spent	$\frac{\Sigma AC}{BAC} X100$

Project % Complete	$\frac{\Sigma EV}{BAC} X100$
ETC	ETC = (BAC – EV) / CPI
	ETC = (BAC – EV)
	$ETC = (BAC - EV) / CPI_p$
EAC	EAC = AC + ETC
	EAC = AC + (BAC – EV)
	EAC = AC + (BAC – EV) / CPI
	EAC = BAC / CPI
	EAC = AC + [(BAC – EV) / (CPI * SPI)]
VAC	VAC = BAC – EAC
TCPI	TCPI = (BAC – EV) / (BAC – AC)
	TCPI = (BAC – EV) / (EAC – AC)

Earned Schedule Management

SV_T	ES - AT
SPI_T	ES / AT

Network Diagram

Total Float	TF = LS – ES
	TF = LF – EF
Free Float	$FF = ES_{Successor} - ES_{Present} - Dur_{Present}$

Project Selection Methods

PV / DCF	$PV = FV / (1 + r)^n$
	PV = FV * DF
NPV	NPV = ∑PV
ROI	ROI = Return / Investment
BCR	BCR = Benefits / Costs
CBR	CBR = Costs / Benefits
IRR	Formula not needed. Higher is better.
PP	No formula. Lesser the better.
Opp Cost	No formula.

Expected Monetary Value

EMV_R	$EMV_R = P * I$
EMV_P	$EMV_P = \sum EMV_R$
Net Benefit	Net Benefit = EMV_P – Cost

Estimation

Triangular Dist.	E = (O + P + M) / 3
	$\sigma = \sqrt{\frac{(P-O)^2 + (M-P)(M-O)}{18}}$
PERT	E = (O + P + 4*M) / 6
	σ = (P – O) / 6
Range Est.	R = E ± (n * σ)
Var.	$Var = \sigma^2$
Path Var.	$Var_{Path} = \sum(Var)$
Path St. Deviation	$\sigma_{Path} = \sqrt{Var_{Path}}$
Sigma Values	1σ = 68.27%
	2σ = 95.45%
	3σ = 99.73%
	4σ - 99.994%
	5σ = 99.99994%
	6σ = 99.999999%

Communication Channels

C = n*(n – 1) / 2

Procurement

Pt. of Total Assumption	$PTA = \frac{CP - TP}{Buyer's\ Share\ Ratio} + TC$