Technical Project Management

Engineers’ Week 2009

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Technical Project Management: Outline

A. What Is Project Management?
   ◦ What is a Project?

B. Why Is Project Management Needed?

C. Who Is Involved With Project Management?

D. When Does Project Management Occur?

E. Where Is Project Management Done?

F. How Is Project Management Done?

G. Certification Process (By Project Management Institute (PMI))
Some might say it is the art of creating the illusion that any outcome is the result of a series of predetermined, deliberate acts when, in fact, it was dumb luck.

Others might say it is…

- A set of activities to PLAN, MONITOR, COORDINATE, and REVIEW a systems development project
- Or
- Management activities that include:
  - Estimation costs
  - Preparation of schedules
  - Application of standards
  - Preparation and evaluation of proposals

A systematic approach
What is Project Management?

**Official PMI Definition:**

Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project.

WHAT IS A PROJECT??

- General Definition: A temporary endeavour undertaken to create a unique product or service.

  Or

- PMI: An endeavour in which human, material and financial resources are organised in a novel way, to undertake a unique scope of work of given specification, within the constraints of cost and time.
Project Management

- **Project Planning**
  - Definition of work requirements
  - Definition of quantity and quality of work
  - Definition of resources needed
- **Project monitoring**
  - Tracking progress
  - Comparing actual outcome to predicted outcome
  - Analyzing impact
  - Making adjustments

What is a Project?

- Has a specific objective (which may be unique or one-of-a-kind) to be completed within certain specifications
- Has defined start and end dates
- Has funding limits (if applicable)
- Consumes human and nonhuman resources (i.e., money, people, equipment)
- Is multifunctional (cut across several functional lines)
Operations and projects differ:

- Operations are ongoing and repetitive
- Projects are temporary and unique
- “A project is a temporary endeavor undertaken to create a unique product or service.”
  - temporary - definite beginning and end
  - unique - different in some distinguishing characteristic

Why do PM?

- The Bottom line

- Project management provides a system for planning, documenting, organizing, and communicating.

- Project Management provides a basis for better decisions
Project Management Value

- Why do organizations want this?
  - Deliver projects successfully
  - Achieve project objectives
  - Goal clarity and measurement
  - Coordinated resources
  - Risk identification and management
  - Cost savings
  - Efficiency of repeatable processes

Why do you need project management techniques?

- “The reason for organizing an assignment as a project is to **FOCUS** the responsibility, authority, and scheduling of the project in order to meet defined goals.”
  - schedule
  - cost
  - performance (quality)
Who Should be on the Project Team?

- **GOAL:** Early CROSS-FUNCTIONAL Cooperation
  - **Internal Stakeholders:**
    - R&D, Development, Engineering, Manufacturing, Purchasing, Production, Quality Assurance, Quality Control, Finance, Legal, Publications, Sales, Marketing, Customer Support
  - **External Stakeholders:**
    - Customers, Vendors, Suppliers, Partners, Community Members, Champions, Third Party Developers, Regulatory Agencies

The Team: A Three-Legged Stool

- Project Manager
- Management Line
- Senior Management (i.e. Sponsor)
Who Is A Project Manager?

- Someone responsible for
  - Planning (strategic)
  - Scheduling and coordinating (tactical)
  - Working with people (soft skills)
What is Project Scope Management?

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

- **Scope planning**: deciding how the scope will be defined, verified, and controlled
- **Scope definition**: reviewing the project charter and preliminary scope statement and adding more information as requirements are developed and change requests are approved
- **Creating the WBS**: subdividing the major project deliverables into smaller, components
- **Scope verification**: formalizing acceptance of the project scope
- **Scope control**: controlling changes to project scope

Creating the Work Breakdown Structure (WBS)

- A **WBS** is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
- WBS is a foundation document that provides the basis for planning and managing project schedules, costs, resources, and changes
- **Decomposition** is subdividing project deliverables into smaller pieces
- A **work package** is a task at the lowest level of the WBS
The WBS Dictionary and Scope Baseline

- Many WBS tasks are vague and must be explained more so people know what to do and can estimate how long it will take and what it will cost to do the work.
- A WBS dictionary is a document that describes detailed information about each WBS item.
- The approved project scope statement and its WBS and WBS dictionary form the scope baseline, which is used to measure performance in meeting project scope goals.

Scope Verification

- It is very difficult to create a good scope statement and WBS for a project.
- It is even more difficult to verify project scope and minimize scope changes.
- Scope verification involves formal acceptance of the completed project scope by the stakeholders.
- Acceptance is often achieved by a customer inspection and then sign-off on key deliverables.
Scope Control

- **Scope control** involves controlling changes to the project scope
- Goals of scope control are to:
  - Influence the factors that cause scope changes
  - Assure changes are processed according to procedures developed as part of integrated change control
  - Manage changes when they occur
- **Variance** is the difference between planned and actual performance

Using Software to Assist in Project Scope Management

- Word-processing software helps create several scope-related documents
- Spreadsheets help to perform financial calculations and weighed scoring models, and develop charts and graphs
- Communication software like e-mail and the Web help clarify and communicate scope information
- Project management software helps in creating a WBS, the basis for tasks on a Gantt chart
- Specialized software is available to assist in project scope management
**Project Time Management**

- **Steps**
  - Continue form WBS
  - Define activities
  - Sequence activities
  - Estimate time
  - Develop schedule

- **Techniques**
  - Gantt chart
  - CPM
  - PERT
  - Microsoft Project

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**Example of Gantt Chart**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design house and obtain financing</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>Lay foundation</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>Order and receive materials</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>Build house</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>Select paint</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>Select carpet</td>
<td>0 2 4 6 8 10</td>
</tr>
<tr>
<td>Finish work</td>
<td>0 2 4 6 8 10</td>
</tr>
</tbody>
</table>
Project Network for a House

1. Design house and obtain financing
2. Order and receive materials
3. Lay foundation
4. Select paint
5. Select carpet
6. Build house
7. Finish work

Critical Path

<table>
<thead>
<tr>
<th>Activity</th>
<th>LS</th>
<th>ES</th>
<th>LF</th>
<th>EF</th>
<th>Slack S</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
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<td>2</td>
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<td>5</td>
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<tr>
<td>7</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>

* Critical Path
**Time-Cost Relationship**

- Crashing costs increase as project duration decreases
- Indirect costs increase as project duration increases
- Reduce project length as long as crashing costs are less than indirect costs

**Project Cost Management**

- “The processes involved in planning, estimating, budgeting, and controlling costs so that the budget can be completed within the approved budget”
How Do We Manage Cost?

- Three processes
  - Cost Estimating
  - Cost Budgeting
  - Cost Control

Cost Estimating

Inputs
- Enterprise Environmental Factors
- Organizational Process Assets
- Project/Scope Statement
- Work Breakdown Structure
- WBS Dictionary
- Project Management Plan
  - Schedule Mgmt Plan
  - Staffing Mgmt Plan
  - Risk Register

Tools & Techniques
- Analogous estimating
- Determine resource cost rates
- Bottom up estimating
- Parametric estimating
- Project management software
- Vendor bid analysis
- Reserve analysis
- Cost of quality

Outputs
- Activity Cost Estimates
- Activity Cost Estimates Supporting Detail
- Requested Changes
- Cost Management Plan Updates

Cost Budgeting

Cost Control
Cost Budgeting

- Project Scope Statement
- Work Breakdown Structure
- WBS Dictionary
- Activity Cost Estimates
- Supervision Detail
- Project Schedule
- Resource Calendars
- Contract
- Cost Management Plan

Cost Control

- Cost Estimate Updates
- Cost Baseline Updates
- Performance Measurements
- Forecasted Completion
- Requested Changes
- Recommended Corrective Actions
- Organizational Process Assets Updates
- Project Management Plan Updates

Tools & Techniques

- Cost aggregation
- Reserve analysis
- Parametric estimating
- Funding limit reconciliation

Cost Baseline
- Project Funding Requirements
- Cost Management Plan Updates
- Requested Changes

Inputs

Outputs

Cost Baseline
- Project Funding Requirements
- Cost Management Plan Updates
- Requested Changes

Cost Estimate Updates
- Cost Baseline Updates
- Performance Measurements
- Forecasted Completion
- Requested Changes
- Recommended Corrective Actions
- Organizational Process Assets Updates
- Project Management Plan Updates
What Is Project Quality?

- The International Organization for Standardization (ISO) defines quality as “the degree to which a set of inherent characteristics fulfills requirements” (ISO9000:2000)

- Other experts define quality based on:
  - Conformance to requirements: the project’s processes and products meet written specifications
  - Fitness for use: a product can be used as it was intended

What Is Project Quality Management?

- Project quality management ensures that the project will satisfy the needs for which it was undertaken

- Processes include:
  - Quality planning: identifying which quality standards are relevant to the project and how to satisfy them
  - Quality assurance: periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards
  - Quality control: monitoring specific project results to ensure that they comply with the relevant quality standards
**Quality Planning**

- Implies the ability to anticipate situations and prepare actions to bring about the desired outcome

- Important to prevent defects by:
  - Selecting proper materials
  - Training and indoctrinating people in quality
  - Planning a process that ensures the appropriate outcome

**Who’s Responsible for Project Quality?**

- Project managers are ultimately responsible for quality management on their projects

- Several organizations and references can help project managers and their teams understand quality
  - International Organization for Standardization (www.iso.org)
  - IEEE (www.ieee.org)
Quality Assurance

- **Quality assurance** includes all the activities related to satisfying the relevant quality standards for a project.
- Another goal of quality assurance is continuous quality improvement.
- **Benchmarking** generates ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organization.
- A **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.

Quality Control

- The main outputs of quality control are:
  - Acceptance decisions
  - Rework
  - Process adjustments
- There are Seven Basic Tools of Quality that help in performing quality control:
  - Cause and Effect Diagram
  - Control Chart
  - Run Chart
  - Scatter Diagram
  - Histogram
  - Pareto Chart
  - Flowchart
Sample Cause-and-Effect Diagram

- Training
  - User did not check box to save password
- User did not reset password
- User keeps forgetting password
- System Hardware
  - Not enough memory
  - Not enough hard disk storage
- Processor too slow
- Software
- User’s Hardware
- Problem: Users cannot get into system

Sample Quality Control Chart

- Upper Spec Limit 12.10
- Upper Control Limit 12.09
- Lower Control Limit 11.91
- Lower Spec Limit 11.90
- Mean
- time dimension
- inches

★ Denotes violation of 7 run rule
**Run Chart**

- A run chart displays the history and pattern of variation of a process over time.
- It is a line chart that shows data points plotted in the order in which they occur.
- Can be used to perform trend analysis to forecast future outcomes based on historical patterns.

**Scatter Diagram**

- A scatter diagram helps to show if there is a relationship between two variables.
- The closer data points are to a diagonal line, the more closely the two variables are related.
**Histograms**

- A **histogram** is a bar graph of a distribution of variables.
- Each bar represents an attribute or characteristic of a problem or situation, and the height of the bar represents its frequency.

**Pareto Charts**

- A **Pareto chart** is a histogram that can help you identify and prioritize problem areas.
- **Pareto analysis** is also called the 80-20 rule, meaning that 80 percent of problems are often due to 20 percent of the causes.
Flowcharts

- Flowcharts are graphic displays of the logic and flow of processes that help you analyze how problems occur and how processes can be improved.
- They show activities, decision points, and the order of how information is processed.

Statistical Sampling

- 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.
- Sample size formula:
  \[ \text{Sample size} = 0.25 \times \left( \frac{\text{certainty factor}}{\text{acceptable error}} \right)^2 \]
- Be sure to consult with an expert when using statistical analysis.

<table>
<thead>
<tr>
<th>Desired Certainty</th>
<th>Certainty Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>95%</td>
<td>1.960</td>
</tr>
<tr>
<td>90%</td>
<td>1.645</td>
</tr>
<tr>
<td>80%</td>
<td>1.281</td>
</tr>
</tbody>
</table>
Human Resource Management

- The PMBOK characterizes Human Resource Management as the “processes that organize and manage the project team”:
  - Human Resource Planning
    - The primary HR Planning output is the Staffing Management Plan
  - Acquire Project Team
  - Develop Project Team
  - Manage Project Team

Human Resource Management

- In project HR Planning, the existing enterprise context must be considered
  - Organizational – How the organizations get along
  - Technical – What types do you need?
  - Interpersonal – The Cultural Question
  - Logistical – Distance between members
  - Political – Private agendas of the mighty
Human Resource Management

- HR Planning Tools & Techniques
  - Org Charts & Position Descriptions
    - Everyone should be clear regarding who is responsible for what
  - Organizational Breakdown Structure
    - Shows work by functional department / organizational unit
  - Resource Breakdown Structure
    - Shows work by type of resource (useful for project cost accounting)
  - Responsibility Assignment Matrix (RAM)
    - Shows project work by individual; clarifies roles
  - Other Text Formats
    - Position/role descriptions, etc
  - Networking
    - Never underestimate this

Human Resource Management

- Acquire Project Team is “the process of obtaining the human resources needed to complete the project”
  - Author comment dead on – if the PM is the smartest team member, the PM has failed in recruiting
- If team members aren’t pre-assigned, this may require
  - Negotiation skill (influence)
  - The use of Virtual Teams (which in turn will require more focus on Communications)
  - Resolving individual schedule conflicts
Human Resource Management

- Acquire Project Team uses two primary techniques to accomplish his/her objective of achieving project success without increasing time or cost
  - Resource Loading, or allocating resources to the schedule over specific time periods
  - Resource Leveling, or minimizing period-to-period variations in resource loading via shifting tasks on the calendar using critical path analysis (specifically, float/slack analysis)
- Word of caution: Automated Leveling using PM software often (usually) pushes out completion date

Human Resource Management

- Develop Project Team is about assuring project performance by improving the members’ competencies & interactions
- These activities yield the greatest benefit when done early in the project life cycle, but should not be ignored during the remainder of that cycle
- Important for PM to recognize and respect the group formation cycle
  - Forming, Storming, Norming, Performing, Adjourning
**Human Resource Management**

- **Develop Project Team Tools:**
  - General Management Skills (soft skills)
  - Training
    - Formal / On-the-Job
    - Just-in-Time concept important here
    - Delivery methodology should be matched to specific need
  - Team-Building
    - Myers-Briggs,
  - Ground Rule Setting
  - Co-Location (if possible)
  - Recognition & Reward Systems
    - Should be team-based to some extent

- **Manage Project Team** “involves tracking team member performance, providing feedback, resolving issues and coordinating changes to enhance project performance”

- Deals with the dual-reporting relationships inherent in matrix project structures
Human Resource Management

- One commonly used Manage Project Team Tool is Conflict Management
  - Project team members should be encouraged to resolve their own conflicts, but the PM is responsible if those conflicts escalate
  - The primary output is Lessons Learned, to lessen the pain for future projects
- Conflict Management Methods
  - Problem Solving/Confrontation (usually best)
  - Compromising
  - Smoothing (de-emphasizing differences)
  - Withdrawal (delaying tactic)
  - Forcing (win-lose – last resort)
- Choice of method should be situational

Project Communications Management

- PROCESSES:
  - Communications planning: determining the information and communications needs of the stakeholders
  - Information distribution: making needed information available in a timely manner
  - Performance reporting: collecting and disseminating performance information
  - Managing stakeholders: Managing communications to satisfy the needs and expectations of project stakeholders and to resolve issues.
**Project Communication Management**

View *Project Communication* in the context of the five PM process groups.

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**1. Communications Planning**

- Every project should include some type of communications management plan, a document that guides project communications

- **Inputs**
  - Communication requirements, e.g.,
    - Project organization and stakeholders’ responsibilities
  - Communication technology

- **Tools and Techniques**
  - Stakeholder analysis

- **Outputs**
  - Communication management plan
Communications Management Plan

- **Why?** Rational for communicating. Can be derived from stakeholder analysis
- **What?** Project information to communicate
- **When?** Schedule/frequency for communication
- **Who?** Entities responsible for generating, disseminating, receiving the information
- **How?** Method and format for communication
- **Where?** (if location is relevant)

Stakeholder Analysis

A stakeholder analysis documents important (often sensitive) information about stakeholders such as:
- stakeholders’ names and organizations
- roles on the project
- unique facts about stakeholders
- level of influence and interest in the project
- suggestions for managing relationships

<table>
<thead>
<tr>
<th>Key Stakeholder</th>
<th>Role on Project</th>
<th>Unique Facts</th>
<th>Level of Influence</th>
<th>Level of Interest</th>
<th>Suggestions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmed</td>
<td>Sponsor of project and one of the company's founders</td>
<td>Demand, likes details, business focus, Stanford MBA</td>
<td>Very high</td>
<td>Very high</td>
<td>Keep informed, keep him happy, prioritize his work</td>
<td>Competing for company resources</td>
</tr>
<tr>
<td>Susan</td>
<td>Subject matter expert; critical to success</td>
<td>Very smart, PhD in biology, easy to work with, has a toddler</td>
<td>High</td>
<td>Very high</td>
<td>Make sure he leads; can do some work from home</td>
<td></td>
</tr>
<tr>
<td>Erik</td>
<td>Subject matter expert; critical to success</td>
<td>Very smart, PhD in biology, easy to work with, has a toddler</td>
<td>High</td>
<td>Very high</td>
<td>Make sure he leads; can do some work from home</td>
<td></td>
</tr>
<tr>
<td>Mark</td>
<td>Competing for company resources</td>
<td>Start-up company, knows his project takes a back seat to this one, but I can learn from him</td>
<td>Low to medium</td>
<td>Very high</td>
<td>He knows his project takes a back seat to this one, but I can learn from him</td>
<td></td>
</tr>
<tr>
<td>David</td>
<td>Competing for company resources</td>
<td>Very smart, PhD in biology, easy to work with, has a toddler</td>
<td>Very high</td>
<td>Very high</td>
<td>Keep informed, keep him happy, prioritize his work</td>
<td></td>
</tr>
</tbody>
</table>

Specialthanks
2. Information Distribution

- Getting the right information to the right people at the right time and in a useful format is just as important as developing the information in the first place.
- Project team members are suppliers and customers:
  - Suppliers provide inputs
  - Task managers deliver WBS elements
  - Customers receive the products
- Important considerations include:
  - Using technology to enhance information distribution
  - Formal and informal methods for distributing information

3. Performance Reporting

- Performance reporting keeps stakeholders informed about how resources are being used to achieve project objectives:
  - Status reports
  - Progress reports
  - Project forecasting

<table>
<thead>
<tr>
<th>1. Accomplishments for Month of January (or appropriate month):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe most important accomplishments. Refer to project's Gantt chart.</td>
</tr>
<tr>
<td>2. Describe other important accomplishments. One bullet for each. If any issues were resolved from the previous month, list them as accomplishments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Plans for February (or following month):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe most important items to be accomplished in the next month. Again, refer to the project's Gantt chart.</td>
</tr>
<tr>
<td>2. Describe other important items to accomplish; one bullet for each.</td>
</tr>
</tbody>
</table>

| 3. Issues: Briefly list important issues that surfaced or are still important. Managers have surprises and want to help the project succeed, so be sure to list issues. |

| 4. Project Changes (Date and Description): List any approved or requested changes to the project. Include the date of the change and a brief description. |
What Is Risk Management?

- The means by which uncertainty is systematically identified and managed to increase likelihood of success
- Risk might be obvious:
  - Development of a new drug to treat cancer in a new way
- Or less obvious:
  - Large contract requires execution of 1 or more subcontractors (how will ensure they will deliver?)
  - Turn-over in industry may result in loss of key people on project
  - Departmental reorganization may disrupt project

Risk Management Process

- Risk Identification
  - Analyze the source of risks
- Known Risks
- New Risks
- Response Development
  - Define the risk & potential negative impact
  - Assign probability
  - Develop risk reduction strategy
- Risk Management Plan
- Control
  - Implement the risk strategy
  - Continue to monitor for new risks
Step I - Identify Risk

- There are 4 techniques to identify risks
  1. Asking stakeholders
  2. Developing a risk profile list
  3. Learning from similar projects
  4. Focus on schedule and budget risk

Step II - Risk Response Strategy

- Not all risks are equally important and/or likely.
- Need a plan that will
  1. Identify the severity of risk
  2. Identify the probability of the risk
  3. Develop strategy to deal with the risk
Risk Response Strategy

- **Condition** - soil conditions require a complex boring machine
- **Consequence** - Improper use of machine may cause damage
  - Machine damage could be from 50-250K
- **Probabilities**
  - 75K of equipment damage - 20%
  - 200K of equipment damage - 20%
  - no damage at all 60%
  - Probable cost of damage - 55K
    \[(200\times.2 + 75\times.2 = 55K)\]
- **Strategy** - Hire operator from equipment provider for estimated cost of 10K. (any damage by their operator paid by them).
  - Adds 10K to cost of project but reduces possible additional cost and schedule risk

02/18/2009

Step Three: Control

**Risk Control - not a 1-shot step**

- Monitor risks like monitor project execution
  - periodic risk review with Project Board
  - evaluate status of identified risks
  - identify new risks
- **Create a risk control log**
  - Someone responsible for each risk
  - Rank risks by severity
  - Update periodically

<table>
<thead>
<tr>
<th>ID</th>
<th>W/o</th>
<th>Description</th>
<th>Strategy</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>T. Chang</td>
<td>All diagrams need to use software tool that is new to tech writers.</td>
<td>1. Send everyone to training 2. TC will complete aids and templates 3. TC will complete Doc mgmt strat</td>
<td>1. Completed. Helped learning curve 2. Completed. Helped effectiveness 3. Troubles with merging old documents. Working with vendor. RISK: M.D.</td>
</tr>
<tr>
<td>3</td>
<td>T. Smith</td>
<td>Require complex boring machine that we could damage.</td>
<td>1. Equipment provider will supply operator for 10K</td>
<td>Operator and equipment are scheduled. RISK: LOW.</td>
</tr>
</tbody>
</table>
Project Procurement Management Processes

- **Plan Purchases and Acquisitions**: determining what to purchase or acquire, when, and how
- **Plan Contracting**: documenting product requirements and identifying potential sellers
- **Request Seller Responses**: obtaining information, quotations, bids, offers, or proposals as appropriate
- **Select sellers**: reviewing offers and choosing from among potential sellers, and negotiating a written contract with each seller
- **Contract administration**: managing the relationship with the seller
- **Contract close-out**: completion and settlement of the contract

Plan Purchases and Acquisitions process

- **Inputs**
  - Scope statement
  - WBS and WBS dictionary
  - Project management plan
- **Tools and techniques**
  - Make-or-buy analysis
  - Experts, both internal and external, can provide valuable inputs in procurement decisions
  - Contract type
- **Outputs**
  - Procurement management plan
  - Contract statement/s of work
  - Make or buy decisions
Procurement management plan

- What the project will buy?
- Who will buy?
  - Assignment of technical responsibilities
  - Assignment of buying responsibilities
- When each buy must happen and when can it be awarded?
- How much will each buy cost?
- What type of contracts will be used?

Statement of Work (SOW)

- A statement of work is a description of the work required for the procurement
- Many contracts, or mutually binding agreements, include SOWs
- A good SOW gives bidders a better understanding of the buyer's expectations

<table>
<thead>
<tr>
<th>I. Scope of Work:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe the work to be done in detail. Specify the hardware and software involved and the exact nature of the work.</td>
</tr>
<tr>
<td>II. Location of Work:</td>
</tr>
<tr>
<td>Describe where the work must be performed. Specify the location of hardware and software and where the people must perform the work.</td>
</tr>
<tr>
<td>III. Period of Performance:</td>
</tr>
<tr>
<td>Specify when the work is expected to start and end, working hours, number of hours that can be billed per week, where the work must be performed, and related schedule information.</td>
</tr>
<tr>
<td>IV. Deliverables Schedule:</td>
</tr>
<tr>
<td>List specific deliverables, describe them in detail, and specify when they are due.</td>
</tr>
<tr>
<td>V. Applicable Standards:</td>
</tr>
<tr>
<td>Specify any company or industry-specific standards that are relevant to performing the work.</td>
</tr>
<tr>
<td>VI. Acceptance Criteria:</td>
</tr>
<tr>
<td>Describe how the buyer organization will determine if the work is acceptable.</td>
</tr>
<tr>
<td>VII. Special Requirements:</td>
</tr>
<tr>
<td>Specify any special requirements such as hardware or software certifications, minimum degree or experience level of personnel, travel requirements, and so on.</td>
</tr>
</tbody>
</table>
Plan contracting process

- Inputs
  - Procurement management plan
  - Contract SOW
  - Make-or-buy decisions
  - Project management plan

- Tools and techniques
  - Standard forms
  - Expert judgment

- Outputs
  - Procurement documents
  - Evaluation criteria
  - Contract SOW (updates)

Detailed Criteria for Selecting Suppliers

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Possible Points</th>
<th>Supplier 1 Points</th>
<th>Supplier 2 Points</th>
<th>Supplier 3 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project manager's educational background and experience</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Project manager is PMP certified</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Presentation on management approach</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Organization's project management methodology</td>
<td>10</td>
<td>7</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Total Score</td>
<td>30</td>
<td>24</td>
<td>13</td>
<td>28</td>
</tr>
</tbody>
</table>
**Project Integration Management Processes**

- **Develop the project charter**: working with stakeholders to create the document that formally authorizes a project—the charter
- **Develop the preliminary project scope statement**: working 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
- **Develop the project management plan**: coordinating all planning efforts to create a consistent, coherent document—the project management plan

**Project Integration Management Processes (continued)**

- **Direct and manage project execution**: carrying out the project management plan by performing the activities included in it
- **Monitor and control the project work**: overseeing project work to meet the performance objectives of the project
- **Perform integrated change control**: coordinating changes that affect the project’s deliverables and organizational process assets
- **Close the project**: finalizing all project activities to formally close the project
**BEST PRACTICES**

- Define the project scope in detail and get appropriate approvals
- Get the right people involved
- Estimate the time and costs
- Break the job down
- Identify all project stakeholders and manage expectations
  - Communicate, communicate, communicate!
- Define project management procedures up front
  - Don’t make them up as you go
BEST PRACTICES (Continued)

- Monitor the schedule and budget
- Manage scope via a project Change Control process
  - Have the Project Sponsor approve scope changes
  - Watch out for “scope creep”
- Get deliverable approvals as defined in the Scope document
- Identify risks up front and manage them
- Issues -- identify, escalate, and track
  - Resolve as quickly as possible
- Capture Lessons Learned throughout the project
  - Don’t wait until the end of the project

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- Founded in 1969
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- http://www.pmi.org
- Project Management Professional
  - 3 years exp with bachelors
  - 35 classroom hours
  - 200 question, 4 hour exam
  - Must agree to code of ethics
  - Continuing education requirement
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- **Project Management Professionals (PMP®)**
- **Program Management Professionals (PgMP)®**
- **PMI Risk Management Professional (PMI-RMPSM)**
- **PMI Scheduling Professional (PMI-SPSM)**