Project Management Framework

- What’s “Project”?  
  - Why “Project”?  
- What’s “Project Management”?  
  - Why “Project Management”?  
- What’s “Project Management Professionals”?  
  - Why “Project Management Professionals”?
### Project Management Framework

- **Organizational Influences**

<table>
<thead>
<tr>
<th>Organization Structure</th>
<th>Functional</th>
<th>Weak Matrix</th>
<th>Balanced Matrix</th>
<th>Strong Matrix</th>
<th>Projectized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager's Authority</td>
<td>Little or None</td>
<td>Limited</td>
<td>Low to Moderate</td>
<td>Moderate to High</td>
<td>High to Almost Total</td>
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<tr>
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<tr>
<td>Who controls the project budget</td>
<td>Functional Manager</td>
<td>Functional Manager</td>
<td>Mixed</td>
<td>Project Manager</td>
<td>Project Manager</td>
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<tr>
<td>Project Manager's Role</td>
<td>Part-time</td>
<td>Part-time</td>
<td>Full-time</td>
<td>Full-time</td>
<td>Full-time</td>
</tr>
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<td>Project Management Administrative Staff</td>
<td>Part-time</td>
<td>Part-time</td>
<td>Part-time</td>
<td>Full-time</td>
<td>Full-time</td>
</tr>
</tbody>
</table>

Source: PMBOK 2004
Project Management Framework

The *PMBOK® GUIDE* Structure:

- Project life cycle definition
- 5 Processes
- 9 Knowledge Areas
Project Management Framework

Source: PMBOK 2004
Project Management Framework

- 9 Knowledge areas describe the key competencies that project managers must develop.
  - 4 core knowledge areas lead to specific project objectives (scope, time, cost, and quality).
  - 4 facilitating knowledge areas are the means through which the project objectives are achieved (human resources, communication, risk, and procurement management).
  - 1 knowledge area (project integration management) affects and is affected by all of the other knowledge areas.
  - All knowledge areas are important!
Project Integration Management

- **4.1 Develop the project charter:**
  Work with stakeholders to create the document that formally authorizes a project—the charter.

- **4.2 Develop the preliminary project scope statement:**
  Work with stakeholders, especially users of the project’s products, services, or results, to develop the high-level scope requirements and create a preliminary project scope statement.

- **4.3 Develop the project management plan:**
  Coordinate all planning efforts to create a consistent, coherent document—the project management plan.

Source: PMBOK 2004
Project Integration Management

- **4.4 Direct and manage project execution:** Carry out the project management plan by performing the activities included in it.
- **4.5 Monitor and control the project work:** Oversee project work to meet the performance objectives of the project.
- **4.6 Perform integrated change control:** Coordinate changes that affect the project’s deliverables and organizational process assets.
- **4.7 Close the project:** Finalize all project activities for formally closure

Source: PMBOK 2004
Develop Project Charter

**Inputs**
1. Contract (when applicable)
2. Project statement of work
3. Enterprise environmental factors
4. Organizational process assets

**Tools & Techniques**
1. Project selection methods
2. Project management methodology
3. Project management information system
4. Expert judgment

**Outputs**
1. Project charter

Source: PMBOK 2004
Develop Project Charter

- Purpose of Project Charter
  - Constraint, Assumptions
  - What is “Stakeholder”?

- Project Statement of Work
- Enterprise Environmental Factors
- Organization Process Assets
Develop Project Charter

- Project Selection Methods
  - Benefit measurement
  - Mathematical models

- Project Management Methodology
- Project Management Information System
- Expert Judgment
Develop Preliminary Project Scope Statement

**Inputs**
1. Project charter
2. Project statement of work
3. Enterprise environmental factors
4. Organizational process assets

**Tools & Techniques**
1. Project management methodology
2. Project management information system
3. Expert judgment

**Outputs**
1. Preliminary project scope statement

Source: PMBOK 2004
Develop Preliminary Project Scope Statement

- **What is Required?**
  - Project Statement of Work
  - Company Culture
  - Company Existing Systems
  - Processes, Procedure
  - Historical Information
Develop Project Management Plan

**Inputs**
1. Preliminary project scope statement
2. Project management processes
3. Enterprise environmental factors
4. Organizational process assets

**Tools & Techniques**
1. Project management methodology
2. Project management information system
3. Expert judgment

**Outputs**
1. Project management plan

Source: PMBOK 2004
Develop Project Management Plan

- **Subsidiary plans include, but are not limited to:**
  - Project scope,
  - time,
  - cost,
  - quality,
  - human resource,
  - communication,
  - risk,
  - procurement management plan (Magic 9!)

- **These other components include, but are not limited to:**
  - Milestone list
  - Resource calendar
  - Schedule baseline
  - Cost baseline
  - Quality baseline
  - Risk register
Develop Project Management Plan

- Configuration Management System
- Change Control System
- Work Authorization System
- Project Baseline
- Project Management Plan Approval
- Kickoff Meeting
Direct and Manage Project Execution

Inputs
1. Project management plan
2. Approved corrective actions
3. Approved preventive actions
4. Approved change requests
5. Approved defect repair
6. Validated defect repair
7. Administrative closure procedure

Tools & Techniques
1. Project management methodology
2. Project management information system

Outputs
1. Deliverables
2. Requested changes
3. Implemented change requests
4. Implemented corrective actions
5. Implemented preventive actions
6. Implemented defect repair
7. Work performance information

Source: PMBOK 2004
Direct and Manage Project Execution

- Approved corrective actions that will bring anticipated project performance into compliance with the project management plan
- Approved preventive actions to reduce the probability of potential negative consequences
- Approved defect repair requests to correct product defects found by the quality process.
Direct and Manage Project Execution

- Deliverables
- Requested Changes
- Implemented Change Requests, Corrective Actions, Preventive Actions, Defect Repair
- Work Performance Information
Monitor and Control Project Work

**Inputs**
1. Project management plan
2. Work performance information
3. Rejected change requests

**Tools & Techniques**
1. Project management methodology
2. Project management information system
3. Earned value management
4. Expert judgment

**Outputs**
1. Recommended corrective actions
2. Recommended preventive actions
3. Forecasts
4. Recommended defect repair
5. Requested changes

Source: PMBOK 2004
Monitor and Control Project Work

- Comparing actual project performance against the project management plan
- Assessing performance to determine whether any corrective or preventive actions are indicated
- Analyzing, tracking, and monitoring project risks to make sure the risks are identified, their status is reported, and that appropriate risk response plans are being executed
Monitor and Control Project Work

- Maintaining an accurate, timely information base concerning the project’s product(s) and their associated documentation through project completion
- Providing information to support status reporting, progress measurement, and forecasting to update current cost and current schedule information
- Monitoring implementation of approved changes when and as they occur.
Integrated Change Control

**Inputs**
1. Project management plan
2. Requested changes
3. Work performance information
4. Recommended preventive actions
5. Recommended corrective actions
6. Recommended defect repair
7. Deliverables

**Tools & Techniques**
1. Project management methodology
2. Project management information system
3. Expert judgment

**Outputs**
1. Approved change requests
2. Rejected change requests
3. Project management plan (updates)
4. Project scope statement (updates)
5. Approved corrective actions
6. Approved preventive actions
7. Approved defect repair
8. Validated defect repair
9. Deliverables

Source: PMBOK 2004
Integrated Change Control

- What is the “Triple Constraint”? 
- Process of making changes
- Corrective Action and Integrated Change Control Process
- Change Control Board
configuration management activities included in the integrated change control process are:

- Configuration Identification.
- Configuration Status Accounting.
- Configuration Verification and Auditing.
# Close Project

## Inputs
1. Project management plan
2. Contract documentation
3. Enterprise environmental factors
4. Organizational process assets
5. Work performance information
6. Deliverables

## Tools & Techniques
1. Project management methodology
2. Project management information system
3. Expert judgment

## Outputs
1. Administrative closure procedure
2. Contract closure procedure
3. Final product, service or result
4. Organizational process assets (updates)

Source: PMBOK 2004
Close Project

- Administrative Closure Procedure
- Contract Closure Procedure
- 4 Formal types of project ending:
  - Addition
  - Starvation
  - Integration
  - Extinction
Project Scope Management

- **Scope**  
  refers to *all* the work involved in creating the products of the project and the processes used to create them.

- **5.1 Scope planning:**  
  Key inputs include the project charter, preliminary scope statement, and project management plan.

- **5.2 Scope definition:**  
  Reviewing the project charter and preliminary scope statement and adding more information as requirements are developed and change requests are approved.

Source: PMBOK 2004
Project Scope Management

- **5.3 Creating the WBS:** Subdividing the major project deliverables into smaller, more manageable components.

- **5.4 Scope verification:** Formalizing acceptance of the project scope. Scope creep!

- **5.5 Scope control:** Controlling changes to project scope.

Source: PMBOK 2004
Scope Planning

Inputs
- 1. Enterprise environmental factors
- 2. Organizational process assets
- 3. Project charter
- 4. Preliminary project scope statement
- 5. Project management plan

Tools & Techniques
- 1. Expert judgment
- 2. Templates, forms, standards

Outputs
- 1. Project scope management plan

Source: PMBOK 2004
Scope Planning

- **Templates, Forms, Standards**
  - Templates could include work breakdown structure templates, scope management plan templates, and project scope change control forms.

- **Project Scope Management Plan**
Scope Definition

**Inputs**
1. Organizational process assets
2. Project charter
3. Preliminary project scope statement
4. Project scope management plan
5. Approved change requests

**Tools & Techniques**
1. Product analysis
2. Alternatives identification
3. Expert judgment
4. Stakeholder analysis

**Outputs**
1. Project scope statement
2. Requested changes
3. Project scope management plan (updates)

Source: PMBOK 2004
Scope Definition

- Product Analysis
- Alternatives Identification
- Stakeholder Analysis
Create WBS

**Inputs**
1. Organizational process assets
2. Project scope statement
3. Project scope management plan
4. Approved change requests

**Tools & Techniques**
1. Work breakdown structure templates
2. Decomposition

**Outputs**
1. Project scope statement (updates)
2. Work breakdown structure
3. WBS dictionary
4. Scope baseline
5. Project scope management plan (updates)
6. Requested changes

Source: PMBOK 2004
Create WBS

- **WBS (Work Breakdown Structure):**
  
a deliverable-oriented hierarchical decomposition of the work to be executed by the project team, to accomplish the project objectives and create required deliverables.

- **Decomposition**
- **Control Account**
- **Work Package**
- **WBS Dictionary**
Scope Verification

Inputs
1. Project scope statement
2. WBS dictionary
3. Project scope management plan
4. Deliverables

Tools & Techniques
1. Inspection

Outputs
1. Accepted deliverables
2. Requested changes
3. Recommended corrective actions

Source: PMBOK 2004
Scope Verification

- **Inspection**
  - includes activities such as measuring, examining, and verifying to determine whether work and deliverables meet requirements and product acceptance criteria
  - Also called reviews, product reviews, audits, and walkthroughs.

- **Accepted Deliverables**
- **Recommended Corrective Actions**
## Scope Control

**Source:** PMBOK 2004

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<th>Tools &amp; Techniques</th>
<th>Outputs</th>
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<td>.1 Change control system</td>
<td>.1 Project scope statement (updates)</td>
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<td>.2 Work breakdown structure</td>
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<td>.2 Work breakdown structure (updates)</td>
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<td>.3 WBS dictionary</td>
<td>.3 Replanning</td>
<td>.3 WBS dictionary (updates)</td>
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<td>.4 Configuration management system</td>
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<tr>
<td></td>
<td></td>
<td>.8 Project management plan (updates)</td>
</tr>
</tbody>
</table>
Scope Control

- Change Control System
- Variance Analysis
- Configuration Management System
- Updated Scope Baseline
6.1 Activity definition:
Identifying the specific activities that the project team members and stakeholders must perform to produce the project deliverables.

6.2 Activity sequencing:
Identifying and documenting the relationships between project activities.

6.3 Activity resource estimating:
Estimating how many resources a project team should use to perform project activities.

Source: PMBOK 2004
Project Time Management

- **6.4 Activity duration estimating:** Estimating the number of work periods that are needed to complete individual activities.

- **6.5 Schedule development:** Analyzing activity sequences, activity resource estimates, and activity duration estimates to create the project schedule.

- **6.6 Schedule control:** Controlling and managing changes to the project schedule.

Source: PMBOK 2004
Activity Definition

### Inputs
1. Enterprise environmental factors
2. Organizational process assets
3. Project scope statement
4. Work breakdown structure
5. WBS dictionary
6. Project management plan

### Tools & Techniques
1. Decomposition
2. Templates
3. Rolling wave planning
4. Expert judgment
5. Planning component

### Outputs
1. Activity list
2. Activity attributes
3. Milestone list
4. Requested changes

Source: PMBOK 2004
Activity Definition

- Rolling Wave Planning
- Activity List
  - Note: Task is NOT used in PMBOK!
- Activity Attributes
  - activity identifier, activity codes, activity description, predecessor activities, successor activities, logical relationships, leads and lags, resource requirements
- Milestone List
Activity Sequencing

**Inputs**
- 1. Project scope statement
- 2. Activity list
- 3. Activity attributes
- 4. Milestone list
- 5. Approved change requests

**Tools & Techniques**
- 1. Precedence Diagramming Method (PDM)
- 2. Arrow Diagramming Method (ADM)
- 3. Schedule network templates
- 4. Dependency determination
- 5. Applying leads and lags

**Outputs**
- 1. Project schedule network diagrams
- 2. Activity list (updates)
- 3. Activity attributes (updates)
- 4. Requested changes

Source: PMBOK 2004
Activity Sequencing

- Involves reviewing activities and determining dependencies.
- A dependency or relationship relates to the sequencing of project activities or tasks.
- Dependencies must determine in order to use critical path analysis.
- Milestones
- Lead and Lags
Activity Sequencing

- **Network Diagrams**
  - Network diagrams are the preferred technique for showing activity sequencing.
  - A network diagram is a schematic display of the logical relationships among, or sequencing of, project activities.
- **Two main formats are the arrow and precedence diagramming methods.**
- **Differences between PDM and ADM**
Activity Sequencing

- **4 Types of Dependencies:**
  - Finish-to-Start.
  - Finish-to-Finish.
  - Start-to-Start.
  - Start-to-Finish.

- **3 Types of Dependency Determination**
  - Mandatory dependencies
  - Discretionary dependencies
  - External dependencies
Activity Resource Estimating

**Inputs**
1. Enterprise environmental factors
2. Organizational process assets
3. Activity list
4. Activity attributes
5. Resource availability
6. Project management plan

**Tools & Techniques**
1. Expert judgment
2. Alternatives analysis
3. Published estimating data
4. Project management software
5. Bottom-up estimating

**Outputs**
1. Activity resource requirements
2. Activity attributes (updates)
3. Resource breakdown structure
4. Resource calendar (updates)
5. Requested changes

Source: PMBOK 2004
Activity Resource Estimating

- Resource Availability ↔ Resource Calendar (Updates)
- Make or Buy Decision
- Bottom-up Estimating
- Resource Breakdown Structure
  - RBS is a hierarchical structure of the identified resources by resource category and resource type.
Activity Resource Estimating

- **Project Management Software**
  - Misuse project management software: due to misunderstanding of important concepts and proper training.
  - Should enter dependencies to have dates adjust automatically and to determine the critical path.
  - Should enter actual schedule information to compare planned and actual progress.
Activity Duration Estimating

### Inputs

- 1. Enterprise environmental factors
- 2. Organizational process assets
- 3. Project scope statement
- 4. Activity list
- 5. Activity attributes
- 6. Activity resource requirements
- 7. Resource calendar
- 8. Project management plan
  - Risk register
  - Activity cost estimates

### Tools & Techniques

- 1. Expert judgment
- 2. Analogous estimating
- 3. Parametric estimating
- 4. Three-point estimates
- 5. Reserve analysis

### Outputs

- 1. Activity duration estimates
- 2. Activity attributes (updates)

Source: PMBOK 2004
Activity Duration Estimating

- How to Estimate? ↔ Wild Guess times N
- Estimate with better accuracy:
  - Expert Judgment
  - Analogous Estimating
  - Parametric Estimating
  - Three-Point Estimates
  - Reserve Analysis
- Why “Risk Register” and “Activity Cost Estimates”?
Schedule Development

Source: PMBOK 2004

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<td>.1 Schedule network analysis</td>
<td>.1 Project schedule</td>
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<td>.2 Critical path method</td>
<td>.2 Schedule model data</td>
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<td>.9 Adjusting leads and lags</td>
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<tr>
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</tr>
</tbody>
</table>

Source: PMBOK 2004
Schedule Development

- **Schedule Network Analysis**
- **Critical Path Method**
  - CPM is a network diagramming technique used to predict total project duration.
  - A critical path determines the *earliest time* by which the project can be completed, as well as the *longest path* through the network diagram and has the least amount of slack or float.
- **Float / Slack**
  - the amount of time an activity can be delayed without delaying a succeeding activity or the project finish date
  - Free Float / Total Float
- **Near Critical Path**
Schedule Development

- How Critical Path is determined?
  - Forward pass (ES/LS), backward pass (LS/LF)

- Schedule Compression
  - Fast Tracking
  - Crushing
  - Shorting

- What-If Scenario Analysis
Schedule Development

- Resource Leveling
- Critical Chain Method
- Schedule Baseline
- Schedule Model Data
- Project schedule network diagrams
  - Bar charts (Gantt Charts)
  - Milestone charts
Schedule Control

**Inputs**
1. Schedule management plan
2. Schedule baseline
3. Performance reports
4. Approved change requests

**Tools & Techniques**
1. Progress reporting
2. Schedule change control system
3. Performance measurement
4. Project management software
5. Variance analysis
6. Schedule comparison bar charts

**Outputs**
1. Schedule model data (updates)
2. Schedule baseline (updates)
3. Performance measurements
4. Requested changes
5. Recommended corrective actions
6. Organizational process assets (updates)
7. Activity list (updates)
8. Activity attributes (updates)
9. Project management plan (updates)

Source: PMBOK 2004
Schedule Control

- **Schedule control is a portion of the Integrated Change Control process, and is concerned with:**
  - Determining the current status of the schedule
  - Influencing the factors that create schedule changes
  - Determining that the project schedule has changed
  - Managing the actual changes as they occur.
Schedule Control

- Performance Reports
- Progress Reporting
- Schedule Change Control System
  - defines the procedures by which the project schedule can be changed.
  - includes the paperwork, tracking systems, and approval levels necessary for authorizing changes.
- Performance Measurement
  - Introduction of SV and SPI
- Variance Analysis
Project Cost Management

- **7.1 Cost estimating:**
  Developing an approximation or estimate of the costs of the resources needed to complete a project.

- **7.2 Cost budgeting:**
  Allocating the overall cost estimate to individual work items to establish a baseline for measuring performance.

- **7.3 Cost control:**
  Controlling changes to the project budget.

Source: PMBOK 2004
Cost Estimating

**Inputs**
1. Enterprise environmental factors
2. Organizational process assets
3. Project scope statement
4. Work breakdown structure
5. WBS dictionary
6. Project management plan
   - Schedule management plan
   - Staffing management plan
   - Risk register

**Tools & Techniques**
1. Analogous estimating
2. Determine resource cost rates
3. Bottom-up estimating
4. Parametric estimating
5. Project management software
6. Vendor bid analysis
7. Reserve analysis
8. Cost of quality

**Outputs**
1. Activity cost estimates
2. Activity cost estimate supporting detail
3. Requested changes
4. Cost management plan (updates)

Source: PMBOK 2004
Cost Estimating

- **Project Management Plan in Cost Estimate includes, but not limited to:**
  - Schedule management plan
  - Staffing management plan
  - Risk register

- **Estimate Range:**
  - Rough Order of Magnitude, Budgetary, Definitive
  - When and Why is Done? Accuracy?

- **Type of Cost:**
  - Fixed vs. Variable, Direct vs. Indirect
Cost Estimating

- Analogous Estimating
- Determine Resource Cost Rates
- Bottom-up Estimating
- Parametric Estimating
- Vendor Bid Analysis
- Reserve Analysis
- Cost of Quality

=> How Cost Estimate is Done!
Cost Budgeting

**Inputs**
1. Project scope statement
2. Work breakdown structure
3. WBS dictionary
4. Activity cost estimates
5. Activity cost estimate supporting detail
6. Project schedule
7. Resource calendars
8. Contract
9. Cost management plan

**Tools & Techniques**
1. Cost aggregation
2. Reserve analysis
3. Parametric estimating
4. Funding limit reconciliation

**Outputs**
1. Cost baseline
2. Project funding requirements
3. Cost management plan (updates)
4. Requested changes

Source: PMBOK 2004
Cost Budgeting

- Cost budgeting involves allocating the project cost estimate to individual work items over time.
- The WBS is a required input for the cost budgeting process because it defines the work items.
  - Important goal is to produce a cost baseline:
  - cost baseline: A time-phased budget that project managers use to measure and monitor cost performance.
Cost Budgeting

- How to Budget the Cost Baseline:
  - Cost Aggregation
  - Reserve Analysis
  - Parametric Estimating
  - Funding Limit Reconciliation

- Project Funding Requirements
  - Management Reserve
  - Contingency Reserve
Cost Control

Inputs
1. Cost baseline
2. Project funding requirements
3. Performance reports
4. Work performance information
5. Approved change requests
6. Project management plan

Tools & Techniques
1. Cost change control system
2. Performance measurement analysis
3. Forecasting
4. Project performance reviews
5. Project management software
6. Variance management

Outputs
1. Cost estimate (updates)
2. Cost baseline (updates)
3. Performance measurements
4. Forecasted completion
5. Requested changes
6. Recommended corrective actions
7. Organizational process assets (updates)
8. Project management plan (updates)

Source: PMBOK 2004
Cost Control

- Project Cost control is to Monitor cost performance => Earned Value Management
  - Ensuring that only appropriate project changes are included in a revised cost baseline.
  - Informing project stakeholders of authorized changes to the project that will affect costs.

- Cost Change Control System: Updated Cost Baseline
Cost Control

- EVM is a project performance measurement technique that integrates scope, time, and cost data.
  - Given a baseline (original plan plus approved changes), you can determine how well the project is meeting its goals.
  - Actual information periodically to be entered

- The rule of thumb for EVM
  - Definition, formula, and what it represents
  - Comparison of Old Term and New Term
Project Quality Management

- **8.1 Quality planning:** Identifying which quality standards are relevant to the project and how to satisfy them.

- **8.2 Quality assurance:** Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards.

- **8.3 Quality control:** Monitoring specific project results to ensure that they comply with the relevant quality standards.

Source: PMBOK 2004
Quality Planning

**Inputs**
1. Enterprise environmental factors
2. Organizational process assets
3. Project scope statement
4. Project management plan

**Tools & Techniques**
1. Cost-benefit analysis
2. Benchmarking
3. Design of experiments
4. Cost of quality (COQ)
5. Additional quality planning tools

**Outputs**
1. Quality management plan
2. Quality metrics
3. Quality checklists
4. Process improvement plan
5. Quality baseline
6. Project management plan (updates)

Source: PMBOK 2004
Quality Planning

- **Quality Theorist:**
  - Fitness for Use, 80/20 Principle
  - Total Quality Management
  - Zero Defect, Prevention over Inspection
  - Gold Plating
  - Do it Right at the First Time

- **Impact of Poor Quality**
- **Cost – Benefit Analysis**
- **Benchmarking**
- **Design of Experiment**
Quality Planning

- Design of Experiment
- Cost of Quality
- Additional Planning Tools
- Quality Metrics
- Quality Checklists
- Process Improvement Plan
  - Process boundaries.
  - Process configuration.
  - Process metrics.
  - Targets for improved performance.
## Perform Quality Assurance

### Inputs
- 1. Quality management plan
- 2. Quality metrics
- 3. Process improvement plan
- 4. Work performance information
- 5. Approved change requests
- 6. Quality control measurements
- 7. Implemented change requests
- 8. Implemented corrective actions
- 9. Implemented defect repair
- 10. Implemented preventive actions

### Tools & Techniques
- 1. Quality planning tools and techniques
- 2. Quality audits
- 3. Process analysis
- 4. Quality control tools and techniques

### Outputs
- 1. Requested changes
- 2. Recommended corrective actions
- 3. Organizational process assets (updates)
- 4. Project management plan (updates)

Source: PMBOK 2004
Perform Quality Assurance

- **Quality assurance**
  Includes all the activities related to satisfying the relevant quality standards for a project.

- **Quality audit**
  is a structured review of specific quality management activities that help identify lessons learned that could improve performance on current or future projects.

- **Process Analysis**
  is continuous quality improvement,
Perform Quality Control

**Inputs**
- 1. Quality management plan
- 2. Quality metrics
- 3. Quality checklists
- 4. Organizational process assets
- 5. Work performance information
- 6. Approved change requests
- 7. Deliverables

**Tools & Techniques**
- 1. Cause and effect diagram
- 2. Control charts
- 3. Flowcharting
- 4. Histogram
- 5. Pareto chart
- 6. Run chart
- 7. Scatter diagram
- 8. Statistical sampling
- 9. Inspection
- 10. Defect repair review

**Outputs**
- 1. Quality control measurements
- 2. Validated defect repair
- 3. Quality baseline (updates)
- 4. Recommended corrective actions
- 5. Recommended preventive actions
- 6. Requested changes
- 7. Recommended defect repair
- 8. Organization process assets (updates)
- 9. Validated deliverables
- 10. Project Management Plan (Updates)

Source: PMBOK 2004
Perform Quality Control

- The main outputs of quality control are:
  - Acceptance decisions
  - Rework
  - Process adjustments

- Quality Control Tools:
  - Seven Basic tools of Quality
  - Statistical Sampling
  - Inspection
  - Defect Repair Review
Perform Quality Control
Perform Quality Control

- **Population / Sample**
  - Statistical sampling involves choosing part of a population of interest for inspection.
  - The size of a sample depends on how representative you want the sample to be.

- **Normal Distribution**
  - 3 to 6 Sigma
Project Human Resource Management

- **9.1 Human Resource Planning**
  Identifying and documenting project roles, responsibilities, and reporting relationships, as well as creating the staffing management plan.

- **9.2 Acquire Project Team**
  Obtaining the human resources needed to complete the project.

Source: PMBOK 2004
Project Human Resource Management

● **9.3 Develop Project Team**
  Improving the competencies and interaction of team members to enhance project performance.

● **9.4 Manage Project Team** –
  Tracking team member performance, providing feedback, resolving issues, and coordinating changes to enhance project performance.

Source: PMBOK 2004
Human Resource Planning

**Inputs**
1. Enterprise environmental factors
2. Organizational process assets
3. Project management plan
   - Activity resource requirements

**Tools & Techniques**
1. Organization charts and position descriptions
2. Networking
3. Organizational theory

**Outputs**
1. Roles and responsibilities
2. Project organization charts
3. Staffing management plan

Source: PMBOK 2004
Human Resource Planning

- Role and Responsibility
  - determines project roles, responsibilities, and reporting relationships, and creates the staffing management plan.
  - Responsibility Assignment Matrix

- Staff Management Plan
- Recognition and Reward System
- Resource Histogram
Acquire Project Team

Inputs
.1 Enterprise environmental factors
.2 Organizational process assets
.3 Roles and responsibilities
.4 Project organization charts
.5 Staffing management plan

Tools & Techniques
.1 Pre-assignment
.2 Negotiation
.3 Acquisition
.4 Virtual teams

Outputs
.1 Project staff assignments
.2 Resource availability
.3 Staffing management plan (updates)

Source: PMBOK 2004
Acquire Project Team

- Pre-Assignment
- Negotiation
  - Balanced Matrix: Project Manager vs. Functional Manager
- Acquisition
- Virtual Teams
- Halo Effect
Develop Project Team

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Tools &amp; Techniques</th>
<th>Outputs</th>
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<td>.1 Project staff assignments</td>
<td>.1 General management skills</td>
<td>.1 Team performance assessment</td>
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<td>.6 Recognition and rewards</td>
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</tr>
</tbody>
</table>

Source: PMBOK 2004
Develop Project Team

- Team Building
- Training
- Ground Rule
- Co – Location
- Team Performance Assessment
# Manage Project Team

## Inputs
- 1. Organizational process assets
- 2. Project staff assignments
- 3. Roles and responsibilities
- 4. Project organization charts
- 5. Staffing management plan
- 6. Team performance assessment
- 7. Work performance information
- 8. Performance reports

## Tools & Techniques
- 1. Observation and conversation
- 2. Project performance appraisals
- 3. Conflict management
- 4. Issue log

## Outputs
- 1. Requested changes
- 2. Recommended corrective actions
- 3. Recommended preventive actions
- 4. Organizational process assets (updates)
- 5. Project management plan (updates)

Source: PMBOK 2004
Manage Project Team

- To Manage Project Team, PM needs to:
  - Observation and Conversation
  - Project Performance Appraisals
  - Conflict Management
  - Issue Log

- Conflict Management
  - Confronting (Problem Solving), compromising, withdrawal (Avoidance), smoothing, forcing.
  - Consequence of those
Manage Project Team

- **Power of Project Manager:**
  - Formal (Legitimate), Reward, Penalty (Coercive), Expert and Referent
  - Notice the differences

- **Leadership Style**
  - Directing, Facilitating, Coaching, Supporting, Autocratic, Consultative and consensus
  - How and When?
Manage Project Team

- Expectancy Theory
- Motivation Theory
- McGregor’s Theory of X and Y
- Maslow’s Hierarchy of Needs
- Hezberg’s Hygiene Theory

=> Relative Theories about Human Resource Management:
Project Communications Management

- **10.1 Communications Planning**
  determining the information and communications needs of the project stakeholders.

- **10.2 Information Distribution**
  making needed information available to project stakeholders in a timely manner.

- **10.3 Performance Reporting**
  collecting and distributing performance information. This includes status reporting, progress measurement, and forecasting.

- **10.4 Manage Stakeholders**
  managing communications to satisfy the requirements of and resolve issues with project stakeholders.
Communications Planning

**Inputs**
- 1. Enterprise environmental factors
- 2. Organizational process assets
- 3. Project scope statement
- 4. Project management plan
  - Constraints
  - Assumptions

**Tools & Techniques**
- 1. Communications requirements analysis
- 2. Communications technology

**Outputs**
- 1. Communications management plan

Source: PMBOK 2004
Communications Planning

Basic Model of Communication

Source: PMBOK 2004
Communications Planning

- **Communications Requirements Analysis**
  - Who, When, What, How (For Stakeholders)

- **Communications Method**
  - Formal vs. Informal, Written vs. Unwritten
  - When to use it?

- **Communications Channel**
  - N/2 times (N-1)
Information Distribution

Inputs
.1 Communications management plan

Tools & Techniques
.1 Communications skills
.2 Information gathering and retrieval systems
.3 Information distribution methods
.4 Lessons learned process

Outputs
.1 Organizational process assets (updates)
.2 Requested changes

Source: PMBOK 2004
Information Distribution

- Communications Skills
- Information Gathering and Retrieval Systems
- Information Distribution Methods
- Lessons Learned Process
- Feedback from stakeholders
Performance Reporting

- Performance Reporting collects project performance data and send it to the stakeholders, and should include, but not limited to
  - Status Report
  - Progress Report
  - Trend Report
  - Forecast Report
  - Variance Report
  - Lesson Learned
# Manage Stakeholders

<table>
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<td>.4 Organizational process assets (updates)</td>
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<td></td>
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<td>.5 Project management plan (updates)</td>
</tr>
</tbody>
</table>

Source: PMBOK 2004
Manage Stakeholders

- Stakeholder management refers to managing communications to satisfy the needs of, and resolve issues with, project stakeholders.
- The project manager is usually responsible for stakeholder management.
- Communication blocker
Project Risk Management

11.1 Risk Management Planning
Deciding how to approach, plan, and execute the risk management activities for a project.

11.2 Risk Identification
Determining which risks might affect the project and documenting their characteristics.

11.3 Qualitative Risk Analysis
Prioritizing risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact.
11.4 Quantitative Risk Analysis
Numerically analyzing the effect on overall project objectives of identified risks.

11.5 Risk Response Planning
Developing options and actions to enhance opportunities, and to reduce threats to project objectives.

11.6 Risk Monitoring and Control
Tracking identified risks, monitoring residual risks, identifying new risks, executing risk response plans, and evaluating their effectiveness throughout the project life cycle.
Risk Management Planning

**Inputs**
1. Enterprise environmental factors
2. Organizational process assets
3. Project scope statement
4. Project management plan

**Tools & Techniques**
1. Planning meetings and analysis

**Outputs**
1. Risk management plan

Source: PMBOK 2004
Risk Management Planning

- What is risk? What impact it might bring?
- Risk Categories
  - External, internal, technical and unforeseeable
- Risk Management Plan should includes:
  - Methodology, roles and responsibilities
  - Budgets and timing
  - Risk categories, probability and impact
  - Stakeholder tolerance
  - Reporting format and Tracking system
Risk Identification

**Inputs**
- .1 Enterprise environmental factors
- .2 Organizational process assets
- .3 Project scope statement
- .4 Risk management plan
- .5 Project management plan

**Tools & Techniques**
- .1 Documentation reviews
- .2 Information gathering techniques
- .3 Checklist analysis
- .4 Assumptions analysis
- .5 Diagramming techniques

**Outputs**
- .1 Risk register

Source: PMBOK 2004
Risk Identification

- Documentation Reviews
- Information Gathering Techniques
  - Brainstorming
  - Delphi technique
  - Interviewing
  - Root cause identification
  - SWOT analysis
- Checklist Analysis
Risk Identification

- Assumptions Analysis
  - Influence of the assumption
- Diagramming Techniques
  - Cause-and-effect diagrams
  - System or process flow charts
  - Influence diagrams
- Risk Register
Qualitative Risk Analysis

**Inputs**
- 1. Organizational process assets
- 2. Project scope statement
- 3. Risk management plan
- 4. Risk register

**Tools & Techniques**
- 1. Risk probability and impact assessment
- 2. Probability and impact matrix
- 3. Risk data quality assessment
- 4. Risk categorization
- 5. Risk urgency assessment

**Outputs**
- 1. Risk register (updates)

Source: PMBOK 2004
Qualitative Risk Analysis

- Risk Probability and Impact Assessment
- Probability and Impact Matrix
- Risk Data Quality Assessment
  - Quality of data
  - Reliability and integrity of data
  - Extent of understanding of the risks
- Risk Categorization
- Risk Urgency Assessment
Quantitative Risk Analysis

**Inputs**
1. Organizational process assets
2. Project scope statement
3. Risk management plan
4. Risk register
5. Project management plan
   - Project schedule management plan
   - Project cost management plan

**Tools & Techniques**
1. Data gathering and representation techniques
2. Quantitative risk analysis and modeling techniques

**Outputs**
1. Risk register (updates)

Source: PMBOK 2004
Quantitative Risk Analysis

- Why time and cost management plans need to be considered?
- Data Gathering and Representation Techniques
  - Interviewing
  - Probability distributions
  - Expert judgment
Quantitative Risk Analysis

- Quantitative Risk Analysis and Modeling Techniques
  - Sensitivity analysis
  - Expected monetary value analysis
  - Decision tree analysis
- Prioritized list of quantified risks in the updated risk register
- Trends in quantitative risk analysis results in the updated risk register
Risk Response Planning

**Inputs**
- 1. Risk management plan
- 2. Risk register

**Tools & Techniques**
- 1. Strategies for negative risks or threats
- 2. Strategies for positive risks or opportunities
- 3. Strategy for both threats and opportunities
- 4. Contingent response strategy

**Outputs**
- 1. Risk register (updates)
- 2. Project management plan (updates)
- 3. Risk-related contractual agreements

Source: PMBOK 2004
Risk Response Planning

- Strategies for Negative Risks or Threats
  - Avoid, transfer and mitigate
- Strategies for Positive Risks or Opportunities
  - Exploit, share and enhance
- Strategy for Both Threats and Opportunities Acceptance
- Contingent Response Strategy
Risk Response Planning

- Risk owners
  - Definition and assigned responsibilities
- Fallback plans
- Secondary risks
- Residual risks
- Contingency reserves
  - The contingency plan and trigger
# Risk Monitoring and Control

## Inputs
1. Risk management plan
2. Risk register
3. Approved change requests
4. Work performance information
5. Performance reports

## Tools & Techniques
1. Risk reassessment
2. Risk audits
3. Variance and trend analysis
4. Technical performance measurement
5. Reserve analysis
6. Status meetings

## Outputs
1. Risk register (updates)
2. Requested changes
3. Recommended corrective actions
4. Recommended preventive actions
5. Organizational process assets (updates)
6. Project management plan (updates)

Source: PMBOK 2004
Risk Monitoring and Control

- Risk Audits
- Variance and Trend Analysis
- Reserve Analysis
- Status Meetings
- Workaround
- Common Risk Management Errors
Project Procurement Management

- **12.1 Plan Purchases and Acquisitions**
  Determining what to purchase or acquire and determining when and how.

- **12.2 Plan Contracting**
  Documenting products, services, and results requirements and identifying potential sellers.

- **12.3 Request Seller Responses**
  Obtaining information, quotations, bids, offers or proposals, as appropriate.

- **12.4 Select Sellers**
  Reviewing offers, choosing among potential sellers, and negotiating a written contract with each seller.
12.5 Contract Administration
Managing the contract and relationship between the buyer and seller, reviewing and documenting how a seller is performing or has performed to establish required corrective actions and provide a basis for future relationships with the seller, managing contract-related changes and, when appropriate, managing the contractual relationship with the outside buyer of the project.

12.6 Contract Closure
Completing and settling each contract, including the resolution of any open items, and closing each contract applicable to the project or a project phase.
# Plan Purchases and Acquisitions

## Inputs
- .1 Enterprise environmental factors
- .2 Organizational process assets
- .3 Project scope statement
- .4 Work breakdown structure
- .5 WBS dictionary
- .6 Project management plan
  - Risk register
  - Risk-related contractual agreements
  - Resource requirements
  - Project schedule
  - Activity cost estimates
  - Cost baseline

## Tools & Techniques
- .1 Make-or-buy analysis
- .2 Expert judgment
- .3 Contract types

## Outputs
- .1 Procurement management plan
- .2 Contract statement of work
- .3 Make-or-buy decisions
- .4 Requested changes

Source: PMBOK 2004
Plan Purchases and Acquisitions

- **Project manager’s role in procurement**
  - PM should be assigned before contract is signed!
  - PM should understand contract terms
  - PM should identify the risk with contract
  - PM should fit the schedule
  - PM should work with the contract revise

- **Centralized / Decentralized Contracting**
  - Advantage and disadvantage
Plan Purchases and Acquisitions

- Make-or-Buy Analysis
- Contract Type Selection
  - Fixed price, Cost Reimbursable, T&M
  - CPPC, CPFF, CPIF and CPAF
  - Advantage and disadvantage
- Risk and Contract Type
- Type of Contract Statement of Work
## Plan Contracting

### Inputs

1. Procurement management plan
2. Contract statement of work
3. Make-or-buy decisions
4. Project management plan
   - Risk register
   - Risk-related contractual agreements
   - Resource requirements
   - Project schedule
   - Activity cost estimate
   - Cost baseline

### Tools & Techniques

1. Standard forms
2. Expert judgment

### Outputs

1. Procurement documents
2. Evaluation criteria
3. Contract statement of work (updates)

Source: PMBOK 2004
Plan Contracting

- Risk register ⇔ Risk-related contractual agreements
- Non Disclosure Agreement
- Special Term and Condition
- Procurement Documents
  - RFP, IFB(RFB) and RFQ
  - Difference among those
Request Seller Responses

**Inputs**
- .1 Organizational process assets
- .2 Procurement management plan
- .3 Procurement documents

**Tools & Techniques**
- .1 Bidder conferences
- .2 Advertising
- .3 Develop qualified sellers list

**Outputs**
- .1 Qualified sellers list
- .2 Procurement document package
- .3 Proposals

Source: PMBOK 2004
Request Seller Responses

- Bidder Conferences
  - Collusion
  - Written and formal
- Advertising
- Develop Qualified Sellers List
- Procurement Document Package
- Proposals (Bids)
Select Sellers

**Inputs**
- .1 Organizational process assets
- .2 Procurement management plan
- .3 Evaluation criteria
- .4 Procurement document package
- .5 Proposals
- .6 Qualified sellers list
- .7 Project management plan
  - Risk register
  - Risk-related contractual agreements

**Tools & Techniques**
- .1 Weighting system
- .2 Independent estimates
- .3 Screening system
- .4 Contract negotiation
- .5 Seller rating systems
- .6 Expert judgment
- .7 Proposal evaluation techniques

**Outputs**
- .1 Selected sellers
- .2 Contract
- .3 Contract management plan
- .4 Resource availability
- .5 Procurement management plan (updates)
- .6 Requested changes

Source: PMBOK 2004
Select Sellers

- Evaluation Criteria
  - Inputs, not tools & techniques
- Weighting System
- Independent Estimates
- Screening System
- Seller Rating Systems
- Proposal Evaluation Techniques
Select Sellers

- Negotiation
  - Objects of negotiation
  - Negation Tactics
  - Main items to negotiation
- What Do You Need to Have a Legal Contract?
**Contract Administration**

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<thead>
<tr>
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<td>.1 Contract</td>
<td>.1 Contract change control system</td>
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<td>.2 Contract management plan</td>
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<td>• Contract management plan</td>
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<td>.8 Information technology</td>
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</tbody>
</table>

Source: PMBOK 2004
Contract Administration

- Project Manager Has a Limited Power on Contract Administration
  - Often not involved while contracting
- Contract Change Control System
- Contract Interpretation
- The Execution of Existing Contract
- Buyer-Conducted Performance Review
Contract Closure

**Inputs**
1. Procurement management plan
2. Contract management plan
3. Contract documentation
4. Contract closure procedure

**Tools & Techniques**
1. Procurement audits
2. Records management system

**Outputs**
1. Closed contracts
2. Organizational process assets (updates)

Source: PMBOK 2004
Contract Closure

- **Contract Closure is Done When:**
  - Contract ends
  - Contract terminate before work completion
- **Procurement Audits**
- **Organizational Process Assets (Updates)**
  - Contract file
  - Deliverable acceptance
  - Lessons learned documentation
Professional and Social Responsibility

- **Project Management Institute Code of Ethics and Professional Conduct**
- **The Code of Ethics and Professional Conduct applies to:**
  - All PMI members
  - Individuals who are not members of PMI but meet one or more of the following criteria:
    1. Non-members who hold a PMI certification
    2. Non-members who apply to commence a PMI certification process
    3. Non-members who serve PMI in a volunteer capacity.