4 Integration

Introduction

How would you respond if you were asked, "What is a project manager's primary role?" The correct answer is: To perform integration management—to pull all the pieces of a project together into a cohesive whole—the processes, people, and goals for which the project was undertaken. This is so much a part of a project manager's job that it is arguably the reason for the project manager's existence in an organization and on a project.

All stakeholders have the common purpose of achieving project objectives efficiently and in compliance with scope, schedule, and cost baselines as well as agreed-upon quality requirements, while effectively managing uncertainty. While the work is being done:

- Team members are concentrating on completing the work packages or stories.
- The project sponsor is supporting the project and the team, protecting assigned resources from being diverted to other activities within the organization, and acting as a management consultant to the project manager.
- The project manager is integrating all project components—the team and all other stakeholders, project constraints, processes, and internal and external elements that may affect the project both internal and external to the project and the organization.
- The project manager is also communicating within the organization, usually with management, to integrate the project's needs with those of related portfolios and programs within the larger organization, and within society at large.

This difficult and challenging job requires a project manager to have technical project management skills, of course, but they must also be an accomplished innovative thinker and collaborative leader and possess empathy and business savvy.

TRICKS OF THE TRADE®

Think about integration as balancing all project activities with each other while at the same time being a project ambassador for all stakeholders: The team, customers, management, government regulatory bodies, and any others involved.

Keep in mind that project management activities do not happen independently of one another.

Example To complete an estimated budget, factors must be taken into account such as time and resources needed to create individual work packages or stories (i.e. product increments), available resources, and the costs of managing identified risks. The draft budget must also be reconciled with financial considerations within the larger organization before it is approved.

Read this chapter carefully. Integration management can be a difficult content area because it is something we do as project managers, but we may not often think about it as a separate process, with everything that process entails.

QUICKTEST

- Integration Management process
- Project charter
- Project management plan
- Individual management plans
- Project life cycle
- Development approach
- Management reviews
- Tailoring
- Performance measurement baseline
- Requirements management plan
- Change management plan
- Configuration management plan
- Project documents
- Kickoff meeting
- Work authorization system
- Knowledge management
  - Explicit knowledge
  - Tacit knowledge
- Osmotic communications
- Lessons learned
- Change Requests
  - Corrective action
  - Preventive action
  - Defect repair
- Change control board (CCB)
- Process for making changes on a plan-driven project
- Agile change management
- Transitions

Integration FOUR

Integration Management Overview

As mentioned in chapter 1, we will include here an illustration showing select *Examination Content Outline* (ECO) tasks alongside PMI's Process Groups model for that process. This will help you understand an overall process – in this case, Integration Management. Again, the *PMBOK® Guide* domains listed here are ones we think fit well into the discussion of the process, but we will delve into the *PMBOK® Guide* in more detail in chapter 18.

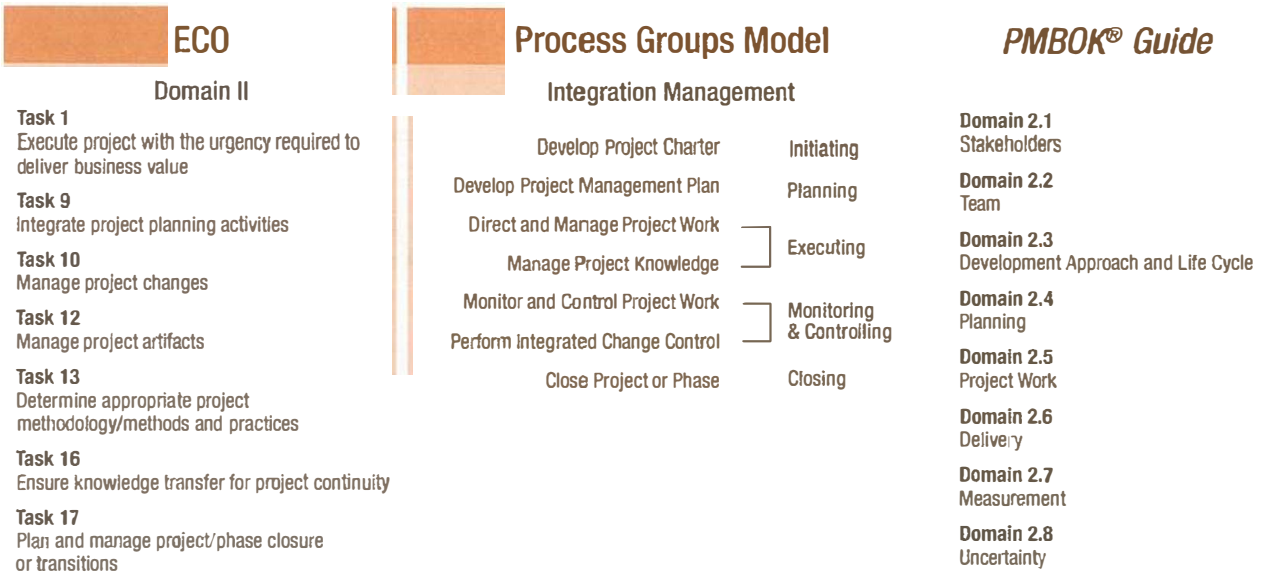
For now, focus on the processes represented by the Process Groups model, the ECO tasks, and the associated agile and hybrid concepts.

The *Examination Content Outline* and Process Groups Model

> **Think About It.** In the ECO, domain II has eight tasks most closely associated with integration management in the Process Groups model. Some tasks might not translate as easily, but in reality, integration and the tasks associated with it are some of the most important tasks of a project manager. If you haven't done so already, take out your copy of the ECO and review these domain II tasks and their enablers as you review this page of this book.

Example Task 1: "Execute project with the urgency required to deliver business value." Wouldn't you say that is exactly what we are doing all the time as project managers? We are executing the project with the urgency required to deliver the business value to the organization and its customers, for which the project was undertaken.

Task 1 is also related to directing and managing project work, managing project knowledge, monitoring and controlling project work, change control, and closing project phases and the project—all processes in the Integration Management area of the Process Groups model.



Now think about the other domain II ECO tasks as they relate to what is in the Process Groups model:

- Task 9: Integrating project planning activities starts in Initiating with developing the project charter (and stakeholder analysis and development of the stakeholder register).
- Task 13: Determining appropriate methodology and practices is just like the first activity in the Planning column of Rita's Process Chart™ (in the "Project Management Foundations" chapter). While not directly listed as an integration process in the Process Groups model, it is what the project manager needs to start creating the project management plan.
- Tasks 9 and 12: The first of these is obvious—task 9. The project manager needs to integrate the many planning activities to develop the project management plan (a project artifact). The project management plan is a series of plans for each project constraint (scope, schedule, cost, quality, risk, etc.), plus plans for requirements management,

configuration management, and change management. These plans are started separately but as each plan matures it requires integration with the other plans, since each project constraint is interdependent with and can affect all others.

- Task 10: Project changes will be managed according to the plan for change management.
- Task 16: As the project manager and the team learn throughout the project, the project manager will need to see that this knowledge is shared for the benefit of the project and documented so the project artifacts can benefit the organization in the future. You can also map task 16 to the Process Groups model processes Direct and Manage Project Work and Manage Project Knowledge.
- Task 17: Can you see from the wording of this task that it carries the same responsibility as Close Project or Phase in the Process Groups model?

Figure 4.1 is a visualization of the integration management processes from the Process Groups model. Remember that for each chapter in which the domain II processes are discussed, we will use the Process Groups model to help you understand the general process. Since the Process Groups model was created based on managing plan-driven projects, we also explain the different methods agile practitioners use to get to the same goals. It is worth repeating: The goal is to work to meet project requirements with the urgency needed to deliver the benefits and value for which the project was selected and undertaken.

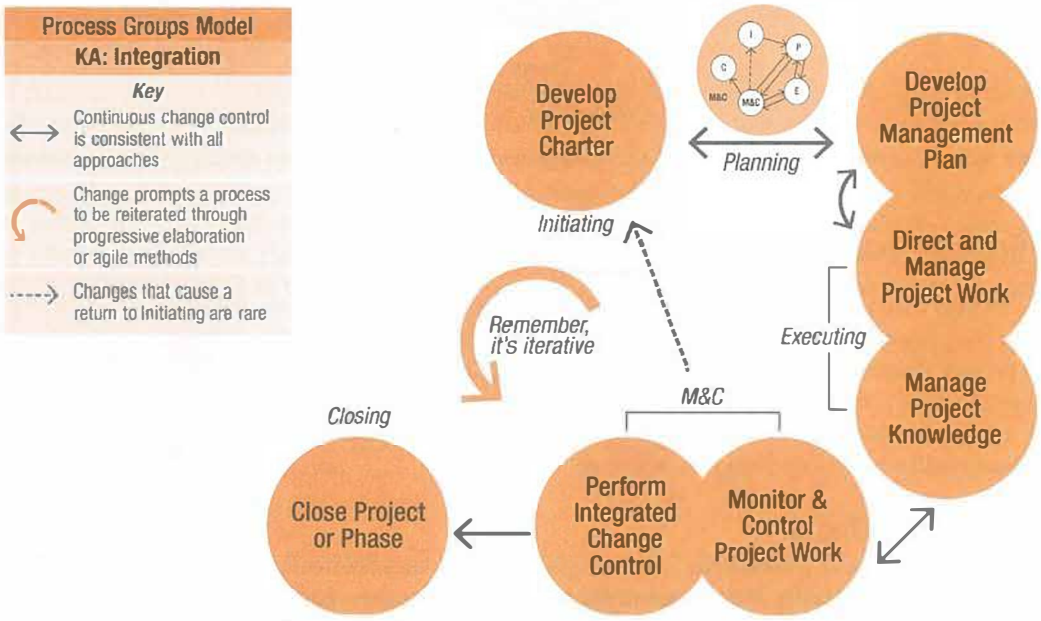


FIGURE 4.1 *Integration management process*

Besides the five process groups, the Process Groups model identifies certain areas that work is focused on (most of which are project constraints). These categories are integration, stakeholders, communications, resources, scope, schedule, cost, quality, risk, and procurement. Figure 4.2 shows the relationship between these categories and process groups from the Process Groups model. With figure 4.2 you can easily see where a project manager's activities are focused by category. For example:

- All project management categories have project management processes in planning and monitoring and controlling.
- Scope, schedule, and cost show no project management activity because it is the team that is executing the work to build the product of the project, while the project manager monitors and controls all project work.
- Stakeholder engagement has no process for closing because when a project or phase is closed, the project manager has already managed the stakeholder engagement for that phase or the project.
- Did you notice that Integration Management is the only project management category that has processes occurring in all process groups? The project manager is always integrating.

We encourage you to return to figure 4.2 after you have had the opportunity to study the process-related chapters in this book. The process-related chapters help you with the details while this figure helps you understand the big picture.

FIGURE 4.2 *The relationship between the process groups and the major project management process categories*

Develop Project Charter

The Develop Project Charter process includes using all the information known about a project from the project selection process to achieve an approved (signed) project charter. The project charter authorizes the project to continue. This process also includes the creation of an assumption log, which is an artifact of developing the project charter. The assumption log is updated throughout the project, as assumptions and constraints change and new assumptions are uncovered.

Process Groups Model
PG: Initiating
Process: Develop Project Charter

ECO
Domain II
Task 8 Plan & manage scope
Task 9 Integrate project planning activities

PMBOK® Guide
Domain 2.4 Planning

Creating the Project Charter

The purpose of the charter is to plan the project at a high level to assess whether it is feasible within the given constraints. Detailed planning begins only after the charter is signed. In project initiating, the project manager meets with key stakeholders to refine the high-level objectives, requirements, scope, risks, assumptions, and other constraints. Then, the information gathered is used to confirm the project is realistic, aligns with the organization's strategic goals, and is likely to deliver the anticipated benefits and value. Additional resources (time and money) are spent only after the project charter is approved.

The project manager most often creates the project charter, but it is issued (signed off on) by the sponsor during initiating. The charter should be broad enough that it does not need to change as the project progresses. Changes to the project charter, beyond initiating, should call into question whether the project should continue.

Projects that include agile or hybrid approaches tailor charter documents. For example, a project charter may articulate that there is more uncertainty about requirements or the product deliverables at the beginning of the project. How the governance of the project is explained may also contain different information. For instance, instead of a formal change control board a project's product owner may typically have the authority to make decisions regarding change management and prioritizing requirements.

4.1 Exercise

Test yourself! Answer the following questions in your Exercise Notebook.

- What does the project charter do for the project and the organization?
- Why is it so necessary?

Answer

The project charter describes the project goals and objectives and defines how success will be measured. For the exam, know that the charter at a minimum does the following:

- Formally authorizes the existence of the project, or establishes the project
- Gives the project manager authority to commit resources to the project
- Provides the project objectives, high-level requirements, and success criteria
- Defines roles and responsibilities at a high level
- Clarifies a common understanding of the project's major deliverables and milestones, between the sponsor and project manager
- Links the project to the ongoing work of the organization

On the exam, assume it is the project charter that gives the project manager the authority on the project (to use the organization's resources to the project's needs). This authority helps the project manager get work done through others who do not directly report to them.

The process of creating the charter uncovers the assumptions recorded as the start of the assumption log. These assumptions will later be updated or addressed in the detailed requirements gathering, scope definition, and risk management efforts. Can you see that the creation of a project charter should address and influence all the project management constraints? Aside from the assumption log and the charter, you should have the following documented in their respective project artifacts:

- Identified and analyzed stakeholders
- Defined project objectives, constraints, and success criteria
- Confirmed high-level requirements
- Preliminary product scope definition
- Documented initial risks and issues

Some of the tools and techniques that can be used during this process include data gathering (interviews, brainstorming, focus groups, etc.), conflict management, and meeting management. During meetings with the sponsor and key stakeholders, the project manager can obtain needed information and work with experts to understand and address organizational strategy and develop measurable project objectives.

Note: The following charter example is not an exact template; a charter should be tailored to meet the needs of the business and project. This example is meant to show you the types of sections that may be included and what those sections may summarize. Also note that this charter refers to attached documents that are not included in this example.

Project Charter

Project Title and Description *(What is the project?)* **Upgrade the Payroll Systems**

We're a large, multinational organization with more than 20,000 employees, so human resource management is critical to our success. To more efficiently compensate our employees, we want to replace or upgrade the employee payroll systems to better reflect the changing nature of our workforce. Employees now work in various locations (offices and homes) around the world, work simultaneously for multiple business units, and have more varied work schedules than ever before. Current geographically focused payroll systems are not integrated, are inflexible, and require significant clerical time to maintain them manually. With the existing systems, consolidated corporate reporting and analysis is expensive and inefficient.

Project Manager Assigned and Authority Level *(Who is given authority to lead the project, and can they determine, manage, and approve changes to budget, schedule, staffing, etc.?)*

Isaiah Higgins will be the project manager for this project. He may request any team members he sees fit and will work with resource managers to secure the needed resources. He has signature authority up to $10,000. Ashley Chan is assigned as assistant project manager.

Business Case *(Why is the project being done? On what financial or other basis can we justify doing this project?)*

Administering payroll currently costs $2.4 million annually along with the unmeasured costs of procedural inefficiencies. The industry average payroll processing costs for a global company our size is $100 per employee per year, or $2 million overall per year. Anticipated savings of $400,000 per year (assuming a three-year payback period) justifies the approval of this project. See the detailed business case attached to this charter.

Resources Preassigned *(How many or which resources will be provided?)*

The corporate payroll processing group will be closely involved in this project, along with the payroll specialists who work in our local offices. A senior team of business analysts, enterprise architects, and software designers has been identified for the initial research and analysis phase. Procurement and legal representatives will be involved in seller contract processes, including development of RFPs and contracts when deemed necessary. English will be the primary project language; local language experts will be involved to ensure country-specific regulations and laws are understood. Other required resources must be identified and negotiated for by the project manager.

Key Stakeholder List *(Who will affect or be affected by the project [influence the project], as known to date?)*

Attached is a list of stakeholder groups that will be impacted by this project. It includes all employees, divided into payees, corporate management, legal, procurement, and payroll administrators. It also includes outside representatives of government taxing authorities, benefit providers, and suppliers of payroll-processing solutions.

Stakeholder Requirements as Known *(Requirements related to both project and product scope.)*

Req. Number	High-Level Requirements
R1	Pay employees based on the agreed-upon rate/salary on the agreed-upon schedule.
R2	Adhere to country-specific government requirements related to tax withholding and payment schedules.
R3	Adhere to state, province, county, or other local government requirements related to tax withholding and payment schedules.
R4	Allow the company to provide benefits for employees as approved by the Board of Directors.
R5	Allow the company to collect benefit premium payments from employee pay as agreed to by each employee.
R6	Keep all employee data confidential, secure, and archived as required by law in each jurisdiction.

High Level Product Description/Key Deliverables *(What are the key product deliverables that are wanted and what will be the end result of the project?)*

The result of this project should be one or more systems that support payroll processing for all employees, at or below the industry average cost. Specific desired features include:

- The systems should allow direct deposit of employee pay into any financial institution in the world, along with notification of deposit via email or text message to any device.
- Workers should be able to change their address, number of dependents, tax withholding parameters, and benefit characteristics via a website at any time from any location.
- The systems must support consolidated management and reporting of corporate payroll processing, plus government mandated reporting and payments.

High-Level Assumptions *(What is believed to be true or reliable in the situation? What do we believe to be the case but do not have proof or data for? See details in the assumption log.)*

- There are payroll applications available that support the countries in which our employees are located.
- The average cost of $100 per employee per year is accurate for our industry.
- Each employee reports their primary residence in just one country for tax reporting purposes.
- We have internal resources available to evaluate and do the work assigned.

High-Level Constraints *(What factors may limit our ability to deliver? What boundaries or parameters will the project have to function within?)*

- The system must be able to comply with all international payroll rules and perform direct deposits globally.
- The solution and the supporting systems must be able to maintain organizational information security standards that meet or exceed individual country standards.
- Year-end tax reporting must be completed by the new system in the year of the implementation (payroll data must be converted).
- Summary milestone schedule: Due no later than October 6, 20XX
- Preapproved financial resources: $1,200,000

Measurable Project Objectives *(How does the project tie into the organization's strategic goals? What project objectives support those goals? The objectives need to be measurable and will depend on the defined priority of the project constraints.)*

The main objective of this project is to decrease costs by at least $400,000 annually. A second objective, which supports the first, is to increase productivity for new employees and payroll processing employees.

- Decrease payroll processing costs by 15 percent in two years by decreasing manual clerical processes.
- Decrease the duration of the new worker onboarding process from an average of 5 business days to 2 business days within 18 months.

Project Approval Requirements *(What items need to be approved for the project, and who will have sign-off authority? What designates success?)*

Approvals for this project include:

- Decision to purchase application software to support the payroll systems (VP of Operations)
- Choice of seller application package (Director of HR)
- High-level design of the new systems (Director of HR)
- Global transition plan for new systems rollout (VP of Operations)

Overall Project Risks *(Overall potential threats and opportunities for the project)*

- Because of the complexity of employee pay calculations and the large number of employees, we may have errors in employee payroll during implementation of the new systems. (High impact)
- Because of the number of localities supported and differing regulations, we may have errors in government tax payments and regulatory compliance during implementation of the new systems. (High impact)
- Because of the volatility in the software application marketplace, we may select an unreliable seller for delivery of the payroll-processing applications. (High impact)

Project Exit Criteria *(What needs must be met so that the project manager will be able to close or terminate the project or phase?)*

- A new payroll processing system that meets the project objectives and requirements and incorporates all key deliverables described herein will be delivered within defined cost and budget constraints.
- *Or,* if it is determined that the project objectives of cost saving cannot be met, the project manager will recommend termination of the project.
- *Or,* if it is determined that another solution will better meet the organizational needs, the sponsor should be notified for closing approval, and a business case will be developed for the new solution.

Project Sponsors Authorizing This Project

Muhammad Chauhan, Executive Vice President

Jessica Bouchard, Director of Human Resources

Develop Project Management Plan

The project management plan describes the project's development approach and life cycle, and how the project will be executed and controlled. It identifies when project management reviews will be needed and contains the performance measurement baseline (scope, schedule, and cost baselines). It contains and integrates plans for managing the following categories:

- Scope
- Requirements
- Schedule
- Cost
- Quality
- Resources
- Communications
- Risk
- Procurement
- Stakeholder engagement

Let's discuss then, what is a management plan.

Process Groups Model
PG: Planning
Process: Develop Project Management Plan

ECO
Domain II
Task 1 Efficiently deliver business value
Task 9 Integrate project planning activities
Task 10 Manage project changes
Task 12 Manage project artifacts
Task 13 Use right methods & practices
Task 16 Ensure knowledge transfer
Task 17 Plan & manage project/phase closure or transitions

PMBOK® Guide
Domain 2.4 Planning
Domain 2.8 Uncertainty

Management Plans

Management plans document the strategy and approach for managing the project and the processes, related project constraints, and other major areas needing management and integration, like communications and stakeholder engagement. Plans include processes, procedures, practices, and standards the team will follow to ensure consistent results.

When creating a management plan, ask yourself, "How will I define, plan, manage (execute), and control scope (or schedule, cost, quality, etc.) for the project?" "How will closing phases be performed, if that's part of the overall project?" You think ahead, and document how you will plan and manage for each project management category based on its particular needs.

Planning Components

Management plans must be tailored to each project, including the format and level of detail needed at each stage of planning. If you don't create management plans for your projects, this area of the exam may be difficult for you. Let's consider an example of how you would address cost management.

Example Let's say you are planning for the cost on a project. You need to address questions such as:

- How will you ensure all costs are identified and estimated?
- Who will be involved in estimating costs?
- What cost estimating methods will you use?
- What historical records, processes, and organizational requirements will need to be used or met?
- What estimating methods will you employ?
- What level of accuracy is appropriate?
- How will funding and cost constraints be considered when establishing the budget?
- What data, metrics, and measurements do you need for planning cost?

Agile and hybrid environments may not have these plans documented as separate artifacts. However, this does not mean the planning of these attributes is absent. Rather, they are incorporated into other artifacts. For example, scope, schedule, and risk management plans are often incorporated into a product backlog and release roadmaps. These artifacts show the plan for project work, inclusive of risk response decisions and when product increments are planned for delivery.

Agile Focus

Executing Components

The executing portion of a management plan focuses on the processes and procedures for doing the work. Some management categories, such as cost management, won't have separate executing processes for the project manager. This is a function of integration management.

Example The executing component of a cost management plan answers questions such as:

- What cost data are needed?
- Who is responsible for gathering the data?
- Where will the raw data be captured that will later be used in monitoring and controlling?

Monitoring and Controlling Components

The monitoring and controlling components of a management plan define the processes and procedures to measure project progress, compare actual project results to what was planned, and determine how to handle variances that require a change.

Before you read further, spend some time imagining what management plans for the different categories (scope, schedule, quality, resources, communications, risk, procurement, and stakeholder engagement) might contain. Many project managers don't realize how big their knowledge gap is regarding management plans until it finds them on the exam. Don't let this happen to you!

Here is a trick to understanding management plans for the exam. Know that management plans look forward in time and that there are management plans for all the project management categories. There are also these management plans:

- Change management plan
- Configuration management plan
- Requirements management plan

When you are taking the exam, assume the project manager has created each of these management plans. If a question refers to a problem on a project, the answer might be for the project manager to look at the management plan for that aspect of the project to see how the plan says to handle such a problem. For example, when the work is being done, the project manager might refer to the cost management plan to see how costs are to be measured and evaluated.

The Project Management Plan

The project management plan integrates all the individual management plans into a cohesive whole, creating a centralized artifact to describe what is involved in the project. The overall project management plan also includes the baselines for the project. This means a project management plan is a set of plans and baselines (not just a schedule). The key components of the project management plan are discussed in the following sections. Remember the agile and hybrid differences we discussed in the previous section, and think through how an adaptive approach may tailor any of the following plans and project management components.

Project Life Cycle
The project life cycle describes the phases of work on a project required to produce the deliverables (for example, requirements, design, code, test, implement). Project life cycles range from plan-driven to change-driven.

Development Approach
Development approaches to produce the project deliverables range from plan-driven to change-driven.

Management Reviews
Milestones will be built into the project management plan, indicating times when management and stakeholders will compare project progress to what was planned and identify needed changes to any of the management plans.

Tailoring
Think about the science of project management for a moment. Would you want to use everything in the Process Groups model to the same extent on every project? No. A project manager should determine what processes and the extent to which processes are to be used, based on the needs of the project. Tailoring the processes and the project work is part of developing the project management plan.

Although we don't always use the word "tailoring" or call tailoring out in separate sections, we talk about tailoring throughout this book. Be aware as you are reading: Everything you do as a project manager is a creative use of the knowledge and skills you have and the methods available to you. This, in essence, is tailoring.

Individual Management Plans
These are the management plans for scope, schedule, cost, quality, resources, communications, risk, procurement, and stakeholder engagement. (The individual management plans are discussed in the Process domain chapters of this book.)

The Performance Measurement Baseline
The project management plan includes scope, schedule, and cost baselines, against which the project manager will analyze and report project performance, Created during planning, these baselines are collectively referred to as the performance measurement baseline. The following are the elements included in each baseline:

- **Scope baseline** The project scope statement, work breakdown structure (WBS), and WBS dictionary
- **Schedule baseline** The agreed-upon schedule, including the start and stop dates for each activity, and scheduled milestones
- **Cost baseline** The time-phased cost budget (the spending plan indicating how much money is approved for the project and when the funds are required and will be available)

The project manager and team will watch for deviations from the baselines while the work is being done. If a deviation is discovered, they will assess whether adjustments can be made to bring the project back in line with the baseline. These adjustments might involve submitting a change request for corrective or preventive action or defect repair.

If minor adjustments will not correct a deviation, a request to change the baselines might be necessary. A substantial part of managing a project beyond planning is making sure the baselines are achieved, which in turn helps ensure the sponsor and the organization get the complete benefits of the project they chartered. Therefore, as a project manager, your ability to not only plan a project but also to control the project and get it completed as planned is very important.

On plan-driven projects, requested changes to the baselines are evaluated and approved in the Perform Integrated Change Control process, discussed later in this chapter. Baseline changes are serious and the evolution of the baselines should be documented to show when and why changes were made. Baselines are mentioned frequently on the exam. Make sure you understand the concepts described here, including what the project manager's approach should be to the project's baselines and any changes to those baselines.

Deviations from baselines are often due to incomplete risk management. Therefore, if the exam asks what to do when a project deviates significantly from established baselines, consider that the correct answer may be the one about reviewing the project's risk management process. Many project managers are not aware of this.

Requirements Management Plan

Part of the scope management process (described in the "Scope" chapter) involves defining and planning for stakeholders' needs, wants, expectations, and assumptions to determine the requirements for the project. The requirements management plan defines how requirements will be gathered, analyzed, prioritized, evaluated, and documented, as well as how the requirements will be managed and controlled throughout the project.

Change Management Plan

Controlling a project to the baselines and the rest of the project management plan is so important that the project manager needs to think in advance about where there might be changes and what to do to limit the negative effects of changes. Are you this focused on change management on your projects? In a plan-driven environment, the project manager needs to plan to minimize changes and prevent unnecessary changes. They also need to proactively look for needed changes, thereby solving issues before they have a major negative impact on the project.

The change management plan describes how changes will be managed and controlled, and may include:

- An outline of how changes will be managed and controlled
- Change control procedures (how and who)
- Approval levels for authorizing changes
- The creation of a change control board (described later in this chapter) to approve changes, as well as the roles and responsibilities of those on the board
- Who should attend meetings regarding changes
- The organizational tools to use to track and control changes
- Information on reporting the outcome of change requests
- The emergency change process

In agile environments the team expects change, which is why this type of project planning is described as *adaptive*. Project and product requirements, including risk management activities, are prioritized in the backlog in order to maximize the team's ability to deliver value through incremental delivery of product features while maintaining an established schedule and budget.

Configuration Management Plan

The configuration management plan defines artifact naming conventions, a version control system, and document storage and retrieval processes and locations. This plan details how the project manager will manage changes to the documentation, including which organizational tools will be used in this effort. Configuration management is essential to ensure all relevant stakeholders are aware of and have access to the latest versions of the project management plan components.

Putting the Project Management Plan Together

The project manager and the team create the project management plan by completing the activities described in the Planning column of Rita's Process Chart™. Once the project management plan is complete, the sponsor or key stakeholders review and approve it.

The Develop Project Management Plan process must result in a plan that is bought into, approved, realistic, and formal. In other words, the project management plan needs to be agreed to by the key stakeholders involved in the project, it needs to be formally approved, everyone needs to believe the project can be done according to the plan, and it needs to remain a formal artifact that is revised and used throughout the project. If this is a new concept to you, make sure you spend time thinking about how to accomplish this in the real world.

On an agile or hybrid project initial plans will be deliberately light and progressively elaborated. Planning takes the form of release and iteration planning and early iterations of product building provide clarification and additional information. Agile methods also encourage shifting planning responsibilities to the team, with scope prioritization by a product owner. The product owner is part of the team and they will, along with the project manager, help ensure that the project plan is viable via the prioritization of the backlog and through a timephased product roadmap. Plans and processes may be less formal than those for a plan-based project but they are made and controlled with as much rigor.

Agile Focus

Through initiating and planning, let's see how everything connects so far by looking at figure 4.3.

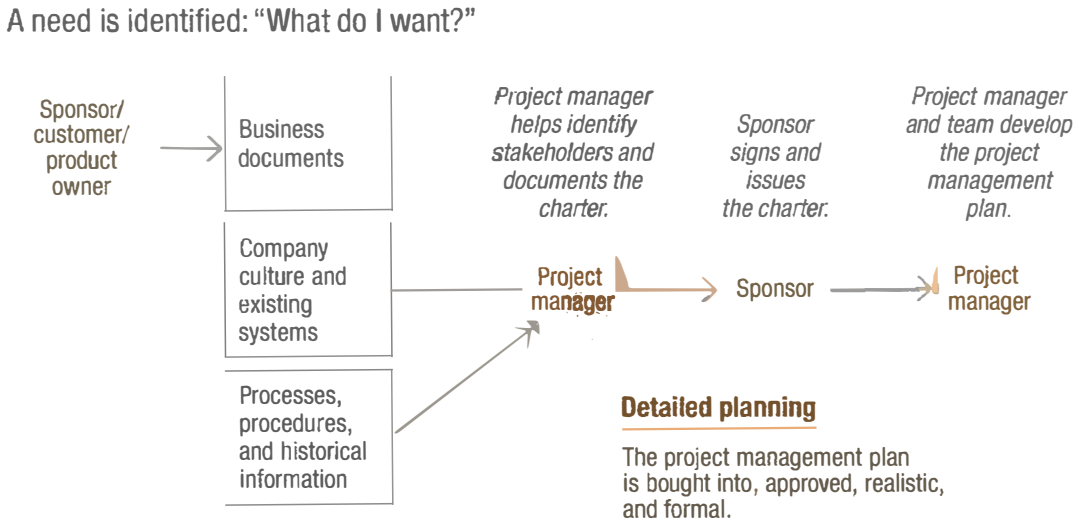


FIGURE 4.3 *Project initiating and planning*

Once the project management plan has been completed, the project manager uses it as a tool to help manage the project on a daily basis. Although it may evolve over the life of the project through progressive elaboration or approved changes, the project management plan in a predictive environment is designed to be as complete as possible when project executing begins. In adaptive environments the frequency of progressive elaboration related to planning and requirements elicitation is more frequent.

Agile Focus

4.2 Exercise

Test yourself! In your Exercise Notebook, make a list of the specific actions required to create a project management plan that is bought into, approved, realistic, and formal.

Answer

Some possible answers include:

- Select the best life cycle and development approach for the project
- Agree on processes to report, control, incorporate, and communicate changes
- Analyze the stakeholders' needs, wants, expectations, and assumptions
- Capture the project requirements as completely as possible
- Work with team members to estimate the project
- Give team members a chance to approve the final schedule that converts the team's activity estimates into a calendar schedule
- Get resource managers to approve the schedule and confirm when their resources will be used
- Work through iterations of the plan (for example, update the work breakdown structure after completing risk analysis)
- Create the necessary supporting project documents (for example, the stakeholder register).
- Apply risk reserves to the project schedule and budget
- Let the sponsor know if any of the project requirements that were outlined in the project charter cannot be met

- Perform schedule compression (crash, fast track, change scope or quality, etc.), and present options to the sponsor
- Look for impacts on the project from other projects
- Make sure the approach and processes are consistent with the PMO and/or program management plan if the project is part of a program

If you included most of the answers from the exercise, you are in good shape. But why is it so important to have a project management plan that is realistic and that everyone believes can be done? Because while the work is being done, progress against the plan is measured to see how the project is going. The constraints agreed to as the project management plan is approved must be met.

So when you think of the project management plan, think of all the facilitations, meetings, sign-offs, interactions with other projects, conflict resolution, negotiations, schedule compressions, etc.—everything required to bring the plan to the point of being bought into, approved, realistic, and formal.

Project Documents

The term "project documents" refers to any project-related documents that are not part of the project management plan. They include artifacts like the following (although not an exhaustive list):

- Project charter
- Assumption log
- Issue log
- Estimates
- Lessons learned register
- Team charter
- Schedule and resource calendars
- Reports (quality, risk, etc.)
- Resource requirements
- Requirements documentation
- Change log
- Agreements
- Contracts
- Statements of work
- Risk register
- Forecasts
- Quality metrics

While the sponsor and/or key stakeholders will see and approve the project management plan, most project documents (excluding the project charter, agreements, contracts, and statements of work) are created and used by the project manager and team and do not require sponsor approval.

Due to the iterative nature of planning and the nature of the work throughout the rest of the project, project artifacts are updated frequently. Though this book will not cover these updates as an output of every process, know for the exam that project documents updates are an output of many project management activities.

Example Midway through the project the project manager and team agree that a particular risk that has not occurred is no longer likely to occur. The risk register and other risk artifacts are updated and the funds in the contingency reserve for that risk are theoretically no longer available to the project.

Project Management Plan Approval

Since the project management plan is a formal document, it requires formal approval by management, the sponsor, the project team, and other key stakeholders. Formal approval means sign-off (signatures). If the project manager has identified all stakeholders and their requirements and objectives, included the appropriate project and product scope in the plan, and dealt with conflicting priorities in advance, getting the project management plan approved should be relatively straightforward.

Kickoff Meeting

Before the Develop Project Management Plan process is considered complete and project executing begins, a kickoff meeting should be held. This is a meeting of the key parties involved in the project to announce the start of the project, to ensure everyone is familiar with its details—including objectives and roles and responsibilities—and to ensure a commitment to the project from everyone. In addition to introducing those involved in the project, the meeting may review such items as milestones, risks, the communications management plan, and the meeting schedule.

While kickoff meetings are common on agile projects, the project information exchanged at this meeting remains high-level. Detailed information about product features and product increments emerge as release and iteration planning continues, followed by iteration reviews with the customer and/or management representatives in iteration review meetings.

Direct and Manage Project Work

This process represents the integration aspect of project executing the part of the project where the team does the work to build the product of the project. In Direct and Manage Project Work, the project manager integrates all the executing work into one coordinated effort to accomplish the project management plan and produce the deliverables. In addition, Direct and Manage Project Work involves gathering work performance data, creating and using the issue log, requesting changes, and completing work resulting from approved change requests.

These tasks involve managing the work and keeping people engaged. Ultimately, it's about being of service to the team to help them get the work completed, ensuring a common understanding of the project among stakeholders, and keeping everyone informed by documenting and facilitating issue resolution. The project manager also facilitates meetings and technical discussions, and on plan-driven projects uses a work authorization system (part of the project management information system or PMIS) to keep the team and functional managers informed of upcoming work assignments and milestones. The project manager also removes impediments for the team, works on process improvement, and informs other departments within the organization how the project may affect their work.

Process Groups Model

PG: Executing
Process: Direct and Manage Project Work

ECO

Domain II
Task 1 Efficiently deliver business value
Task 10 Manage project changes
Task 12 Manage project artifacts
Task 16 Ensure knowledge transfer
Task 17 Plan & manage project/phase closure or transitions

PMBOK® Guide

Domain 2.5 Project Work
Domain 2.6 Delivery
Domain 2.8 Uncertainty

Integration management requires project managers to keep all constraints in mind at all times and to properly look at how issues relating to one constraint affect others. For example, scope management issues can affect quality metrics and resource management.

TRICKS OF THE TRADE®

If you have never used a work authorization system, imagine a large construction project with hundreds of people working on the project. Can you have a plumber and an electrician show up to work in one small area at the same time? No. Remember that a project is planned to the level of detail needed for that project. To handle these types of situations, a work authorization system makes sure work is only started when a formal authorization is given. In many cases, this tool is a company-wide system and not created just for the project. The term "work authorization system" could appear in a question on the exam or be included as an answer choice.

Depending on the needs of the project and its development approach, the use of meetings as a method can range from informal standup sessions to structured meetings with an agenda that focuses on a specific aspect of the project. Other meetings may be related to project updates, lessons learned, upcoming project activities (like an iteration planning meeting), and risk management or change control.

The Direct and Manage Project Work process can be illustrated as shown in figure 4.4. The primary outputs of this process include completed deliverables along with any new work performance data and change requests. Other outputs are updates to organizational process assets and project artifacts.

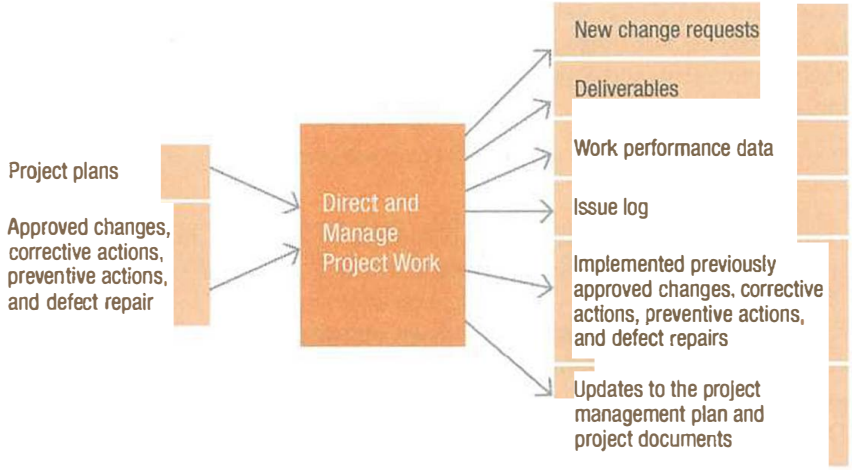


FIGURE 4.4 *Direct and Manage Project Work process*

4.3 Exercise

What are some of the most likely project artifacts to be updated as an outcome of the Direct and Manage Project Work process? Write the answer in your Exercise Notebook.

Answer

Project artifacts that may be updated as a part of this process include the following:

- Project management plan
- Requirements documentation
- Activity list
- Assumption and issue logs
- Lessons learned, stakeholder, and risk registers

Keep in mind as you read the rest of this book, that for every process there are project artifacts that are likely to be updated as the project progresses.

Manage Project Knowledge

Think of the tremendous amount of knowledge required to properly plan and execute a project. Project managers can benefit from the knowledge base the organization has accumulated over time, particularly from the experiences and discoveries of others on past, similar projects. The Manage Project Knowledge process requires each project to actively contribute to that knowledge base. This includes sharing new processes, successes, etc., internally within the project, as well as making that knowledge accessible throughout the entire organization.

Process Groups Model
PG: Executing
Process: Manage Project Knowledge

Domain II
Task 10 Manage project changes
Task 12 Manage project artifacts
Task 16 Ensure knowledge transfer
Task 17 Plan & manage project/phase closure or transitions

PMBOK® Guide
Domain 2.8 Uncertainty

Information and Knowledge Management

Successful and consistent knowledge and information sharing contributes to a productive work environment and increases the ability of project teams to achieve project and organizational objectives. Successful knowledge management requires an organizational culture of trust in which the project manager and stakeholders exchange knowledge without fear of judgment. The project manager needs to foster an environment that will support collaboration and knowledge sharing. As an example, discussion forums and other interactive online tools may help to facilitate this type of environment.

New knowledge that is important to share often involves experiences that did not work out as planned. The project manager can learn from each unidentified stakeholder, each missed risk trigger, and each unrealistic schedule component. Sharing such information and possibly saving another project or person from a similar issue is invaluable. This philosophy has evolved in the traditional project management world and was built into agile project management practices since people started using agile.

Knowledge management includes two distinct types of knowledge—explicit and tacit.

- **Explicit knowledge** is fact-based and can be easily communicated through words and symbols. Traditional lessons learned, processes and procedures, and other information repositories fall under this knowledge type. These are generated and shared as the project is ongoing and consolidated as part of project closing. Explicit knowledge, however, may need explanation or context to provide value.
- **Tacit knowledge** may provide context or explanation to explicit knowledge. It is not easily documented. It includes emotions, experience, and ability, which are difficult to communicate in words and symbols but can be learned through job shadowing or apprenticeship.

Example You can learn a lot about performing an activity by reading the organization's documentation on it and being trained by an experienced employee. This is explicit knowledge. However, you will learn tricks and shortcuts by job shadowing. Watching an experienced person doing the job will give you tacit knowledge they may not think to tell you if they were to train you on the activity.

On the exam, you may see questions related to establishing an environment that encourages the project team to share tacit and explicit knowledge. Or a scenario-based question may have an implicit assumption that knowledge sharing is part of executing a project.

You should also be aware that legal and regulatory requirements and constraints such as nondisclosure agreements may limit or impact the gathering and sharing of particular information.

Example On a project to develop banking software, the team may have access to personal and financial information about customers of the bank for which the software is being developed. Team members would obviously not be permitted to share this information other than for project work.

Managing Project Knowledge

Project artifacts such as the project management plan, project documents (like the lessons learned register and project team assignments), and deliverables are inputs to the Manage Project Knowledge process. Techniques for learning and sharing knowledge may include workshops, training, and observation. Simply asking, "Walk me through how you would do this task," can encourage understanding.

Osmotic Communication Informal sharing occurs through the application of interpersonal and team skills, including active listening and networking. The agile concept of osmotic communication describes the phenomena of communication and knowledge sharing being facilitated and enhanced simply by team members being in proximity to one another.

Example Imagine you work in a cubicle and on the other side of that cubicle works a close colleague. You also have a colleague with whom you work closely, but their desk is down the hall. Would you agree that even without trying you would know more about the colleague who works right on the other side of your cubicle, just from overhearing their daily conversation? That is osmotic communication.

Lessons Learned

You will see lessons learned mentioned throughout this book, both as an input to and an output of many processes. As an input, they help improve the current project. As an output, they help make the organization better by providing historical lessons learned for future projects and project managers. They describe "what was done right, what was done wrong, and what would be done differently." Accurately and thoroughly documenting lessons learned is a professional responsibility, and the lessons learned register is a main output of managing project knowledge. Lessons learned should include an overview of each situation, what corrective actions were taken, the impacts of actions taken, and the resulting updates to project artifacts.

In the first chapter of this book, we described lessons learned under General PMI-isms. Lessons learned are an essential asset to managing a project, as they are taken into account as well as created throughout a project.

Some useful lessons learned categories that should be captured are:

Technical Lessons Learned What was right and wrong about how we completed the work? What did we learn that will be useful in the future? (Examples include acceptable metrics and variance levels, new processes, improved or revised processes for particular results, and the effectiveness of particular acceptance criteria.)

Project Management Lessons Learned How did we do with work breakdown structure (WBS) creation, risk planning, etc.? What did we learn that will be useful in the future? (Examples include recommendations for transitioning project results to the business and operations teams, recommended changes to the organization's procurements process, and experiences working with particular sellers.)

Management Lessons Learned What did we learn from communications and leadership efforts that will be useful in the future? (Examples include the results of stakeholder analysis and stakeholder engagement efforts.)

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Many project managers do not understand the role of lessons learned on projects. Figure 4.5 illustrates their function.

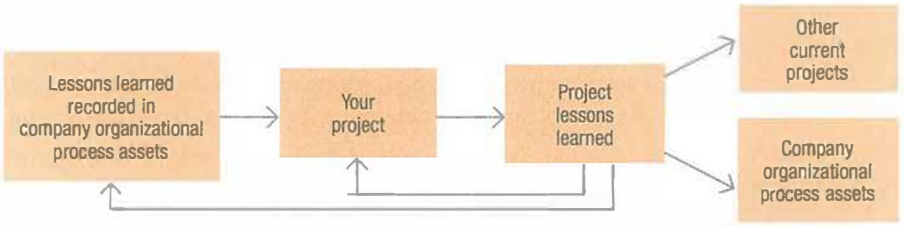

FIGURE 4.5 *Lessons learned on a project*

Monitor and Control Project Work

Monitor and Control Project Work proceeds from project initiating through closing. It involves observing project activities and their results, and comparing the actual and forecasted performance to what was planned. This process involves aggregating the work performance information from the project management processes to evaluate and assess how their results are impacting plans and baselines. This process involves monitoring any performance requirements that were included in the project management plan.

Example Scope may be completed but quality may not be acceptable. The schedule might be met but at excessive cost.

This work encourages a holistic view of project performance and enables the project manager to take appropriate action to keep the project on track. It also includes activities such as analyzing and tracking risks, performing quality control activities, assessing possible outcomes across the project using data analysis techniques (including alternatives, cost-benefit, earned value, root cause, trend, and variance analysis), and reviewing changes and corrective actions made on the project to see if they were effective.

Process Groups Model
PG: Monitoring and Controlling
Process: Monitor and Control Project Work

ECO
Domain II
Task 1 Efficiently deliver business value
Task 12 Manage project artifacts
Task 13 Use right methods & practices
Task 17 Plan & manage project/phase closure or transitions

PMBOK® Guide
Domain 2.7 Measurement
Domain 2.8 Uncertainty

Artifacts of Monitor and Control Project Work

This effort may result in change requests, work performance reports, and updates to project artifacts. The change requests from this and other processes are evaluated and approved, rejected, or deferred in the Perform Integrated Change Control process, described later in this chapter.

Change Requests

Change requests can have differing focuses, depending on which process they are generated from. Examples of changes are additions to project scope requested by the customer, changes to the plan that the team believes would make their work more efficient, or even changes to the policies and procedures used on the project. Needed changes are identified as the project manager manages the execution of the project and as part of monitoring and controlling when project performance is measured against the baseline.

Not all changes require change requests, but change requests are generated from many processes if they require a change to the project management plan or the performance measurement baseline. The three main categories into which changes fall are corrective action, preventive action, and defect repair.

Corrective Action

Any action taken to bring expected future project performance in line with the project management plan is a corrective action. Since corrective actions deal with actual deviations, there needs to be a realistic performance measurement baseline and/or project management plan, including acceptable variances, to determine when a variance has occurred and when corrective action is needed. Those who have problems with this in the real world have problems on the exam.

What do you do on your projects? Do you have predetermined areas to measure, and have you identified an acceptable range into which the measurements can fall (control limits) to determine if a project is on schedule and on budget?

You need to:

- Have a realistic project management plan to measure against
- Have metrics created during project planning that cover all aspects of the project
- Consciously focus on identifying areas that need corrective action
- Look for problems using observation, active listening, and measurement rather than waiting for them to be brought to your attention
- Know when the project is off track and requires corrective action
- Find the root causes of variances
- Measure project performance after a corrective action is implemented to evaluate the effectiveness of the corrective action
- Determine whether there is a need to recommend further corrective action
- Continue to measure throughout the project

As you can see, a significant portion of the project manager's time while the project work is being done is spent measuring performance and implementing corrective actions as needed. You can expect questions about this on the exam. Do not expect all these questions to use the words "corrective action."

Preventive Action

While taking corrective action involves dealing with actual deviations from the performance measurement baseline or other metrics, preventive action means dealing with anticipated deviations from the baseline and other metrics. Knowing when preventive action is needed requires more experience than calculation because the project manager is evaluating trends in the measurement analysis and anticipating that, if they continue, they could lead to deviation from the baseline or other metrics. Examples of preventive actions include:

- Adjusting the project to prevent the same problem from occurring again later in the project
- Changing a resource because the resource's last activity nearly failed to meet its acceptance criteria
- Arranging for team members to take training in a certain area because there is no one with the necessary skills to back up a team member who may unexpectedly get sick

Proposed changes that would affect the baselines, policies or procedures, charter, contracts, or statements of work would likely have to go to the change control board or sponsor for approval, as outlined in the change management plan.

Defect Repair

Defect repair is another way of saying "rework." Defect repair may be necessary when a component of the project does not meet requirements. As with corrective and preventive actions, defect repair may be reviewed and approved or rejected as part of Perform Integrated Change Control.

Perform Integrated Change Control

Process Groups Model
PG: Monitoring and Controlling
Process: Perform Integrated Change Control

Domain II
Task 10 Manage project changes
Task 12 Manage project artifacts
Task 16 Ensure knowledge transfer
Task 17 Plan & manage project/phase closure or transitions

PMBOK® Guide
Domain 2.7 Measurement
Domain 2.8 Uncertainty

In the previous section we discussed three main categories of changes requested on a project. On plan-driven projects, change requests are evaluated and accepted, rejected, or deferred in the Perform Integrated Change Control process. A key focus of integrated change control is to look at the impact of each change on all the project constraints, the value of which is to reduce the potential risk of not meeting project objectives. For example, any scope change needs to be assessed for its impact on quality, risk, schedule, cost, resources, and customer satisfaction. It then needs approval through integrated change control before it can be implemented, since the scope baseline is part of the performance measurement baseline.

Integrated change control ensures that as changes are accepted, updates and re-planning efforts are completed and project artifacts updated. The approved changes are implemented as a function of Direct and Manage Project Work, Control Quality, and Control Procurements.

So, do you need to go through Perform Integrated Change Control to make changes to processes or plans that haven't been finalized? No. When developing the project charter, project management plan, and baseline, changes can be made without a formal change request. But after the charter and the project management plan have been approved, requested changes need to be evaluated in the context of integrated change control. Project document changes like those to lessons learned and the issue log do not require change requests if they do not affect the performance measurement baseline or another project management plan component.

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Read exam questions carefully to understand whether a requested change pertains to something that is still in the process of being finalized or has already been finalized. This will help you determine whether integrated change control is required.

Integrated change control can be a difficult topic on the exam for people who do not work on projects that have formal change procedures. It can also be difficult for project managers who simply estimate the cost and/or schedule impact of a change and stop there, rather than looking for the impacts of a change on all project constraints. Check your understanding of this topic with the following example.

Think About It. A stakeholder wants to add scope to the project. You estimate that the change will add two weeks to the project duration. What do you do next?

Try to answer the question. Is your answer to look for ways to save time so the change can be accommodated? Or should you get the change approved? How about asking for an extension of time to accommodate the change?

None of the previous choices are correct. The next thing to do would be to see how the proposed change impacts the project cost, quality, risk, resources, and possibly customer satisfaction. Whenever the exam mentions change, keep in mind that a change to one project constraint should be evaluated for impacts on all the other constraints.

Are changes bad? In plan-driven project management and in some industries this may be a controversial question. Changes can have negative effects as they may be expensive or disrupt the project. The cost of change tends to increase as the project progresses. The function of each process within monitoring and controlling is to control changes.

Agile Focus

In an adaptive environment accommodating many changes are assumed to be an ongoing part of the project management process. The definition of scope is emergent rather than defined at the beginning of the project. But even in change-driven environments change needs to be carefully planned and managed.

A project manager should work to prevent the root cause of unnecessary changes. The need for many changes in a predictive environment may indicate that the project manager did not fully identify stakeholders and uncover their requirements, plan for risk, or properly complete other project management actions.

To control changes on a plan-driven project, the project manager should:

- Work to obtain complete and thorough requirements as soon as possible
- Continue to observe the environment for the possibility of new or missed stakeholders and new or missed requirements
- Spend enough time on risk management to comprehensively identify the project's risks
- Establish schedule and cost reserves (see the "Risks and Issues" chapter)
- Have a process in place to manage change
- Follow the change management process
- Have a process and templates in place for creating change requests
- Have clear roles and responsibilities for approving changes
- Allow only approved changes to be executed
- Reevaluate the business case in the project charter if the number of changes becomes excessive
- Consider terminating a project that has excessive changes and starting a new project with a more complete set of requirements

Changes can be grouped into two broad categories—those that affect the baselines, policies and procedures, the charter, contracts, or statements of work, and those that do not. If a change does not affect these artifacts, change management policies may allow the project manager to approve the change. If the change does affect those key elements, the change typically needs to go to a change control board and/or sponsor for a decision. Product owners normally make these decisions on agile projects.

Change Control Board (CCB)

Depending on the project manager's level of authority, their role might be to facilitate decisions about certain changes, rather than actually make the decisions. Many projects have formally established change control boards responsible for reviewing change requests in accordance with the change management plan for the project. The CCB (sometimes referred to as the steering committee) approves, defers, or rejects the changes. The results of the decisions are documented in the project's change log. The board may include the project manager, the customer, experts, the sponsor, functional managers, and others. For the exam, assume that plan-driven projects have change control boards.

Summary Process for Making Changes on Plan-driven Projects

The exam has many situational questions that deal with how to manage project changes. Here are two examples.

Question A functional manager wants to make a change to the project. What is the first thing a project manager should do?

Question Someone wants to make a change to the project scope. What is the best thing to do first?

The answers are the same in either case. A trick for answering questions that ask about the process for making changes is to know that, at a high-level, the project manager (and team) should follow these steps:

1. **Evaluate the impact** Assess the impact of the change on all aspects of the project (for example, this change will add three weeks to the project length, require $20,000 additional funding, and have no effect on resources).
2. **Identify options** This can include cutting other activities, compressing the schedule by crashing or fast tracking, or looking at other options. For example, you may be able to decrease the potential effect of the change on the project by spending more time decreasing project risk, or by adding another resource to the project team.
3. **Get the change request approved internally (through the CCB)**
4. **Get customer buy-in** (if required)

Note that changes are always evaluated before any other action is taken. In many cases, evaluation involves using data analysis techniques to determine the impact of the change on all the project constraints.

Next, options to handle the change, such as crashing, fast tracking, re-estimating, and using "what if" analysis are considered and evaluated. (See the "Schedule" chapter for a discussion of crashing, fast tracking, and re-estimating.)

Think About It. Do you remember the following question from earlier in the chapter? It is an example of the type of question you may see on the exam:

A stakeholder wants to add scope to the project. You estimate that the change will add two weeks to the project duration. What do you do next?

Notice how the following question is different:

A change in scope has been determined to have no effect on the project constraints. What is the best thing to do?

Be careful when reading these questions. Expect the right answer to depend on other details in the question. Sometimes evaluation has been done, so the best thing to do is to look for options. Sometimes evaluation and looking for options have been done, and the best thing to do is to meet with the sponsor or change control board to ask for approval, deferral, or rejection of the change.

In the second question, evaluation (step 1 in the previous Trick of the Trade™) has been done. The answer would be to look for options (step 2), and then meet with the sponsor or change control board (step 3) to discuss the change and its lack of impact on the project constraints. After informing the sponsor or change control board, the project manager may inform the customer using the process defined in the communications management plan (step 4).

Detailed Process for Making Changes Now that you know the high-level process, let's look at a more detailed process for making changes:

1. **Prevent the root cause of changes** The project manager should not just focus on managing changes; they should proactively minimize the need for changes.
2. **Identify the need for a change** Changes can come from the project manager, as a result of measuring against the performance measurement baseline, from the sponsor, or any other stakeholder. The project manager should be actively looking for changes from all sources because discovering a change early will decrease the impact of the change.
3. **Evaluate the impact of the change within the project constraints** If it is a scope change, how will it affect the rest of the scope of the project? If it is a schedule change, how will it affect the rest of the schedule for the project?
4. **Create a change request** Changes can be made to the product scope, any part of the project management plan, contracts, charter, statements of work, policies and procedures, or even the performance measurement baseline. The process of making a change should follow the change management plan.
5. **Perform integrated change control** How will the change affect all the other project constraints?
   a. **Assess the change** Does the change fall within the project charter? If not, it should not be a change to the project; it may be an entirely different project. If the change is not beneficial to the project, it should not be approved. Also note that any change for which a reserve has been created (a previously identified risk event) would be accounted for in the project management plan as part of risk management efforts and should be handled as part of the Implement Risk Responses process rather than Perform Integrated Change Control. The techniques of alternative and cost-benefit analysis are helpful in understanding the full impact of a change request.
   b. **Identify options** Actions to decrease threats or increase opportunities include compressing the schedule through crashing or fast tracking, changing how the work is performed, adjusting quality, or cutting scope so that the effect of the change will be minimized. Sometimes it may be necessary to accept the negative consequences of a change, if the positive impact that would result from the change is more valuable to the project. It is a matter of balancing project constraints.

      Example The benefits of adding new scope to the project may outweigh any negative impact. (See the "Schedule" chapter for a discussion of the critical path.)

c. **Get the change approved, rejected, or deferred** Again, the project manager may be able to approve many changes. But those that affect the project management plan, baselines, charter, etc. would likely need to go to a change control board and/or the sponsor. The approved changes are then implemented in the Direct and Manage Project Work, Control Quality, and Control Procurements processes.

d. **Update the status of the change in the change log** This helps everyone know the status of the change. If a change is not approved, the reasons it was rejected should be documented.

e. **Adjust the project management plan, project documents, and baselines as necessary** Some approved changes need to be incorporated into the project baselines. The changes could affect other parts of the project management plan or project documents or could affect the way the project manager will manage the project. Project documentation must be updated to reflect the changes. This means replanning must be done to incorporate the impacts of the change into the new version of the documents and plan before the team starts executing the change. For example, if there is a change in scope, the scope baseline (the WBS, WBS dictionary, and project scope statement), the project management plan, and the requirements traceability matrix should be updated. If that change in scope affects other areas of the project, the associated documentation (such as the activity list, resource management plan and other resource documentation, schedule, budget, or risk register) also needs to be updated.

6. **Manage stakeholders' expectations by communicating the change to stakeholders affected by the change** How often do you remember to do this? You could think of this, in part, as configuration management (version control to make sure everyone is working off the same project documentation).

7. **Manage the project to the revised project management plan and other project artifacts**

Agile Change Management

In agile and hybrid environments, change control is streamlined as there are often many changes to evaluate and make decisions about every day. The product owner is part of the team and has much change approval authority. They will authorize changes that would not significantly alter the outcome or benefits of the project.

Agile Focus

Note that there are some additional guidelines in relation to agile change management. For example, the product owner is typically given a description of business benefits to deliver within a firm budget and timeline. Changes that would impact the intended benefits or require more time or budget than tolerances allow still need to be escalated outside the project to a steering committee or sponsors for approval. However, everyday decisions and minor changes that come with building something new or complex are managed within the team.

4.4 Exercise

Test yourself! In your Exercise Notebook, list some common changes on projects and what you would do to manage each change.

Answer

Because of the wide variety of possible changes that may occur throughout the life of a project, this exercise only includes one answer, but it will help you prepare for questions related to change on the exam.

Common Change	How to Handle It
Customer wants to add scope	Make sure you know what the specific scope is and why it is necessary. Make sure all the data required in the change request is filled out. Assess the change, including whether risk reserves were allocated to accommodate the addition of the scope. Evaluate the impact of the change on all constraints. Look for options. Have the change reviewed by the change control board if necessary.

Close Project or Phase

Process Groups Model
PG: Closing
Process: Close Project or Phase

ECO
Domain II
Task 12 Manage project artifacts
Task 16 Ensure knowledge transfer
Task 17 Plan & manage project/phase closure or transitions

PMBOK® Guide
Domain 2.5 Project Work
Domain 2.6 Delivery

In the ECO, domain II, this is known as task 17: "Plan and Manage Project/Phase Closure or Transitions." This process finalizes all activities across tasks and processes to formally close the project, phase, and transition of the product to the customer or operations. Plan-driven projects generally have transitions between phases and then a transition at the end, while change-driven projects are organized around more frequently occurring iteration cycles according to a product release plan. In either case, similar activities need to be completed to close a project once its phases or iterations have been completed. This is an area that is often overlooked or done incompletely so think about this section carefully.

The project manager will work with subject matter experts to analyze the data, including all the project artifacts, and complete the final work to close the project. Regression analysis will be done to examine the project variables—such as the schedule, budget, and risks that occurred—and how they impacted the project and its outcomes. The project manager will look at planned versus actual project results, identify variances to the plan, along with their impacts, and identify additional lessons learned that can be shared or used in the organization.

A project manager must get formal acceptance of the project and its deliverables, issue a final report that shows the project has been successful, issue the final lessons learned, and index and archive all the project records. Do you understand the importance of the items in the Closing column included in Rita's Process Chart™? Make sure you are familiar with the concepts and actions listed here, and, if you do not currently do these things on your projects, imagine completing these activities in the real world. For the exam, be sure to remember that you always close out a project, no matter the circumstances under which it stops, is terminated, or is completed!

TRICKS OF THE TRADE®

Is your project really done when the technical work is done? Not if you don't close it out! The Close Project or Phase process encompasses the actions of closing as outlined in the project management plan. You must ensure final requirements have been fulfilled and all product acceptance work is done. This much you could have guessed. But there is often work overlooked that is part of the project work, or is known to be project work but gets lost in the rush to the next project assigned by the organization.

Example Outstanding financial work should be facilitated with the organization's finance department (including ensuring proper procurement closures). The product is handed off to the customer and customer feedback is solicited. Often there is facilitation needed for the customer or operations like training and supervision to ensure operations are running as intended. Was this part of the project management plan or is it a separate project? In either case, transitions like this are often haphazard at best, but PMI assumes they are well planned as part of the project.

Finally, appropriate indexing and archiving of records occurs, including final lessons learned. This is another transition step that often gets lost at the end of a project but PMI assumes is done properly and completely.

For the exam, do not forget that there are financial, legal, and administrative efforts involved in closing. Let's look again at the activities presented in Rita's Process Chart™:

- Confirm work is done to requirements
- Complete final procurement closure
- Gain final acceptance of the product
- Complete financial closure
- Hand off completed product
- Solicit customer's feedback about the project
- Complete final performance reporting
- Index and archive records
- Gather final lessons learned, and update the knowledge base

Note that the Close Project or Phase process involves getting the final, formal acceptance of the project or phase as a whole from the customer, whereas Validate Scope (a monitoring and controlling process) involves getting formal acceptance from the customer for interim deliverables. The project needs both processes.

Does it make sense to you that the Close Project or Phase process is an integration management function? If not, think of the example of final performance reporting. Can you see how you would have to report on all project constraints? Make sure you are comfortable with project closing and how it applies to proper project management before you take the exam.

A Word on Transitions

Sometimes transitions to the customer or operations, of products or services built during your project, are included in the project as a phase or product increment. But if transition needs are numerous and complex, transitions are a separate project in a program. In either case, transitions require that the project manager has a sophisticated understanding of the business environment in which the project is taking place. More information on this topic is discussed in the Business Environment section of this book.

A Case Study You Can Use

Throughout this book we provide numerous examples and analogies to help you think about the material being presented. Since your real-world experience is necessary to qualify for and pass the exam, and yet PMI's framework processes and vocabulary do not always align with your experience, a variety of examples and analogies will help stimulate you to "imagine into reality" what you need to know for the exam. We chose one case study for repeated use throughout this book to help you with a consistent application of the concepts discussed.

Integration: Putting It All Together

Integration management occurs throughout the project. The project manager is constantly pulling all the pieces of the project together into a cohesive whole. It is during this process that the project charter and project management plan are developed. These two artifacts will guide the project manager's work. The project manager works to manage project changes and artifacts. During project integration, they also determine which methodologies and practices work best for the project; in other words, they are tailoring to meet the needs of the project. Finally, they ensure that the project or phase is closed out properly.

Do you remember everything involved with project integration? Revisit the Quicktest at the beginning of this chapter and make sure you have filled all the gaps you identified when you began the chapter. Go through the chapter again to review the areas you are still unsure about.

Here is the case study that will be presented throughout this book. In each chapter you will learn more about this project and answer questions to reinforce your learning. Read the overview here and then complete the following exercise.

Introducing the Library Case Study

A project manager has been hired to oversee the creation of a new community library. The scope of the project includes construction of a new building, acquisition of furnishings, movement of resources from the old library, and upgrade of a software application for patrons using the library.

4.5 Exercise

Review each description of work done by the project manager as part of Integration Management. In your Exercise Notebook, write down the integration process and the other project management constraints and categories (scope, schedule, cost, quality, communications, risk, stakeholders, and procurement) involved.

Work of the PM	Integration Process(s)	Constraints; other project management areas involved
1. Prepared a report for the city council including actual spending vs. planned budget, actual schedule vs. plan, and risks identified since last monthly report.		
2. Met with the team to discuss estimates for work packages, to talk about vacation schedules, and decide on the best communication methods for the team to use.		
3. After the foundation of the building was complete, the project manager held a team meeting to discuss what went well, any quality issues that occurred during the work and how those issues were resolved. They also talked about any changes to the original design that might be needed going forward.		
4. Building foundation adjustments will require a change to the architect's design. These changes require more time and cost, these must be approved by the CCB.		
5. The project manager reviews the project every Friday. They review the risk register and work performance data comparing it to the planned schedule and budget. They also read the local paper and read and respond to communications from the city council members, mayor, and head librarian.		
6. During the grand opening of the library, patrons are asked to complete a survey about their thoughts about the new facility.		
7. The project manager interviews the mayor to understand the community objectives of the new library and the key stakeholders.		

Answer

Work of the PM	Integration Process(s)	Constraints; other project management areas involved
1. Prepared a report for the city council including actual spending vs. planned budget, actual schedule vs. plan, and risks identified since last monthly report.	Direct and Manage Project Work	• Cost • Schedule • Risk • Stakeholders • Communication
2. Met with the team to discuss estimates for work packages, to talk about vacation schedules, and decide on the best communication methods for the team to use.	Develop Project Management Plan	• Communication • Resources • Schedule
3. After the foundation of the building was complete, the project manager held a team meeting to discuss what went well, any quality issues that occurred during the work and how those issues were resolved. They also talked about any changes to the original design that might be needed going forward.	Manage Project Knowledge	• Scope (design) • Quality
4. Building foundation adjustments will require a change to the architect's design. These changes require more time and cost, these must be approved by the CCB.	Perform Integrated Change Control	• Scope • Schedule • Cost
5. The project manager reviews the project every Friday. They review the risk register and work performance data comparing it to the planned schedule and budget. They also read the local paper and read and respond to communications from the city council members, mayor, and head librarian.	Monitor and Control Project Work	• Risk • Stakeholder • Communications • Resources • Cost • Schedule
6. During the grand opening of the library, patrons are asked to complete a survey about their thoughts about the new facility.	Close Project or Phase	• Stakeholders • Quality • Communications
7. The project manager interviews the mayor to understand the community objectives of the new library and the key stakeholders.	Develop Project Charter	• Stakeholders