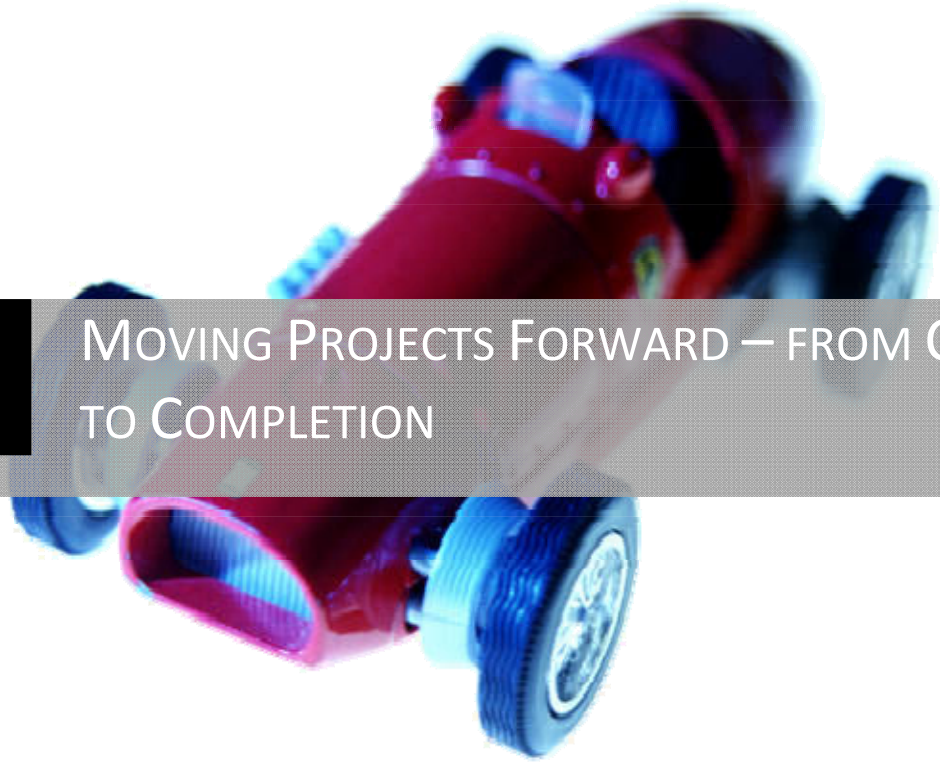
STATE OF COLORADO

MOVING PROJECTS FORWARD – FROM CONCEPT TO COMPLETION



Project Management Training Manual |

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Forward

Why are billions of dollars wasted annually in the United States on projects? Less than a third of all projects are considered successful. A successful project is one that is considered to be completed on or before schedule, on or below the budget, and with the features originally planned.

This course is part of the State of Colorado's Enterprise Portfolio and Project Management Office. One of our goals is to provide education in project management to better equip each person in completing their responsibilities with a higher degree of quality. Through your training you will learn how to determine the requirements for a successful project, how to organize the steps to achieve the requirements and most importantly how to keep your project on track to achieve success. Within the Office is a group of professionals who make up the Project Management Users Group.

The Project Management Users Group (PMUG) aim is to improve the success of projects at the State of Colorado. This course was specially designed by the Training and Mentoring Work Group for PMUG. Special thanks to Korby Johnson, Colorado State Patrol; Nancy Cassell and Sandra Tomlin, Governor's Office of Information Technology; Bill Crick, Colorado Department of Natural Resources, Governor's Office of Information Technology; and Luis Garcia Office of State Planning and Budgeting for devoting hundreds of hours developing this course.

Congratulate yourself on making a great decision to be here to expand your project management knowledge. The skills you learn will help you improve your organizational skills whether it is for work or in your personal life. Every day you use some type of Project Management technique even in its simplest of terms. Every action you take whether you are getting dressed for work, writing a report, conducting research or producing a product requires a series of steps. You always have limits in terms of time, budget and requirements. We ask that you periodically let us know how this course has helped you be successful and also let us know the pitfalls you encounter so we can continually improve our course.

Ron Huston
Governor's Office of Information Technology
Director, Enterprise Portfolio Project Management Office

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Table of Contents

Contents

Project Management 101 – Introduction to Project Management

MOVING PROJECTS FORWARD – FROM CONCEPT TO COMPLETION

Introduction

Course Description:
This is an introductory course in Project Management with materials extracted from the formal publications of the International Project Management Accrediting Group, the Project Management Institute (PMI), the Enterprise Portfolio Project Management Office/Project Management Common Methodology[1], and the real world experiences of the instructors. The class is a three-day presentation using lecture, interactive discussion, a student practicum, and real-world tools and experiences presented by Project Management Professionals (PMP).

Course Objectives:
Upon completion, the student will be able to:

1. Identify the business needs, justifications, and processes necessary for moving from concept to project given a perceived need for an operational improvement.
2. Identify the five process groups of a project, identifying key tasks in each.
3. Identify the nine knowledge areas of a project, their purposes, how they interrelate.
4. Identify the need for formal project management and what project scaling means and how it is performed;
5. Produce a
    a. Project Scaling Matrix
        i. Expedited Project Checklist
    b. Project Scope Statement
    c. Project Management Plan
    d. Work Breakdown Structure
6. Create Project Briefing
    a. Document
        i. Status
        ii. Dashboard
        iii. Lessons Learned
    b. Presentation

[1] The EPPMO Common Methodology is located at: http://www.colorado.gov/cs/Satellite/OIT-New/OITX/1167928259151

Please Observe the Classroom Rules:

1. No talk over, please – no side conversations: share with the group so we can all learn;
2. Place your cell phones on vibrate and step outside the classroom to answer calls;
3. Observe the breaks – this allows everyone to leave on time;
4. Questions are welcome at any time; and
5. Discussions – Please: The free exchange of ideas is encouraged!

History

The profession or discipline of formal project management is relatively new when compared with other professions e.g., accounting, law, or medicine. "The Project Management Institute was founded in 1969 on the premise that there were many management practices that were common to projects[2]." *A Guide to the Project Management Body of Knowledge* (PMBOK® Guide) is the foundation on which project management principles are based.

[2] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Appendix B, B1, Page 359.

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Portfolio Management

"In the extreme case, portfolio managers will be responsible for the management of the entire set of projects undertaken by an organization or division in a manner that optimizes the return on investment (ROI) from these projects and ensures their alignment with the organization's strategic objectives. Particularly in large organizations, a portfolio manager may only have responsibility for a sub-set of the organization's projects and their alignment to the organizational strategic objectives. While the portfolio of projects may share resources, they may have diverse objectives and may be operationally independent of one another. A portfolio manager may interact with senior managers, executives, and major stakeholders to establish strategic plans and objectives for an organization. S/he may also be responsible for the organization-wide integration of consistent project management methodologies and terminology[3]."

Organizations may use portfolio management when:

- Deciding what projects are initiated;
- Aligning with the Agency's vision; or
  - Federal
    - See handout on the President's Management Agenda
  - State Department / Agency / Division
- Projects may be mandated by Federal or State legislation.

Additional information regarding portfolio management and projects and strategic planning may be found in the *Project Management Body of Knowledge* in Chapter 1, Sections 1.4.1 and 1.4.3 respectively, pages 8 thorough 11.[4]

[3] http://www.periscopeiq.com/matt4455/jobresponsibilities.htm, August 18, 2009
[4] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition.

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Project Management Process Group Overview

There are five project management process groups. Below is an overview as it relates to *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fourth Edition pages 41 and 42.

- Initiating
- Planning
- Executing
- Monitoring and Controlling
- Closing

The Project Management Knowledge Area Overview is located on the next page.

Please see Appendices Section for the Project Management Process Groups and Knowledge Areas Mapping and/or refer to the handout as it will assist you when planning your project.

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Project Management Knowledge Area Overview

There are **nine project management knowledge areas and 42 processes** within those groups. Below is an overview as it relates to *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fourth Edition. The knowledge areas are on the Project Management Process Groups and Knowledge Areas Mapping handout.

4. Project Integration Management
   - 4.1. Develop Project Charter
   - 4.2. Develop Project Management Plan
   - 4.3. Direct and Manage Project Execution
   - 4.4. Monitor and Control Project Work
   - 4.5. Integrated Change Control
   - 4.6. Close Project or Phase
5. Project Scope Management
   - 5.1. Collect Requirements
   - 5.2. Define Scope
   - 5.3. Create Work Breakdown Structure
   - 5.4. Verify Scope
   - 5.5. Scope Control
6. Project Time Management
   - 6.1. Define Activities
   - 6.2. Sequence Activities
   - 6.3. Estimate Activity Resources
   - 6.4. Estimate Activity Durations
   - 6.5. Develop Schedule
   - 6.6. Schedule Control
7. Project Cost Management
   - 7.1. Estimate Costs
   - 7.2. Determine Budget
   - 7.3. Control Costs
8. Project Quality Management
   - 8.1. Plan Quality
   - 8.2. Perform Quality Assurance
   - 8.3. Perform Quality Control

9. Project Human Resources Management
    9.1. Develop Human Resource Plan
    9.2. Acquire Project Team
    9.3. Develop Project Team
    9.4. Manage Project Team
10. Project Communications Management
    10.1. Identify Stakeholders
    10.2. Plan Communications
    10.3. Distribute Information
    10.4. Manage Stakeholder Expectations
    10.5. Report Performance
11. Project Risk Management
    11.1. Plan Risk Management
    11.2. Identify Risks
    11.3. Perform Qualitative Risk Analysis
    11.4. Perform Quantitative Risk Analysis
    11.5. Plan Risk Responses
    11.6. Monitor and Control Risks
12. Project Procurement Management
    12.1. Plan Procurements
    12.2. Conduct Procurements
    12.3. Administer Procurements
    12.4. Close Procurements

Initiation Process Group

The initiation process group is the first step when planning a project. Usually, projects are derived from a need. Underdeveloped project ideas are often what is presented to the project manager. It is the project manager's job to begin the initiation process asking who, what, when, where, and why prior to forming the preliminary scope statement.

What is a Project?
A group of tasks or activities to create a unique product, service, or system that is time constrained (has both a **start date and a finish date**). The end is defined as the point at which the project objectives have been achieved or it becomes clear that all the objectives will not or cannot be met or the project is terminated. A project generally uses or consumes resources and it is a temporary endeavor. Please see the *Project Management Body of Knowledge*, Section 1.2, pages 6-7[5] for additional information.

What is a Program?
The difference between a project and a program is that projects have a beginning and ending and programs are ongoing. "A program is defined as a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually.[6]" "Programs may include elements of related work outside of the scope of the discrete projects in the program.[7]"

What is Project Management?
Project Management is the application of knowledge, skills, tools, and techniques to project tasks in order to meet the project's requirements and to exceed the stakeholder needs and expectations. Project management is accomplished through the use of processes such as initiating, planning, executing, controlling, and closing. Project management typically involves the merger of general management knowledge and practice and application area knowledge. The project's team manages the work that typically involves: Please see the *Project Management Body of Knowledge*, Section 1.4.2, pages 9-10[8] for additional information.

- Competing demands for scope, time, cost, risk and quality; and
- Stakeholders with differing needs and expectations.

[5] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition.
[6] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 1, Section 1.4.2, Pages 9-10.
[7] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Glossary, Page 442.
[8] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition.

Processes within project management are iterative in nature. In part, this is due to the existence of and the necessity for progressive elaboration in a project throughout its lifecycle, i.e., the more you know about the project, the better you are able to manage it.

The Project Management Institute (PMI) identifies three classes of personnel within a project:

- Project manager,
- Project team, and
- Core project team.

It is the role of the project manager to work with the sponsor and the functional managers within an organization to establish the qualified personnel for the project team. For example, on a technology project there are certain subject matter experts (SMEs) that will be more qualified to accomplish certain work tasks over others that are not as qualified in that area of expertise. This does not diminish the skills of any one individual as all team members are of equal importance. Level of responsibilities, however, might be lesser or greater for certain individuals based on their level of project involvement.

Project Manager Responsibilities

The following describes the benefits, authority, roles and responsibilities of a Project Manager (PM).

Nuestro modo de proceder.

Our way of proceeding.

- **Responsibilities of a PM**: project, organization, team, self.
- **Project Responsibility**: costs, schedule, functionality and quality targets—runs the project efficiently, and acts as an arbitrator
- **Organizational Responsibility**: guaranteeing the return on time and costs (an internal return on investment [ROI] can be applied to show value)
- **PM**—viewed as the "agent" for the organization and its management, expected to adhere to the policies and procedures of the organization, acts within the limits of the given authority, makes decisions that are in the best interest of the organization, acts as the devil's advocate as necessary on decisions that may not be in the best interest of the project or organization.
- **Information Flow**: honest estimating, timely reporting of status, accurate forecasting/ proactively keeping organizational management informed of a project's status and forecasts (no surprises) providing appropriate opportunities to intercede (corrective action) as needed in guiding the course of the project.
- **Team Responsibility**: the PM keeps the team properly informed; provides constructive feedback: ensures positive, fair, and appropriate recognition for performance. The PM must strike a balance between the needs of the project and the needs of the individual. The PM provides growth and development opportunities for individual team members whenever possible.

- **Self**—odds are that most organizations do not have a well-developed career path/development program specifically toward project management as a discipline; therefore, it then becomes the PM's responsibility to shepherd others in the discipline of Project Management.

Sponsor
"The project sponsor works with the project management team typically assisting with matters such as project funding, clarifying scope, monitoring progress, and influencing others in order to benefit the project[9]."

Stakeholders

The PMBOK® guide further suggests that the following list be a part of the project stakeholders:

- User or Consumer of the Product,
- Project Management Team,
- Performing Organization,
- Sponsor,
- Individuals of Influence, and
- Project Management Office.

Identify Stakeholders

During the Initiation process, stakeholder identification occurs. Below are the inputs.

- Project Charter,
- Procurement Documents,
- Enterprise Environmental Factors, and
- Organizational Process Assets.

The outputs are the:

- Stakeholder Register, and
- Stakeholder Management Strategy.

[9]A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 9, Page 215.

Stakeholder analysis is used to complete the stakeholder register. The techniques below are used when compiling each project member's needs.

- Interview Stakeholders
- Create Power and Influence/Interest/Impact Grids
- Salience Model[10]

The Salience Model describes classes of stakeholders based on their power (ability) to impose their will, urgency (need for immediate attention), and legitimacy (their involvement is appropriate).

The Stakeholder Register contains each member's identification information, assessment information, and stakeholder classification.

The Stakeholder Management Strategy identifies:

- Key stakeholders who can significantly impact the project,
- Level of participation,
- Stakeholder groups and their management as groups, and
- Expert judgment must be used, as some information may be sensitive.

Please see the Appendices Section for the Stakeholder Interview Questions.

Please see the Appendices Section for the Power and Influence Grid.

Please see the Appendices Section for the Power and Interest Grid.

Please see the Appendices Section for the Influence and Impact Grid.

Develop Project Charter

The project's charter statement of work includes:

- Business Need,
- Product Scope Description, and
  - The relationship between the product/service being created and the business need.
- Strategic Plan.
  - All projects should support the organization's strategic goals.

[10] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 9, Page 249.

The business case contains analysis of the following:

- Market Demand,
- Organizational Need,
- Customer Request,
- Technological Advance,
- Legal Requirement,
- Ecological Impacts, and
- Social Need.

Enterprise Environmental Factors analyze:

- Governmental or Industry Standards,
- Organization Infrastructure, and
- Marketplace Conditions.

Organizational Process Assets include:

- Organizational standard processes, policies, and standardized process definitions for use in the organization;
- Templates; and
- Historical Information and Lessons Learned Knowledgebase.

Additional Templates

Often during the initiation process, there are questions about:

- Why are we proposing this project?
- How big is this project?
- How much will it cost?

The templates below will assist you when prepare for briefings and in preparing your business case.

Please see the Appendices Section for the Strengths, Weaknesses, Opportunities, and Threats (SWOT) diagram.

Please see the Appendices Section for the Time and Cost Curves.

Project Scaling

The nature and type of a project can have a few characteristics that define the complexity of the project. Projects that are defined by the sponsor or agency as simple projects can have very little impact on the organization. More complex projects as defined by the sponsoring organization can have large impacts on the organization. Some projects may be legislatively mandated.

Before the project begins, it is important for the project manager and the project team to review the scale, strategic alignment, and complexity of the project and then estimate the level of impacts on all factors to the organization.

The Project Scaling Matrix provides details of some of the common factors that impact project complexities.

Please see the Appendices Section for the Project Scaling Matrix.

Initiation Templates are listed below:

- Expedited Project Checklist,
- Initial Project Scope Statement,
- Project Charter, and
- Project Scaling Worksheet.

Please refer to the State's website for the most current methodology. The EPPMO Common Methodology is located at:
http://www.colorado.gov/cs/Satellite/OIT-New/OITX/1167928259151 .

Next Steps

At the completion of the Initiation process, the project manager should have and archive the following documentation:

- Checklist of Preliminary Project Conditions from the Pre-Initiation Process,
- Business Case Template from Pre-Initiation Process,
- Project Scaling Worksheet,
- Rough Order of Magnitude to Determine Costs,
- Initiation Checklist,
- Signed Initial Project Scope Statement,
- Stakeholder Register,
- Stakeholder Management Strategy, and
- Signed Project Charter.

Further documentation may include:

- Preliminary Requirements Document,
- Project Feasibility Document (Whether Routine, First Phase, or Stand-Alone),
    - Assessment of Existing Environment
    - Alternatives Analysis
        - Feasibility Study Approach
            - Needs Assessment
                - Stakeholder Interviews
                - Workshops
                - Best Practices Research
                - Gap Analysis
            - Preliminary List of Alternatives
                - Identify
                - Analyze
                - Develop Recommendations
    - Next Steps
        - Identify Alternatives
        - Analyze Alternatives in Detail
        - Develop Recommendation
        - Prepare Implementation Plan

    - Evaluation Criteria
        - Strategic Fit
        - Alignment with Business Requirements
        - Consistency with OIT
        - Cost
            - Off-the-Shelf
            - Customized
        - Lifecycle Costs to Include Total Cost of Ownership
        - Scalability
        - Ease of Implementation
        - Ongoing Operational Needs
        - Degree of Risk
- Communication Matrix to Include a List of Project Stakeholders and Team Members (Including Core Team Members),
- Preliminary Roles and Responsibilities Matrix (Responsibilities Assignment Matrix [RAM]), and
- Preliminary Project Schedule.

It is important for the project manager to ensure that the project team members and all associated sponsors have access to project documentation. Based on the infrastructure of the organization, this access can be granted electronically or can be physically stored for access and retrieval.

Now that the Initiation Process has been completed and the above documentation has been archived, the project is ready to move into the Planning Process.

Inputs and Outputs

The primary purpose of initiation is to obtain approval to start the project. Key elements of initiation include:

- Development of Project Charter,
- Formal Authorization of Project/Phase,
  - Project Manager Identification,
  - Commitment of Financial Resources, and
- Identification of Stakeholders.

The Initiation Knowledge Areas are:

- Project Integration Management, and
  - Develop Project Charter
- Project Communications Management.
  - Identify Stakeholders

Initiation Inputs include:

- Statement of Work,
- Business Case,
- Contract,
- Enterprise Environmental Factors (EEFs), and
  - Organizational Culture, Politics, Technological Advancements, High-Profile Projects
- Organizational Process Assets (OPAs).
  - Templates, Lessons Learned, Metrics/Measurements

The Initiation process outputs are the project charter, the stakeholder register, and the stakeholder management strategy.

Organizational Process Assets (OPAs)

Pre-Initiation Templates:

- Checklist of Preliminary Project Conditions,
- Project Management Process Groups and Knowledge Areas Mapping, and
- Business Case Template.

Initiation Reminders

- Within the **first 20%** of the timeline, the chances for the project's success are largely set.
- The most important meeting in a project is the **kickoff meeting**. It is the initial project meeting where all stakeholders are included.
- A **budget** is normally a requirement of a project.

Planning Process Group

The Planning process group involves organizing the work of the project, and determining whether it can be accomplished on-time and within budget. The six main objectives of the Planning Group are described below.

1. Define and record requirements (Scope Planning), constraints, and assumptions.
2. Identify project team, define roles / responsibilities.
3. Create the Work Breakdown Structure (WBS).
4. Develop the Change Management Plan.
5. Identify risks and risk response strategies.
6. Create the Project Plan (with subsidiary plans), and obtain approval.

Project scaling is such an important topic that it bears repeating in the Planning Section. At the beginning of the planning effort, it is always a good idea to repeat the project scaling exercise. This ensures that changes have not occurred that alter the complexity of the project. Depending on the scaling exercise's rating, you will be able to determine how much planning effort is justified based on project size and complexity. Planning factors include:

- Criticality to the business,
- Sponsor and Stakeholder support / existence of external stakeholders,
- Number of team members, number of end users, and
- Estimated project cost and duration.

Many processes within planning will be performed iteratively throughout the life of the project. For example, the project scope is "finalized" during Planning; however, it is a rare project that proceeds through Closing without requiring scope changes. As scope changes are approved and implemented, the Project Scope Statement and possibly other Planning documents will be revised.

The most important output of Planning is the Project Management Plan. This is a formal, approved document that guides project execution and control. The Project Management Plan, depending on the scale and complexity of the project, may include one or more of the following subsidiary plans:

- Integration Management Plan,
- Scope Management Plan,
- Time (Schedule) Management Plan,
- Cost Management Plan,
- Quality Management Plan,
- Human Resources Management Plan,
- Communication Management Plan,
- Risk Management Plan, and
- Procurement Management Plan.

Integration Management

Integration Management during the Planning Process yields the Project Management Plan (PMP). The PMP is a formal, approved document that guides project execution and control. The PMP is the foundation planning document upon which most other planning documents are based. The PMP may include one or more subsidiary management plans such as:

- Scope, Schedule,
- Cost,
- Quality,
- Staffing,
- Risk,
- Procurement, and
- Communication Management.

Scope Management

Poor Scope Management is often cited as a major cause of challenged and failed projects. There are three processes that make up Scope Planning:

1. Collect Requirements: This involves determining the needs and wants of stakeholders, and converting them into requirements for the product of the project. Writing the requirements documentation and Scope Management Plan is part of this process.
2. Define Scope Process: This involves identifying stakeholder needs, project objectives, boundaries (exclusions), specifications, deliverables, acceptance criteria, constraints and assumptions, risks, and milestones. This process also provides a common understanding among stakeholders.

3. Produce the detailed Project Scope Statement: Included in the Scope Statement should be the project objectives, detailed specifications, list of deliverables, acceptance criteria, constraints, assumptions, milestones dates, and exclusions.
4. Create the Work Breakdown Structure (WBS): This is a **deliverable-oriented**, hierarchical breakdown of project work. The top level can represent deliverables, lifecycle phases, or sub-projects. The lowest-level components of the WBS are called work packages; these can be assigned to team members and can be reasonably estimated. The process of breaking down the work is called decomposition. The WBS Dictionary contains additional detail on the work packages which normally do not exceed 10-days for 80-hours of work.

   Please see the Appendices Section for a WBS example.

Preparing a Scope Management Plan

After you've identified your project's objectives, assumptions, and constraints, you are ready to draft a scope management plan. The project's scope is the combination of all the project's goals and tasks, and the work required to accomplish them. The Scope Management Plan sets a procedure for handling changes to your project. Further, a Scope Management Plan is helpful because project teams often must adjust their goals during a project, and all project stakeholders must be kept apprised of these changes.

A scope management plan may include:

- An assessment of how likely the scope is to change, how often, and by how much.
- A description of how scope changes will be identified and classified. For example, in a construction project, you may decide that if the client requests a design change that will cost under $1,000, the foreman can approve the work, but if the change order will cost more, the project manager and client must reevaluate the scope of the project in terms of cost, resources, and other factors.
- A plan for what to do when a scope change is identified, e.g., notify the sponsor and issue a contract change order.
- A well-prepared scope management plan can serve as the basis for your project's contingency plan.

Time Management

Project Time Management is the group of processes that involves creating the project schedule, and managing the project in order to meet the schedule. There are 5 related Planning processes:

- **Define Activities**: Activities in this context are steps that can be scheduled and assigned to project team members, and that are needed to produce the deliverables. Determining a project's Activities often involves further decomposition of WBS work packages. Outputs include the Activity List (a description of the work), Activity Attributes (dependent prior and subsequent activities, responsible team members, etc.), and Milestones (significant events in the project with **zero duration**).
- **Sequence Activities**: This involves determining dependencies between Activities. Two ways of depicting Activity sequences are the Precedence Diagram and the Gantt Chart. A project schedule created by Microsoft® Project is a Gantt Chart.
- **Estimate Activity Resources**: This process determines the types and quantities of resources that are required for each Activity. The term "Resources" in this context often refers to staff hours. Determining the Level of Estimate (LOE) is a means of identifying the hours, days, and weeks needed to complete a task. Resource availability is often a significant constraint on the project. This process is closely coordinated with Cost Estimating. Whenever possible, use historical data if it's available. Lastly, **estimates should come from project team members, should not be imposed by management**.
- **Estimate Activity Durations**: Given the resource availability, determine how long (in hours, days, weeks, etc.) the Activity will take to complete. Project team members, not management, should provide these estimates. Estimated Activity Durations feed into the schedule development. Estimate activity durations use the project's scope statement, activity list, and activity resources requirements. Estimates come from analogous, parametric, and three-point estimating. Activity Duration Estimates are expressed as a range should become more accurate as project progresses.
- **Develop Schedule**: Use Activity dependencies and estimated durations, EEF, and OPA to determine **start and finish** dates for each Activity and for the overall project. Analyze activity sequences, durations, resources, and constraints to create the schedule. Plan **start and finish** dates for each WBS activity. Network Diagrams and Critical Path Method are tools. Schedule Compression shortens the schedule without changing scope. Fast-tracking[11] and schedule crashing[12] result in increased risk. Lastly, the schedule is approved by the Sponsor.

[11] **Fast tracking** provides tasks that may have been done in sequence are now done in parallel. Fast tracking often results in rework and increases risk.

[12] A specific type of project schedule compression technique performed by taking action to decrease the total project schedule duration after analyzing a number of alternatives to determine how to get the

Three important concepts when scheduling projects include the critical path, duration compression (crashing and fast-tracking), and reverse scheduling.

Critical Path

The critical path is the longest path through the schedule. If the tasks along the critical path are delayed, the project will be delayed.

One of the challenges of project management is the assignment of unrealistic deadlines. Below are two techniques to shorten the schedule. Both dramatically increase risk.

Duration Compression

Duration compression looks for ways to shorten the project's schedule without changing the scope. Schedule **crashing** occurs when cost and schedule tradeoffs are analyzed to determine if the greatest amount of compression can occur at the least incremental cost. Note: crashing does not always produce a viable alternative and often results in increased costs. **Fast tracking** provides tasks that may have been done in sequence are now done in parallel. Fast tracking often results in rework and increases risk.

Reverse Scheduling

When assigned a project with an impossible date, the PM must avoid the temptation to start with the finish date and work backward. This will create a false sense of what is achievable and mask the true level of **risk** involved in meeting that date.

Cost Management

Project Cost Management: there are two Planning processes involved in Cost Management:

- Estimate Costs of individual Activities requires the knowledge of project resources. The estimates should be created by staff that will be completing the Activities, not by management. Analogous, Parametric, and Three-Point Estimates are three example types cited by PMI. Contingency Reserves are used at the project manager's discretion for "known unknowns."
- Cost Budgeting aggregates work package/activity cost estimates into the project's cost baseline. The baseline shouldn't change unless scope changes occur and then only through integrated change control. Reserve Analysis management reserves for "unknown unknowns."

maximum schedule duration compression for the least additional cost. Typical approaches for crashing a schedule include reducing schedule activity durations and increasing the assignment of resources on schedule activities.

Quality Management

Quality Planning: This process identifies what quality standards will be applied to the project deliverables, and what project management processes will be used to meet the standards. The Quality Management Plan must address quality control, quality assurance, and process improvement. You cannot test quality into the project. The quality baseline records the project's quality objectives. The quality management plan is the output of this process. Some important points are:

- Quality metrics such as defect rate (during product development) and percent uptime (for IT systems in production) may be used on the project, and should be discussed in the Quality Management Plan.
- Some projects may also include a Process Improvement Plan, which addressed ways to analyze and improve processes used on the project.

Human Resources Management

Human Resources Planning: This process describes how the project team will be acquired, assigned to activities, developed, and rewarded for their work on the project. Some important points are:

> **The true test of character is not how much we know how to do, but how we behave when we don't know what to do.**
>
> *John Holt*

- Two tools that might be used are the Responsibility Assignment Matrix (RAM) and the RACI (Responsible, Accountable, Consult, and Inform) chart.
- If gaps are identified between the competencies of the team and the needs of the project, additional hiring, training, contracting, and as a last resort scope changes may be necessary.
- The Staffing Management Plan should address training needs, reward system, and plans to release team members.

Communications Management

Communications Planning:

The Communications Management Plan documents the stakeholders, their communication needs, the frequency, and types of communication that will be carried out during the project, and guidelines for holding meetings. A project manager may spend 90% of their time communicating. Below are some important points to consider when planning for communications:

- Consider when planning what types and formats of communication are appropriate for the situations: Formal versus Informal and Verbal versus Written.
- A larger project team size will result in greater need for communication. The number of communication channels for a team is calculated by: **n(n-1)/2** where n are the number of people on the team.

Risk Management

Risk Response Planning: The Risk Management Plan is done early in the project planning process and will describe how the project team will react to and mitigate the risks that have been identified. The project manager should allocate time and money for risk management activities within the WBS and in the cost and/or schedule baselines. Below are some important points to consider when planning for risks.

- Risk is defined as any uncertainty that can affect project outcomes.
- Risks can be negative (threats) or positive (opportunities).
- The Risk Register documents identified risks, their root causes, categories (categories of risk include market, personnel, technical, etc.), probabilities and impact, and mitigation strategies. The risk register should be reviewed frequently.
  - When identifying risks, all stakeholders and team members should be involved. Information gathering techniques include:
    - Delphi Technique,
    - Interviewing,
    - Root Cause Analysis, and
    - SWOT.
- A Probability/Impact Matrix, created during a process called Qualitative Risk Analysis, helps to prioritize risks so that planning and mitigation efforts target the most important risks.
- Quantitative Risk Analysis may be performed on some high-profile projects.
  - Quantitative Risk Analysis techniques include:
    - Monte Carlo, or
    - Decision Tree Analysis.
  - Each calculates the probability of achieving the project's cost and/or time objectives.
- Stakeholders should be consulted regarding their risk tolerance.
- The Risk Management Plan describes how risks will be monitored, controlled, and reviewed through the life of the project. Strategies for risk responses include:

  - Negative Risks (Threats) — Avoid, Transfer, or Mitigate;
  - Positive Risks (Opportunities) — Exploit, Share, Enhance; and
  - Strategy for Threats and Opportunities — Accept the Risk.

Once a risk is realized, it becomes an issue. An Issue Log is then created. "Issues are clearly stated and based on urgency and potential impact. An owner is assigned an action item for resolution, and a target date is usually established for closure. Unresolved issues can be a major source of conflict and project delays."[13]

[13] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 10, Section10.4.1.4, Page 263.

Procurement Management

Procurement Planning: The Plan Procurements process involves contracting with vendors or teaming with other organizations to accomplish project work and to attempt to reduce risk. The Procurement Management Plan will address types of contract (Fixed Price, Time and Materials, Cost-Reimbursable, etc.), risk issues, build versus buy decisions, and other factors. Procurement documents are written to obtain accurate, complete vendor responses. The contract's statement of work must enable sellers to accurately estimate the work.

Inputs and Outputs

Planning Inputs include:

- Project Charter
- Stakeholder Register
- Stakeholder Management Strategy

The Planning process outputs are:

- Project Management Plan
  - Requirements Documentation
  - Scope Statement
  - WBS / Dictionary
  - Activity List
  - Project Schedule
  - Activity Resources, Durations, Costs
  - Quality Plan
  - Human Resources Plan
  - Communication Plan
  - Risk Plan

Planning Reminders

- The two minimum project scheduling milestones are **start and finish**.
- The triple constraints are:
    - Time
    - Cost
    - Scope
        - Quality is the intangible.

Executing Process Group

Introduction
Executing happens in parallel with monitoring and controlling. The project manager should expect changes in budget and schedule during execution. This is where it is very important to have a strong change control process to analyze changes in scope and their impact to cost, schedule, and quality. The project manager will need to adjust and re-baseline the schedule as changes are approved.

Integration Management
Directing and managing project execution is the heart of the execution process. This is the process that directs the work as outlined in the project plan. Activities include making sure that all resources are working together to achieve what was outlined in the plan, being proactive by anticipating issues and taking corrective actions if the actual performance deviates from the plan. This also includes implementing changes that are approved through the defined change management process.

Review of deliverables by the correct staff is key to knowing if the project is proceeding according to plan in terms of quality and schedule.. Deliverables were defined in the planning process and are concrete evidence of what is "done". Identifying issues and risks continues throughout this phase, in addition to addressing them in a timely fashion. Ensuring that stakeholders are aware of the progress being made, what issues have occurred and how they are being addressed is key to a successful project.

Quality Management
Performing quality assurance is the actual comparison of the quality plan with the measurements taken during the monitoring and controlling process group. This is where you know if the quality being delivered is aligned with what was planned and taking steps for process improvements. The actual process depends on the type of project. For a software project, it could be the results of unit testing and taking steps to reduce the number of defects. For a construction project, it could be the results of inspections. For other projects, it could be as simple as reviewing the checklists that are completed for each deliverable. The "what" and "how" that is being measured and when it is reviewed are outlined in the quality assurance plan. During the executing process group, you are implementing that plan.

Human Resources Management

The activities of human resource management during the executing process group are acquiring, developing, and managing the project team. Acquiring the project team as outlined in the project plan, can be a key success factor. Sometimes, assignments are made during the project plan, but other times the team is not identified until the execution phase. Getting the resources with the needed skills and experience can be a major undertaking. Negotiating with managers to get the resources needed or to "share" the resources with other projects may require assistance from your project sponsor. The way this is approached will vary depending on the culture of your department. The project team will be adding and releasing team members as tasks start up and are completed. The communication with their managers is critical.

The extent of time and effort that should be spent on developing the project team will depend on the length of time that the project lasts and on whether the project team will need skills that they do not have. However, providing training for your project team should not be limited to giving training on the technical skills required for the project. Developing the team should include team building activities and developing interpersonal skills, in addition to giving opportunities or training to develop new technical skills.

Managing the team includes performance appraisals and managing conflict between team members. Getting the team to work together in a productive manner will make the execution of the project plan smoother. Managing the team also includes motivating and rewarding members of the project team.

Communications Management

The most important part of executing from a project management viewpoint is communication. This is often overlooked or downplayed. Communication is with team members, project sponsor, and other stakeholders. Managing expectations, communicating status, and distributing information about the project benefits are essential. The method and frequency for communications should have been detailed in the communications plan. This is the actual communications, whether formal or informal, verbal or written. More than one communication method will be used, depending on the nature of the information and the intended audience. Communications is often cited as the number one reason why projects fail. Project managers must be sure that they are communicating frequently with project team members, the project sponsor, and stakeholders. Project scope and schedule may change, but no one should be surprised at the end of the project about what is delivered.

Communications is not just about distributing information. Another important piece of communication is listening. The project manager must be sure that to hear what is being said by the project team members (what are their concerns and are they seeing risks), the project sponsor (is there still support for the project), and the stakeholders (will what is being delivered meet the business objectives).

Managing stakeholders' expectations is an ongoing activity throughout the project. Each stakeholder has expectations regarding what the project will deliver and when. As the project progresses, these expectations need to be aligned with the scope of the project. Good communications is a key to this, but it is more than just sending status reports. Often, the stakeholders will expect more from the project as they see progress. It is important to remind them of the original scope and the change process that is in place if there are any changes needed. It is important for them to understand the "triple constraint" and that adding more scope will mean analyzing the change for the effect on schedule, budget, and quality; in addition changes may mean increased risk. An effective use of the project sponsor's time is to have them engaged with the key stakeholders on a regular basis.

Procurement Management

Procurement of resources and all that entails is part of executing. Any RFP or contract may have taken place in the planning stage, but depending on the amount and kind of resources, the procurement of resources can be time consuming and critical to success.

Conduct procurements is the activity under the executing process group. Depending on the type of procurement (services versus goods), this may need to actually occur during the planning timeframe. The selection of a vendor may have a large impact on the schedule and the budget. The best advice is to work closely with the procurement staff within your department to ensure you are complying with the procurement regulations regarding how and when to conduct a Request for Proposal, what can be purchased as "sole source" and what approvals are needed for purchasing.

Inputs and Outputs

Executing Inputs include:

- Project Management Plan
  - Requirements Documentation
  - Scope Statement
  - WBS / Dictionary
  - Activity List
  - Project Schedule
  - Activity Resources, Durations, Costs
  - Quality Plan
  - Human Resources Plan
  - Communication Plan
  - Risk Plan
- EEFs
- OPAs
- Metrics
- Staff Assignments
- Performance Reports
- Issue/Change Logs

The Executing process outputs are:

- Deliverables
- Work Performance Information
- Change Requests
- Staff Assignments
- Selected Sellers, Contract Award
- Project Management Plan Updates

Executing Reminders

- Distribute project information through regularly scheduled, written, status reports.

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Monitoring and Controlling Process Group

The Monitoring and Controlling Process Group are those processes performed to ensure the project is being executed according to the project management plan, identifying instances where the plan needs to change, and ensure that only those changes that are authorized are executed. Performance is measured in a prescribed manner and on a regular schedule to identify variances early and work with the team and the stakeholders to take steps to remedy the variance or authorize changes, if needed. An important piece of this process group is being proactive and recommending actions before the project faces serious issues. This can also result in the project being cancelled if the project can no longer meet the business objectives or the cost and schedule has increased as to change the relative value of the project. An important element of this process group is to identify where the integrated change control is being bypassed to ensure only approved changes are implemented.

Monitoring provides the project team a snapshot into the health of the project and identifies any areas requiring additional attention. These reviews can result in recommended and approved updates to the project management plan. For example, recent budget cuts have reduced the skill set needed for many state projects because contractors with the needed skills can't be hired. This has caused a review of the scope and timeline as a trade-off between budget and schedule objectives.

The Monitoring and Controlling Process Group includes the following project management processes (as identified in the Project Management Process Groups and Knowledge Areas Mapping document located in the Appendices):

- Monitor and Control Project Work,
- Integrated Change Control,
- Verify Scope,
- Scope Control,
- Schedule Control,
- Control Costs,
- Perform Quality Control,
- Report Performance,
- Monitor and Control Risks, and
- Administer Procurements.

Integration Management

Monitor and Control Project Work

This is measuring the performance, reporting the status, forecasting the likelihood of meeting the project objectives, and recommending any corrective actions. Measurement should not be focused only on schedule and costs, but should also measure how well the project is adhering to the original scope, and monitoring whether the processes are being followed for risk managements, change control, and quality management.

Integrated Change Control

Performing Integrated Change Control is the process of reviewing all change requests, approving changes, and managing changes to the deliverables, organizational process assets, project documents, and the project management plan.

Change Control

Change control requests may occur in many forms—oral, written, direct, indirect, external, internal, legally mandated, or optional. Those change control requests may require the scope to expand or shrink. By implementing a scope change-control system, the agency can define the procedures by which the project's scope may be changed. This will include a paperwork tracking system (change control form) that will require approval prior to changing the project. *If the project has deliverables under contract, the scope change must also comply with all relevant contractual provisions.*

Scope change control is concerned with influencing the factors that create scope changes to ensure that changes are agreed upon, documenting that scope change has occurred, and managing the actual changes. Scope change must be thoroughly integrated with the other change-control processes: schedule, cost, and quality.

Corrective action is performed to bring expected future project performance in line with the project's plan. The causes of variances and the reason for the corrective action chosen become a part of the lessons learned and should be documented so that this information becomes a part of the historical database for the project. An adjusted baseline document may be revised and reissued to reflect the approved change and form the new baseline for future changes.

Performance measurement techniques will help assess the magnitude of any variations which do occur through change control. Determining the cause of variance relative to the initial baseline and deciding if the variance requires corrective action are an important element of scope change control.

As a very small percentage of projects run exactly according to plan, prospective scope changes may require modifications to the work breakdown structure (WBS). Once the initial WBS is approved and a change is proposed, an adjustment may be necessary to the cost, time, quality, or other project objectives. The change is then fed back through the planning process, technical planning documents are updated as needed, and stakeholders are notified as appropriate.

An example of a change control process is located at the end of this section.

Scope Management

Verify Scope

Verify Scope is the process of obtaining formal acceptance of the deliverables by the customer, as the deliverables are completed. It is very important that acceptance is not postponed until the end of the project. If a deliverable is not accepted, the customer must specify why the deliverable is not acceptable, which may result in a change request. Remember that delivering a project that meets the project plan, but does not meet the objectives of the customer is a failed project.

Scope Control

Scope Control is the process of ensuring that all proposed changes are managed through the change control process (whether approved or rejected) and that approved changes are integrated throughout the other processes. This includes ensuring that the approved changes are managed by updating the WBS, schedule, budget, quality management, and risk management plans.

Schedule Control

This process monitors project status in order to update progress and manage changes to the schedule baseline. Since schedules are based on estimates, no project is going to execute exactly according to the schedule for all tasks. The questions to be answered include: Are tasks starting and finishing when scheduled? Are the durations of the tasks accurate?

There are many tools to measure progress against the schedule, but unless the actual start and finish dates are recorded and the level of effort measured, these tools cannot be used. The project management plan should have included what tools would be used. Control schedule should track whether the tool is being used.

One important element of controlling the schedule is to determine the cause for the variances in schedule. Is there a common root cause for the variances? Has there been a delay in getting a resource or has the duration been underestimated for certain types of tasks? The proper corrective action cannot be determined if the cause of the variation is unknown.

Another important aspect of controlling the schedule is to know what variances affect the critical path and need to be addressed and the variances that will not affect the final project delivery. What changes can be made to the project schedule (adding resources, doing tasks in parallel, or other alternatives) so that the final delivery date is not affected?

Control Costs

Control Costs is the process of comparing the actual costs against the project budget, both by time period and by progress against the schedule. If the project is behind schedule and is spending according to the budget for the time period, then the project is over budget. The cost management plan should outline what tools will be used to track costs and what will be done if there is a significant variance in the cost. Earned value measurements are a common way to determine if the costs and the work produced so far are truly on track and within the budget. In many projects, the major cost is labor. For many state projects, costs are understated by ignoring the costs of the state employees assigned to the project; it is sometimes seen as not a cost by saying that the cost of the salaries is the same no matter what project is being worked. However, it is a significant part of the cost and must be captured.

Perform Quality Control

Perform Quality Control is the process to assess the performance as outlined in the quality management plan. This is the measuring and recording the results from the quality activities and making recommendations for changes when the results indicate a variance from the quality standards that are outside of the tolerance. There are many statistical tools that can be used to analyze the results of quality measurements. What tests are performed and how they are measured vary greatly depending on the nature of the project, but should be outlined in the quality management plan. It is important for quality control to take place throughout the project and not just on final deliverables.

Report Performance

Report Performance is collecting and distributing project performance information. This includes regularly scheduled status reports, progress measurements, and forecasts. At a minimum, status reports should include accomplishments for the reporting period, what is scheduled for the next reporting period, and any issues or risks. Measurements should report variations from the project schedule and budget and any corrective actions to be taken. Forecasts should include realistic projections of total costs and completion dates. Although no one likes to deliver bad news, postponing bad news in the hopes of making a turnaround is not acceptable. The distribution and manner of these communications should be outlined in the communications management plan.

Monitor and Control Risks

No project is without risks. This process includes tracking identified risks, implementing risk response plans, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project. The risk management plan should have detailed the process and tools that would be used to manage risks throughout the project, this process is ensuring that the process is being followed and any process changes are implemented. Monitoring risks is a proactive look at what could go wrong with a project and ways to address the possibility based on the probability and the impact of the risk to the project. Many projects hold formal risk meetings at least monthly to evaluate new risks and to monitor the effectiveness of the risk response plans. Other projects include this as an essential part of their status meetings. What works best will depend on the size and the complexity of the project.

Administer Procurements

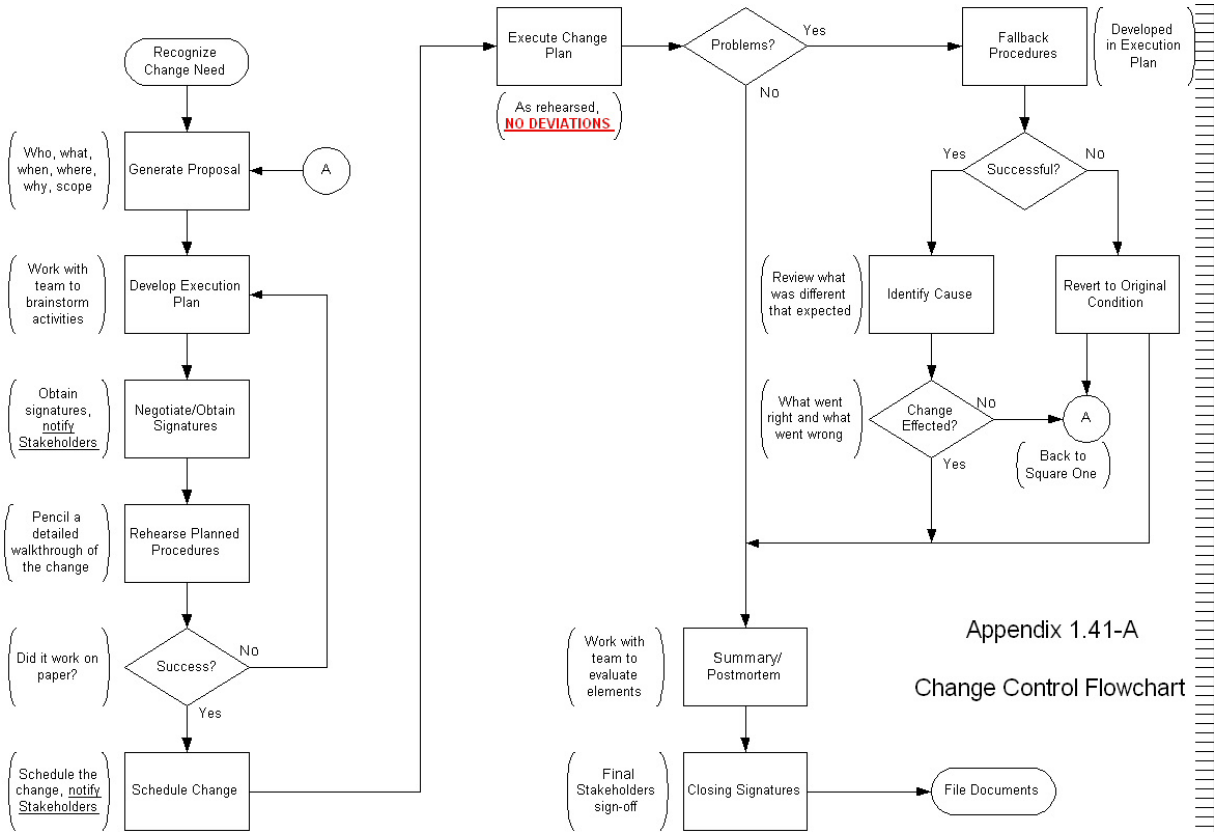
Administer Procurements is often seen as contract management. It includes managing relationships with any vendors, monitoring contract performance, and making changes, as needed. The amount of time spent on this will depend on the number of contracts and the dollar amount of the procurements.

Change Control Process

The following process is applied to all changes to the project:

1. A change control request is initiated by the individual identifying the need for the change (Requestor) by filling out the top portion of the Project Change Request form and submitting it to the project manager for analysis and sponsor sign off.
2. The Project Manager assigns a change control request number for the request. S/he then performs an evaluation of the proposed change request and completes the Impact Analysis section of the form.
3. The Project Manager makes a recommendation regarding the request based on impacts to the project's scope, cost, schedule, and product quality, initialing and dating the form in the space provided in the Approval, Control, Test, Acceptance, and Sign-off section.
4. The Project Manager presents the completed form to the Project Sponsor for evaluation and approval or rejection. The Project Sponsor will circle the decision made on the form and date it in the appropriate spaces, making appropriate comments in the space provided.
5. If the change request is rejected, the Project Manager will file the change request in the project binder and notify the Requestor of the decision and rationale.
6. If the change request is accepted, the Project Manager will develop the change process, identifying:
   a. **Who** (will do it – all personnel involved in the hands-on activities)
   b. **What** (will be done – generally, the 10,000-foot level)
   c. **When** (will it be done, how long will it take, and how long will it be in effect)
   d. **Where** (will it be done)
   e. **Plan** (What – specifically – will be done, sequentially, and what measures will be taken to undo the change, should something go wrong – fallback)
   f. **Notification matrix** (Who will be notified of the change, when will they be notified, and by whom)
7. The Project Manager will then develop an execution plan, identifying:
   a. **Time** (man-hours and elapse times for preparation, planning, rehearsal, execution, clean-up and documentation)
   b. **Budget** (requirements, sources, availability)
   c. **Point of No Return** (PONR) Decision (Specific conditions that come into play to trigger a stand-down decision, and at what point in the actual execution)
8. The change is executed as planned, with the appropriate checklist active, attendees present/involved, and fallbacks observed.
9. Upon completion, the Approval, Control, Test, Acceptance, and Sign-off section is completed by the Project Manager.
10. The change control documentation is filed in the project binder in the change control section.

Change Control Process Flow



Please see Appendices Section for the Project Change Request form.

Inputs and Outputs

Monitoring and Controlling Inputs include:

- Project management plan
- Performance reports
- Change Requests
- Enterprise environmental factors
- Organizational process assets

The Monitoring and Controlling process outputs are:

- Change requests
- Project management plan updates
- Project document updates

Monitoring and Controlling Reminders

- Scope verification is the process of obtaining formal acceptance of the project's scope.
- Scope verification differs from quality control because it is concerned with the acceptance of the work.

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Closing Process Group

You're finally finishing up an important and lengthy project, and you're basking in the glow of a job well done. Now it's time to move on, right?

Wrong. As a project manager, you have a responsibility to customers and team members to close your project formally, as well as practically.

Closing Process

The primary purpose of closing is to finalize all activities across all project management process groups to formally complete the project or phase.

The Closing process will emphasize verifying that the project has satisfied the original need. Ideally, the project will culminate with a smooth transition from deliverable creation to deliverable utilization in the post-project life cycle.

Project closing also provides guidance for future projects based upon current project experiences and identifies positives and negatives in the project documenting the experience for future use.

Why does closure matter?

By definition, a project is a group of tasks or activities to create a unique product, service, or system that is time constrained (has both a **start date and a finish date**). The end is defined as the point at which the project objectives have been achieved or it becomes clear that all the objectives will not or cannot be met or the project is terminated. A project generally uses or consumes resources and it is a temporary endeavor. Please see the *Project Management Body of Knowledge*, Section 1.2, pages 6-7[14] for additional information.

But without a formal closure process, project teams can fail to recognize the end, and then the project can drag on—sometimes at great expense.

Project closure is an important part of the overall project lifecycle. It brings things to the ended state in a formal approved way. PMBOK® Guide defines the Closing Process Group as "Those processes performed to formally terminate all activities of a project or phase, and transfer the completed product to others or to close a cancelled project.

[14] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition.

It's a nice way to move the project into business operations or review cancelled projects to glean information from them. Project closure ensures the following:

- Outcomes match the stated goals of the project;
- Customers and stakeholders satisfaction;
- Critical knowledge is captured;
- Lessons Learned are documented;
- Project documents are archived;
- Contracts are closed out;
- The team feels a sense of completion; and
- Project resources are released for new projects.

Which projects need closure?

Every project requires closure.

Projects are cancelled for numerous reasons. A late start to a project can ultimately cause the project to cancel. Budget cuts can cause end the funding of a project and bring it to a premature end. Having a project team with an inadequate skill set can bring about the end of a project. Also having a plethora of project changes can result in draining the life from the project, causing a cancellation situation.

Whether a project is successful or not, it is good to record the lessons learned from the project. These lessons are fed from the successes and failures in the project. It is important to keep this information and inject the knowledge into other project, current and future.

For large or complex projects, it's a good idea to close out each major project phase (for example, design, code and test, or training) individually. The closure process can also help by identifying lessons learned on projects that are canceled or deferred before completion.

Knowledge Areas

The Closing Process involves two of the nine knowledge areas outlined in PMBOK® Guide. The knowledge areas included are Project Integration Management and Project Procurement Management.
Integration management is an element of project management which coordinates all aspects of a project. Project integration, when properly performed, ensures that all processes in a project run smoothly. Integration management will produce a series of deliverables. These deliverables include the project charter, project plan, and preliminary project scope statement.

Project Procurement Management involves getting work done by people outside the project team. Project Procurement Management includes administering contracts and change control process to manage contracts or purchase orders.

Lessons Learned

Closing the project involves reviewing the processes, successes and deficits that were encountered during the project lifecycle. During the closing process, a lessons-learned document is produced by the project management team.

At the end of each phase of a project, a lessons-learned document must be prepared. The lessons learned document defines what was done right, wrong etc. It is required to be completed in order for the project to be completed.

Gauging customer satisfaction is a good way to measure the results of the project efforts. If the ratings on the projects are very high or are improving that is a good indication that your projects are being done well. In contrast, if the ratings are low or dropping then it may indicate a need to review the processes followed in the project and look for areas to improve.

Some of the most valuable knowledge you can capture is in the form of lessons learned. You can gather this information from several sources. Examples include:

- Survey team members about what worked and what didn't,
- Call a meeting with your sponsor and executive stakeholders to capture their thoughts, and
- Ask consultants and vendors for objective feedback, both about your organization and about the project's execution.

Provide a summary of your results to team members, either as a presentation at a meeting or as a formal document.

Finalize the Project's Documents

Project closure begins with wrapping up administrative documentation and providing a support plan for product maintenance.

Much of a project's documentation is created over the life of the project. Document collection and update procedures are probably already well established. Even so, you need to:

- Collect final time sheets, expense reports, and team status reports,
- Close or complete remaining tasks in the project schedule,
- Collect final cost and schedule metrics,
- Make final payments to vendors and contractors, and close out contracts,
- Review and update the issues log, highlight remaining issues, and decide how these issues are to be addressed,
- Prepare a plan for handling ongoing product support, and
- Prepare a final project status report.

Capture the Knowledge

Your project has likely produced documents that will be helpful during future projects, in troubleshooting the product, or in a future audit. Documenting of this valuable information is often deferred or overlooked because team members become busy with new projects, but the longer you wait, the less likely you are to capture all of the important data.

Set Up a Library or Project Repository

Store all key documents in a project library that is accessible to future project teams. Possible document categories include:

- Project planning documents,
- Status reports,
- Design documents,
- Test cases and test results,
- Issues and resolutions,
- Risk documentation,
- Change Requests,
- Presentations,
- Important communications (both those sent and those received),
- Time and expense reports, and
- Contracts and invoices.

Ideally, the project library is set up at the beginning of the project, and team members add documents as they produce them. It's a good idea to maintain the library in an electronic format that is backed up at regular intervals—something as simple as a set of folders on the LAN or as robust as a knowledge management system.

At project closure, review the contents of the project library and update them where necessary. You also need to collect any relevant paper documents and store them in an organized set of files or binders.

Archive Project Documentation

Once the project is complete, all the project documentation should be archived for future reference to use in similar projects. This "organization knowledge" can be used as a basis for future projects. Specifically, the estimates of efforts and resulting actuals can be used to improve estimating for future projects.

Receive Knowledge Transfer

Have you used consultants on your project? Ensure that they don't walk away with your most valuable asset—critical knowledge that your organization can use.

Don't release consultants until they have transferred all of their important product maintenance knowledge to the team. The transfer might take the form of documents created by the consultants or training sessions that the consultants conduct.

Get Final Signoff

Prepare a Project Closeout Report.

Schedule a meeting with the project's sponsor and key stakeholders to get their final signoff on the project. A formal signoff documents that the sponsor is satisfied, objectives have been met, and the project is truly complete.

The project closeout report should include the following:

- Project Summary,
- Project Results,
    - Scope
    - Cost
    - Schedule
- Success Criteria,
- Key Lessons Learned,
- Project Assessment,
- Project Manager Assessment,
- Team Assessment,
- Action Items, and
- Project Acceptance/Signoff Signatures.

Recognition

A closed project may mean cause for celebration or a sigh of relief. It definitely means that the project phase has been completed, the project has been finished, or it was cancelled.

Your team members have worked hard, and now they deserve some real recognition. As their project manager, you have the best understanding of who pulled the project out of each tight spot, which members have transformed themselves with new skills, and who might be ready for a new level of responsibility. This puts you in the perfect position to remind the team members' supervisors of what each team member has brought to the project.

In addition to your group acknowledgments, be sure to take each team member aside and thank them individually. Make a point of reminding the sponsor and other executive stakeholders of individual members' contributions and of letting them know how much a personal thank-you would mean to your team.

An announcement to the organization is a good way to highlight the success of the project and its benefits to the company. For example, you might arrange for an executive to send out an e-mail message recognizing the team's efforts, or publish an article touting the project's success.

Conclusion

Formal project closure ensures that your team has met its objectives, satisfied the customer, and captured important knowledge, archived project documents and team member recognized for their efforts. With the door closed securely behind you, you can move on to your next project with confidence.

Inputs and Outputs

The Close Project or Phase Inputs include:
• Project Management Plan,
• Accepted Deliverables, and
• Organizational Process Assets.

The Close Project or Phase Outputs include:
• Final Product, Service, or Result Transition, and
• Organizational Process Assets Updates.

The Close Procurement Inputs include:
• Project Management Plan, and
• Procurement Documentation.

The Close Procurement Outputs include:
• Closed Procurements, and
• Organizational Process Assets Updates.

Closing Reminders

- The project closeout report includes:
  - Key Lessons Learned
  - Project Summary
  - Project Acceptance/Signoff
- The primary purpose of closing is to finalize all activities across all process groups including:
  - Finalize Project Documents
  - Archive Project Documentation
  - Lessons Learned Meeting
  - Final Acceptance

Acronyms and Definitions

Acronym	Meaning	Definition/Discussion
AC	Actual Cost	The *actual* cost *incurred*, derived from performance reporting.
BAC	Budget at Completion	The total *approved* budget; the cost baseline for the entire project.
CAPM	Certified Associate Project Manager	An individual who has become certified as an apprentice project manager, having documented 1,200 hours of project participation over a five-year period, and has taken a project management knowledge examination.
CPI	Cost Performance Index	A ratio between Earned Value (EV) and Actual Cost (AC), where the EV is a percentage of the actual cost. The formula is **EV / AC**. A value less than one is undesirable, implying that the value received is worth less than the costs.
CPM	Critical Path Method	A means of determining which tasks lie along the path that provides no slack in either lead or lag time. A delay to a task in the critical path will create a delay in the project delivery schedule, without modifying scope, budget, risk, or quality.
CV	Cost Variance	The different between Earned Value (EV) and Actual Cost (AC), the formula being **EV - AC**. A negative value is not good, as this means that the cost was greater than the value.
EAC	Estimate at Completion	A forecasting technique to help assess the cost or amount of work to complete scheduled activities: · **AC + ETC**, new estimate · **AC + (BAC - EV) / CPI**, typical · **AC + BAC - EV**, using remaining budget

Acronym	Meaning	Definition/Discussion
EEF	Enterprise Environmental Factors	Factors regarding the organization's culture, infrastructure, tools, human resources, personnel policies, and marketplace conditions that could affect how project scope is managed. Other factors included can be: · Work authorization systems; · Stakeholder risk tolerance; · PMIS; · Data bases, and; · Processes for estimating and addressing risk data.
ETC	Estimate to Complete	The forecast of the most likely total value based on project performance and risk quantification. · **EAC - AC**, dissimilar · **(BAC - EV) / CPI,** similar
EV	Earned Value	The value of work *actually* completed, derived from performance reporting.
NPV	Net Present Value	A means of evaluating financial appraisal of long-term projects. It measures the excess or shortfall of cash flow in terms of expected future values applied to the present.

Acronym	Meaning	Definition/Discussion
OPA	Organization Process Assets	Formal and informal policies, procedures, processes, and guidelines that could impact how the project scope is managed, including historical information regarding previous projects. Included in this are: · Organization Standards; · Performance criteria; · Templates; · Communication requirements; · Fiscal processes and controls; · Issue and defect management; · Change control and configuration management; · Risk management; · Work authorization; · Project files, and; · Performance and defect data. This list of acronyms is an example of a Template that is incorporated into the CSP's OPA arsenal.
PERT	Program Evaluation and Review Technique	A method used to analyze tasks involved in completing a project, especially the time needed to complete each task, and identifying the minimum time needed to complete the total project. The formula **(O + 4M + P)/6** is used, where O is the estimated optimistic duration, M is the most likely estimated duration, and P is the pessimistic estimate.
PM[1]	Project Management	Means of applying specific methodologies, techniques, and tools to bring a project to successful conclusion, meeting the constraints of time, cost, scope, risk, and quality.
PM[2]	Project Manager	An individual charged with the responsibility and authority to bring a project to successful conclusion, meeting the constraints of time, cost, scope, risk, and quality.
PMBOK® Guide	Project Management Body of Knowledge	A formal copyrighted document published by the PMI in which the Project Management Methodology doctrine is codified.

Acronym	Meaning	Definition/Discussion
PMIS	Project Management Information System	A standardized set of automated tools available within the organization and integrated into a system. Supports generation of a project charter, facilitate feedback, control changes, and communicate the project plan conceptually.
PMI	Project Management Institute	An international organization that provides and promotes project management methodologies, best practices, certification, and oversight in project management.
PMO	Project Management Office	An organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of a project.[15]
PMP	Project Management Professional	An individual who has become certified through the PMI, having documented a minimum of 4,500 hours of project management functions over an eight-year period, has taken at least 35 hours continuing (formal) education in project management, and has taken a rigorous project management knowledge examination.
PMUG	Project Management User's Group	The PMUG is hosted through the Governor's Office of Information Technology, Enterprise Portfolio Project Management Office.
PONR	Point of No Return	The **point of no return** is the point beyond which someone, or some group of people, must continue on their current course of action because to do so would be prohibitively expensive. It is also used when the distance or effort required to get back would be greater than the tasks as yet undertaken.
PV	Planned Value	The value of the work *to be* completed, derived from time-phased cost baseline.
QA	Quality Assurance	Application of the planned, systematic quality activities to ensure that the project employs all processes needed to meet requirements.
QC	Quality Control	Monitoring specific project results to determine whether they comply with relevant quality standards and identifying ways to eliminated causes of unsatisfactory performance.

[15] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Glossary, Page 435.

Acronym	Meaning	Definition/Discussion
RACI	Responsible, Accountable, Consult, Input (Inform)	Task assignments used within a RAM: · R - **Responsible** for task completion, the actual work to be performed (multiple R's for a common task constitute the team); · A - Approves the completed task and is **Accountable** for the it; · C - **Consulted**, having the information and or capability to complete the work; is adjunct to the task; · I - **Informed** of the progress and results. Typically one-way communications from R to I
RAM	Responsibility Assignment Matrix	A tool typically used to link activities to resources to ensure that the scope's components are each assigned to an individual or team.
RFP	Request for Proposal	A type of procurement document used to request proposals from prospective sellers of products or services[16].
ROI	Return on Investment	A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. To calculate ROI, the benefit (return) of an investment is divided by the cost of the investment; the result is expressed as a percentage or a ratio. The return on investment formula: $ROI = \frac{(\text{Gain from Investment} - \text{Cost of Investment})}{\text{Cost of Investment}}$ Return on investment is a very popular metric because of its versatility and simplicity. That is, if an investment does not have a positive ROI, or if there are other opportunities with a higher ROI, then the investment should be not be undertaken
SME	Subject Matter Expert	An expert in a particular function, area or topic.

[16] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Glossary, Page 437.

Acronym	Meaning	Definition/Discussion
SOW	Statement of Work	A narrative description of products or services to be supplied by the project. This is based on the business needs, product or service requirements. This incorporates a: · Business need based on needed training, market demand, technological advance, legal requirement, or government; · Product Scope Description, identifying the product requirements and characteristics, and; · Strategic Plan support mechanism.
SWOT	Strengths, Weaknesses, Opportunities, and Threats	SWOT analysis is a tool for auditing an organization and its environment. It is the first stage of planning.
SPI	Schedule Performance Index	A ratio between Earned Value (EV) and Performance Value (PV), where EV is a percentage of the actual performance executed. The formula is **EV/PV**. A value less than one is undesirable, implying that the value received is worth less than the effort to produce it.
SV	Schedule Variance	The difference between Earned Value (EV) and Performance Value (PV). The formula is **EV - PV.** A negative value is not good, implying that it has cost more to produce the EV than anticipated.
VAC	Variance at Completion	The difference between budgeted and actual costs. The formula is **BAC - EAC**. Zero is best; implying that all the fiscal resources were appropriately forecast and used as predicted, while negative is worst, meaning that there have been cost overruns.
WBS	Work Breakdown Structure	A comprehensive deliverable-oriented hierarchical decomposition of the work to be executed by the project team. The WBS doesn't necessarily contain assignments or task duration, but it could.

Glossary

Analogous Technique	An estimating technique that uses the values of parameters, such as *scope, cost, budget,* and *duration* or measures of scale such as size, weight, and complexity, from a previous, similar activity as the basis for estimating the same parameter or measure for a future activity. It is frequently used to estimate a parameter when there is a limited amount of detailed information about the project (e.g., in the early phases). Analogous estimating is a form of expert judgment. Analogous estimating is most reliable when the previous activities are similar in fact and not just in appearance, and the project team members preparing the estimates have the needed expertise.
Assumptions	Assumptions are factors that, for planning purposes, are considered to be true, real, or certain without proof or demonstration. Assumptions affect all aspects of project planning, and are part of the progressive elaboration of the project. Project teams frequently identify, document, and validate assumptions as part of their planning process. Assumptions generally involve a degree of risk.
Authority	The right-to-apply project resources, expend funds, make decisions, or give approvals.
Baseline	The approved time-phased plan (for a project, work breakdown structure component, a work package, or a schedule activity), plus or minus approved project scope, cost, schedule, and technical changes. Generally refers to the current baseline, but may refer to the original or some other baseline. Usually used with a modifier (e.g., cost baseline, schedule baseline, performance measurement baseline, technical baseline, etc.).
Brainstorming	A general data gathering and creativity technique that can be used to identify risks, ideas, or solutions to issues by using a group of team members or subject matter experts (SME). Typically, a brainstorming session is structured so that each participant ideas are recorded for later analysis.
Change Control System	A collection of formal documented procedures that define how project deliverables and documentation will be controlled, changed, and approved. In most application areas the change control system is a subset of the configuration management system.

Change Request	Requests to expand or reduce the project scope, modify policies, processes, plans, or procedures, modify costs or budgets, or revise schedules. Requests for a change can be direct or indirect, externally or internally initiated, and legally or contractually mandated or optional. Only formally documented requested changes are processed, and only approved change requests are implemented.
Charter	A document issued by the project initiator or sponsor that formally authorized the existence of a project, and provides the project manager with the authority to apply organizational resources to project activities.
Closing	The process of finalizing all activities across the project process groups to formally close the project or phase.
Communication	A process through which information is exchanged among persons using a common system of symbols, signs, or behaviors.
Constraint	The state, quality, or sense of being restricted to a given course of action or inaction. An applicable restriction or limitation, either internal or external to the project that will affect the performance of the project or a process. For example, a schedule constraint is any limitation or restraint placed on the project schedule that affects when a schedule activity can be scheduled and is usually in the form of fixed imposed dates. A cost constraint is any limitation or restraint placed on the project budget such as funds available over time. A project resource constraint is any limitation or restraint placed on resource usage, such as what resource skills or disciplines are available and the amount of a given resource available during a specified time frame.
Cost	The monetary value or price of a project activity or component that includes the monetary worth or the resources required to perform and complete the activity or component, or to produce the component. A specific cost can be composed of a combination of cost components including direct labor hours, other direct costs, indirect labor hours, other indirect costs, and purchased price. (However, in the earned value management methodology, in some instance, the term cost can represent only labor hours without conversion to monetary worth.)

CPM	Critical Path Method: A schedule network analysis technique used to determine the amount of scheduling flexibility (float) on various logical network paths in the project schedule network, and to determine the minimum total project duration. Early start and finish dates are calculated by means of a forward pass, using a specified start date. Late start and finish dates are calculated by means of a backward pass, starting from a specified completion date, which sometimes is the project early finish date determined during the forward pass calculation.
Crashing	A specific type of project schedule compression technique performed by taking action to decrease the total project schedule duration after analyzing a number of alternatives to determine how to get the maximum schedule duration compression for the least additional cost. Typical approaches for crashing a schedule include reducing schedule activity durations and increasing the assignment of resources on schedule activities.
Creep	Adding features and functionality without addressing the effects on time, costs, and resources, or without customer approval.
Criteria	Standards, rules, or tests on which a judgment or decision can be based, or by which a product, service, result, or process can be evaluated.
Critical Path	Generally, but not always, the sequence of schedule activities that determines the duration of the project. Generally, it is the longest [time] path through the project. However, a critical path can end, as an example, on a schedule milestone that is in the middle of the project schedule and that has a finish-no-later-than imposed date schedule constraint.
Decomposition	A planning technique that subdivides the project scope and project deliverables into smaller, more manageable components, until the project work associated with accomplishing the project scope and providing the deliverables is defined in sufficient detail to support executing, monitoring, and controlling the work.
Deliverable	Any unique and verifiable product, result, or capability to perform a service that must be produced to complete a process, phase, or project. Often used more narrowly in reference to an external deliverable which is the deliverable that is subject to approval by the project sponsor or customer.

EEF	Enterprise Environmental Factors: Any or all external environmental factors and internal organization environmental factors that surround or influence the project's success. These factors are from any or all of the enterprises involved in the project, and include organizational culture and structure, infrastructure, existing resources, commercial databases, market conditions, and project management software.
EV	Earned Value: The value of work performed expressed in terms of the approved budget assigned to that work for a schedule activity or work breakdown structure component. Also referred to as the budgeted cost of work performed.
Feasibility	The capability, probability, suitability or advisability of a task or project being done, effected, or accomplished.
Executing	The processes directing, managing, performing and accomplishing the project work, providing deliverables, and providing work performance information to complete the work defined in the project management plan to accomplish the project's objectives defined in the project scope statement.
Expert Judgment	Judgment provided based upon expertise in an application area, knowledge area, discipline, industry, etc. as appropriate for the activity being performed. Such expertise may be provided by any group or person with specialized education, knowledge, skills, experience, or training, and is available from many sources, including: other units within the performing organization; consultants; stakeholders, including customers; professional and technical associations; and industry groups.
Fast Tracking	A specific type of project schedule compression technique that changes network logic into overlap phases that would normally be done in sequence, such as the design phase and construction phase, or to perform schedule activities in parallel.
Float	The total amount of time that a schedule activity may be delayed from its early start date without delaying the project finish date, or violating a schedule constraint. Calculated using the Critical Path Method technique and determining the difference between the early finish dates and late finish dates.
Gantt Chart	A graphic display of schedule-related information. In the typical [Gantt] chart, schedule activities or work breakdown structure components are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars.

Goal	High-level statements that provide the overall context for what the project is trying to accomplish.
Human Resources	Manpower used to execute tasks in a project, including the qualitative aspects of achieving the tasks at hand.
Initiating	Those processes performed to authorize and define the scope of a new phase or project or that can result in the continuation of halted project work. A large number of the initiating processes are typically done outside the project's scope of control by the organization, program, or portfolio processes and those processes provide input to the project's initiating processes group.
Lag	A modification of a logical relationship that directs a delay in the successor activity. For example, in a finish-to-start dependency with a den-day lag, the successor activity cannot start until ten days after the predecessor activity has finished. A negative lag is equivalent to a positive lead.
Lead Time	A modification of a logical relationship that allows an acceleration of the successor activity. For example, in a finish-to-start dependency with a ten-day lead, the successor activity can start ten days before the predecessor activity has finished. A negative lead is equivalent to a positive lag.
Life Cycle	A collection of generally sequential project phases whose name and number are determine by the control needs of the organization or organization involved in the project. A life cycle can be documented with a methodology.
Metrics	Quantifiable values used for monitoring task progress.
Milestone	A significant point or event in the project. Technically, will have a task duration of zero.
Monitoring & Controlling	Those processes performed to measure and monitor project execution so that corrective action can be taken when necessary to control the execution of the phase or project.
Objective	Concrete statements describing what the project is trying to achieve, written at a lower level, so that it can be evaluated at the conclusion of a project to see whether it was achieved or not. Goal statements are designed to be vague; a well-worded objective will be Specific, Measurable, Attainable/Achievable, Realistic, and Time-bound (SMART).

OPA	Organization Process Assets: Any or all process related assets from any or all of the organizations involved in the project that are or can be used to influence the project's success. These process assets include formal and informal plans, policies, procedures, and guideline. The process assets also include the organizations' knowledge bases such as lessons learned and historical performance.
Opportunity	A condition or situation favorable to the project, a positive set of circumstances, a positive set of events, a risk that will have a positive impact on project objectives, or a possibility for positive changes. Contrasts with Threat.
PMI	Project Management Institute: The world's leading not-for-profit association for the project management profession with more than 265,000 members in over 170 countries around the world. PMI is recognized for the advocacy programs conducted with governments, organizations and industries around the world as they recognize and embrace project management to achieve business results. PMI publishes the defacto project management standard, the Project Management Body of Knowledge®, Third Edition (PMBOK® Guide)
PMIS	Project Management Information System: An information system consisting of the tools and techniques used to gather, integrate, and disseminate the outputs of project management processes. It is used to support all aspects of the project from initiating through closing, and can include both manual and automated systems.
PMO	Project Management Office: An organization body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of a project.
PMP	Project Management Professional: A person certified as a PMP® by the Project Management Institute (PMI®).
Predecessor	The schedule activity that determines when the logical successor activity can begin or end.
Progressive Elaboration	Continuously improving and detailing a plan as more detailed and specific information and more accurate estimates become available as the project progresses, and thereby producing more accurate and complete plans that result from the successive iterations of the planning process.

Project	A temporary endeavor undertaken to create a unique product, service, or result.
Project Management Process Group	A logical grouping of the project management processes described in the PMBOK® Guide. The project management process groups include initiating processes, planning processes, executing processes, monitoring and controlling processes, and closing processes. Collectively, these five groups are required for any project, have clear internal dependencies, and must be performed in the same sequence on each project, independent of the application are or the specifics of the applied project life cycle. Project management process groups are not project phases.
Project Phase	A collection of logically related project activities, usually culminating in the completion of a major deliverable. Project phase (also called phases) are mainly completed sequentially, but can overlap in some project situations. Phases can be subdivided into sub-phases and then components; this hierarchy, if the project or portions of the project are divided into phases, is contained in the Work Breakdown Structure. A project phase is a component of a project life cycle. A project phase is not a project management process group.
Quality	The degree to which a set of inherent characteristics fulfills requirements.
RACI	Responsible-Approve-Consult-Inform: A matrix used to describe the roles and responsibilities of various teams or people in delivering a project or operating a process. It is especially useful in clarifying roles and responsibilities in cross-functional/departmental projects and processes. The classifications are: • **R**esponsible - Those who do work to achieve the task. There can be multiple resources responsible; • **A**ccountable - (Also Approver) the resource ultimately answerable for the correct and thorough completion of the task. There must be only one **A** specified for each task; • **C**onsulted - Those whose opinions are sought. Two-way communication; • **I**nformed - Those who are kept up-to-date on progress. One-way communication.
RFI	Request for Information: A type of procurement document whereby the buyer requests a potential seller to provide various pieces of information related to a product or service or seller capability.

RFP	Request For Proposal: A type of procurement documentation used to request proposals from prospective sellers of products or services.
RFQ	Request For Quotation: A type of procurement document used to request price quotations from prospective sellers of common or standard products or services. Sometimes use in place of a RFP.
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.
Risk Acceptance	A risk response planning technique that indicates that the project team has decided not to change the project management plan to deal with a risk, or unable to identify any other suitable response strategy.
Risk Avoidance	A risk response planning technique for a threat that creates changes to the project management plan that are meant to either eliminate the risk or to protect the project objectives from its impact. Generally, risk avoidance involves relaxing time, cost, scope, or quality objectives.
Risk Mitigation	A risk response planning technique associated with threats that seek to reduce the probability of occurrence or impact of the risk to below an acceptable threshold.
Risk Transference	A risk response planning technique that shifts the impact of a threat to a third party, together with ownership of the response.
Rolling Wave	A form of progressive elaboration planning where the work to be accomplished in the near term is planned in detail at a low level of the work breakdown structure, while the work far in the future is planned at a relatively high level of the work breakdown structure, but the detailed planning of the work to be performed within another one or two periods in the near future is done as work is being completed during the current period.
Schedule Activity	A discrete scheduled component of work performed during the course of a project. A schedule activity normally has an estimated duration, an estimated cost, and estimated resource requirements. Schedule activities are connected to other schedule activities or milestones with logical relationships, and are decomposed from work packages.
Scope	The work that must be performed to deliver a product, service, or result with the specified features and functions.

Six Sigma	Sigma (σ) is the expression used by statisticians to denote standard deviation, a variance from a sample or population central tendency or mean. The sixth standard deviation (6σ) is approximately 3.4 variations per 1,000,000 samples. Six Sigma is the quality control strategy used to try to achieve fewer than 3.4 variances out of 1,000,000 transactional opportunities by using applied techniques of Definition, Measurement, Analysis, Improvement, and Control (DMAIC). 6σ certification is ranked in belts (much as karate), with Yellow, Green, Black, and Master Black belts, ranked from lowest to highest.
Slack	The amount of time that a schedule activity can be delayed without delaying the early start of any immediately following schedule activities.
SME	Subject Matter Expert: An individual who is an expert in a particular area, often asked to review, improve, and approve technical work, to guide others, and to teach. According to Six Sigma, a SME "Exhibits the highest level of expertise in performing a specialized job, task, or skill."
Sole Source	Sole Source refers to a *non-competitive* purchase or procurement process accomplished after soliciting and negotiating with *only one source*, so-called *sole source*, thus limiting Full and Open Competition.
Sponsor	The person or group that provides the financial resources, in cash or in kind, for the project, having the authority to grant responsibility for accomplishing the project.
Stakeholder	Person or organization (e.g., customer, sponsor, performing organization or the public) that is actively involved in the project, or whose interests may be positively or negatively affected by execution or completion of the project. A stakeholder may also exert influence over the project and its deliverables.
Successor	The activity that follows a predecessor activity, as determined by their logical relationship.
Task	A term for work whose meaning and placement within a structures plan for project work varies by the application area, industry, and brand of project management software.
TCO	Total Cost of Ownership: The total cost of a project, including initiation and feasibility studies, development, implementation, and its operational costs after implementation, including periodic reviews of efficacy.
Threat	A condition or situation unfavorable to the project, a negative set of circumstances, a negative set of events, a risk that will have a negative impact on a project objective if it occurs, or a possibility for negative changes. Contrast with Opportunity.

WBS	Work Breakdown Structure: A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages. The deliverable orientation of the hierarchy includes both internal and external deliverables.
Work Package	A deliverable or project work component at the lowest level of each branch of the WBS. The work package includes the schedule activities and schedule milestones required to complete the work package deliverable or project work component. Normally not more than 10-work days.

APPENDICES

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Project Management Process Groups and Knowledge Areas Mapping[17]

Project Management Process Groups and Knowledge Areas Mapping

			Five Process Groups				
			1	2	3	4	5
		Nine Knowledge Areas	**Initiating**	**Planning**	**Executing**	**Controlling**	**Closing**
Activities	4	**Project Integration Management**	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Execution	4.4 Monitor and Control Project Work 4.5 Integrated Change Control	4.6 Close Project or Phase
	5	**Project Scope Management**		5.1 Collect Requirements 5.2 Define Scope 5.3 Create WBS		5.4 Verify Scope 5.5 Scope Control	
	6	**Project Time Management**		6.1 Define Activities 6.2 Sequence Activities 6.3 Estimate Activity Resources 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Schedule Control	
	7	**Project Cost Management**		7.1 Estimate Costs 7.2 Determine Budget		7.3 Control Costs	
	8	**Project Quality Management**		8.1 Plan Quality	8.2 Perform Quality Assurance	8.3 Perform Quality Control	
	9	**Project Human Resources Management**		9.1 Develop Human Resource Plan	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
	10	**Project Communications Management**	10.1 Identify Stakeholders	10.2 Plan Communications	10.3 Distribute Information 10.4 Manage Stakeholder Expectations	10.5 Report Performance	
	11	**Project Risk Management**		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Monitor and Control Risks	
	12	**Project Procurement Management**		12.1 Plan Procurements	12.2 Conduct Procurements	12.3 Administer Procurements	12.4 Close Procurements
							Tasks

The matrix above represents project management processes in the five process groups. This is not meant to be an inclusive list; rather it indicates where project management processes fit into both the project management process groups and the project management knowledge areas.

[17] *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Fourth Edition page 43.

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Communication Management Planning Workbook

Please double click on the documents below to open.

Communication Management Planning

Communication Management Plan.pd

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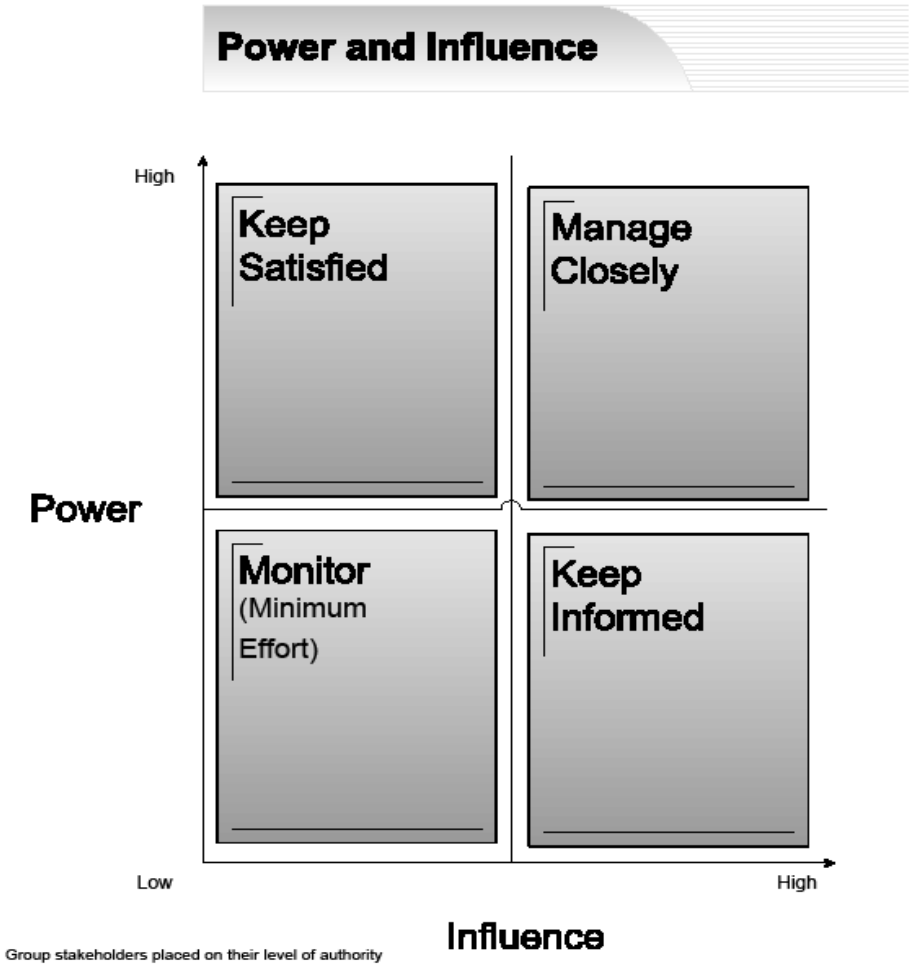
Stakeholder Interview Questions

Please note: not all stakeholder interview questions are pertinent to each stakeholder- therefore may not need to be asked. Below are stakeholder interview questions:

1. What role does the stakeholder have in this project?
2. Do they have multiple roles?
3. Are they managing resources participating on this project?
4. What are their expectations for this project?
5. What do they want out of the project?
6. Do they have an output associated with the project?
7. Do they have signoff authority?
    a. If so, which artifacts?
8. What are their concerns and fears regarding the project?
9. What are their frustrations with the project?
10. Does this project conflict with or compete with their interests?
11. What information do they need to know?
    a. How often?
12. What style of communication do they prefer?
13. Are they an internal or external stakeholder?
    a. If external, are there contractual or legal obligations?
14. Is the stakeholder the type of person that needs information pushed to them, or do they prefer to pull information from a central repository?
15. Do they have access to a central repository?
16. What type of personality, e.g., detail oriented or big picture?
17. Are they fact/data driven or people/resource driven?

18. What persuasion technique would work best with this stakeholder?
19. Do they usually communicate or make decisions informally (hallway or break room)?
20. Where is the stakeholder physically located?
    a. Are there distance concerns?
    b. Virtual considerations?
21. What is their style in resolving conflict?
22. What is my current relationship with this stakeholder?
23. How do they handle escalations?

Power and Influence Grid[18]



Group stakeholders placed on their level of authority (power) and their active involvement (influence) in the project.

[18] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 9, Page 249.

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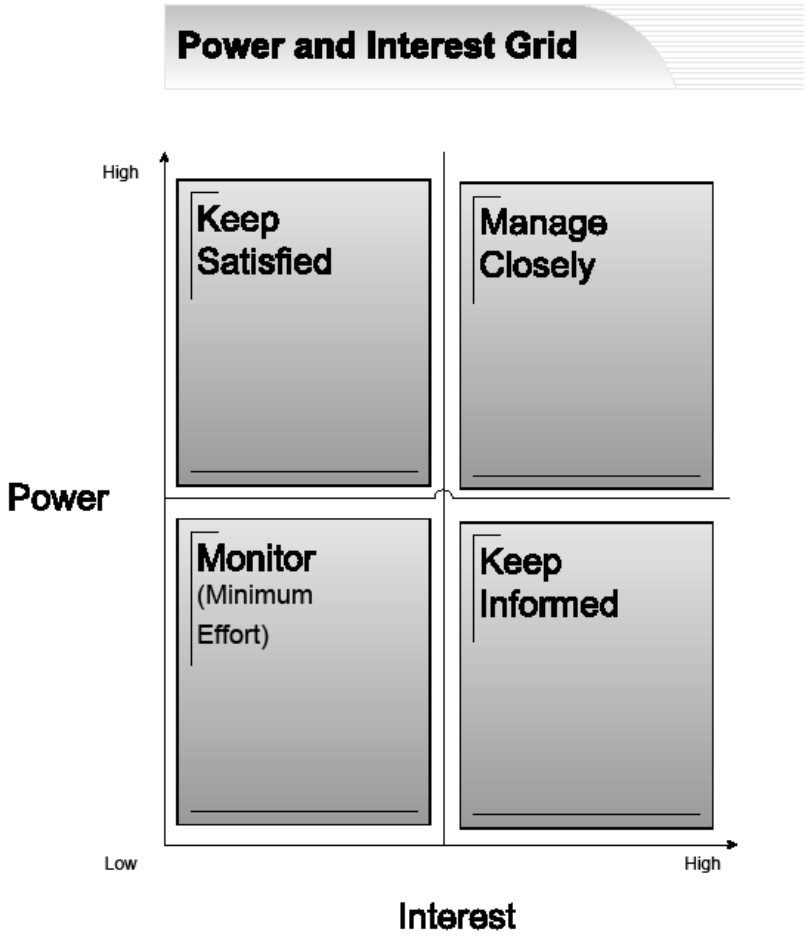
Power and Interest Grid[19]



[19] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 9, Page 249.

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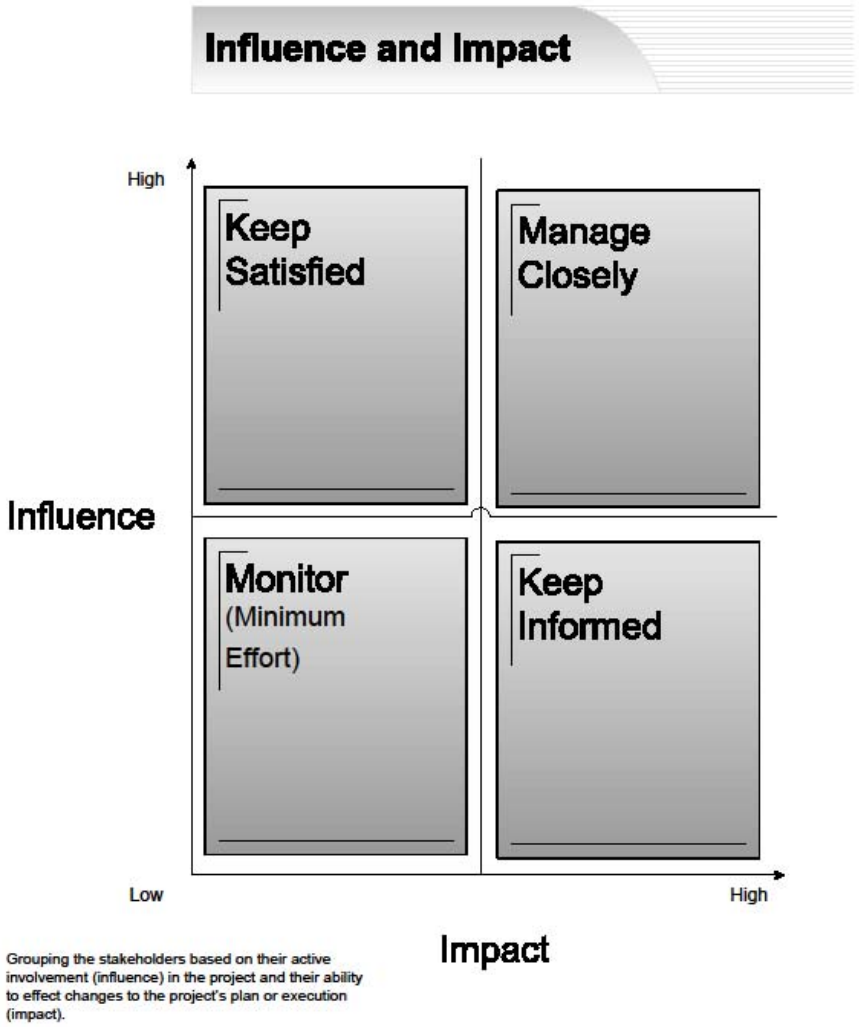
Influence and Impact Grid[20]



[20] A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition, Chapter 9, Page 249.

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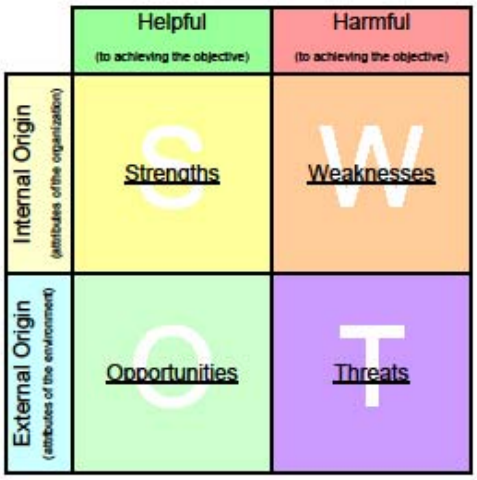
Strengths, Weaknesses, Opportunities, and Threats (SWOT)



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Project Scaling Matrix

The documents below may be used to identify the size of a project. Please double click on the documents below to open.

Project Scaling Worksheet 8-2010.dc

Project Scaling Worksheet 8-2010.pc

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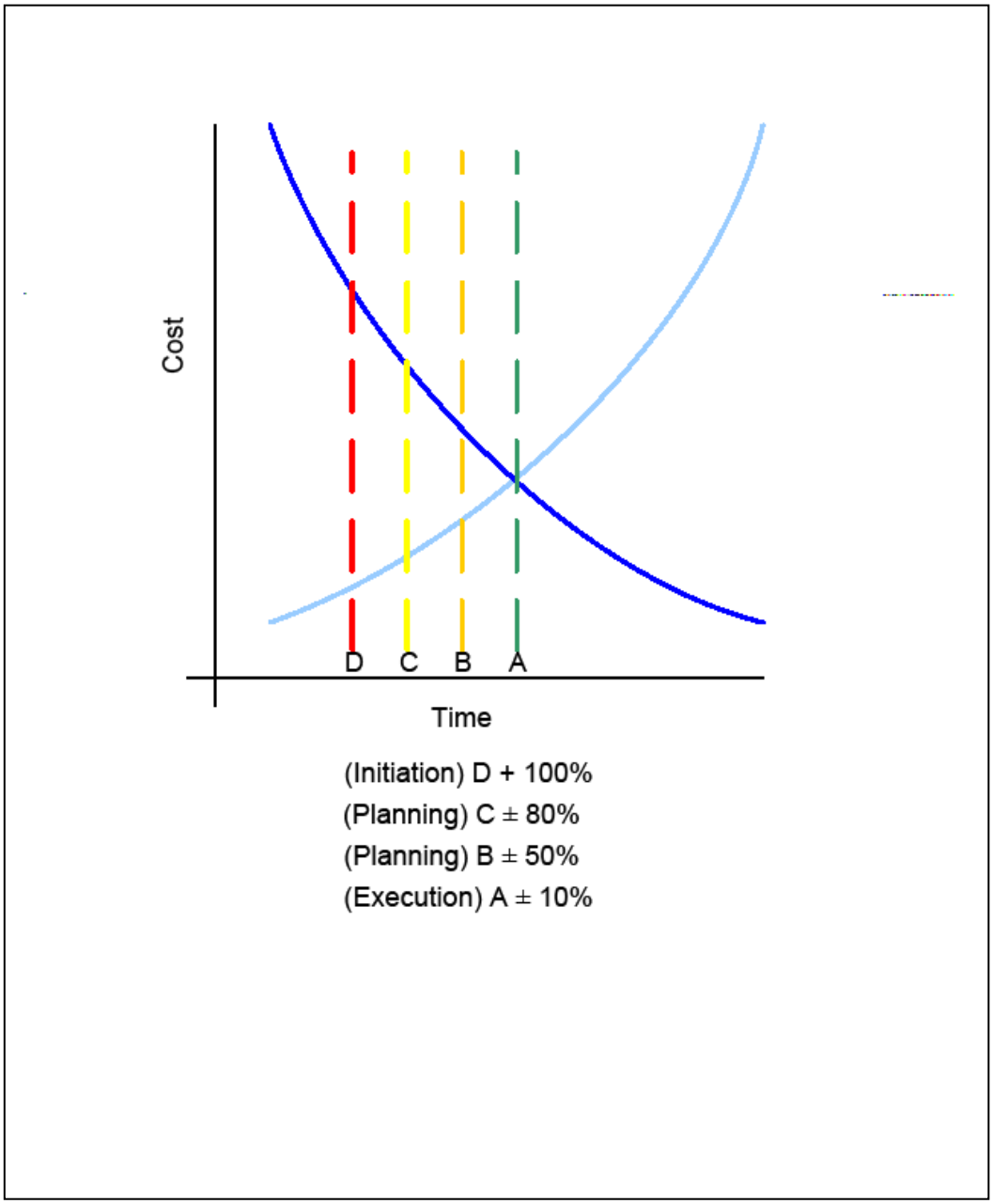
Time and Cost Curves

The drawing below indicates the level of confidence when predicting what a project will cost at the various process stages. This is important as a discussion point when dealing with sponsors and stakeholders. Further the time and cost curves assist the project manager in developing a rough order of magnitude (ROM) when estimating costs in the planning process.



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Expedited Project Checklist

Prior to beginning a project, assemble the project's notebook. Organization is key to maintaining the records necessary to run a project smoothly. Begin by separating the notebook into the five sections listed below.

- **Initiating Phase**
  - Define the statement of work's purpose (problem or opportunity).
  - Define the project's purpose (proposed solution).
  - **Prepare a scope of work**.[21] Use the acronym **SMART**: specific, measurable, achievable, reasonable, and time bound for the objective(s) and/or deliverable(s) associated with the project.

- **Planning Phase**
  - List any agreement(s) that have been made.
  - Project budget
  - **Work Breakdown Structure**. Is a hierarchical representation of the project with headings and tasks. Milestones are zero duration, significant events in the project—like the completion of a major deliverable.
  - Estimated Schedule (must include two milestones: start and finish.)

- **Executing Phase**
  - Procurement
    - What do you need to purchase?
    - Does the amount require a purchase order, documented quote, request for proposal et cetera?
  - Quality
    - How are you evaluating the project's overall performance?
    - How often and to whom will you be providing reports?
  - Human Resources
    - How are you managing the project's team competencies to enhance the project's performance?

[21] May be used with the generic statement of work template.

Executing Phase (continued)

- Communications
  - **Always begin a project with a kickoff meeting with all the stakeholders that details:**
    - describes the vision of the project,
    - identifies roles and responsibilities,
    - presents the project's schedule, and
    - requests feedback.
  - Updates and progress reports will be provided to stakeholders on a regular basis (at a minimum using the monthly project dashboard).
  - Always run meetings with an agenda.
  - Always provide timely meeting minutes to stakeholders and keep a copy in the project file.

- **Controlling Phase**
  - Schedule
  - Cost
  - Functionality
  - Quality

- **Closing Phase**
  - Punch list management
  - Project performance evaluation,
  - Team recognition,
  - Lessons learned,
  - Closing report, and
  - **Closing meeting**.

Work Breakdown Example

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HRS WBS v3-3.pdf

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Project Change Request Form

Please double click on the documents below to open.

Project Change Request.docx

Project Change Request Form.pdf

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End of Course Book

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We sincerely thank you for your participation and hope that this training was beneficial.

To request additional information, or if you have questions/concerns/compliments about this training course, please contact

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