

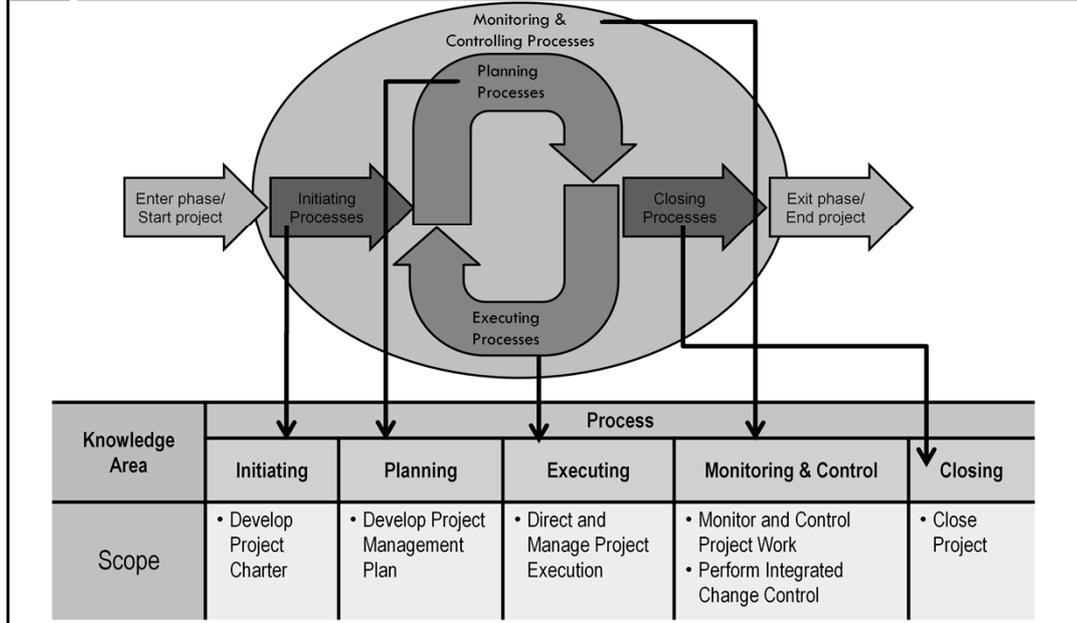
U08784

SOFTWARE PROJECT MANAGEMENT

Lecture 2: Project Integration Management

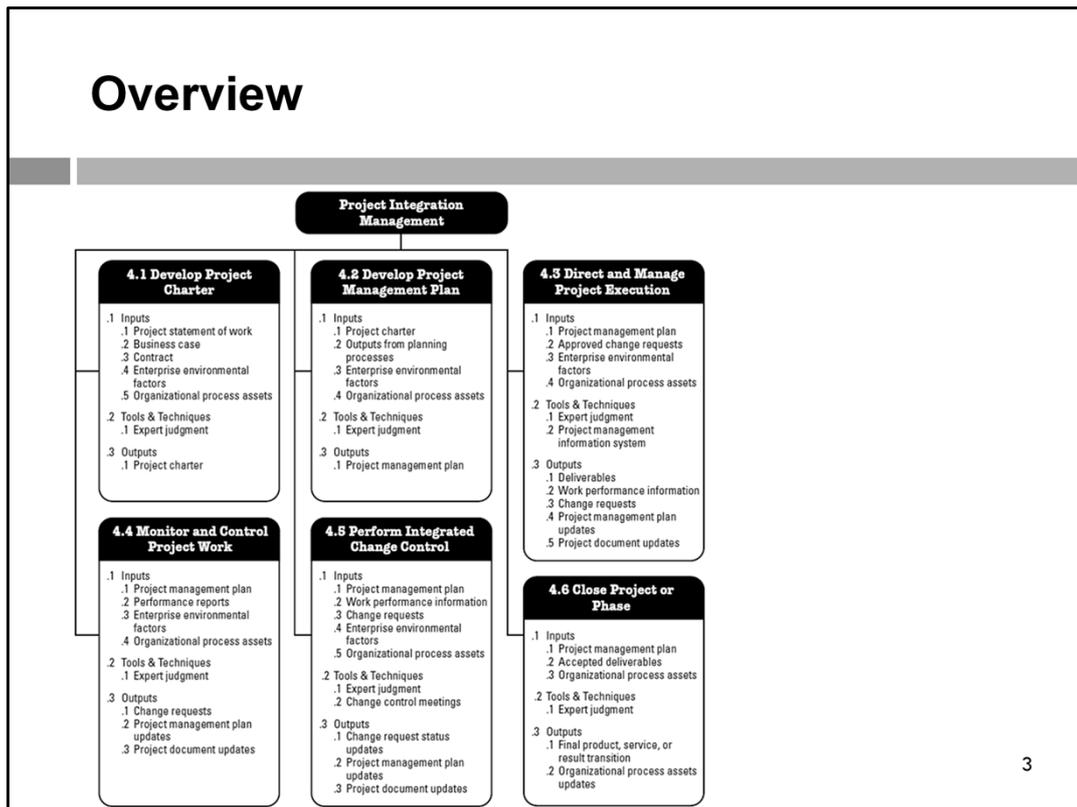
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Overview



Process and activities needed to **identify, define, combine, unify, and coordinate the various processes and project management activities** within the Project Management Process Groups.

Overview



To identify, define, combine, unify and coordinate the various processes and project management activities

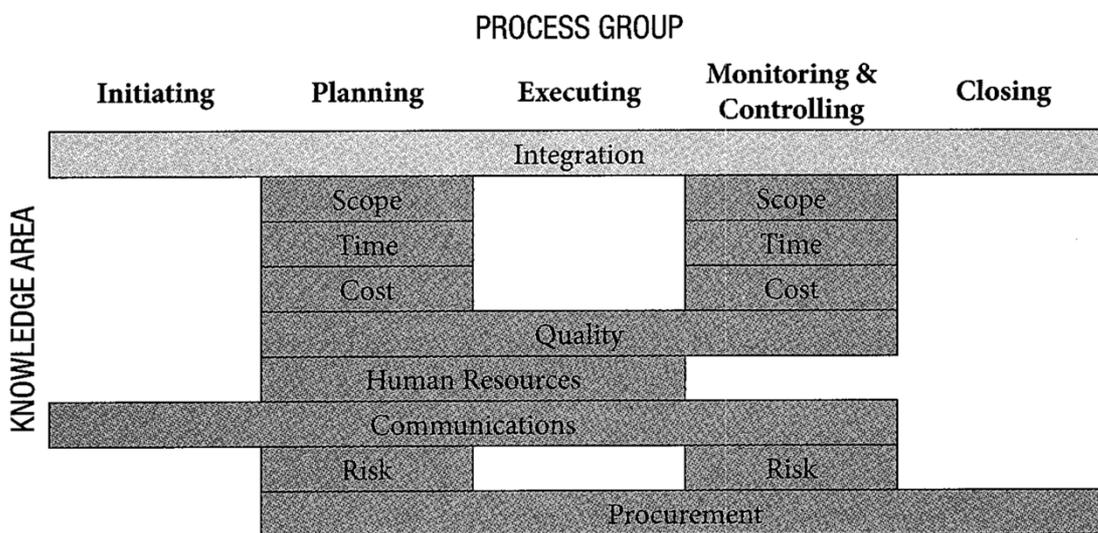
- **Develop Project Charter** - The process of developing a document that formally authorizes a project or a phase and documenting initial requirements that satisfy the stakeholder's needs and expectations.
- **Develop Project Management Plan** - The process of documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans.
- **Direct and Manage Project Execution** - The process of performing the work defined in the project management plan to achieve the project's objectives
- **Monitor and Control Project Work** - The process of tracking, reviewing, and regulating the progress to meet the performance objectives defined in the project management plan.
- **Perform Integrated Change Control** - 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.
- **Close Project or Phase** - The process of finalizing all activities across all of the Project Management Process groups to formally complete the project or phase.

Relationship between Process and Project Phase

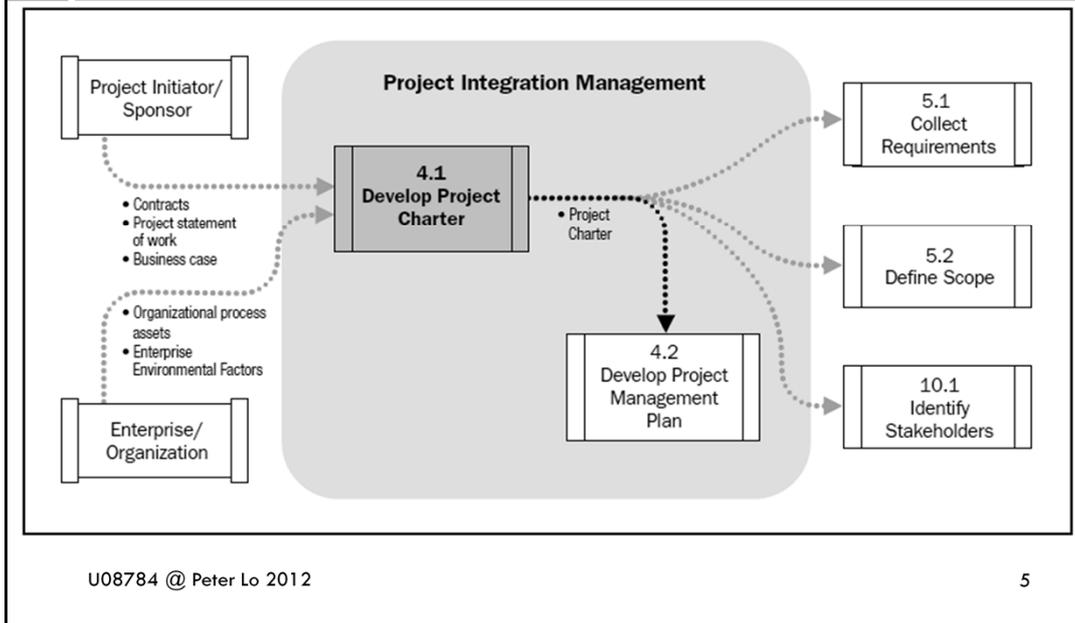
Process	Project Phase	Key Deliverables
Develop Project Charter	Initiating Process	Project Charter
Develop Project Management Plan	Planning Process	Project Management Plan
Direct and Manage Project Execution	Execution Process	
Monitor and Control Project Work	Monitoring and Control Process	Change Requests
Perform Integrated Change Control	Monitoring and Control Process	Change Requests status updates
Close Project and Phase	Closing Process	

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Develop Project Charter

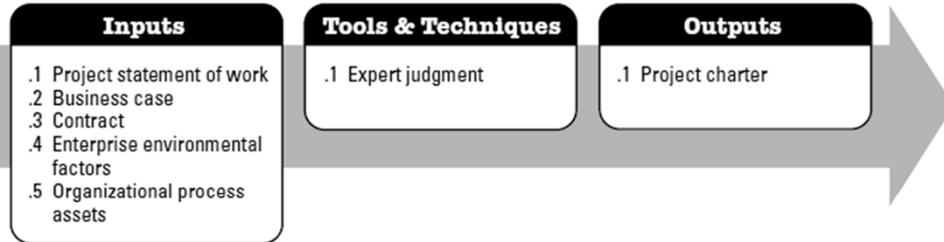


A project initiator or project sponsor external to the project issues the project charter. Project Manager should be ideally assigned during the feasibility study and definitely before planning phase. As a project manager if you did not get a project charter, you can prepare on and get it approved by Sponsor or Initiator. But as per PMBOK, It has to be prepared by Sponsor. Also remember that the author name should be the Executive Project Manager's or Sponsor with in your organization since they are the ones who have the power to give you the authority to use the resources.

The project charter should have the following details

- Project Purpose or Justification
- Business need for the project
- Business case justification for the project
- High-level project description or product requirements
- Requirements that must be completed to be consider the project successful
- Stakeholder Influences
- Involvement of Other Departments
- Constraints
- Assumptions
- Summary milestone schedule(Preliminary)
- Summary Budget(Preliminary)
- Name of the project manager and authority level

Develop Project Charter



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Inputs

- Project Statement of Work (SOW)
- Business Case
- Contract (when applicable)
- Enterprise Environmental Factors
- Organizational Process Assets

Tools and Techniques

- Expert Judgment

Outputs

- Project Charter

Develop Project Charter (Input)

- Project Statement of Work (SOW)
 - A narrative description of products or services to be delivered by the project.
 - **Business Need** – An organization's business need may be based on a market demand, technological advance, legal requirement, or government regulation.
 - **Product Scope Description** – Documents the characteristics of the product that the project will be undertaken to create.
 - **Strategic Plan** – Documents the organization's strategic goals.

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SOW is a narrative description of products or services to be delivered by the project. For internal projects, the project initiator or sponsor provides the statement of work based on business needs, product, or service requirements. For external projects, the statement of work can be received from the customer as part of a bid document, for example, request for proposal, request for information, request for bid, or as part of a contract.

The project statement of work identifies the products or services to be delivered by the project. For internal projects, if one has been developed, this would be provided by the project sponsor or initiator. For external projects, the statement of work is provided by the customer in a contract or other procurement document. In most cases, you would more likely have a statement of work for an external project than for an internal project.

The SOW references:

- Business need. An organization's business need may be based on a market demand, technological advance, legal requirement, or government regulation.
- Product scope description. This documents the characteristics of the product that the project will be undertaken to create. The description should also document the relationship between the products or services being created and the business need that the project will address.
- Strategic plan. The strategic plan documents the organization's strategic goals. Therefore, all projects should be aligned with the strategic plan.

Develop Project Charter (Input)

- Business Case
 - Provides the necessary information from a business standpoint to determine whether or not the project is worth the required investment.
 - Market Demand
 - Organizational Need
 - Customer Request
 - Technological Advance
 - Legal Requirement
 - Ecological Impact
 - Social Need

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The business case provides the necessary information from a business standpoint to determine whether or not the project is worth the required investment. Typically the business need and the cost-benefit analysis are contained in the business case to justify the project.

The requesting organization or customer, in the case of external projects, may write the business case.

The business case justifies the project and also usually comes from the initiator or sponsor of the project. In some organizations, the business case is developed concurrently with the project charter.

The business case is created as a result of one or more of the following:

- Market Demand
- Organizational Need
- Customer Request
- Technological Advance
- Legal Requirement
- Ecological Impact
- Social Need

In the case of multi-phase projects, the business case may be periodically reviewed to ensure that the project is on track to deliver the business benefits. In the early stages of the project life cycle, periodic review of the business case by the sponsoring organization also helps to confirm that the project is still required.

Develop Project Charter (Input)

- Contract (when applicable)
 - ▣ A contract is an input if the project is being done for an external customer.



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A contract would be an input if the project is being performed for an external customer. Besides a statement of work, the contract would also provide conditions which may result in project team constraints.

Develop Project Charter (Input)

- Enterprise environmental factors
 - Refer to both internal and external environmental factors that surround or influence a project's success. These factors may come from any or all of the enterprises involved in the project.
 - May enhance or constrain project management options and may have a positive or negative influence on the outcome.

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Generally, Enterprises Environment Factors are factors which may influence the execution of the process, limit the project team options or provide operational conditions or rules. In the case of the "Develop Project Charter" process, factors can include but are not limited to government regulations or standards, marketplace conditions, organizational structure, industry standards, and risk tolerances.

- Organizational or company culture and structure
- Governmental or industry standards
- Infrastructure
- Existing human resources
- Personnel administration
- Company work authorization system
- Marketplace conditions
- Stakeholder risk tolerances
- Commercial databases
- Project management information systems

Develop Project Charter (Input)

□ Organizational Process Assets

■ Include:

- Process related assets from the organizations involved in the project that can be used to influence the project's success.
- Formal and informal plans, policies, procedures, and guidelines.
- Organization's knowledge bases such as lessons learned and historical information.
- Completed schedules, risk data, and earned value data.

■ Grouped into two categories:

- Processes and Procedures – for conducting work
- Corporate Knowledge Base – for storing and retrieving information

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Updating and adding to the organizational process assets as necessary throughout the project are generally the responsibility of the project team members. Organizational process assets may be grouped into two categories:

1 Processes and Procedures

- Organizational standard processes such as standards, policies, standard product and project life cycles, and quality policies and procedures
- Standardized guidelines, work instructions, proposal evaluation criteria, and performance measurement criteria;
- Templates
- Guidelines and criteria for tailoring the organization's set of standard processes to satisfy the specific needs of the project
- Organization communication requirements
- Project closure guidelines or requirements
- Financial controls procedures
- Issue and defect management procedures defining issue and defect controls, issue and defect identification and resolution, and action item tracking
- Change control procedures, including the steps by which official company standards, policies, plans, and procedures will be modified, and how any changes will be approved and validated
- Risk control procedures, including risk categories, probability definition and impact, and probability and impact matrix; and procedures for prioritizing, approving, and issuing work authorizations.

2 Corporate Knowledge Base

- Process measurement databases used to collect and make available measurement data on processes and products,
- Project files
- Historical information and lessons learned knowledge bases
- Issue and defect management database containing issue and defect status, control information, issue and defect resolution, and action item results
- Configuration management knowledge base containing the versions and baselines of all official company standards, policies, procedures, and any project documents
- Financial database containing information such as labor hours, incurred costs, budgets and project cost overrun.

Generally, organizational process assets aid in the execution of the process. For the "Develop Project Charter" process, this could include templates, Project Management procedures, organizational standards, processes and procedures, and historical information.

Develop Project Charter (Tools and Techniques)

- Expert Judgment
 - ▣ Used to assess the inputs used to develop the project charter.
 - ▣ Applied to any technical and management details during this process.
 - ▣ Provided by any group or individual with specialized knowledge or training, and is available from many sources

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The only tool or technique specified for the "Develop Project Charter" process is "Expert Judgment". Expert judgment can come from many sources such as Subject Matter Experts (SME's), consultants, other project managers, stakeholders, customers, and the Project Management Office. Provided by any group or individual with specialized knowledge or training (e.g. consultants, other units within the organization, professional and technical associations)

Develop Project Charter (Output)

- Project Charter
 - ▣ Documents the business needs, current understanding of the customer's needs, and the new product, service, or result that it is intended to satisfy

The only output of the "Develop Project Charter" process is the "Project Charter". The Project Charter provides a project vision or purpose along with supporting project objectives and high level requirements. Possible components of the project charter include:

- Project purpose or justification
- Measureable project objectives and related success criteria
- High-level requirement (customer, sponsor and other stakeholder needs)
- High-level project description
- High-level risks
- Summary milestone schedule
- Summary budget
- Project approval requirements
- Assigned project manager, responsibility, and authority level
- Name and authority of the sponsor or other person authorizing the project
- Measurable objectives and related criteria
- Constraints
 - Factors that will limit the project team's options. E.g. predefined dates, predefined budgets, contractual provisions
- Assumption
 - Factors that are considered to be true, real and certain
 - Project teams frequently identify, document and validate assumptions as part of their planning process
 - This is a manifestation of the progressive elaboration nature of projects

Project Charter Template

<p><i>Project Name or Identification</i></p> <p><i>Project Stakeholders</i></p> <ul style="list-style-type: none"> ■ Names ■ Titles or roles ■ Phone numbers ■ E-mail addresses <p><i>Project Description</i></p> <ul style="list-style-type: none"> ■ Background ■ Description of the challenge or opportunity ■ Overview of the desired impact <p><i>Measurable Organizational Value (MOV)</i></p> <ul style="list-style-type: none"> ■ Statement or table format <p><i>Project Scope</i></p> <ul style="list-style-type: none"> ■ What will be included in the scope of this project ■ What will be considered outside the scope of this project <p><i>Project Schedule Summary</i></p> <ul style="list-style-type: none"> ■ Project start date ■ Project end date ■ Timeline of project phases and milestones ■ Project reviews and review dates <p><i>Project Budget Summary</i></p> <ul style="list-style-type: none"> ■ Total project budget ■ Budget broken down by phase <p><i>Quality Issues</i></p> <ul style="list-style-type: none"> ■ Specific quality requirements <p><i>Resources Required</i></p> <ul style="list-style-type: none"> ■ People 	<ul style="list-style-type: none"> ■ Technology ■ Facilities ■ Other ■ Resources to be provided <ul style="list-style-type: none"> ■ Resource ■ Name of resource provider ■ Date to be provided <p><i>Assumptions and Risks</i></p> <ul style="list-style-type: none"> ■ Assumptions used to develop estimates ■ Key risks, probability of occurrence, and impact ■ Constraints ■ Dependencies on other projects or areas within or outside the organization ■ Assessment project's impact on the organization ■ Outstanding issues <p><i>Project Administration</i></p> <ul style="list-style-type: none"> ■ Communications plan ■ Scope management plan ■ Quality management plan ■ Change management plan ■ Human resources plan ■ Implementation and project closure plan <p><i>Acceptance and Approval</i></p> <ul style="list-style-type: none"> ■ Names, signatures, and dates for approval <p><i>References</i></p> <p><i>Terminology or Glossary</i></p> <p><i>Appendices (as required)</i></p>
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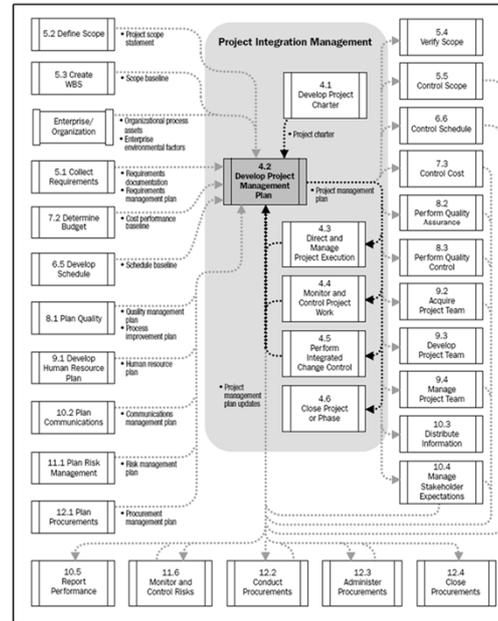
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Sample Project Plan Template

- Introduction and project scope
- Project stakeholders and organization
- Project requirements
- Resource estimates
- Project technical lifecycle
- Project schedule
- Technical description and software design
- Project standards and procedures
 - Development processes used
 - Review process
 - Change control boards
- Quality Plan
 - Test plan
- Documentation plan
- Risk management plan
- Training and support plans
- Configuration management plan
- Communications plan

Develop Project Management Plan

- The process defines, integrate and coordinate the development of all subsidiary plans into a consolidated project management plan.



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Documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans

Subsidiary management plan include: scope, schedule, cost, quality, staffing, communications, risk, procurement, etc.

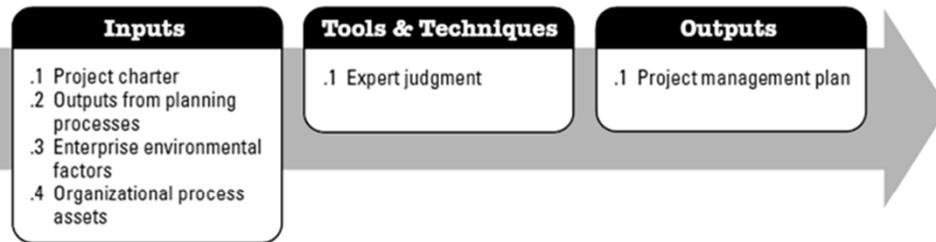
The project management plan:

- Defines how the projects is executed, monitored and controlled, and closed.
- Develop through a series of integrated processes until project closure.

The content is vary depending upon the application area and complexity of the project

This project management plan is progressively elaborated by updates and controlled and approved through the Perform Integrated Changed Control process

Develop Project Management Plan



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Inputs

- Project Charter
- Outputs from Planning Process
- Enterprise Environmental Factors
- Organizational Process Assets

Tools and Techniques

- Expert Judgment

Outputs

- Project Management Plan

Develop Project Management Plan (Input)

- Project Charter
- Outputs from Planning Process
 - Any baselines and subsidiary management plans that are an output from the planning process are the input to this process.
 - Update to those documents can necessitate updates to the project management plan.
- Enterprise Environmental Factors
- Organizational Process Assets

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Project Charter - Based on the high-level scope outlined in the project charter, the project team can start determining which project management processes will be most beneficial for this particular project.

Output from Planning Process - Outputs from the planning processes that may be helpful input to develop the project management plan include:

- Any processes used that produce a baseline
- Any processes that produce a subsidiary management plan

Enterprise Environmental Factors - Key elements of the environmental factors that should be considered when choosing the processes to perform for this project include:

- company culture and organizational structure
- Personnel administration
- The project management information system (PMIS) - an automated or manual system used to document the subsidiary plans and the project management plan, facilitate the feedback process, and revise the documents.

Organizational Process Assets - Key elements of the organizational process assets to consider within this process include:

- Standards and regulations (both industry and governmental)
- Project management plan template
- Change control procedures
- Historical information
- The configuration management knowledge database that contains the official company policies, standards, procedures, and other project documents.

Develop Project Management Plan (Tools and Techniques)

- Expert Judgment
 - When developing the project management plan, expert judgment is utilized to:
 - Tailor the process to meet the project need
 - Develop technical and management details to be included in the project management plan
 - Determine resources and skill levels needed to perform project work
 - Define the level of configuration management to apply on the project
 - Determine which project documents will be subject to the formal change control process

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The tool and technique for this process is expert judgment, and the output is the actual project management plan.

Don't be fooled by the single tool and technique and output for this process, because the project management plan is essential to the success of the project and is a compilation of all the key components of the project. The project management plan can be a fairly large document with many volumes or it can be small in size, depending on the complexity of the project. The project management plan should be used to guide the execution of the project. It will be the first place someone (such as a new team member or an auditor) goes to understand the project and how it is to be managed. The copies/files should be date stamped and clearly marked with a version number so there is no confusion over which is the latest version to be used for reference by the PM and the team.

Develop Project Management Plan (Output)

- Project Management Plan
 - The project management plan integrates and consolidates all the subsidiary management plans and baselines from the planning processes, and including the following element:
 - The project management processes selected
 - The level of implementation of each process
 - The descriptions of the tools and techniques for accomplishing those processes
 - How the selected processes will be used to manage the specific project
 - How work will be executed
 - How changes will be monitored and controlled
 - How configuration management will be performed
 - How performance measurement baselines will be maintained and used
 - The need and techniques for communication
 - The selected project life cycle or project phases
 - Key management reviews and addressing open issues and pending decisions.

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The output of this process is the Project Management Plan, and the elements included are:

- Processes used to perform each phase of the project
- The life cycle used for the project and for each phase of the project when applicable
- the tailoring of the results the project team defines
- Methods for executing the work of the project to fulfill the objectives
- Change management plan describing methods for monitoring and controlling change
- Configuration management
- Methods for determining and maintaining the validity of performance baselines
- Communication needs of the stakeholders and techniques to fulfill those needs
- Management reviews of content, issues, and pending decisions.

The project management plan also contains multiple subsidiary plans and project planning document .

Develop Project Management Plan (Output)

□ Project Management Plan

▣ High Level view of Subsidiary Plan



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The project management plan is a single document, but it's broken into a bunch of pieces called subsidiary plans. There's one subsidiary plan for each of the other knowledge areas: scope management, time management, cost management, quality management, human resource management, communications management, risk management, and procurement management.

Project Management Plan contains scope, cost, schedule baselines. Scope baseline consists of Project scope statement , Work Breakdown Structure and Work Breakdown Structure Dictionary -These baselines are together called Performance Measurement Baseline.

Develop Project Management Plan (Output)

□ Project Management Plan Template

Task	Duration
Project Management (PM)	228 hrs
Initiating	77 hrs
Develop Project Charter	32 hrs
Identify Goals and Objectives	8 hrs
Develop Strategies and Plans	8 hrs
Research Previous Experience	8 hrs
Develop Project Charter	8 hrs
Develop Preliminary Project Scope Statement	40 hrs
Conduct Planning Workshop	8 hrs
Document Project Costs and Benefits	8 hrs
Develop High Level Work Breakdown Structure	8 hrs
Conduct Peer Review	8 hrs
Prepare Preliminary Project Scope Statement	8 hrs
Planning	248 hrs
Set Up Project Environment	32 hrs
Prepare Facilities	8 hrs
Set Up Project Standards and Procedures	8 hrs
Set Up Project Management Tools	8 hrs
Set Up Project Book	8 hrs
Define Scope	32 hrs
Document Scope Management Plan	8 hrs
Specify Deliverables and Acceptance Criteria	8 hrs
Define Scope	8 hrs
Document Assumptions	8 hrs
Develop Project Schedule	40 hrs
Build Work Breakdown Structure	8 hrs
Develop Resource Plans	8 hrs
Prepare Project Estimates	8 hrs
Define Dependencies and Develop Project Schedule	8 hrs
Document Assumptions	8 hrs
Develop Risk Plans	32 hrs
Document Risk Management Plan	8 hrs
Identify Risks	8 hrs
Analyze Risks	8 hrs
Document Risk Management Plans	8 hrs
Plan for Quality	8 hrs
Document Quality Management Plan	8 hrs
Organize Project Resources	14 hrs
Develop Organization Structure	8 hrs
Develop Staffing Plan	8 hrs

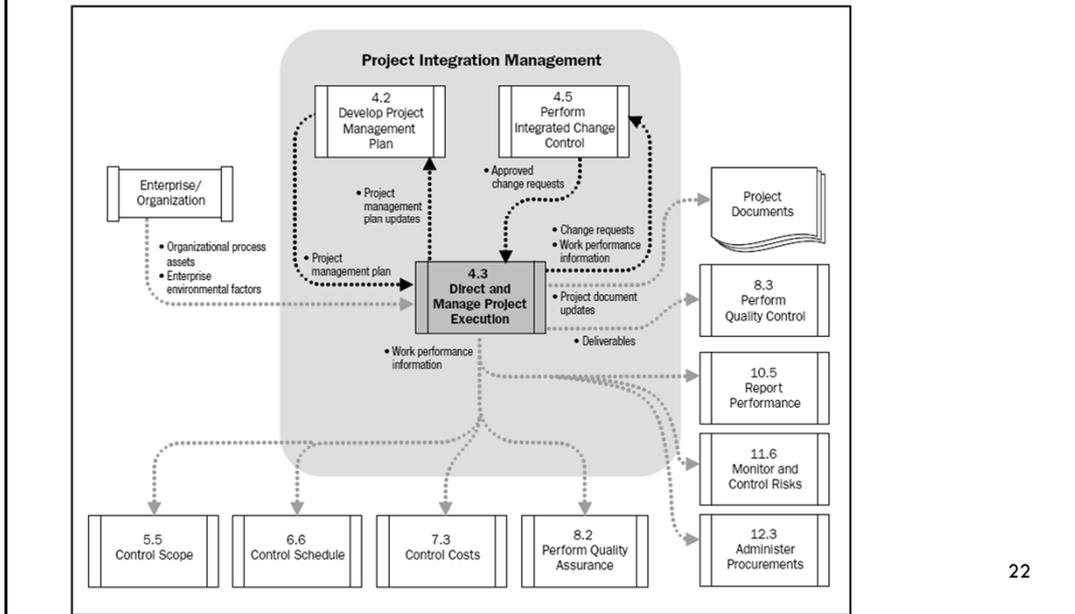


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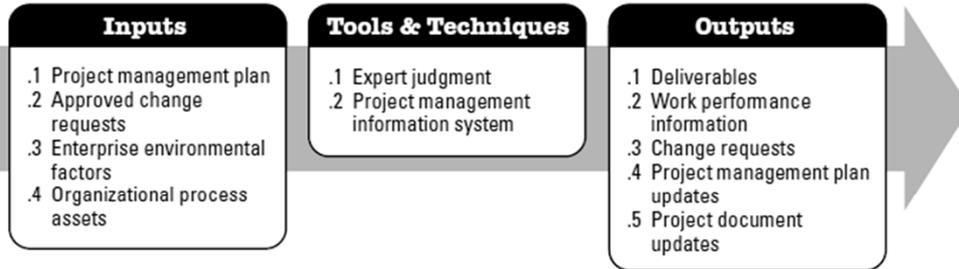
Direct and Manage Project Execution



A series of actions to execute the project management plan to fulfill the project scope statement

- Perform activities to accomplish project objectives
- Expend effort and spend funds
- Staff, train, and manage the project team members
- Obtain quotations, bids, offers, or proposals
- Select sellers by choosing from among potential sellers
- Obtain, manage, and use resources
- Implement the planned methods and standards
- Create, control, verify, and validate project deliverables
- Manage risks and implement risk response activities
- Manage sellers
- Adapt approved changes into the project’s scope, plans, and environment
- Establish and manage project communication channels, both external and internal
- Collect project data and report status information to facilitate forecasting
- Collect and document lessons learned, and implement approved process improvement activities.

Direct and Manage Project Execution



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Inputs

- Project Management Plan
- Approved Change Request
- Enterprise Environmental Factors
- Organizational Process Assets

Tools & Techniques

- Expert Judgment
- Project Management Information System

Outputs

- Deliverables
- Work Performance Information
- Change Requests
- Project Management Plan Updates
- Project Document Updates

Direct and Manage Project Execution (Input)

- Project Management Plan
 - ▣ This process is focused on the executing the contents of the project plan and this is therefore the most important inputs for this process

	Task Name	Duration	Start	Finish	27 Apr '09	04 May '09	11 May '09
					S	M	T
1	Requirements Phase	40 days	Mon 27/04/09	Fri 19/06/09			
2	Requirements Detailed	25 days	Mon 27/04/09	Fri 29/05/09			
3	Interactive Requirements	25 days	Mon 27/04/09	Fri 29/05/09			
4	Retail Requirements	25 days	Mon 27/04/09	Fri 29/05/09			
5	Business System Requirements	35 days	Mon 04/05/09	Fri 19/06/09			
6	Design Phase	35 days	Mon 04/05/09	Fri 19/06/09			
7	Designs delivered	35 days	Mon 04/05/09	Fri 19/06/09			
8	Software Development Phase	59 days	Wed 13/05/09	Tue 21/07/09			
9	Development	50 days	Wed 13/05/09	Tue 21/07/09			
10	System Testing Phase	61 days	Tue 07/07/09	Tue 29/09/09			
11	Testing	61 days	Tue 07/07/09	Tue 29/09/09			
12	Handover of Code	1 day	Wed 30/09/09	Wed 30/09/09			
13	UAT	22 days	Thu 01/10/09	Fri 30/10/09			
14	Testing	22 days	Thu 01/10/09	Fri 30/10/09			
15	Launch	1 day	Fri 08/11/09	Fri 08/11/09			

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A project management plan is a formal, approved document that defines how the project is executed, monitored and controlled. It may be summary or detailed and may be composed of one or more subsidiary management plans and other planning documents. The objective of a project management plan is to define the approach to be used by the Project team to deliver the intended project management scope of the project. The project manager creates the project management plan following input from the project team and key stakeholders. The plan should be agreed and approved by at least the project team and its key stakeholders.

Direct and Manage Project Execution (Input)

- Approved Change Request
 - A change control status update will indicate that some changes are approved and some are not.
 - Approved change requests are scheduled for implementation by the project team.
 - Approved change requests are the documented, authorized changes to expand or reduce project scope.
 - The approved change requests can also modify policies, the project management plan, procedures, costs, or budgets; or revise schedules.
 - Approved change requests may require implementation of preventive or corrective actions.

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As a natural consequence of performing work changes will normally be requested and such changes maybe as a result of any part of the project as may be the impact of such requested changes. All requested changes are brought into the process of perform integrated change control where they are evaluated for their impact on the whole of the project.

Such change requests may be approved or rejected, and those that are approved will often modify the contents of the project management plan and its components such as cost, schedule and the scope baselines.

Change Request - These are requests that may change budgets or schedules, increase or reduce the project scope, or modified in some way the various plans, procedures processes or policies relating to the project.

Corrective Action - Such a request is there to bring about a change to future results or performance of the project work so that they remains aligned with the project management plan.

Preventative Action - As the name suggests this type of change takes proactive action to avoid the occurrence of a problem. This may be to reduce the probability or impact of a risk, to increase the chance of opportunity, or to reduce the impact of a current issue.

Defect - These arise as a result of identifying a defect in a project deliverable or component. They are an imperfection or deficiency such that the product or component does not meet its requirements all specifications and hence will need to be repaired or replaced. The recommendation therefore of and defect, is either to repair or replace it.

Direct and Manage Project Execution (Input)

- Enterprise Environmental Factors
 - The enterprise environmental factors which can influence the process include:
 - Organizational, company or customer culture and structure
 - Infrastructure
 - Personnel administration
 - Stakeholder risk tolerances
 - Project management information systems

Since the direct and manage project execution process covers everything that the project is to produce or create, then so too will be the range of possible enterprise environmental factors that may need to be considered here. These will range from soft aspects such as your organizations values and work ethic, the structure and culture of your organization, and its appetite for risk taking.

At the other end of the scale, factors to be considered may include laws and regulations, the physical or operational environment within which the project is taking place, the socio economic impact that the project may have.

Direct and Manage Project Execution (Input)

- Organizational Process Assets
 - The organizational process assets that can influence the process include, but are not limited to:
 - Standardized guidelines and work instructions
 - Communication requirements defining allowed communication media, record retention, and security requirements
 - Issue and defect management procedures defining issue and defect controls, issue and defect identification and resolution, and action item tracking
 - Process measurement database used to collect and make available measurement data on processes and products
 - Project files from prior projects
 - Issue and defect management database containing historical issue and defect status, control information, issue and defect resolution, and action item results.

Since this is an execution process, then such assets will be focused on aiding the creation of the projects products and deliverables. Examples may be historical data for previous project plans, tools and techniques along with organizational competences, lessons learned from previous similar projects along with their estimating data, and any databases of project information and knowledge.

Direct and Manage Project Execution (Tools and Techniques)

- Expert Judgment
 - This is called upon whenever the project team and the project manager do not have sufficient expertise and such expertise may come from outside of the organization as well as inside.
 - Such expert judgment may give help in the methods used to accomplish the project work, who should execute it, and most importantly to ensure a common understanding of the work to be carried out.
 - Expert judgment can be invaluable in providing good quality data to make informed decisions.

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Expert judgment is used to assess the inputs needed to direct and manage execution of the project management plan.

Such judgment and expertise is applied to all technical and management details during this process.

This expertise is provided by the project manager and the project management team using specialized knowledge or training.

Additional expertise is available from many sources, including:

- Other units within the organization
- Consultants
- Stakeholders, including customers or sponsors, and
- Professional and technical associations.

Direct and Manage Project Execution (Tools and Techniques)

- Project Management Information System (PMIS)
 - This consists of an automated system that provides support for the project manager by optimizing the schedule in assisting in collecting and distributing project information.
 - Such a system will often help you keep track of documentation and project deliverables.

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The configuration management system which lays out how change control is to be implemented also formed part of the project management information system.

- Configuration Management System
 - Formal documented procedures used to apply technical and administrative direction to:
 - Identify and document the characteristics of a product or component
 - Control any changes
 - Record and report each change and its status
 - Support the audit to verify conformance to requirements
- Change Control System
 - Formal documented procedures that define how deliverables and documentation are controlled, changed, and approved

Direct and Manage Project Execution (Output)

- Deliverables
 - ▣ The deliverables are the produced (but not conformed) results of the project



These are the main reason why the project is being undertaken as they will be passed on to those who will use them ultimately to realize the business benefits. Deliverables may take the form of a product, the service, or a result that must be completed in order to finish the project. Each deliverable will need to pass through the process of 'perform quality control' and 'verify scope' until such time as they demonstrate that they meet the desired specifications for both completeness and correctness.

Direct and Manage Project Execution (Output)

- Work Performance Information
 - The Work Performance Information are status information collected and documented by the team
 - Routinely collected
 - Schedule progress
 - Percentage of completion of various deliverables
 - Scheduled activities status
 - Quality standards
 - Costs authorized and incurred
 - Estimation to completion of the schedule activities
 - Lessons learned
 - Resource utilization detail

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This is the information that confirm the status of the above deliverables. Such information is used to determine how each deliverable is performing against the plan and if required to take any corrective action.

When referring to the progress of each deliverable, it is important to understand the various metrics that may need to be tracked here. These include schedule progress at task level, milestones, phases or stages, actual costs versus planned costs, and deliverable quality aspects including defects if appropriate. In short, any information that relates to the progress towards completion of each and every project deliverable.

The work performance information will also include the status for change requests, corrective actions, preventative actions, and defect repairs along with their estimates that lead to completion or resolution.

Direct and Manage Project Execution (Output)

- Change Requests
 - The Change Requests are request to expand or reduce project scope, to modify policies or procedures, to modify project cost or budget, or to revise the project schedule
 - Change in Scope
 - Change in Schedule
 - Change in Cost

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Whereas one of the inputs here was approved change requests so that the direct and manage project execution can implement them, as a result of carrying out the work of the project, then this in and of itself may create requests for change. The examples used for approved change requests are also relevant here.

- **Corrective Action** - Documented direction for executing the project work to bring expected future performance of the work in line with the project management plan.
- **Preventive Action** - A documented direction to perform an activity that can reduce the probability of negative consequences associated with project risks.
- **Defect Repair** - The formally documented identification of a defect in a project component with a recommendation to either repair the defect or completely replace the component.
- **Updates** - Changes to formally controlled documentation, plans, etc., to reflect modified or additional ideas or content.

Direct and Manage Project Execution (Output)

- Project Management Plan Update
 - ▣ As a result of executing the project work, the various parts of the project management plan will need to have the actual dates entered and revise future forecasts, and both of these will normally result in updates being made to the various sections of the project management plan

Elements of the project management plan that may be updated include, but are not limited to:

- Requirements management plan
- Schedule management plan
- Cost management plan
- Quality management plan
- Human resource plan
- Communications management plan
- Risk management plan
- Procurement management plan
- Project baselines

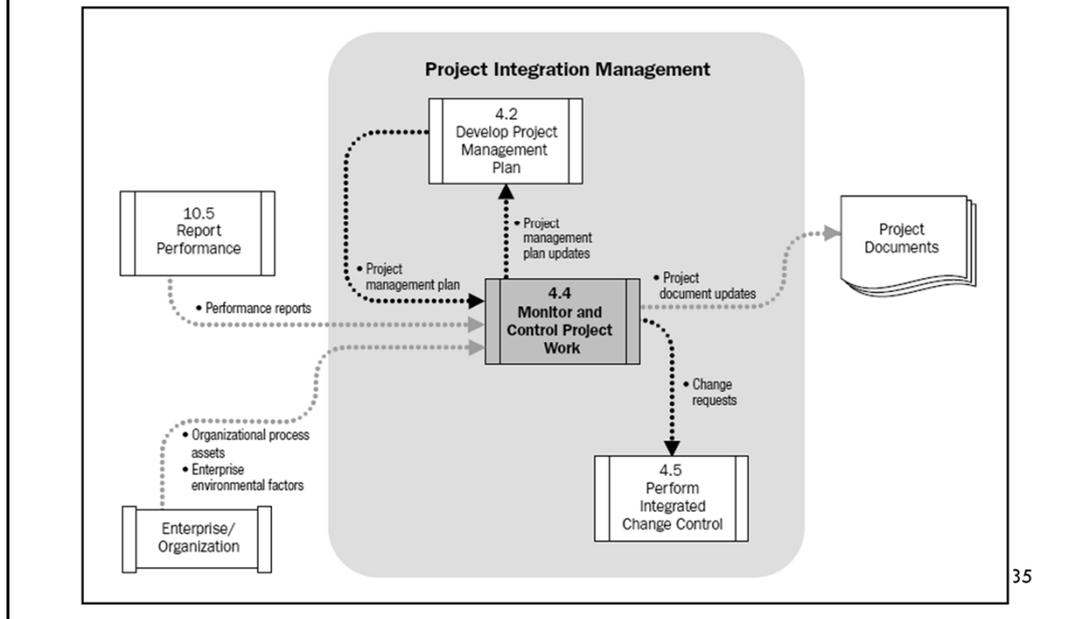
Direct and Manage Project Execution (Output)

- Project Document Update
 - ▣ The same is true here for updates to the project management plan.
 - ▣ However this refers to other supporting documents that are used within a project such as logs and registers for example.

Project documents that may be updated include, but are not limited to:

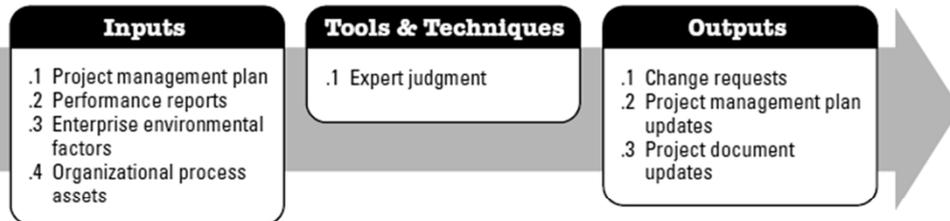
- Requirements documents,
- Project logs (issue, assumptions, etc.),
- Risk register, and
- Stakeholder register.

Monitor and Control Project Work



- Comparing actual project performance against the project management plan
- Determine if any corrective or preventive actions are required
- Analyzing, tracking, and monitoring project risks
- Maintaining an accurate, timely information and documentation
- Providing information to support status reporting, progress measurement, and forecasting
- Providing forecasts
- Monitoring implementation of approved changes

Monitor and Control Project Work



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Inputs

- Project Management Plan
- Performance Reports
- Enterprise Environmental Factors
- Organization Process Assets

Tools and Techniques

- Expert judgment

Outputs

- Change Requests
- Project Management Plan Updates
- Project Document Updates

Monitor and Control Project Work (Input)

- Project Management Plan
- Performance Reports
 - ▣ Work Performance Information from direct and manage project execution phase
- Enterprise Environmental Factors
- Organization Process Assets

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Reports should be prepared by the project team detailing activities, accomplishments, milestones, identified issues, and problems. Performance report can be used to report the key information including

- Current status
- Significant accomplishments for the period
- Schedule activities
- Forecast
 - Estimates or predictions of conditions and events in the project's future
 - Estimate at completion (EAC) and estimate to complete (ETC)
- Issue

Monitor and Control Project Work (Tools and Techniques)

- Expert Judgment
 - ▣ Expert judgment is used by the project management team to interpret the information provided by the monitor and control processes.
 - ▣ The project manager, in collaboration with the team, determines the actions required to ensure project performance matches expectations.

Since it is the project manager that is responsible for monitoring and controlling the project work, then it is their judgment that is needed to weigh the evidence of project performance so that this can be evaluated and if necessary take appropriate corrective action.

In making these decisions, the project manager may also need to consult with other knowledge or experience specialists such as the project team or consultants.

Monitor and Control Project Work (Output)

- Change Requests
 - ▣ Corrective Actions - Bring expected future project performance into conformance
 - ▣ Preventive Actions - Reduce the probability of negative consequences associated with project risks
 - ▣ Defect Repair
- Project Management Plan Updates
- Project Document Updates

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There are three outputs from the monitor and control project work process:

Change requests

As work is performed, it is quite natural for changes to be requested. Such changes may for example request the scope of the project to change, timescales to change, budgets to change, or functionality to change.

All such change requests need to be brought into the process for impact evaluation on the project, where they will either be approved or rejected. Such change requests normally emanate from the need for corrective action which is to bring future results in line with the plan, or from preventative actions which were raised to avoid the occurrence of a future problem, or possibly changes may be because of the need for defect repair.

Project management plan updates

As a result of taking corrective action as well as capturing work progress, then changes to the various documents within the project management plan need to be updated to reflect current progress and future forecast.

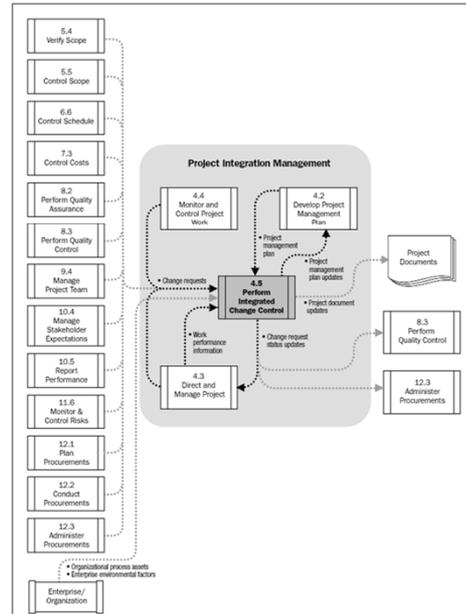
Project document updates

Other documents that may need to be changed should also be updated. Examples here could be logs or registers.

Perform Integrated Change Control

- 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.
- This process is conducted from project inception through completion.

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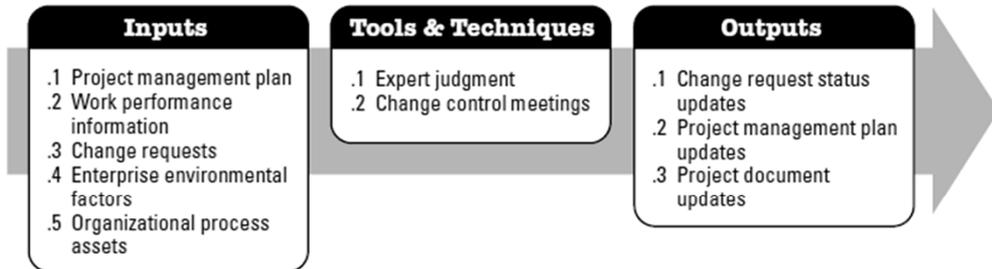


This process serves as an overseer of the monitoring and controlling processes.

This is where you establish the project's change control process.

- Sometimes by change control meeting hosted by Change Control Board (CCB)
- Identifying that a change needs to occur or has occurred
- Reviewing and approving requested changes
- Managing the approved changes
- Maintaining the integrity of baselines and their related configuration and planning documentation
- Reviewing and approving all recommended corrective and preventive actions
- Controlling and updating the scope, cost, budget, schedule and quality requirements
- Documenting the impact of requested changes

Perform Integrated Change Control



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Inputs

- Project Management Plan
- Work Performance Information
- Requested Changes
- Enterprise Environmental Factors
- Organizational Process Assets

Tools and Techniques

- Expert judgment
- Change Control Meetings

Outputs

- Change Requests Status Updates
- Project Management Plan Updates
- Project Document Updates

Perform Integrated Change Control (Input)

- Project Management Plan
- Work Performance Information
- Requested Changes
- Enterprise Environmental Factors
- Organizational Process Assets

The primary purpose of this process is to review change requests, determine whether to approve them, and then manage the effects of those changes on the deliverables, organizational process assets, project documents, and project management plan. These Change Requests then all become an input into the Perform Integrated Change Control process. In order to help determine whether changes should be approved, the Project Management Plan and Work Performance Information are used as additional information. The change control board convenes in Change Control Meetings to make the decision to approve or reject each change request.

Project management plan – change can impact one or more aspects of project management plan – e.g. scope, schedule, cost, risks etc.

Work performance information – Decision on a change will be affected by the current stage and status of project execution. E.g. a change in window glass type is likely to be approved before building is constructed than after construction has been completed. Likewise a good-to-have enhancement might be approved for an on-time on-budget project but would almost certainly be rejected for a late and over budget project.

Perform Integrated Change Control (Tools and Techniques)

- Expert judgment
 - The project management team, stakeholders, subject matter experts, consultants, industry or professional groups, PMO, etc.
- Change Control Meetings
 - A Change Control Board is responsible for meeting and reviewing the change requests and approving or rejecting those change requests.

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Type of Change Control

- Scope change control
- Schedule change control
- Cost change control
- Quality change control
- Risk change control
- Contract Administration

Some of the configuration management activities included in the integrated change control process are as follows:

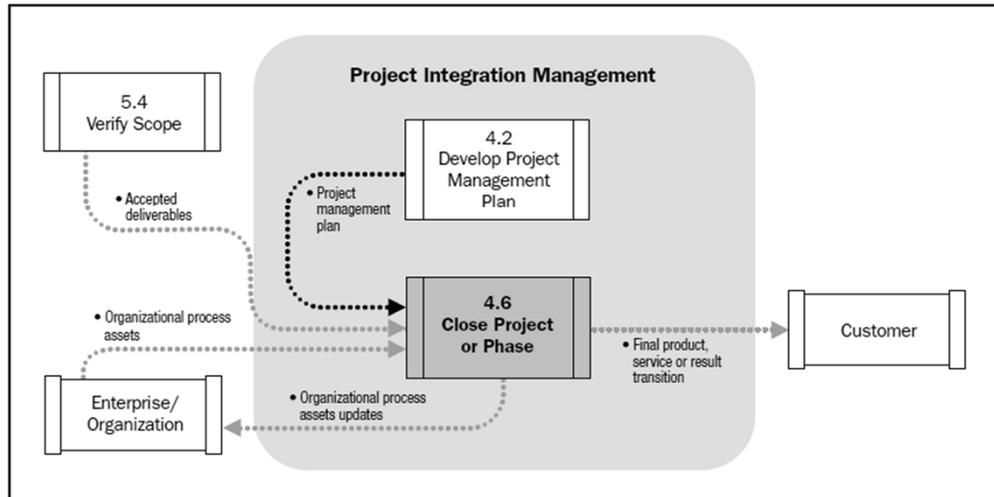
- **Configuration Identification** - Selection and identification of a configuration item provides the basis for which product configuration is defined and verified, products and documents are labeled, changes are managed, and accountability is maintained.
- **Configuration Status Accounting** - Information is recorded and reported as to when appropriate data about the configuration item should be provided. This information includes a listing of approved configuration identification, status of proposed changes to the configuration, and the implementation status of approved changes.
- **Configuration Verification and Audit** - Configuration verification and configuration audits ensure the composition of a project's configuration items is correct and that corresponding changes are registered, assessed, approved, tracked, and correctly implemented. This ensures the functional requirements defined in the configuration documentation have been met.

Perform Integrated Change Control (Output)

- Change Requests Status Updates
 - Status of changes, approved or not, are updated in the change request log
- Project Management Plan Updates
 - Any subsidiary management plans.
 - Baselines
- Project document updates

The primary output of the process is Change Request Status Updates, meaning that these discussed Change Requests are now approved or rejected. Because of these changes, updates may need to be made to the Project Management Plan and Project Documents. If a Change Request is approved, this Approved Change Request may be an input into these three processes: Direct and Manage Project Execution, Perform Quality Control, and Administer Procurements.

Close Project and Phase



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- Closure is required after the objectives of project or phase is achieved or terminated
- Consists of documenting project results to formalize acceptance of the project

Close Project or Phase



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Inputs

- Project management plan
- Accept Deliverables
- Organizational process assets

Tools and Techniques

- Expert judgment

Outputs

- Final product, service, or result
- Organizational process assets updates

Close Project or Phase (Input)

- Project Management Plan
 - One of the key documents that establish the activities that should have been completed before formal closure should occur.
- Accept Deliverables
 - Includes those deliverables that have been accepted as a result of the Verify Scope process.
- Organizational Process Assets
 - The specific organization process assets that may affect closure activities include:
 - Project or phase closure guidelines (audit, evaluations, transition procedures)
 - Historical information and lessons learned knowledge base.

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Project Management Plan

This defines how to close the project and will be useful in establishing the project closure procedure. The project management plan is also used in verifying and accepting the project deliverables because it explains what deliverables are expected. Note, however, that the Verify Scope process belongs to the scope management knowledge area.

Accepted Deliverables

These are the deliverables that have been verified through the scope verification process. That means these deliverables meet the scope requirements and are accepted by the customer. It includes the deliverables from procurements that have been accepted through the procurement closure process.

Organizational Process Assets

These can include project closure guidelines or requirements—for example, product validation and acceptance criteria, final project audits, and project evaluations. Also, you can learn from the historical information what kind of project documents you need to archive and in what detail you want to review the project to gather and store lessons learned. Your organization may also have a transition criteria or procedure on handing the product of the project to the appropriate party.

Close Project or Phase (Tools and Techniques)

- Expert Judgment
 - ▣ The project management methodology should outline processes for both project and administrative closeout.
 - ▣ The PMIS and expert judgment are used to perform these processes.

Appropriate experts ensure that closure of the project or phase is performed using the correct standards.

Close Project or Phase (Output)

- Final Product, Service, Result
 - ▣ Formal acceptance and handover of the final product, service, or result that the project
 - ▣ Receipt of a formal statement that the terms of the contract have been met

Final Product, Service or Result Transition: the name says it all. The product, service or result created by the phase or project must be transitioned or delivered to the next step.

Close Project or Phase (Output)

- Organizational Process Assets Updates
 - ▣ Formal Acceptance Documents
 - ▣ Project Files
 - ▣ Project Closure Document
 - ▣ Historical Information and lesson learned

The organizational process assets that are updated as a result of the Close Project or Phase process include:

- Project Files - Documentation resulting from the project's activities, for example, project management plan, scope, cost, schedule and project calendars, risk registers, change management documentation, planned risk response actions, and risk impact.
- Project or phase closure documents - Project or phase closure documents, consisting of formal documentation that indicates completion of the project or phase and the transfer of the completed project or phase deliverables to others, such as an operations group or to the next phase. During project closure the project manager reviews prior phase documentation, customer acceptance documentation from the Verify Scope process (Section 5.4) and the contract (if applicable), to ensure that all project requirements are complete prior to finalizing the closure of the project. If the project was terminated prior to completion, the formal documentation indicates why the project was terminated and formalizes the procedures for the transfer of the finished and unfinished deliverables of the cancelled project to others.
- Historical information - Historical information and lessons learned information are transferred to the lessons learned knowledge base for use by future projects or phases. This can include information on issues and risks as well as techniques that worked well that can be applied to future projects.

Reference

- Ch. 4, PMBOK Guide, 4th Edition
- Ch. 2, Software Project Management, 4th Edition
- Ch. 2, Project Management for Information Systems, 5th Edition