# Course 1: Initiating and Planning

## Introduction of Project management

1. A Project is a temporary endeavor
   1. Has defined start and end dates
   2. Has a specific objective to be completed within certain specifications
   3. Has funding limits
   4. Consumes resources
   5. Creates a lasting outcome
2. Project Management Process
   1. Initiating
      1. Develop Charter
      2. Identify Stakeholders
   2. Planning
      1. Develop Project plan
      2. Develop schedule
      3. Estimate costs
      4. Perform risk analysis
      5. Plan stakeholder management
   3. Executing
      1. Direct work
      2. Perform quality assurance
      3. Identify and manage project team
      4. Manage communications
      5. Perform procurement
   4. Monitoring and Controlling
      1. Monitor work
      2. Perform change control
      3. Control cost and schedule
      4. Control quality
      5. Control risks
   5. Closing
      1. Completed work
      2. Assessment of performance
3. Two key elements of project management
   1. Management and Leadership
      1. Management is blocking and tackling or technical elements of running a project
      2. Leadership creates the vision and motivates the people
4. Leadership Skills – leaders work with others to create solutions
   1. Guide influence and collaborate using relational power
   2. Develop
   3. Innovate
   4. Focus on relationships with people
   5. Inspire trust
   6. Focus on long-range vision
   7. Ask what and why
   8. Focus on horizon
   9. Challenge status quo
   10. Do the right things
   11. Focus on vision, alignment, motivation, and inspiration
5. Management – Managers direct people
   1. Direct using positional power
   2. Maintain
   3. Administrate
   4. Focus on systems and structure
   5. Rely on control
   6. Focus on near-term future goals
   7. Ask how and when
   8. Focus on bottom line
   9. Accept status quo
   10. Do things right
   11. Focus on operational issues and problem solving

Performance

Management Leadership

Most successful find the optimal level of a mix between management and leadership

1. Leadership styles
   1. Laissez-fiare
      1. Focused on rewards
   2. Transactional
   3. Servant leadership
      1. Putting other people first
   4. Transformational
      1. Empowering other and encouraging innovation
   5. Charismatic
      1. Inspiring others
   6. Interactional
      1. Combination of many
2. Manager’s mange projects, leaders lead people
3. Project Manager Roles
   1. Identify the requirements of the project
   2. Address the needs concerns and expectations of the stakeholders
   3. Deliver project through the team
   4. Plan and execute communications among stakeholders
   5. Balance the competing project constraints which include, but are not limited to:
      1. Scope
      2. Quality
      3. Schedule
      4. Budget
      5. Resources
      6. Risk
4. Managing the IRON triangle

Scope

Schedule

Project

Cost

If you increase your scope – leads to an increase in time and budget

If you increase you cost – leads to an increase in time and schedule

1. Enterprise Environmental Factors
   1. Organizational culture: structure and governess
   2. Geographical distribution of resources
   3. Infrastructure: inside org.
   4. Information technology software
   5. Resource availability: contracting, purchasing constraints
   6. Employee availability: right skills
   7. Other factors: weather, shipping delays
2. Project manager leads the project team to meet the projects objectives and the stakeholders’ expectations. They work to balance the competing constraints or restraints on the project with the resources available.
3. Program Management: ensures that all the required components are completed in a way that makes sense for the project and the organization
4. Portfolio Management: process of managing projects, programs, sub-portfolios and operations as a group of strategic objectives. Aligns organizational strategies and determines the right programs or projects that should be prioritized while providing the resources to make it happen.
   1. Ex. Program management – development of one car
   2. Portfolio management – general design of multiple types of cars
5. Portfolios
   1. Projects
   2. Programs
   3. Sub portfolios
6. PMO – Project management office: this is the structure that standardizes the processes and governance in an organization
   1. Supportive: Provide templates, best practice, training
   2. Controlling: monitor the compliance to the organizational standards
   3. Directive: control the project from start to finish

## Ethics

1. Ethical Decision Making
   1. A system of moral principles that we all live by the way we treat other people
2. Areas of Ethical Concern
   1. COI – conflict of interest
   2. Environmental and Safety
   3. Quality and Product liability
   4. Honesty and Truthfulness
   5. Treating others fairly
   6. Bribery and Compliance
   7. Ownership: respect the rights of design, proprietary info
3. Four key questions
   1. Are our ethics based on a set of personal values?
   2. Are they benchmarked against socially acceptable norms?
   3. Are our values and standards consistent with our chosen environment? Do they match the organization and the situation we find ourselves? Are we different and outlying?
   4. Do we consistently apply these values and standards in all situations?
4. Values
   1. Personal values: consistent set of personal standards
   2. Legal codes and standards: obligated to follow these standards
   3. Professional codes of Ethics: Acceptable behavior
   4. Organizational standards: how to act when conducting business
5. Most ethical tradeoffs are conflicts between two desirable ends
   1. Economic benefit balanced against social performance
6. Ethical Values to have
   1. Integrity: adherence to ethical principles
   2. Honesty
   3. Fidelity: allegiance to public trust, loyalty
   4. Charity: how we treat others
   5. Self-Discipline
   6. Reliability and dependability
7. PMI Code of Ethics
   1. Vision
      1. Do what is right and honest
   2. Applicability
      1. All members of PMI
      2. All members applying for PMI
8. The four codes
   1. Responsibility
      1. Take ownership for all decisions regardless of outcome
      2. Make decisions and take actions based on interests of society, public safety and the environment
      3. Accept only those assignments consistent with our background experience and skills and qualifications
      4. Protect confidentiality and proprietary information
      5. Fulfill our commitments
      6. Report ethical violations
   2. Respect
      1. Show a high regard for yourself, others and the resources entrusted to you
      2. Diverse perspectives and views are encouraged and valued
      3. Negotiate in good faith
      4. Do not use our position to the benefit of ourselves at the expense of others
   3. Fairness
      1. Make decisions and ac impartially and objectively free from competition, self-interest, prejudice and favoritism
      2. Disclose any conflicts of interest
   4. Honesty
      1. Understand the truth and at truthful in manner in both communication and behavior
9. Ethical Decision Making
   1. Assessment
      1. Make sure you have all the facts
      2. Assess the motivations of the stakeholders
   2. Alternatives
      1. Develop options
   3. Analysis
      1. Select the best course of action
   4. Test
      1. Check your decision against standards
      2. Check with experts
   5. Act
      1. Put your decision into practice
   6. Monitor
      1. Follow up on the outcome
10. Do what is right
    1. Is it legal?
    2. Organizational core values?
    3. Involving the right people?

## Project Organizations and Processes

1. Functional Matrix Based Organizations
   1. Each function represents a key requirement for completion of business
   2. Pros: resources are optimized, improved technical control, communication and procedures established, job security for team members
   3. Cons: There is no one person in charge, coordination is more complex, no customer focal point, functional priorities govern over project priorities, project activities can easily get siloed, distributed budget and schedule authority
   4. This works well for small projects
2. Weak Matrix organization – greater coordination is required for some functions
   1. Pros: Some project coordination is provided, improved reporting, communication improved, resources optimized, job security for team majors
   2. Cons: No one person is responsible, coordination is more complex, no customer focal point, functional priorities govern over project priorities, project activities can easily get siloed, distributed budget and schedule authority
3. Balanced Matrix Organization
   1. There is a project manager with more responsibility
   2. Project manager has control over day-to-day operations, interfaces with client
   3. Functional managers remain in control
   4. Pros: Single point of responsibility identified, improved customer focus, improved communication among team members, improved reporting, resources flexibility, job security for team members
   5. Cons: Unclear budget and schedule authority, potential conflicts between functional managers and project managers, potential priority conflicts
4. Strong Matrix Organization
   1. A project management group for this model: fully responsible for scope, schedule, and budget
   2. Functional manager still has control over staff
   3. Cost – increase of budget allocation, loss of control of functional manager
   4. Pros: Single point of responsibility, budget and schedule management is clearer, reporting is improved, customer focus is improved, resource flexibility, job security for team members
   5. Cons: Dual reporting for team, resources not dedicated, potential conflicts between functional managers and project managers, potential priority conflicts
5. Project-Oriented Matrix Organization
   1. Sometimes called tasked based – all members put onto a single task force in a common area
   2. Project manager becomes team manager, provide advice on technical aspects of the project
   3. Functional managers have limited input on how and when activities are done
   4. Pros: Clear single point of responsibility, strong lines of authority, dedicated staff focused on project, flexibility in scheduling, strongest customer focus, strongest reporting control
   5. Cons: Resource use is less efficient, lower technical interchange among projects, issues with reintegration of staff at project conclusion, technical oversight of project is weaker
6. Project managers influence grows stronger through each organization type
   1. Functional optimize resources and lose this as you get to project oriented
   2. Project based optimize scope, schedule, budget, control of project manager and these become less as you move down to functional organization
7. Factors that influence project organization style
   1. Size of the organization
   2. Size of the project
   3. Duration
   4. Uniqueness of the project
   5. Complexity
   6. Risk
   7. Significance
   8. Cost
8. Functional Organization: types of projects successfully executed
   1. Small organizations with limited resources
   2. Simple projects
   3. Small projects
   4. Projects that are very similar to previous projects
   5. Low cost/low risk
      1. Ex. Standard software updates
      2. Concept studies
      3. Project definition studies
9. Weak Matrix Organization
   1. Small projects of limited duration
   2. Relatively simple
   3. Projects with limited changes relative to previous projects
   4. Low cost low risk
   5. Moderate schedule pressure
      1. Ex. Maintenance projects coordinated by one engineer
      2. Task force to develop recommendations: one member coordinates
      3. Concept selection studies
      4. Technology strategy development projects
10. Balanced Matrix Organization
    1. Larger in scope and more complex
    2. Small/moderate size with more coordination to be successful
    3. Moderate cost, risk and schedule pressure
       1. Relocation operations
       2. Cross functional reorganization Projects
11. Strong Matrix organization
    1. Medium to large projects where resource efficiency is important
    2. Non-schedule driven projects
    3. Moderate duration projects
    4. Unique projects with limited challenges
    5. Functional input is important
    6. Managed risk projects
       1. Feasibility studies for large projects: too large for just a project manager
       2. Design projects for construction projects
       3. New software development
       4. Plant turnaround: modified or maintained, central group that plans and manages, but each department loans their personnel
12. Project Oriented Organization
    1. Typically used for long duration
    2. High risk with high focus team
    3. Project focused organization
    4. Challenging
    5. Schedule driven
       1. Large scale public works: require a large amount of coordination
       2. NASA Space station: added complexity for high risk
       3. Grass-roots refinery design and construction: typically schedule and cost driven
       4. Major offshore developments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Functional** | **Weak Matrix** | **Balanced Matrix** | **Strong Matrix** | **Project Oriented** |
| Scope | Small | Small | Medium | Medium | Large |
| Duration | Short (<<1year) | Short | Medium | Medium | Long |
| Uniqueness | Similar to normal business | Small changes | Neutral | Unique | One of a Kind |
| Complexity | Simple | Simple with some coordination | Medium | Medium-High | High |
| Ambitiousness | Easy Success |  | Achievable |  | Challenging |
| Significance | Low Priority | Low-Moderate | Moderate | Important | Key |
| Risk | Small |  | Moderate |  | High |
| Cost | Low or no budget | Low budget | Moderate | Medium-High | High |
| Simultaneity | Many |  | Few |  | Very Few |

1. Project Management Process: a set of interrelated activities performed to create a product, service or result
2. PMBOK 49 Processes
   1. Project integration management
   2. Project Scope Management
   3. Project Schedule Management
   4. Project Schedule Management
   5. Project Cost Management
   6. Project Quality Management
   7. Project Resource Management
   8. Project Communications Management
   9. Project Risk Management
   10. Project Procurement Management
   11. Project Stakeholder Management
3. Project Management Groupings
   1. Initiation: Develop Charter, Identify Stakeholders
   2. Planning: Develop Project Plan, Develop Schedule, Estimate Costs, Perform Risk Analysis, Plan Stakeholder, Engagement
   3. Executing: Direct Work, Manage Quality, Acquire Resources, manage project team, manage communications, implement risk responses, perform procurement
   4. Monitoring and Controlling: Monitor work, perform integrated change control, control cost and schedule, control quality, monitor risks
   5. Closing: Project completed, lessons learned, archive records
4. Recycle and update plans on a continuous basis: project manager has to react to the change
5. Project Manager as a leader
   1. One key to success is the Project Manager’s ability to effectively deal with:
      1. Functional Managers
      2. Project Sponsors
      3. Organization Executives
      4. Clients and outside entities
      5. Support Personnel
      6. The Team
6. Key Leadership elements
   1. A project manager must be key in leading which means excellence in the following areas:
      1. Create a clear vision for the team to follow
      2. Assistance in problem solving
      3. Integrating new members into the team
      4. Conflict management
      5. Facilitating group decisions
      6. Setting and tracking goals
      7. Capability to plan and gain commitments
      8. Effective communication
      9. Ability to balance technical solutions with economic and human factors

## Wilmont Case Study

1. Wilmont Pharmacy: Project Organization Chart
   1. Operations Vice President (George Cranston): Development of Pilot Project
      1. Provide funds
      2. Oversee aspects of initiative
   2. CIO (James Connor): Information Systems Development
      1. Project Manager for IT (Mary Pearson)
         1. Approve the customer
         2. Send a confirmation to the customer
   3. Project Manager for business (Phillip Greenberg): control and management of delivery system
      1. Works with me
   4. 4 Pharmacies are participating in the prototyping phase, close geographic suburban area
      1. Load products into the drone package carrier
      2. Engage in this prototype by the time for first flight
   5. Customer orders
      1. Taking orders from customers
      2. Delivery of orders
   6. Change Management team (Shirley Johnson)
      1. User training
      2. System implementation
2. Drone Tech: Project Organization Chart
   1. CEO (Jordan Kempler): Prototype in SF area
      1. Customize systems, interface, and business process to conform to project requirements
   2. Project Manager (Me): general oversight
      1. Interface with Wilmont and report directly to Jordan Kempler
   3. Piloting drones and delivery of products (Eileen Seymour)
      1. Order entry
         1. Register willingness to have a drone deliver their orders by means of online entry
      2. Delivery confirmation
      3. Mobile app
         1. Register willingness to have a drone deliver their orders by means of online entry on smart phone
   4. Interface communications
      1. Email
      2. Online
      3. Mobile alerts
   5. Contract Negotiations
      1. Involvement with Drone Tech Engineering and Flight Operations
   6. Flight Operations (Gerald Hasper)
      1. Adapt a temperature-controlled product bagging system along with a bubble type cushion
      2. Reliability to package release system (engineering sub project)
   7. Allocation of 4 drones
      1. Painted in wilmont’s corporate colors and logo
   8. Testing, quality control

## Project Stakeholder Management

1. Project stakeholder: management process organizes the functions necessary to identify and classify and manage your stakeholders in a methodical way which will help you create a plan that you can execute.
2. 4 major components to stakeholder management
   1. Identify Stakeholders
   2. Plan Stakeholder Management
   3. Manage stakeholder engagement
   4. Monitor Stakeholder Engagement
3. A stakeholder is a person group or entity that may affect or be affected by your project
   1. Sponsor
   2. Client
   3. Regulator
   4. Someone in company
4. Why is it important to identify stakeholders early?
   1. May be a positive or negative influence
   2. May have competing interests, causing possible conflicts
   3. Have varying levels of responsibility and authority
   4. Management can mean the difference between success and failure
   5. Sponsor, business partners, employees
5. Identifying Stakeholders (Inputs)
   1. Project Charter
   2. Business and Project Documents
   3. Project Management Plan
   4. Agreements
   5. Enterprise environmental Factors
   6. Organizational Process Assets
6. Identifying Stakeholders (Tools and Techniques)
   1. Initial stakeholder analysis and assessment
      1. Identify potential stakeholders
      2. Analyze and prioritize the impact of each stakeholder
      3. Assess stakeholder reactions to various situations
7. Stakeholder Classifications
   1. Power/interest
   2. Power/influence
   3. Influence/impact
   4. Salience model
   5. Stakeholder cube

Manage Closely

Keep Satisfied

Influence

Power

Keep informed

Monitor

1. Stakeholder register
   1. Helps record stakeholder prioritization during assessment and analysis
   2. Should include name, type, and how often they want to be communicated with
2. Plane Stakeholder engagement
   1. Project management plan may include:
      1. Life cycle and processes for each phase
      2. Description of how work will be executed during each phase
      3. Resource management requirements
      4. Change management plan
      5. Communication management plan
   2. Stakeholder register
   3. Risk management
   4. Enterprise environmental factors
   5. Organizational Processes
3. Plane Stakeholder Engagement: Tools and techniques
   1. Utilize expert judgement to determine the level of engagement
      1. Senior managers
      2. Identify key stakeholders
      3. PMs who have worked in the same area
      4. Subject matter experts (SMEs)
      5. Industry groups and consultants
      6. NGOs, technical associations, governmental agencies
4. How to gain expert Feedback
   1. One-on-one meetings
   2. Panels
   3. Focus groups
   4. Surveys
5. What is the current engagement level of your stakeholders?
6. How does the desired/planned engagement level compare to the current level?
7. Hod do you classify engagement levels?
8. Some examples of stakeholder engagement are:
   1. Unaware: of project and potential impacts
   2. Resistant: aware if the project and potential impacts and resistant to change
   3. Neutral: Aware of the project yet neither supportive or resistant
   4. Leading: Fully aware and actively engaged in ensuring the project is a success
   5. Supportive: Aware of the project and potential impacts and supportive to change
9. Stakeholder Engagement Assessment Matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Stakeholder** | **Unaware** | **Resistant** | **Neutral** | **Supportive** | **Leading** |
| Stakeholder 1 | C |  |  | D |  |
| Stakeholder 2 |  |  | C | D |  |
| Stakeholder 3 |  |  |  | D |  |

1. Stakeholder Engagement Plan includes:
   1. Desired and current engagement levels of key stakeholders
   2. Scope and impact of change to stakeholders
   3. Identified interrelationships or overlaps
   4. Stakeholder communication requirements
   5. Type of information distributed and how
   6. reason for the distribution
   7. Frequency of the distribution
   8. Method of updating the plan throughout the process
2. Manage stakeholder engagement inputs
   1. Project management plan
   2. Project documents
   3. Enterprise environmental factors
   4. Other organizational assets
      1. Communication requirements
      2. Issue management
      3. Change control
      4. Historical information
3. Stakeholder Engagement Tools
   1. Interpersonal skills – effective engagement to resolve concerns
      1. Building trust
      2. Resolving conflict
      3. Active listening
      4. Change management
      5. Cultural awareness
      6. Observation
      7. Political awareness
   2. Management skills
      1. Influence people
      2. Facilitate cooperation
      3. Negotiate
      4. Influence or modify organizational behavior
   3. Communication methods
      1. Specific stakeholder communication methods
4. Communication Plan
   1. Establishes the who, what, how, and when people communicate during the project: the communication flow
   2. Prioritizes information and how it is communicated
   3. Identifies how people will communicate: use of technology
   4. Applies constraints
   5. Push/pull/interactive methods of communication
      1. Interactive part of the project plan: multiple parties
         1. Meetings, phone calls, video, IM
      2. Push: Sent to specific people who need specific information
         1. Letters, emails, faxes, memos
      3. Pull: Large audiences
         1. Intranet, e-learning, databases
5. Manage Stakeholder Engagement Outputs:
   1. Project management plan updates
   2. Change requests
   3. Project document updates
   4. Organizational process updates
      1. Stakeholder notifications
      2. Reports
      3. Presentations
      4. Records
      5. Feedback
      6. Lessons learned
6. Monitor stakeholder engagement: The process of monitoring the stakeholder relationship throughout the project
   1. Project managers responsibility
      1. Monitor and manage the stakeholder engagement
      2. Utilize stakeholder management plan inputs
      3. Utilize expert judgement
7. Monitor Stakeholder Engagement Inputs
   1. Project management plan
   2. Issue logs
   3. Performance data
      1. Completion dates, changes, costs
   4. Project documentation
8. Tools and techniques
   1. What tools can you use to assist you in managing this?
      1. Information systems
      2. Input from others
         1. Senior leaders
         2. Key stakeholders
      3. Meetings
9. What should be some of the outputs of your plan?
   1. Status updates
   2. Change requests
   3. Updates to your project management plan
   4. Updated documentation
   5. Any lessons learned from the process and feedback
10. Project Stakeholder Register Assignment
    1. You are the project manager for dronetech
    2. You are assigned to prepare the project stakeholder register for dronetech engineering
    3. Based on the wilmonts pharmacy drone case
11. The final document should have:
    1. Project name and document revision number and date
    2. It should incorporate the names of the stakeholders
    3. Their role in the project
    4. Project expectations
    5. Their interests
    6. Their influence on the project outcome
    7. How they prefer to communicate

## Project Integration Management

1. Learning Objectives
   1. Define the prerequisites for a project
   2. Initiate the project: opportunity evaluation and chartering a project
   3. Understand what goes into the project plan including bringing together all subsidiary planning documents
   4. Describe the integration of project management processes and their role in defining, planning executing, controlling, and closing a project
2. Project Integration Management
   1. The processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups.
   2. “The core activities of a project manager – pull together and integrating a plan
3. Project integration management process
   1. Develop a charter
   2. Develop project management plan
   3. Direct and manage project work
   4. Monitor and control
   5. Close
4. Project Charter (Scoping Document) Inputs
   1. Benefits management plan
   2. Business case
   3. Agreements
   4. Enterprise environmental factors
   5. Organizational process assets
5. Project Benefits management plan
   1. Target benefits
   2. Strategic alignment
   3. Time frame
   4. Benefits owner
   5. Metrics for measuring benefit
   6. Assumptions
   7. Risks
6. Business Case
   1. The business case is a document economic feasibility study used to establish the benefits of a selected case and justify further project management activities
   2. Assists the company in allocating scarce resources – time people and money
   3. May compare different options
   4. Typically prepared in a standard organization format to allow comparisons
7. Three of the most common economic methods for describing project economics are
   1. Payback time: is the easiest of the three
      1. It is the time it takes to pay back the initial investment
      2. Calculated by summing the cash flows over time until the total cumulative value turns positive
      3. Example: Sum of positive and negative case flow (In-out) for the total period of time
   2. Net present value
      1. Takes into the account the time value of money
      2. Is based on the life of the project and the discount rate (i)
      3. Most spreadsheet programs have an NPV function
      4. Example: N = 5 if net present value is positive, the company is generating profits even when discount is given
   3. Internal rate of return
      1. Internal rate of return is the discount rate (i) at which the net present value (NPV) is zero
      2. Most spreadsheet programs have an IRR function
8. Project Charter Contents: document that formally authorizes the project
   1. Project purpose or justification
   2. High level project description
   3. Project objectives and success criteria
   4. High level requirements
   5. Assumptions and constraints
   6. High level risks
   7. Summary milestones schedule
   8. Pre-approved financial resources
   9. Stakeholder list
   10. Project approval Requirements
   11. Project exit criteria
   12. Assigned Project manager, responsibility, and authority level
   13. Name and authority of sponsor
9. Project Charter Sections
   1. Project description: brief description of the project – what are we trying to accomplish
   2. Project Purpose: describe the business case or reason why the organization should pursue this project including the goals and requirements
   3. Scope/Boundaries: Describe the high-level scope of the project. Describe what is included and any exclusions
   4. Requirements: List the high-level project requirements for the project to be successful. This can be qualitative or subjective.
   5. Deliverables/Objectives: List the key final deliverables or objectives of the project at a high level or reference a standard or other document
   6. Success Criteria: make the success criteria as objective as practical – how will we know we met the deliverable or accomplished the objective
   7. Schedule: list any schedule or milestone requirements
   8. Pre-Approved financial resources: Provide and budget guidance for this phase of work
   9. Assumptions and constraints: List any dependencies that must be in place before the project can be key to project success – “project can not start until money is available”
   10. Risks: list any known high risk
   11. References: If there are any previous projects, reference materials, or key contacts that the team should know
10. Key Stakeholders section
    1. Client, project sponsor, project manager
11. Authority levels: Describe the authority level of the project manager to make decisions and any other groups or persons who have authority over the project
12. Project Management Plan: a document that describes how the project will be planned executed monitored and controlled
13. Typical Table of contents includes:
    1. Scope management plan etc. –
14. Additional elements of the project management plan may include
    1. Executive summary – gives the reader an overview of the scope
    2. Execution approach – PM lay out the strategy, outline how to approach each plan element
    3. Change management plan – separate from the other plan, can be included as a part of the scope
15. Setting up key project baseline elements
    1. Project charter or contract including business case
    2. Scope baseline project and product
    3. Project management plan
    4. Cost baseline
    5. Schedule baseline
    6. Risk register
    7. “ all 6 are project baseline documents”
16. Direct and manage the work: the goal of the PM is to assist the project team to achieve the project objectives and deliverables
    1. Following the baseline
    2. Managing the stakeholders and communication
    3. Adjusting the plans and schedules based on actual performance
    4. Obtaining the required resources
    5. Training and managing the team members
17. Manage and control the work
    1. As part of directing the work, the project manager must assist the team in monitoring and controlling the work by:
       1. Comparing actual performance against the project baseline
       2. Assessing performance to determine if any corrective or preventative action is required
       3. Forecasting future performance based on history and judgement
       4. Implementing risk control procedures
       5. Updating plans as required
       6. Implementing active change control
18. Change control: is a process to identify, document and approve modifications to the project baseline
    1. There are two types
       1. Trends – conditions that deviate from the baseline but are within the original charter, requirements or scope of the project baseline
          1. An actual labor rate that is higher or lower than expected
          2. Schedule durations that are longer or shorter than predicted
          3. Material costs that are different than expected
       2. Change requests – formal proposals to modify any document, deliverable, or baseline
          1. The client requests a change to the project specifications
          2. A government regulation changes and must be incorporated causing a change in cost and schedule
          3. The client or sponsor requests that you accelerate the schedule
    2. Changed may be modifications to the scope, charter, cost etc

No Change

Issue Trend

No Change

Formal approval

Formal Change Request

Different than baseline

Potential Change

Update Change Log

Change baseline

1. Was there a formal request/ if not we should change notice and record it in a change log etc.
2. Project phase close out
   1. It is important that we properly close out our project
   2. The steps are easy:
      1. Document that the project or phase is complete and met objectives or was abandoned – receive approval from customer and or project sponsor
      2. Transfer the deliverables to operations or to the next project phase
      3. Update the organizational assets (lessons learned, project history, cost, and schedule information)
      4. Archive any project files and data according to company policy

# Course 2: Scope, Time, and Cost Management

## Project Scope Management

1. Learning objectives
   1. Create a Project scope statement
   2. Identify Ways to control the scope of the project
   3. Decompose the work and develop work packages
   4. Create a work breakdown structure
   5. Develop a critical path schedule
   6. Review types of cost estimates ad identify whether they are top down or bottom up
   7. Review budgets, contingencies, and reserves
   8. Calculate planned and earned values to compare with actual performance
   9. Perform a schedule and analysis
2. Scope Management
   1. Define a project scope based on stakeholder needs
   2. Develop a scope management plan based on the approved project scope
   3. Identify the key requirements and deliverables needed to be collected and analyzed to complete the plan
   4. Review a scope validation process
   5. Develop a scope control plan
   6. Develop a scope change management plan
3. Project Scope Statement: (What are we planning to do)
   1. These statements can be divided into two parts
      1. Product Scope: the features, functions, and specifications that describe the product, service, or result of the project. It is typically a physical facility, product or program to be delivered
      2. Services Scope: the work to be performed to deliver the product (May be the same as the product scope)
         1. If this is left out, it can cause issues later on (sponsor needs to know what the project involves) Common understanding will manage customer expectations
4. Planning Phase of the project management process is where you develop the scope
   1. Also done in this phase:
      1. Collect the requirements, define scope, create WBS
5. Monitoring & controlling phase : validation of the scope
6. Project scope development (3 key steps)
   1. Planning how to develop scope
   2. Collecting requirements
   3. Preparing the scope statement
7. Project scope statement development inputs
   1. Project Charter: formal authorization for the project
      1. Contains scope description
   2. Stakeholder register: key players for requirements
   3. Stakeholder management plan: how to engage stakeholders
   4. Project management plan: includes any prepared sections & helps us define the scope
   5. Enterprise environmental factors: company culture, general market conditions, may influence the product development
8. Contents of a good project scope statement: all specifications and details – can be lengthy
   1. Project name
   2. Business purpose
   3. Project goals
   4. Project work statement
   5. Primary deliverables
   6. Key milestones
   7. Constraints
   8. Project work exclusions
9. Plan scope management: how we lay out the scope for the project
   1. Process for collecting the requirements: interview with stakeholders
   2. Process for developing, reviewing, and approving a scope statement
   3. How the WBS will be developed (Subject for next week)
   4. Approval of project deliverables
   5. Process to approve and manage changes to the project scope
10. Collect Requirements: element of project scope statement
    1. The project charter defines the requirements: ideal situation
    2. Sources of information:
       1. Project charter
       2. Bid documents
       3. Product specifications
    3. Additional sources
       1. Stakeholder surveys
       2. Focus groups
       3. Facilitated work shops
       4. Questions and surveys
       5. Prototypes
       6. Benchmarks
    4. Types of requirements
       1. Business or mission requirements
       2. User requirements
       3. Functional requirements
       4. Stakeholder requirements
       5. Quality requirements
       6. Project requirements
    5. Requirements reviews
       1. A key element of successful project execution is making sure that all of the requirements are well understood by all. To assure this is true, we should review the requirements to make sure:
          1. Each requirement has a sing meaning
          2. Ambiguous works are removed and replaced
          3. There are no unbounded lists such as etc. or TBD
          4. Al key words are defined in a dictionary
    6. Requirement’s traceability matrix
       1. As you collect requirements, also develop a requirements traceability matrix. The traceability matrix allows us to:
          1. Track requirements from their source to how they will be implemented in the project
          2. Links each requirement to a business value
          3. Ensures that each requirement is included in the project
       2. Matrix helps to keep track of requirements dropped or added – keeps items up to date
    7. Approved product scope statement is the agreement of deliverables
    8. Scope validation: process of confirmation that we are meeting project deliverables
       1. Confirmation by customer and stakeholders that we meet their needs
       2. Different than checking & quality control? This process comes after the internal checks – ultimate customer satisfaction
    9. Inputs: Requirements/checked deliverables/traceability matrix
    10. Tools and Techniques: Inspection/Group decision making
    11. Outputs: Accepted deliverables or Change requests(acknowledges that it met the original scope)/defect(project must correct and resubmit)
11. Scope Control Process: If scope changes – schedule or cost or both must change
    1. The scope control process is an established work process to identify, evaluate, control, and approve changes on a Project
    2. Uncontrolled project scope changes will:
       1. Cause undocumented delay
       2. Increase the cost without approval
       3. Damage morale and productivity
       4. Spoil relationships
       5. Morale and smooth functions
       6. Requirements feel as though they are always changing
    3. Good scope control process have these key attributes:
       1. Documented and Approved Process
       2. Contains Layers of Authority
          1. Level 1: Project Approval – smaller changes
          2. Level 2: Change Control Board Approval – middle sized changes
          3. Level 3: Executive approval – larger changes (may impact business plan)
       3. Adapted to Organization and Project needs
       4. Based on validated scope
       5. Accepted process to modify the baseline
       6. Outlines roles and responsibilities of key players
    4. Key additional attributes
       1. Change requests must be in writing
       2. Benefits of the change must be documented
       3. Roles and responsibilities must be appointed and documented
       4. Approval process must be documented
       5. Decision authorities must be appointed and agreed
       6. Approved changes must be incorporated into the plan
       7. Scope changes must be communicated
       8. A set of standardized tools used
    5. Key roles and who fills them
       1. Originator: Person or Persons requesting the change
       2. Coordinator: person who records the proposed change in the change log and shepherd it through the process
       3. Assessment body: Project team that evaluates the change and makes a recommendation
       4. Decision Makers: authority to approve the change
       5. Implementers: Team members acting on a change
    6. Scope Change Process
       1. First a Change is identified
       2. Assessed by an assessment team and the impacts and recommendations for how to proceed are documented
       3. Submitted to one or more levels of authority to implement or reject
       4. If approved, then the baseline documents are corrected, and the change is implemented
       5. The proposed change and its documented outcome are recorded in the change log for future reference.
    7. Change log
       1. Contains a record of each proposed change
       2. This document contains:
          1. ID
          2. Origination Date
          3. Originator
          4. Description
          5. Assessment (Cost, Schedule, Quality impacts)
          6. Disposition
          7. Approvals and Approval Dates
       3. Should be published in the monthly report
    8. Fundamental goals of the process and benchmark of how you will be judged

## Project Schedule management

1. Work Breakdown Structure (WBS)
   1. A work breakdown structure is a hierarchical breakdown of a project into manageable pieces, the smallest of which is called a work packages and defines the scope of the project. Packages are typically assigned to project team members
   2. Easy to understand
   3. Terminal work package
   4. Project Scope baseline
2. Types of WBS
   1. Project life cycle: project and product deliverables in the third level
   2. Major deliverables: as the second level
   3. Incorporating subcomponents: contracted work outside organization
3. Determining level of detail is imperative to determine which type
4. Post-it note method for determination
5. Tips for creating a WBS
   1. Include all the work necessary to complete the project
   2. 100-200 Work packages
   3. Deliverables
   4. 8/80 rule – for each person’s work load
   5. 8 hours a day or 80 hours for a project
   6. Templates – create multiple layers
   7. Not more than 5-9 jobs at one level
   8. Jobs should be similar size and complexity
   9. Provides a sense of progress
6. Work Package
   1. Smallest piece in a work project
   2. Assigned to an individual who is responsible for the package
   3. Help identify the types of resources necessary
   4. Create the RAM (Responsibility Assignment Matrix)
   5. Levels of individual responsibility: Responsible, accountable, consulted, or informed
7. Other things to consider
   1. Assigning Responsibility
   2. Estimate the resource cost associated with the resource
   3. Develop plan to mitigate risks
   4. How to measure performance and completion
8. WBS Dictionary
   1. The document provides details about each component of the WBS
      1. Description of the work
      2. Assumptions
      3. Schedules and Milestones
      4. Resources Required
      5. Cost and Estimates
9. Building Work Breakdown structure
   1. Step 1: create a list of tasks
   2. Step 2: identify a hierarchy (parallel versus prior)
10. Control Account
    1. A management control point where the project is analyzed against scope, budget, actual cost, and schedule to determine if the project is on track
    2. Typically include one or more work packages which are tied to one control account
    3. How do you decide which account to use for project organization structure based on responsibility?
    4. Makes sense for work packages to be tied to a specific branch/ manager
    5. Function or product line
    6. One technique that may help tie an account to a work package is by looking at the same package from two different angles: The WBS and the Organization Structure

## Project Time Management

1. Tools for managing project
   1. Gantt chart
      1. Easy to use, been in uses since WW1
      2. Originally used to build ships
      3. Shows tasks, time. And order, but not how the tasks interact
      4. Visual representation of tasks but lacks detail
2. CPM (Critical path method)
   1. Shows the longest path through a project after everything is completed
   2. Use your WBS
   3. Follow the same steps as with a Gantt Chart
      1. List tasks, determine precedence based on logic, estimate times for each task, determine which style of diagram
      2. Make sure your sequence is correct, if its wrong your diagram will be wrong
3. Choose diagram style
   1. Activity on the node or activity on the arrow
      1. Each shows the same result, but indicates where the work or activity happens
   2. First choose which type of symbol you want to use to represent your nodes: they are usually circles or squares, but you can use other shapes. Use an arrow to show flow of the work
4. Activity on the Node (AON)
   1. If using the activity on the node style:
      1. The actual work is represented by the node or shape
      2. Arrows indicate the direction of work and connect the diagram
      3. In most diagrams additional information is listed in the nodes such as task lengths and the name of the task/activity
5. Activity on the Arc (AOA)
   1. If using the activity on the Arc Style
      1. The actual work is represented by the arc which is represented by the arrow between nodes
      2. Arrows once again indicate the direction of the work and connect the diagram
6. Next Steps
   1. Draw your graph using the tasks ad precedent you established in your WBS and schedule
   2. If using AON, label your nodes and add task length:
      1. In the PMBOK, the nodes also include boxes to add start and stop times for each task
         1. This will be important when calculating the overall time
7. AON
   1. Tasks are drawn as boxes or rectangles and include times and an identifying nomenclature
   2. Start with the first task on your list: typically “Start” – everything flows from there
   3. Show the flow of work using arrows
   4. Add up the task Length from each box in a particular path – the longest path that follows a logical progression and completes all tasks is the critical path
   5. Larger projects can have ore than one critical path
8. Critical path works if these assumptions are true
   1. Each task is identified and is included in the diagram
   2. When all tasks are completed; the project is complete
   3. All jobs have a logical order and precedence
9. Early start: the earliest start that can start
10. Early finish: the latest something can finish without impact to flow
11. Late start/Late finish
12. Early finish = late finish gives you the critical path
13. Forward pass/backward pass
14. Slack Time
    1. Maximum amount of time a task may be delayed beyond its early start without delaying project completion
    2. Activities in the critical path do not have slack
    3. Slack time is a useful tool and allows the project manager to shift resources as necessary
15. TS = LF – EF way to calculate total slack
16. Free Slack is the amount a task can be delayed without delaying the early start of any other task
17. Calculated Free Slack: Free slack = minimum value of ES of all successors – ES of current activity – duration of current activity
18. Free Slack is the amount a task can be delayed without delaying the Early Start of any other task
19. Calculate Free Slack: Free slack = Minimum of ES of all successors – ES of current activity – Duration of current activity
20. Main Errors
    1. Estimation task times are wrong
    2. Relationships are wrong
    3. Relationships are missed
    4. Some tasks may be missing
21. Refinement
    1. Task Times
       1. Review time estimates
       2. Re-estimate times with little slack
       3. Iterate
    2. Predecessor Relationships
       1. Check for predecessor errors
    3. Wrong or Missing Facts
       1. Cannot be detected by computers
22. Control Schedule
    1. The Process of monitoring the status of a project throughout the project and how to manage change if necessary
       1. Quickly identifies deviations from the schedule and plan
       2. Typiclly, done by measuring the current work by the work estimates based on time
       3. May require reprioritization and change
    2. How do you measure performance against the schedule?
       1. Compare progress along the CP
       2. Critical chain (comparing built in buffers against the delivery date)
       3. Earned Value Management
          1. Looking at variances and their impacts on parts of the project
          2. Some are more impactful than others
          3. CP vs. non-CP
    3. What can you do if you find you’re off schedule
       1. Change request
       2. Update your schedule
       3. Choose an appropriate corrective action
       4. Resource leveling or smoothing
       5. Crashing: adds cost to the project or fast tracking: overlaps components in the project. Chance of quality issues
23. Automation Tools
    1. Automation helps with larger projects
       1. Use automation to help build you schedule and CP
       2. Helps track status

## Cost Estimation

1. Definition: A cost estimate may be defined as an approximation of the monetary or effort hours required to complete a project or a project phase
   1. Estimations are prepared to quantify the cost required to complete a scope of work
      1. Product Scope: cost of the facility, product or other deliverable
      2. Services Scope: cost of the services to deliver a specified product, deliverables or services
2. Purpose and Uses
   1. Evaluate the economic viability of a project
      1. Input to NPV or IRR calculations
      2. Evaluation of various alternative configurations/approaches
   2. Provide a cost baseline against which a project team can monitor the Project
   3. Provide data for schedule and progress measurement
   4. Evaluate the cost impact of a change in the scope of facilities or services
   5. Provide the basis for bidding
   6. Establish a benchmark for evaluating a third-party bid/proposal
3. Key Criteria
   1. An estimate must have context
   2. The methodology must be well documented
   3. It should be run like a project
   4. Use accepted standards that can be repeated
4. Estimating Standards
   1. AACE international: recognized source of recommended practices for estimating in multiple industries and geographies
   2. Published recommended practices on earned value, risk management, contingency, and other estimating related areas
5. Estimate Classes (5 recognized classes)
   1. Class 1: detailed unit cost with detailed take off
   2. Class 2: prepared after project start, fully defined or quantified, establish a control base
   3. Class 3: semi- detailed costs with assembly level line items, done after 10-40% of project complete
   4. Class 4/5: Top-down estimates, start with big picture
      1. Class 4: equipment factored or parametric models, historical data to factor the cost
      2. Class 5: lowest level of accuracy, concept screen or feasibility, early in project before engineering work begins, might be used in a first business case.
6. Accuracy versus Scope Definition: Class 3 estimate expected within a certain range of accuracy
7. Basis of Estimation
   1. All the baseline elements are part of the basis of estimation
      1. Project charter or contract including business case
      2. Scope baseline
      3. Project management plan
      4. Cost baseline
      5. Schedule baseline
      6. Risk register
   2. The estimate does not make sense except in this context
8. Estimate Plan/Basis
   1. Use table of contents from estimate
   2. A typical estimate plan describes how the estimate will be prepared and is later converted to the basis which then contains
      1. Product/services scope
      2. Work breakdown structure
      3. Source and values of pricing and labor costs
      4. Drawings and specifications
      5. Contractual requirements
      6. Project execution plan
      7. Approach to contingency
      8. Approach to allowances
      9. Estimate schedule and resource requirements
9. Estimate documents for each class of estimate
   1. Class 5: high level description, overall configuration, unit capacity size agreed, simple written scope of facilities
   2. Class 4: conceptual design available, schematic design with materials defined
   3. Class 3: project proposal or plan, sketches, project and product description, basic design completed, pricing on major components from bids
   4. Class 2: detailed engineering, major items sized and specified, product layouts complete, key drawings complete, electrical drawings, civil drawings, detailed pricing on most of the cost items
   5. Revamp: need as much detailed information as possible, these are the most challenging estimates to produce
10. Most common types of estimates used
    1. Analogous – class 4/5
       1. Based on a similar project or a similar section of a project
       2. Some adjustments are made to account for known differences
       3. Basic approach:
          1. Basic approach is based on experience, almost always considered class 5
    2. Parametric – class 4/5
       1. Capacity Factored
          1. Curve fit cost from similar projects
          2. Need good historic data
          3. Formula: regression analysis (capacity size or weight) exponents available from literature
       2. Equipment based
          1. A factored estimate is one in which the cost of a battery-limits facility is derived from the major elements in that facility using installation factors or modeling. There are two major approaches
             1. Factoring – price of major elements (structural steel, equipment) times a factor to cover the cost of bulk material and labor
             2. Equipment Modeling – Using third party software to develop a direct cost base on conceptual configuration and design specification.
    3. Semi-Detailed – achieve more accuracy
       1. A semi-detailed estimate is one employing either capacity or factor/modeling based techniques in estimating direct field costs for some portions of the project with the balance of the direct field costs estimated in a detailed manner using some method of quantification and unit pricing. May employ frequency data and factors in the determination of quantities
          1. Used when there is not sufficient historical data, not a good candidate for factoring
    4. Detailed – achieve more accuracy
       1. A detailed estimate is one in which each component or group of components has been quantitatively surveyed and priced, using the most realistic unit prices available. Quantities are determined from drawings or sketches and specifically identified
11. Estimate Review
    1. Estimate review are the key to quality. There are several levels of review
       1. Functional Peer Review
       2. Discipline review
       3. Project review
       4. Project sponsor review
       5. Customer review
12. Cost Baseline
    1. Cost baseline the approved version of the time-phased project budget (estimate) excluding any management reserves, which can only be changed through a formal change process.
    2. Validated estimate and becomes a basis
    3. Time-phase: costs are spread across the schedule with accordance with the estimate
    4. It is typically divided into WBS work packages and then time-phased using the project schedule. Estimate contingency and risk contingency are time phased per their related component
13. Typical Cost Baseline
    1. May be tracked at the project level or by major WBS elements
    2. On a project, we would track actual costs against the baseline forecast to determine whether we are on track
14. Key takeaways
    1. An estimate must be placed in context with the other baseline elements- it is meaningless by itself
    2. An estimate must have a documented basis that states how it was developed and the source of the data
    3. An estimate should match the project wbs to facilitate preparation of the cost baseline and project control
    4. An estimate preparation should be run like a project
    5. An estimate should be prepared in accordance with accepted standards and be repeatable

## Earned Value Management

1. Goals
   1. Define and describe the difference between planned value, earned value, and actual cost
   2. Calculate earned value
   3. Describe cost and schedule performance indices
   4. Develop techniques for cost and schedule analysis
   5. Develop techniques for forecasting
2. Project Scope Statement
   1. Work Breakdown Structure
   2. Project Schedule
      1. Matches WBS
      2. Resource loaded
3. Project Cost Baseline
4. Resource Loading Curves
   1. Cost Resource Curve
      1. Based on the budget estimate
      2. Favored by PM who are responsible for the total cost of the project
      3. Planned cost vs time
   2. Man- hour resource curve
      1. Based on man-hour estimate
      2. Favored by PM who are only asked to manage the direct hours expended
      3. Planned hours vs time
5. Cost Resource Curve
   1. The project has started and its time to add actual progress to the Resource Curve
6. Actual vs plan project curves
7. Earned Value Management
   1. EVM is an approach that combines the scope, schedule, and cost baseline into a project performance and progress measurement tool
   2. The key element of EVM is an agreed method to measure the physical progress of each wbs work package
8. The steps to set up EVM
   1. Set up the WBS/Baseline estimate by WBS work package, should have already been set up prior to cost baseline
   2. Select the level of management control appropriate for your project, organization culture and standards
   3. Determine the method for calculating earned value
9. Level of Management control
   1. The appropriate level of control (control account plan) is typically based on the following considerations
      1. Define scope definition with clear boundaries for each package
      2. Package activities grouped in one wbs area
      3. Each package should have a single owner
      4. Each package should be a manageable size
   2. For small projects there may be one single control account
   3. For large projects, there may be many
   4. Each control account should be treated like a mini project or project segment. It will have its own status and progress
10. The basic approach to earned value is
    1. Estimate a percent complete for each wbs work package
    2. Multiply the percent complete x the value of the work package to calculate the earned value for that package
    3. Sum up the work package earned values to calculate the earned value of the control account and ultimately the project
11. There are six methods for estimating percent complete ina work package
    1. Fixed formula
       1. Fixed % based on completing fixed activities in package
       2. Good for recurring packages where the formula is developed over time
    2. Weighted milestones
       1. Values are assigned to intermediate milestones in each package
       2. Good when you must prove the progress; takes a lof of planning and effort
    3. % complete with milestone gates
       1. Combine % complete with weighted milestones to take up partial credit for milestone
       2. More complex than milestones, but more accurate
    4. Earned Standards
       1. Uses established metrics to five credit for partial work
       2. Good for piece work or repetitive work such where units can be estimated
    5. Equivalent units
       1. The value for the package is earned when it is complete
       2. Requires a detailed bottoms up estimate and small work packages/units
12. Schedule Indices
    1. Schedule Variance = Earned value – planned value
       1. If the schedule variance is negative then we are behind plan. If the schedule variance is positive, then we are ahead of plan
    2. Schedule Performance Index = EV/PV
       1. If the SPI is less than 1.0 then we are behind plan
       2. If the SPI is greater than 1.0 then we are ahead of plan
    3. One thing to watch out for using schedule indices; while they are accurate relative to plan; if the activities that are behind are not on the critical path, then the overall schedule may not be behind
    4. The indices are guideline to tell use if and where to look for issues
13. Cost Indices
    1. Cost Variance = Earned Value – Actual Costs
       1. If the CV is positive, then the project is running under budget; if the CV is negative, then the project is running over budget
    2. Cost Performance Index
       1. If the CPI is greater than 1 then the project is running under budget
       2. If the CPI is less than 1.0, then the project is running over budget
14. Creating a forecast
    1. If your project has a significant variation wither positive or negative relative to cost or schedule, it is your duty to forecast the impact and inform the project sponsor
    2. The longer you wait to recognize an issue, the harder it will be to impact the outcome
    3. If situation cannot be rectified, then need to inform the customer
15. Three major options to forecast what the cost or schedule will be at the end of the Project
    1. Prepare a detail estimate to complete
       1. Perform bottoms up estimate on the remaining work considering the risk events and performance
       2. Time consuming and requires more work
    2. Assume the remaining work will be done at the budget rate
       1. Add the budget value of the remaining work to the actual costs to the date to estimate a new completion value
       2. Quick and easy. May be optimistic as assumes any issues are gone
    3. Assume the remaining work will be done at the current performance
       1. Divide the remaining work budget by the performance index to estimate the remaining work and add to actual costs to date
       2. Quick and easy. May be pessimistic as assumes no learning curve on project
    4. Calculate Performance indices by smaller units to pinpoint the problem area
    5. Plot the SPI and CPI by area as a function of time. The trends will give insight on a learning curve or if the problem has been addressed
    6. Review scope to understand if there have been undocumented changes – change orders to the budget will impact the performance indices
    7. Review the critical path to see how the work is progressing

# Course 3: Risk, Quality, Teams, and Procurement

## Project Risk Management

1. In this course we will:
   1. Develop a risk management plan including a qualitative risk assessment
   2. Develop a quality plan including quality standards and cause and effect tools
   3. Develop a team management plan that includes team development, identifying team members and clarifying roles and responsibilities
   4. Develop a procurement plan that includes contract types and incentives
2. Learning Objectives
   1. Develop a risk management plan
   2. Identify positive and negative risks
   3. Creates risk strategies
   4. Perform a qualitative risk analysis
   5. Develop contingencies and reserves
3. Project risk management
   1. The objectives of project risk management are to increase the likelihood of positive events and decrease the probability of negative events
   2. We do this by implementing a formal risk management strategy complete with contingency plans
4. Project Risk Management Processes take place during the planning stage
   1. Plan risk management
   2. Identify risks
   3. Perform qualitative risk analysis
   4. Perform Quantitative risk analysis
   5. Plan Risk Responses
5. Risk Management Process
   1. Identify Risk > Analyze and Prioritize the Risks > Develop Risk Responses > (Establish and Update Reserves || Implement Risk Responses) > Update project Plan > Monitor Risks > Update Project Plan
   2. Continuously update and renew risks
6. Types of Risk Analysis
   1. For large projects, you may analyze risks in three distinct groups
      1. Cost estimate contingency
         1. Reserved to address the parts of a project that we know are uncertain
            1. Labor productivity
            2. Replacing damaged goods
            3. Re-work
            4. Miss-estimations
      2. Schedule contingency
         1. Like cost estimate, one or more allowances in the project schedule for increases or decreases in the duration of activities on the project
      3. Management Reserves or Contract and Business Risks
         1. Unusual and unpredictable weather patterns
         2. Acts of God
         3. Unforeseen increases in scope
         4. Changes in law or regulations
7. Identify Risks
   1. Check Existing Resources
   2. Review Project Documentation
   3. Facilitated Brainstorming Session
   4. Check List Analysis
   5. Interviews
8. Potential Existing Resources
   1. Enterprise Environmental Factors
      1. Published Information
      2. Academic Studies
      3. Benchmarking
      4. Industry Studies
      5. Risk Attitudes
   2. Organization Process Assets
      1. Project Files
      2. Organizational and project process controls
      3. Risk statement formats or templates
      4. Corporate risk lists
      5. Lessons learned
9. Review the available Project documentation
   1. Assumptions
   2. Project Charter
   3. Contract or other agreements
   4. Estimates and Schedules
   5. Plans
10. Brainstorm and Check Lists
    1. Identify any Risk check lists that may be available
    2. Distribute them to the Risk Team
    3. Ask Each member to brainstorm potential risk and submit them to the facilitator
    4. Review the consolidated list and the check list in a facilitated team meeting to identify any further risks based on the shared lists
    5. Consolidate similar risks into a single item to avoid duplication
11. Interviews
    1. Subject Matter Experts
    2. Key Stakeholders
    3. Project Managers from similar Projects
    4. Risk Managers
    5. Consolidate the results of the interviews with the Risk List from the previous sessions
12. Risk Register
    1. Every risk reported should be given a unique tracking number and good description
13. Risk Management Plan
    1. Part of the Project Management Plan
    2. Documents how to conduct the risk management activities
    3. Aligns the project risk approach with the risk profile of the organization
    4. Communicates the project risk approach to the stakeholders and helps to gain their support
14. Key Inputs
    1. Project Management Plan
    2. Project Charter
    3. Stakeholder Register
    4. Enterprise Environmental Factors
    5. Organizational Process Assets
15. Organizational Process Assets
    1. Risk Categories
       1. Common definitions and concepts
    2. Risk statement formats
       1. Standard templates
    3. Role and Responsibilities
       1. Authority levels for decision making
    4. Lessons Learned
16. Typical Table of Contents
    1. Methodology
    2. Roles and Responsibilities
    3. Budgeting
    4. Timing
    5. Risk categories
    6. Definitions of risk probabilities and impact
    7. Probability and impact matrix
    8. Risk tolerances
    9. Reporting formats
    10. Tracing
17. Perform Qualitative Analysis
    1. For each Risk identified in the risk register
       1. Identify the likelihood the event will occur
       2. Measure the impact of the event
       3. Create a severity rating
       4. Assign priority based on the severity
18. Perform Qualitative Analysis and Prioritize Risks
    1. Example likelihood rating matrix
       1. 5: Nearly Certain >80% occurring
       2. 4: likely 50-80% occurring
       3. 3: Possible 21-49% occurring
       4. 2: unlikely 1-20% occurring
       5. 1: Rare <1% change of occuring
19. Impact Rating Matrix
    1. Impact rating / cost/ schedule/ scope/ quality/ health safety and the environment
       1. 5: Very high | > 40% Cost increase | > 20% tie increase | Product end time is effectively useless | Severe Injury fatality or major impact
       2. 4: High | 20-40% Cost increase | 10-20% time increase | Scope reduction unacceptable to sponsor | quality reduction unacceptable to sponsor
       3. 3: Moderate | 10-20% Cost increase | 5-10% time increase | Major areas of scope impacted | Quality reduction requires sponsor approval | Minor Injury or impact
       4. 2: Low | <10% cost increase |<5% time increase | minor areas of scope impacted | Only very demanding applications are affected
       5. 1: Very low | Insignificant increase | insignificant increase | Scope decrease insignificant | quality decrease insignificant | no impact
20. Risk Assessment Matrix

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Severity Rating | | | | |
| Likelihood | 1: Very Low | 2: Low | 3: Moderate | 4: High | 5: Very High |
| 5: Nearly Certain | 5 | 10 | 15 | 20 | 25 |
| 4: Likely | 4 | 8 | 12 | 16 | 20 |
| 3: Possible | 3 | 6 | 9 | 12 | 15 |
| 2: Unlikely | 2 | 4 | 6 | 8 | 10 |
| 1: Rare | 1 | 2 | 3 | 4 | 5 |

Medium

Low

Serious

High

1. Prioritize Risks
   1. Record all risks
   2. Focus on high-risk items
   3. If there are sufficient resources, you can add some Risks from the serious category
2. Develop Risk Responses
   1. Escalate
   2. Avoid
   3. Mitigate
   4. Transfer
   5. Accept
3. Escalate Strategies
   1. When: Threat is outside the scope of the project or outside the authority of the project manager
   2. Who: Part of organization that will be impacted by the threat or group responsible for the risk
4. Avoid Strategies
   1. Modify the execution plan to eliminate the Risk
   2. Change the project objectives to avoid the Risk
   3. Clarify requirements
   4. Obtain additional information
   5. Acquire expertise
   6. Improve communication
5. Transfer Strategies: move the risk to a third party who is better equipped to handle it. Strategies might include
   1. Insurance
   2. Bonds
   3. warranties and guarantees
   4. Hiring special expertise
   5. Contracts or agreements are used to affect the transfer
6. Mitigation Strategies: where the project team acts to reduce the probability or the impact of a given Risk
   1. Conducting more tests
   2. More monitoring
   3. Select better supplies
   4. Develop a prototype
   5. Add resources
7. Accept Strategy
   1. Typically employed for risks outside of high priority
   2. Continue to monitor risks
   3. Establish a contingency reserve to handle the risk
8. Develop Risk Responses: Positive Risks
   1. Exploit: Develop a strategy to make sure the opportunity is realized
   2. Enhance: improve the probability of occurrence or impact
   3. Share: assign part of the opportunity to a third party who is better positioned to make sure it happens
   4. Accept: position to take advantage if it occurs but do not pursue
9. Risk Responses
   1. Estimate the impact of the risk (schedule or cost) prior to the implementation of a risk strategy. Add this information to the risk register
   2. Estimate the impact of the risk (schedule or cost) after the implementation of the risk strategy. Add this information to the Risk Register
10. Quantitative Risk Assessment
    1. Monte Carlo techniques
    2. PERT (Program evaluation and review technique)
    3. Decision Tree
11. Implement Risk Responses
    1. Update Project Management plan
    2. Update baseline cost and schedule
    3. Update risk register and report
    4. Make project team assignments
12. Monitor Risks
    1. Risk reassessment
    2. Risk audits
    3. Variance and trend reports
    4. Technical performance measures
    5. Reserve analysis
       1. Cost
       2. Schedule
       3. Contract and business risks
    6. Meetings

## Project Quality Management

1. Project quality management – The process for incorporating the organization’s quality policy regarding planning, managing, and controlling project and product quality requirements to meet stakeholder objectives
2. What is quality
   1. It is the degree to which a set of inherent characteristics fulfill requirements
   2. Meets the agreed upon needs and expectation of the customer
3. Who is responsible for quality?
   1. All members of the team
   2. Ultimate responsibility lies with management
4. Why is quality important to a project manager?
   1. Increases customer satisfaction
   2. Lower costs-fewer returned products
   3. Helps brand
   4. A quality plan that is properly implemented prevents issues and lowers the number of identified problems during final inspection
5. Plan Quality Management
   1. Identify the quality standards
   2. Identify the mechanism or processes needed to ensure standards are met
6. Quality Vs. Grade
   1. Quality relates to performance
   2. Grade relates to the category of products serving the same function
7. Quality management plan includes
   1. Requirements management plan
   2. Risk Management plan
   3. Stakeholder engagement plan
   4. Scope baseline
   5. Stakeholder Register
   6. Risk Register
   7. Requirement Documentation
   8. Environmental factors
   9. Assumption Log
8. Consider the Cost of Quality
   1. Cost quality is a way to compare planned preventative costs with possible corrective costs indicating the total quality cost of a project – ie. Money spent to ensure a satisfied stakeholder
   2. Cost of Conformance: Money spent during the project to avoid failures
      1. Prevention costs: Build a quality product
         1. Training document processes
         2. Equipment
         3. Time to do it right
      2. Appraisal Cost: Assess the quality
         1. Testing
         2. Destructive testing loss
         3. Inspections
   3. Cost of Nonconformance: Money spent during and after the project because of failures
      1. Internal Failure Costs: Failures found by the project
         1. Rework
         2. Scrap
      2. External Failure Costs: Failures found by the customer
         1. Liabilities
         2. Warranty work
         3. Lost Business
9. Cost of Quality
   1. This is the total cost of conformance work and non-conformance work that is required to complete the project to the stakeholder’s specification
   2. It can take the form of warranty work, returns, recalls, or any other post project costs
   3. It is important to try to reduce these costs before they occur through high quality standards – DO it right the first time
10. Costs Associated with Quality
    1. Prevention
       1. Up front costs to satisfy stakeholder requirements
    2. Appraisal
       1. Cost associated with assessing whether the stakeholder’s needs were met
    3. Internal Failure
       1. Costs due to manufacturing or internal failure prior to leaving the organization
    4. External Failure
       1. Costs associated with dissatisfied stakeholder and corrective actions
11. Manage Quality: Is this process of translating the quality management plan in executable strategies that incorporate quality into the project or product
12. Quality Assurance: Product will meet agreed upon standards
13. Implement the Plan
    1. Ensure the procedures are being followed
    2. Ensure procedures achieve desired results
    3. Confirms policies are used
    4. Improves efficiency and effectiveness
14. How do you manage quality?
    1. Inspect all processes and implement continuous process improvement
    2. Collect and analyze data
    3. Use data to inform decisions
    4. Conduct audits to confirm that processes are working
15. Tools for collecting and analyzing data
    1. Affinity diagrams
    2. Cause and Effect diagrams
    3. FlowCharts
    4. Histograms
    5. Matrix diagrams
    6. Scatter diagrams
16. Control Quality
    1. The process of monitoring and recording results of executing the quality management activities to assess performance and ensure project outputs are complete, correct, and meet customer expectations
    2. Data collection
       1. Surveys
       2. Efficacy of process
    3. Analysis
    4. Inspection
    5. Testing
    6. Representing data in a meaningful way
17. Completing the Project Quality Management Plan
    1. Ensure that any changes to the process are approved by the change control board
    2. Lessons learned are recorded and transferred to the project management plan

## Project human resources management

1. Project Resource Management
   1. Project resource management includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project.
      1. Plan resource management
      2. Estimate Activity Resources
      3. Acquire Resources
      4. Develop Team
      5. Manage Team
      6. Control Resources
2. Key Concepts
   1. The project team consists of individuals with assigned roles and responsibilities who work collectively to achieve a shared project goal
      1. Team environment
      2. Communication among stakeholders
      3. Organizational change management
      4. Internal and External politics
      5. Cultural issues/organizational uniqueness
      6. Varying other factors that may impact the project
3. Emerging Practices
   1. Resource management methods
   2. Emotional intelligence
   3. Self-organizing teams
   4. Virtual teams/distributed teams
4. Tailoring Resources
   1. Each project is unique and the PM should consider the resources specifically suited for the project
      1. Diversity
      2. Physical location
      3. Industry specific resources
      4. Acquisition of the team
      5. Life cycle approaches
5. Plan resource management: The process of defining how to estimate, acquire, manage and use team and physical resources
6. What makes up resources?
   1. Team members
   2. Supplies
   3. Equipment
   4. Services/ facilities
   5. Outputs of this plan: Project schedule, Requirement’s documentation, stakeholder register, Risk register
7. Important Considerations:
   1. Enterprise Environmental factors
   2. Organizational culture, geographic location, existing resources and availability, marketplace
   3. Organizational Process assets
   4. HR policies and procedures, physical resource management policies, safety templates
8. Organizing Plan Data
   1. Hierarchical Charts
      1. WBS
      2. Organizational breakdown structure
      3. Resource breakdown structure
   2. Text-oriented Formats
      1. Each persons role
      2. Who has authority to make decisions
      3. Assigned work and expectations
   3. Assignment Matrix
      1. RAM
      2. RACI
         1. Responsible, accountable, consult, inform
9. RACI matrix: provides the activity and what RACI element each person is on that activity
10. Outputs of Planning Phase
    1. Identification of the needed resources
    2. Guidance on acquiring team and resources
    3. Roles and responsibilities
    4. Project organization charts
    5. Project team resource management
    6. Training
    7. Team development
    8. Recognition plan
    9. Team charter
11. Estimate Activity Resources: the process of estimating team resources and the types and quantities of materials equipment and supplies necessary to do the work
    1. Expert judgement
    2. Bottom-up estimate
    3. Analogous estimate
    4. Parametric estimating
    5. Data analysis
    6. Project management information systems
    7. Meetings
       1. Resource Requirements, basis of estimates, resource breakdown structure
12. Acquiring Resources: Process of obtaining team members, facilities, equipment, materials, or any other resources necessary to complete the work associated with your project
    1. Internal (assigned) or external (acquired) sources
    2. Project manager negotiates for resources
    3. Failure to acquire resources will affect the project
    4. Project manager identifies solutions to fit constraints
13. Tools and Techniques
    1. Decision making: decision analysis
    2. Interpersonal and team skills
    3. Virtual teams
    4. Assignment of physical resources
    5. Project team assignments
    6. Resource calendars
14. Develop Team: improving competencies, helping team interactions, and the overall team environment
15. Project Managers should
    1. Create an environment that facilitates teamwork
    2. Continually motivate the team
    3. Provide feedback and support
    4. Recognize and reward good performance
16. Making the team more effective
    1. Effective communication
    2. Team training
    3. Team-building opportunities
    4. Develop trust
    5. Manage conflict
    6. Encourage collaborative problem solving and decision making
17. Objectives for team development
    1. Improve knowledge and skills of team members to increase efficiency and lower cost
    2. Improve feelings of trust and agreement, which will lower conflict and increase morale
    3. Create a dynamic, cohesive, collaborative team
    4. Empower the team
18. Stages of Team Development
    1. Forming – learn about roles
    2. Storming – conflict begins
    3. Norming – starts to work together
    4. Performing – team is producing results
    5. Adjourning – completes work and moves on
19. Things you can do
    1. Colocation
    2. Virtual Teams
    3. Utilizing communications technology
    4. Interpersonal and team skills
       1. Conflict management
       2. Influence
       3. Motivation
       4. Negotiation
       5. Team building
20. Control Resources
    1. The process of ensuring that the physical resources assigned and allocated to the project are available as planned
    2. It should be done continuously throughout the project
    3. This process is primarily concerned with physical resources
21. Key Steps
    1. Monitoring expenditures
    2. Dealing with resource shortages/surpluses
    3. Ensuring resources are used according to the plan
    4. Keeping stakeholders informed about resource issues
    5. Influencing factors that may change resources and managing those changes if they occur
22. Tools
    1. Data analysis
    2. Interpersonal skills
    3. Problem solving
    4. PMIS – project management information systems

## Project Procurement ManageMent

1. Learning Objectives
   1. Identify the conditions that would cause you to go outside the organization for goods and services
   2. Create a procurement plan
   3. Identify different types of contracts and the associated risks with each type
   4. Review and compare incentive and award fees
2. Definition
   1. Process to acquire goods, services, or results from outside the project team to support the project
   2. Contract Management and change control processes required to develop and administer contracts and purchase orders
   3. Control of any contract by any outside organization that is delivering goods, services or results for use by the Project Team
3. Key Learning
   1. The seller of the goods, services or results will typically treat the procurement event as a project
   2. They will apply the full range of processes that we have learned as part of this specialization to their work process using the Procurement documents as inputs
   3. A smart project team will recognize this and interface appropriately
4. Key inputs to the Procurement management plan
   1. Project charter
   2. Business plan
   3. Project management plan
   4. Project scope statement
   5. WBS
   6. Requirements documents
   7. Risk register
   8. Activity resource requirements
   9. Project schedule
   10. Activity cost estimates
   11. Stakeholder register
   12. Enterprise environmental factors
   13. Organizational process assets
5. Potential Contract Types
   1. Fixed price
   2. Cost reimbursement
   3. Time and material
6. Contract Types
   1. Fixed Price Contracts
      1. Firm fixed price FFP
         1. Most commonly used fixed price contract
         2. Price fixed at award
         3. Price change based solely on scope change or change in conditions
         4. Requires buyer to precisely specify scope and conditions
      2. Fixed price incentive Fee FPIF
         1. Base price fixed at award
         2. Financial incentives based on performance metrics cost, schedule, technical performance, quality
         3. Scope conditions and performance targets are precisely specified at award
         4. Final price calculated at completion
      3. Fixed price with economic price adjustments FE-EPA
         1. Typically used when contract spans a considerable period
         2. Similar to firm fixed price contracts
         3. Includes a provision to adjust the price based on a reliable financial index such as inflation or commodity prices
         4. Designed to protect buyer and seller from external conditions
   2. Cost Reimbursable contracts
      1. Cost Plus Fixed Fee CPFF
         1. Seller is reimbursed for all allowable costs
         2. Receives a fixed fee calculated as a percent of initial estimated project cost
         3. Fee is adjustable only for scope changes
         4. Fee is paid based on completion schedule
      2. Cost Plus Incentive Fee CPIF
         1. Seller is reimbursed for all allowable costs
         2. Receives an incentive fee based on achieving certain performance metrics as set forth in the contract
         3. Fee is adjusted only for scope changes
         4. Fee is paid based on completion schedule
      3. Cost Plus Award Fee CPAF
         1. Seller is reimbursed for all allowable costs
         2. Receives a fee based on the satisfaction of certain broad subjective performance criteria
         3. Fee is based solely on the subjective evaluation of the buyer
         4. Fee is paid based on completion schedule
   3. Hybrid contracts: Time and Material Contract
      1. Hybrid contract containing elements of fixed fee and cost-reimbursement contracts
      2. Often used for staff augmentation, acquisition of experts and outside support when a precise scope of work is not available
      3. Can resemble cost-reimbursable contracts with a sliding fee
      4. Can resemble fixed fee contracts by using uint rate prices that are fixed times the actual units used
7. Contract selection criteria
   1. Industry organization standards
   2. Project definition
   3. Resource available to oversee work
   4. Specific expertise
   5. Risk allocation
   6. Amount of control desired
   7. Cost
8. Procurement Statement of work
   1. Developed from the Project Scope baseline and defines only the project scope related to a single contract or Purchase Orders
   2. Includes:
      1. Specifications
      2. Quantities
      3. Quality Requirements
      4. Performance Data
      5. Work Locations
      6. Any other requirements
9. Source Selection Criteria
   1. Understanding of requirements
   2. Technical capability
   3. Management approach
   4. Warranty
   5. Financial capacity Business size and type
   6. References
   7. Propriety rights
10. Conduct Procurements
    1. Bidder Conferences
    2. Bidder Evaluations
    3. Negotiations
    4. Agreements
    5. Control Procurements
11. Close Procurements
    1. Acceptance of Final Documentation
    2. Procurement Audits
    3. Procurement Negotiations
    4. Records Management
    5. Lessons Learned Documentation